Gehl RT185
Gehl RT215
Gehl RT255
Mustang/Manitou 1850RT
Mustang/Manitou 2150RT
Mustang/Manitou 2550RT

Compact Track Loader
Service Manual

50940649 Rev. B 08/20

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Safety

Safety Symbol and Signal Words

This manual and decals on the machine warn of safety hazards and should be read and observed closely.

Manitou, in cooperation with the Society of Automotive Engineers, has adopted this:



Safety Alert Symbol

This symbol is used throughout this operator's manual and on the decals on the machine. It identifies potential safety hazards, which, if not properly avoided, could result in injury. When you see this symbol in this manual or on the machine, you are reminded to BE ALERT! Personal safety is involved!

Signal Words

DANGER

The word "DANGER" indicates an imminently hazardous situation, that, if not avoided, will result in serious injury or death.

WARNING

The word "WARNING" indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death.

CAUTION

The word "CAUTION" indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.

- Before operating the machine, first read and study the safety information in this manual. Be sure that anyone who operates or works on the machine is familiar with the safety precautions. This includes providing translations of the warnings and instructions for operators who are not fluent in reading English.
- It is essential that operators be thoroughly trained in the safe operation of the machine and load handling.
- Operators must not be physically or mentally impaired. Do not allow minors or unqualified personnel to operate the machine, or to be near the machine unless they are properly supervised. It is recommended that the operator be capable of obtaining a valid motor vehicle operator's license.
- Do not use the machine for any application or purpose other than those described in this manual, or in manuals supplied with any attachments used with the machine.
- Use of the machine is subject to certain hazards that cannot be eliminated by mechanical means, but only by exercising intelligence, care and common sense. Such hazards include: hillside operation, overloading, load instability, poor maintenance, and using the machine for a purpose for which it was not intended or designed.
- Manitou always takes operator's safety into consideration during the design process. Guards and shields are provided, which protect the operator and bystanders from moving parts and other hazards. Operators must be alert, however, because some areas cannot be guarded or shielded without preventing or interfering with proper operation.

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Component Identification

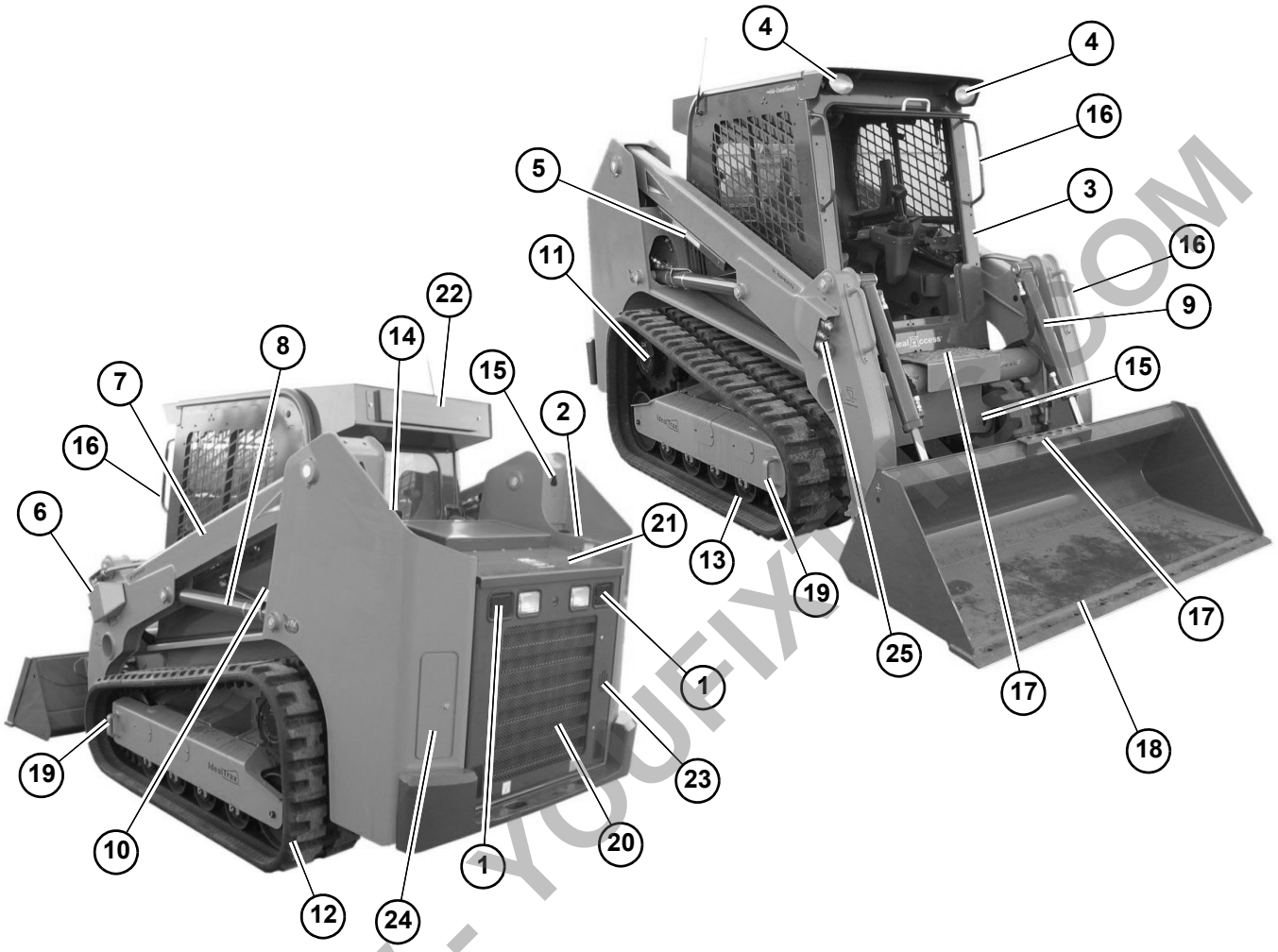


Fig. 5 – Component Identification

Item	Description
1	Tail light
2	Hydraulic tank filler cover
3	ROPS/FOPS
4	Work lights
5	Lift arm support
6	Standard auxiliary hydraulics lines
7	Lift arm
8	Lift arm cylinder
9	Tilt cylinder
10	Fuel filler cap
11	Travel motor
12	Rubber track
13	Track roller

Item	Description
14	Battery compartment cover
15	Lift points
16	Exit/entry hand-holds
17	Exit/entry step
18	Bucket
19	Tie-down point
20	Back cover
21	Engine compartment cover
22	Optional Air conditioning intake cover
23	Backup alarm location
24	Storage compartment
25	Optional high-flow auxiliary hydraulics lines

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Machine Controls and Operation

Refer to the Operator's Manual for the machine for detailed controls and operation information.

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Changing Engine Oil and Filter

Change the engine oil and filter after the first 50 hours of use, and every 250 hours thereafter. See "Fluids/Lubricants Types and Capacities" on page 301 for proper grade and type.

IMPORTANT: *Oil should be changed more frequently under heavy work conditions, if higher sulphur content fuel is used, or if multiple standstill regenerations are performed.*

Reduce the oil change interval if the machine is exposed to constant ambient temperatures below -10 °C (14 °F).

1. Park the machine on a level surface.
2. Perform the "Mandatory Safety Shutdown Procedure" on page 8.
3. Wait until the engine has cooled, but is not completely cold. Oil will drain faster and more completely if it is warm.
4. Open the engine cover according to "Engine Access" on page 37.
5. Remove hardware (M, Fig. 15) securing lower engine access panel (N). Remove panel to access engine oil drain plug (O).
6. Position a waste oil collection container under the engine oil drain plug to catch draining oil.

IMPORTANT: *Dispose waste engine oil according to environmental laws, or take to a recycling center for proper disposal. DO NOT pour waste engine oil onto the ground or down a drain.*

7. Remove drain plug (O) from the engine oil pan and allow the oil to drain into the waste oil collection container.
8. Re-install drain plug (O) with a new sealing ring and tighten to 55 Nm (40.5 lbs.-ft.).

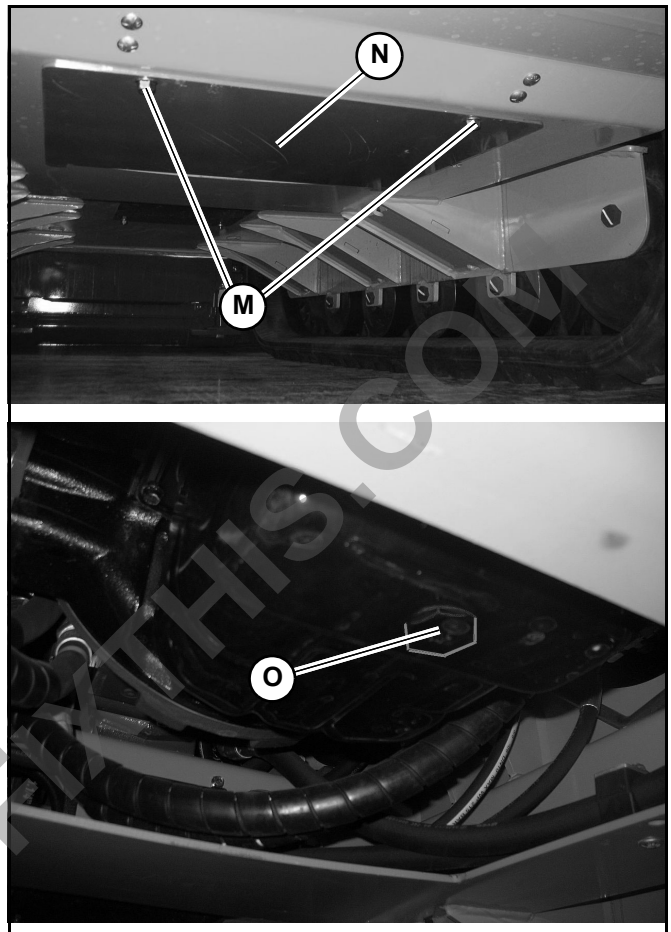


Fig. 15 – Engine Oil Drain Plug

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Deutz Engine Error Codes

Table 8: Deutz Engine Error Codes

Error Code	Engine Error Code Type	Error Description
51-3	EGR valve actuator error	Short-circuit to battery or open load; short-circuit to battery on ECU pin A19; actuator error EGR-Valve – internal error, short-circuit to battery or open load; power reduction may result
51-4		ECU detects a short-circuit to ground; short-circuit to ground or battery on ECU pin A19; ECU voltage under limit; actuator error EGR-Valve; internal error, short-circuit to ground; throttle valve over-limit power reduction may result
51-5		Signal range check low, measured current is below target; actuator error EGR valve (2.9;3.6) or throttle-valve (6.1,7.8); internal error; short-circuit to ground; power reduction may result
51-6		Signal range check high; overload by short-circuit; internal error; load over limit; short-circuit to battery or open load; power reduction may result
51-7		Actuator position for EGR valve is not plausible; internal error; angular misalignment of the flap (deviation from setpoint > 7%); internal error, position error of throttle flap (deviation > 7%); power reduction may result
51-11		Powerstage actuator temperature limit reached due to high current; actuator error EGR valve (2.9;3.6) or throttle valve (6.1,7.8); internal error; temperature over-limit
94-1	Sensor error	Low fuel pressure; engine shutdown may result
94-3		Low fuel pressure; signal range check high/low; possible short or open load
94-4		Low fuel pressure; signal range check low
97-3		Water in fuel; maximum voltage exceeded
97-4		Water in fuel; minimum voltage exceeded
97-12	Fuel pre-filter sensor error	Fuel filter water level sensor: the maximum level is exceeded; water in fuel level pre-filter; maximum value exceeded; water level over limit (bad fuel quality)
102-2	Charged air pressure error	Charged air pressure above warning threshold
		Charged air pressure above shut-off threshold
102-3		Sensor voltage out of target range; sensor error charged air pressure; signal range check high; short-circuit to battery or open load
102-4		Sensor voltage out of target range; charged air pressure sensor error; signal range check low; short-circuit to ground

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Hydrostatic Drive System Troubleshooting

The following table details some, but not all, hydrostatic drive system malfunctions and possible causes/ corrective action.

Table 11: Hydrostatic Travel Drive System Troubleshooting

Problem	Possible Cause	Corrective Action
Drive does not operate in either direction.	Parking brake applied.	Disengage parking brake.
	Parking brake malfunction.	See “Parking (SAHR) Brake Malfunctions” on page 162.
	Safety interlock malfunction.	See “Hydraloc Safety Interlock Solenoid Valve Test” on page 183.
	Low hydraulic oil level.	Top-off hydraulic oil. See “Checking Hydraulic Oil Level” on page 49.
	Low or no charge pressure.	See “Hydrostatic Charge Pressure Test and Adjustment” on page 132.
	Damaged pump coupler	See “Hydrostatic Pump Drive Coupling Removal and Installation” on page 146.
	Travel drive joystick lockout valve malfunction.	See “Travel Drive Joystick Lockout Valve Test” on page 134
	Hydrostatic pump(s) relief valves malfunction.	See “Hydrostatic Pump Relief Valves” on page 132.
	Hydrostatic pump malfunction.	See “Hydrostatic Drive Pump” on page 131.
Drive does not operate on one side only.	Travel drive motor malfunction.	Refer to Manitou service manual “Fairfield Motor Service Manual” [Manitou part # 50940041].
	Hydrostatic pump malfunction.	See “Hydrostatic Drive Pump” on page 131.
Hydrostatic drive not responsive.	Hydraulic oil viscosity too heavy.	Allow longer warm-up.
		Replace hydraulic oil with proper type/ grade. See “Fluids/Lubricants Types and Capacities” on page 301.
High speed drive malfunction.	Low or no charge pressure.	See “Hydrostatic Charge Pressure Test and Adjustment” on page 132.
	High-speed (pilot) valve solenoid malfunction.	See “Travel Drive High-Speed (Pilot) Valve Test” on page 152.
	Travel drive motor malfunction (one side only).	Refer to Manitou service manual “Fairfield Motor Service Manual” [Manitou part # 50940041].

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Hydraulic Schematic

DRIVE MOTOR PORT KEY

A-B.....HIGH PRESSURE PORTS

L3/L4...CASE DRAIN PORTS

XB.....PARK BRAKE

X1.....2 SPEED

DRIVE PUMP PORT KEY

A-B.....HIGH PRESSURE PORTS

T.....CASE DRAIN PORT

MA.....GAUGE-OPERATING PRESSURE A

MB.....GAUGE-OPERATING PRESSURE B

R.....AIR BLEED

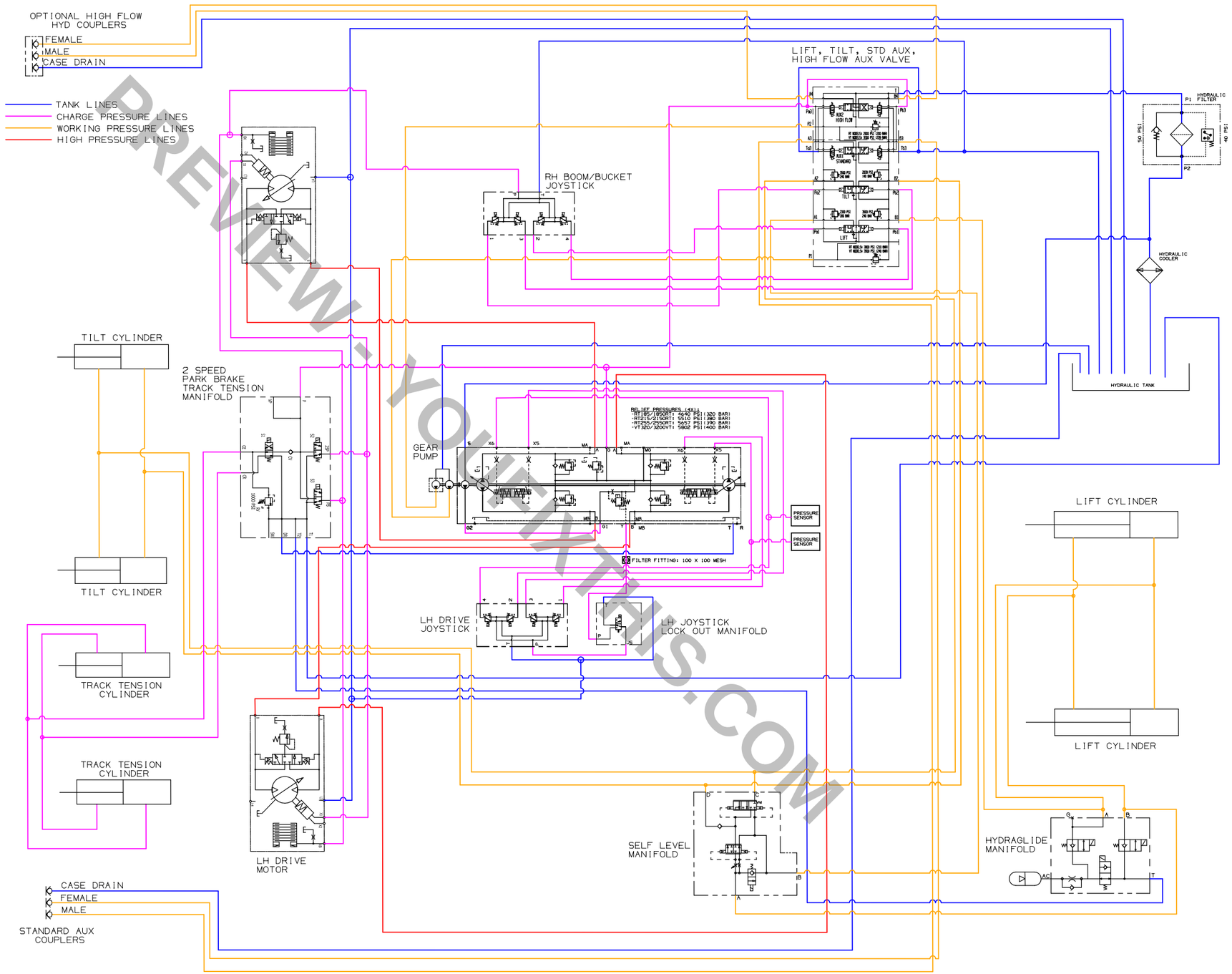
X5-X6..CONTROL PRESSURE PORTS (BEFORE THE ORFICE)

G-G1-G2.PRESSURE PORT FOR CHARGE CIRCUIT

S.....BOOST SUCTION PORT

MG.....GAUGE-OPERATING PRESSURE G

Y.....CONTROL PRESSURE GAUGE PORT



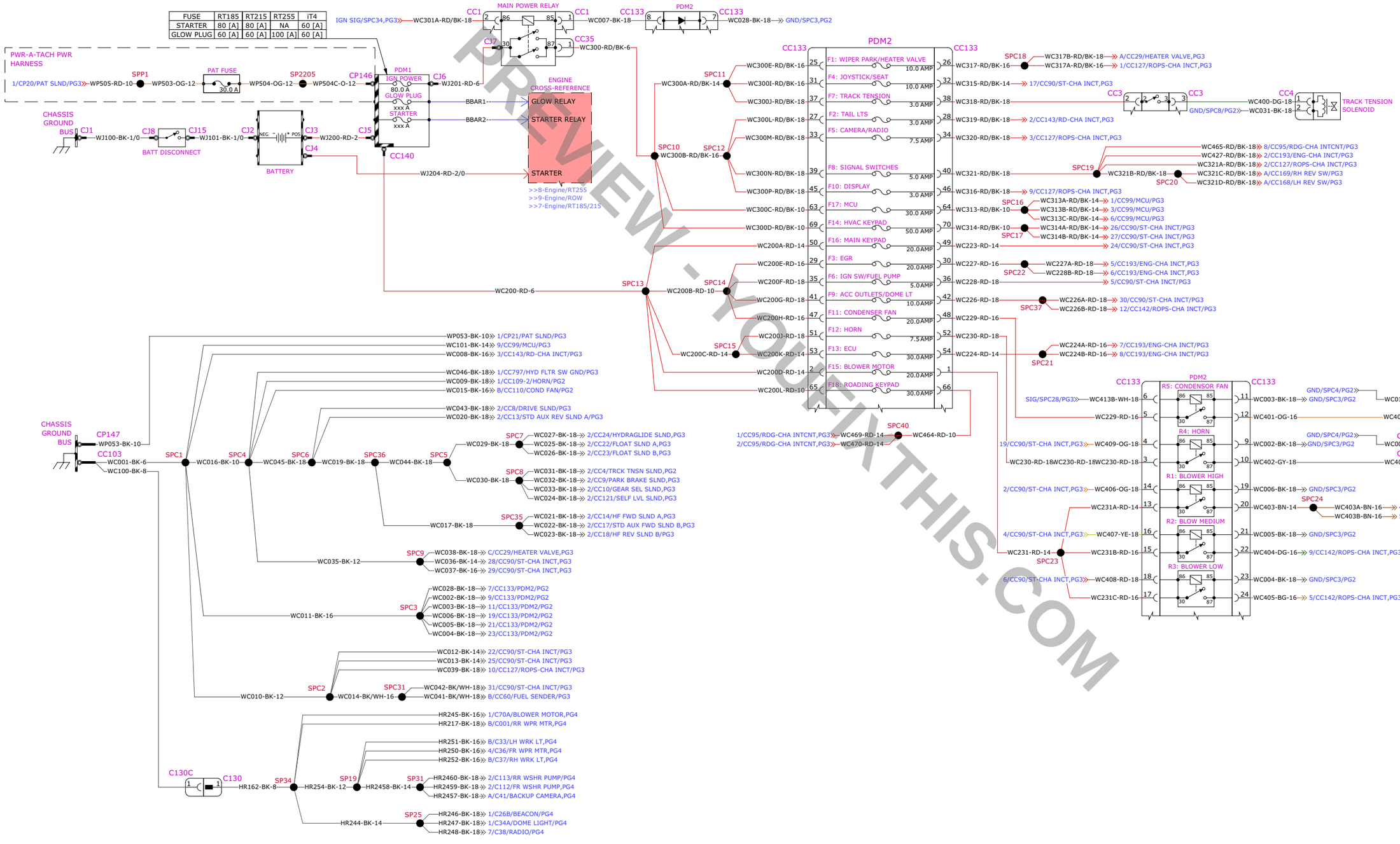
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Electrical Schematics

Electrical Schematic – Power Distribution



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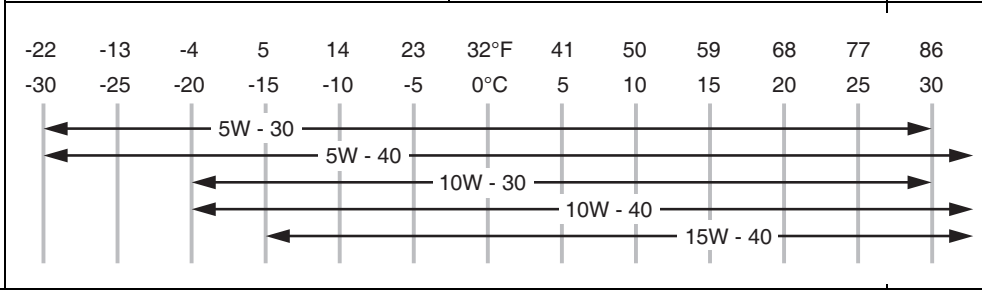
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Specifications

Fluids/Lubricants Types and Capacities

NOTE: *Capacities shown are approximate.*

Table 28: Fluids/Lubricants Types and Capacities

Component/Application	Type	Quantity		
		RT185/1850RT	RT215/2150RT	RT255/2550RT
Hydraulic Oil Tank	Premium ISO 62 Mfr: PETROCANADA (Mfr. P/N: Premium HVI 60), or equivalent	41.6 L (11.0 gal)	52.2 L (13.8 gal)	
Hydraulic System – Total		70.0 L (18.5 gal)	81.4 L (21.5 gal)	
Grease Fittings, Lift Arm	Lithium-saponified, brand-name multi-purpose grease MPG-A	As required		
Battery Terminals	SP-B acid-proof grease	As required		
Diesel Fuel Tank	Tier 4 engines: ULSD[1] low sulfur or ultra-low sulfur, below 15 PPM. interim Tier 4 engines: LSD or ULSD1 low sulfur or ultra-low sulfur, below 500 PPM.	91 L (24 gal)		121 L (32 gal.)
Engine Coolant	Long life coolant ASTM D4985, D6210 (United States) SAE J814C, J1941, J1034 or J2036 (international) Refer to "Coolant Compound Table" on page 305 for proper mixture	13.3 L (3.5 gal)	14.4 L (3.8 gal.)	23.1 L (6.1 gal.)
Radiator Cap Pressure		0.90 bar (13.0 psi)		
Air Conditioning (option)	R 134a refrigerant ZXL 100PG PAG (DH-PS) lubricant	1134 g. (2.5 lbs.) @ 24°C (76°F) 100 mL (3.4 oz)		
Final Drives: Motor Gearbox	SAE 80W90 with EP additives	0.8 L (0.85 qt)		
Engine Oil (with filter)	**IMPORTANT:** Refer to the Engine Operator's Manual for specific oil recommendations and additional information. **Service Classification:** API-CK-4 preferred; API-CJ-4 acceptable	10.5 L (11 qt)		8.5 L (9 qt)
				

1. Ultra-Low Sulfur Diesel (ULSD) fuel lubricity must have a maximum scar diameter of 0.45 mm, as measured by ASTM D6079 or ISO 12156-1, or a minimum of 3100 grams a50940649s measured by ASTM D6078. Contact your fuel supplier for details. Specification 1-D S15 or 2-D S15, ASTM D975.

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Torque Specifications

Note: Use these torque values when tightening hardware (excluding: locknuts and self-tapping, thread forming and sheet metal screws) unless specified otherwise.

Hydraulic fittings with various seals (light application). All torque values are in lb.-ft. (Nm) unless marked otherwise.

Thread	Straight pipe fitting with thread and screwed plug (GE)			Non-return valve with elastic seal	Identification aid outside Ø
	Sealing washer	Elastic seal	O-ring		
M10X1.0	7 (9)	13 (18)	11 (15)	13 (18)	0.4 in. (10 mm)
M12X1.5	15 (20)	18 (25)	18 (25)	18 (25)	0.5 in. (12 mm)
M14X1.5	26 (35)	33 (45)	26 (35)	26 (35)	0.6 in. (14 mm)
M16X1.5	33 (45)	41 (55)	30 (40)	37 (50)	0.6 in. (16 mm)
M18X1.5	41 (55)	52 (70)	33 (45)	52 (70)	0.7 in. (18 mm)
M22X1.5	48 (65)	92 (125)	44 (60)	92 (125)	0.9 in. (22 mm)
M27X2.0	66 (90)	133 (180)	74 (100)	107 (145)	1.0 in. (27 mm)
M33X2.0	111 (150)	229 (310)	118 (160)	155 (210)	1.3 in. (33 mm)
M42X2.0	177 (240)	332 (450)	155 (210)	266 (360)	1.7 in. (42 mm)
M48X2.0	214 (290)	398 (540)	192 (260)	398 (540)	1.9 in. (48 mm)
G1/8A	7 (9)	13 (18)	11 (15)	13 (18)	0.4 in. (9.73 mm)
G1/4A	26 (35)	26 (35)	22 (30)	26 (35)	0.5 in. (13.16 mm)
G3/8A	33 (45)	52 (70)	33 (45)	37 (50)	0.7 in. (16.66 mm)
G1/2A	48 (65)	66 (90)	41 (55)	48 (65)	0.8 in. (20.96 mm)
G3/4A	66 (90)	133 (180)	74 (100)	103 (140)	1.0 in. (26.44 mm)
G1A	111 (150)	229 (310)	118 (160)	140 (190)	1.3 in. (33.25 mm)
G1 1/4A	177 (240)	332 (450)	155 (210)	266 (360)	1.7 in. (41.91 mm)
G1 1/2A	214 (290)	398 (540)	192 (260)	398 (540)	1.9 in. (47.80 mm)

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Travel Motor Maintenance

Travel Motor Gearbox Oil

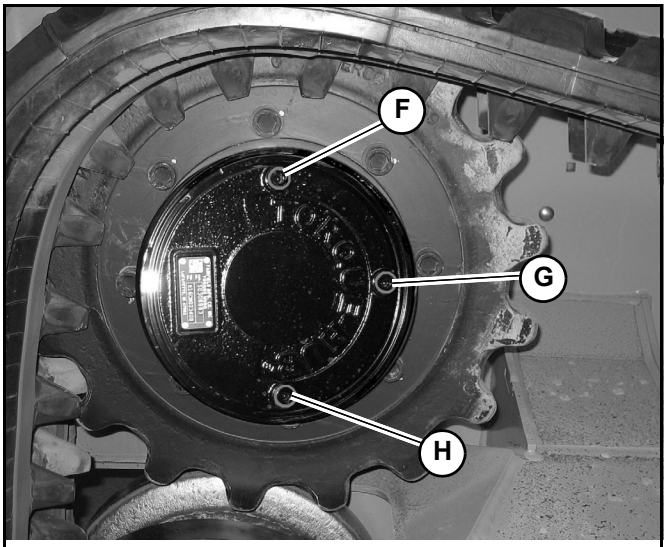


Fig. 35 – Travel Motor Gearbox Oil

Replace the travel motor gearbox oil if it becomes contaminated, after major repairs, after the first 50 hours of use and every 1000 hours or annually thereafter.

1. Park the machine with travel motor gearbox plugs (F, G, and H, Fig. 35) positioned as shown in the figure.
2. Perform the "Mandatory Safety Shutdown Procedure" on page 8.
3. Position a waste oil collection container with a 1 quart/liter (± 0.10 quarts/liters) capacity underneath plug (H).

IMPORTANT: *Always dispose of hydraulic fluids according to environmental laws or take to a recycling center for proper disposal. DO NOT pour onto the ground or down a drain.*

4. Remove plug (F) to allow for venting as the oil drains.
5. Remove plug (H) and allow the oil to drain completely.
6. Clean and replace and plug (H). Tighten securely.
7. Remove plug (G).
8. Fill the travel motor gearbox through plug (F) hole with the correct grade and type oil until it reaches the level of plug (G) hole.

NOTE: *Refer to "Fluids/Lubricants Types and Capacities" on page 301 for travel motor gearbox oil specifications. Motor gearbox oil capacity is approximately 0.8L (0.84 qts.).*

9. Clean and replace plugs (F and G). Tighten securely.
10. Test the drive system and check for leaks.

Track Maintenance

Inspect the tracks daily for damage and wear.

IMPORTANT: *To avoid damaging the tracks and to ensure maximum track life, refer to "Rubber Track Use Cautions and Tips" on page 155.*

Observe the following conditions to extend track life:

- Avoid traveling or turning on broken stone, jagged rock, metal or other material that could damage or cut the tracks.
- Avoid traveling on riverbeds or areas with soft rocks that could become stuck in the tracks, which could cause damage to the tracks or cause the tracks to slip off.
- Avoid using the machine on the seashore. Sea salt can corrode the metal cores inside the tracks.
- Immediately wipe any spilled fuel, oil, salt or chemical solvents off of the tracks, as these substances can corrode the coupling in the metal cores in the tracks, causing corrosion and peeling
- Avoid traveling on freshly paved roads or on hot surfaces (e.g. fires, metal sheets exposed to direct sunlight, etc.). Hot surfaces can damage the lugs or cause irregular wear.
- Avoid moving earth in area where the tracks may slip, which can cause excessive lug wear.

Track Replacement

Refer to "Track Replacement" on page 157.

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29. Loosen nuts (R, Fig. 152) securing air filter housing to the engine compartment. Remove the air filter housing from the machine.

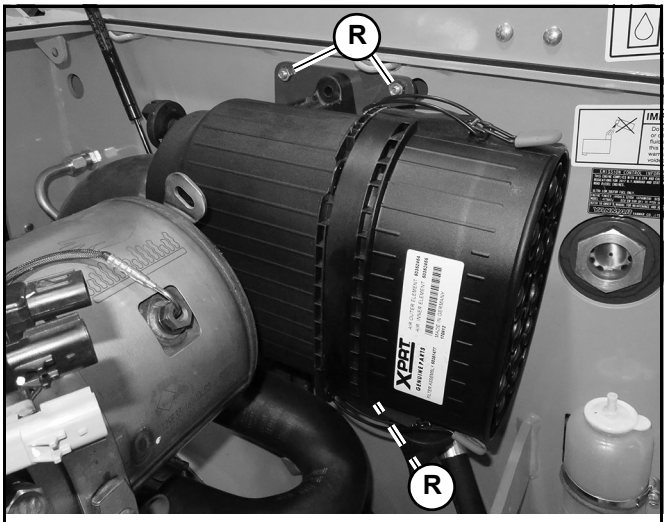


Fig. 152 – Air Filter Housing Mounting Hardware

30. Remove screw (S, Fig. 153) securing engine ground cable (T) to the machine.

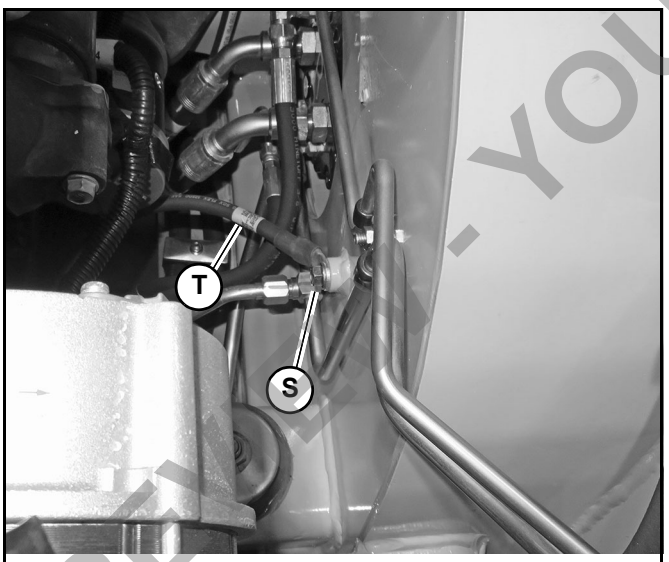


Fig. 153 – Engine Ground Cable

31. Remove nuts (U, Fig. 154), and disconnect wires (V) from alternator (W).

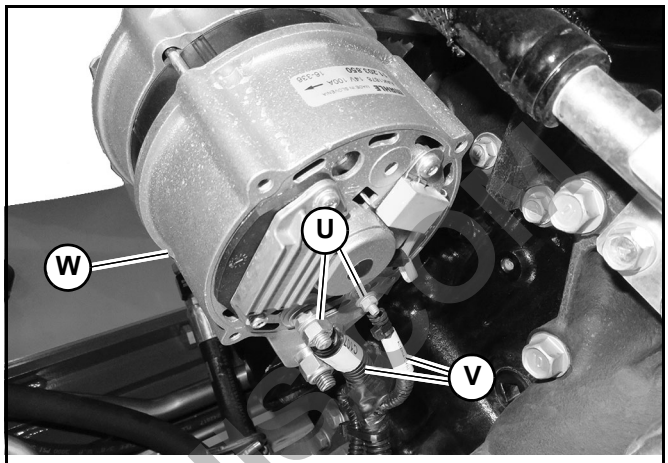


Fig. 154 – Alternator

32. Remove nut (X, Fig. 155) and screw (Y) securing wires (Z) to starter (A). Remove the terminal lugs from the engine starter.

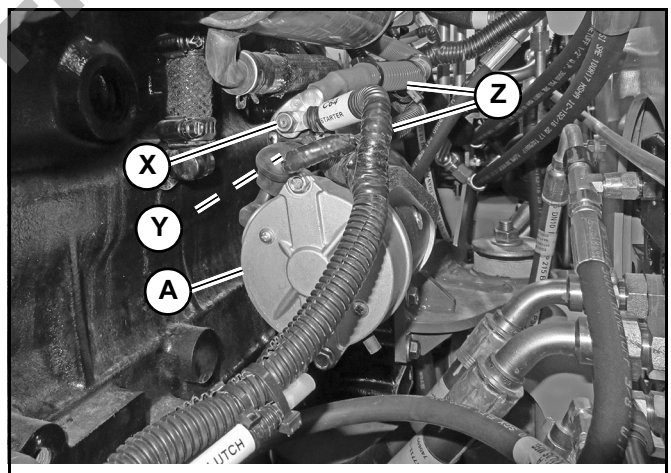


Fig. 155 – Engine Starter

IMPORTANT: *Note the orientation/location of the flange gasket for reassembly.*

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Constant operation on slopes, side hills, crowns and depressions accelerates guide lug, idler, roller, and sprocket wear. Avoid cutting across slopes. Instead, drive up or down them. It is best to climb straight up or down, and then turn when the machine is in a more level location.

Alternate turning direction from one side to the other. Always turning in one direction can accelerate sprocket tooth, track tread, guide lugs and roller flange wear.

Unnecessary track slippage accelerates undercarriage and track wear and can cut tracks. Avoid track slippage when driving into material and dig using the lift/tilt hydraulics. Be aware when track slippage occurs and adjust machine operation to prevent it.

Avoid making spin turns or pivot turns, which accelerate wear and cause de-tracking. Always make wide turns whenever possible.

Don't allow the sides of the tracks to strike against objects such as curbs or walls.

Avoid traveling with one track on a slope or a projecting object and the other track on a flat surface. Travel with both tracks on a level surface if possible. Operating tracks with the outside or inside edge of the track turned up on a curb, mound or stone can crack tracks or shear the rubber.

Operate slowly and carefully. High-speed operation accelerates wear on all undercarriage and track components.

Avoid traveling or operating on broken stone, jagged base rock, iron rods, scrap iron or other recycling-type materials. Rubber tracks are not intended for these surfaces.

Working in heavily stone-laden soils or conditions can cause damage or de-tracking due to stones becoming lodged in the idler or drive sprockets.

Rubber tracks are not intended for use in quarry, recycling or demolition applications.

Rubber track loaders are not intended for use with cold planers.

Harder surfaces cause accelerated wear on track treads, links, rollers, idlers, sprockets and other undercarriage components. To minimize wear, avoid routinely driving and turning on hard surfaces like asphalt and concrete.

Avoid allowing fuel, oil, salt or fertilizer to get on the tracks. These substances can corrode the metal cores in the rubber tracks. If these materials come in contact with the tracks, flush the tracks and undercarriage with clean water to remove the damaging materials.

Avoid operating in job sites where there are sharp objects, such as jagged rocks or broken concrete, which can damage the lug surface of the tracks. Use common sense when operating in conditions which are potentially damaging to rubber tires, because the same conditions are damaging to rubber tracks as well. Damaged tracks cannot be repaired and must be replaced, and are not warrantable for failures under these conditions.

Excessively worn undercarriage components will damage tracks. Monitor these components to ensure maximum track life. If replacing tracks, replace any worn undercarriage components at the same time.

Listen for unusual or loud track/undercarriage noises during operation. Loud/unusual noises often indicate worn tracks/undercarriage.

Sprocket Tooth Wear and Track Life

Worn sprockets are a typical cause of track damage and abnormal track noise. Check for sprocket wear often. Sprocket wear (B, Fig. 264) normally occurs along the sides and crests of the sprocket teeth (C). Use the sprocket tooth wear gauge (A - Manitou part # 50309811), included with the machine, to determine exact sprocket tooth wear:

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Ignition/Starting Functional Detail

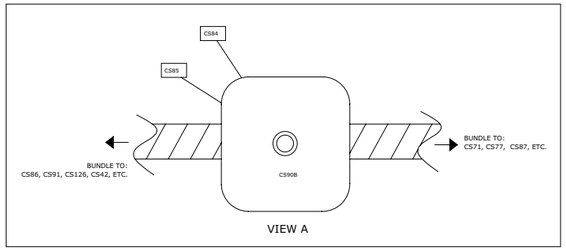
Table 17: Ignition/Starting Functional Detail

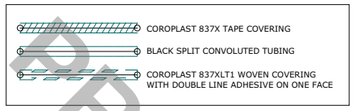
Function	Inputs/Conditions	Outputs/Actions	Malfunction Causes
Power On	• Ignition switch in ON/RUN position. • Ignition Run (green) on DIAGNOSTIC INPUTS screen.	• All indicator lights, key pad button backlights and audible alarm activate for 3 seconds to test; test interrupted if the ignition switch is turned to the START position. • Parking brake push button indictor is lit. • Disable Park Brake (blank) on DIAGNOSTIC OUTPUTS screen.	• Ignition switch malfunction. • Electrical fault (switch, components, connections or battery). **NOTE:** If display and/or keypad does not power up: • Make sure battery disconnect switch is in the ON position. • Check battery terminal connections. • Check for sufficient battery voltage (12VDC). • Check for power to display at pin #1 (12VDC), and/or keypad(s) at the following pins: pin #1, [main keypad - connector C146B] and pin #5, 7, 10 [HVAC keypad - connector C145B] (12VDC). • If no power to display and/or keypad, check fuse and also electrical connections in the fuse box. • Check for proper grounding on display at pin #2, and/or keypad(s) at pin #12 (main keypad - connector C146B) and pin #9 (HVAC keypad - connector C145B) (12VDC).

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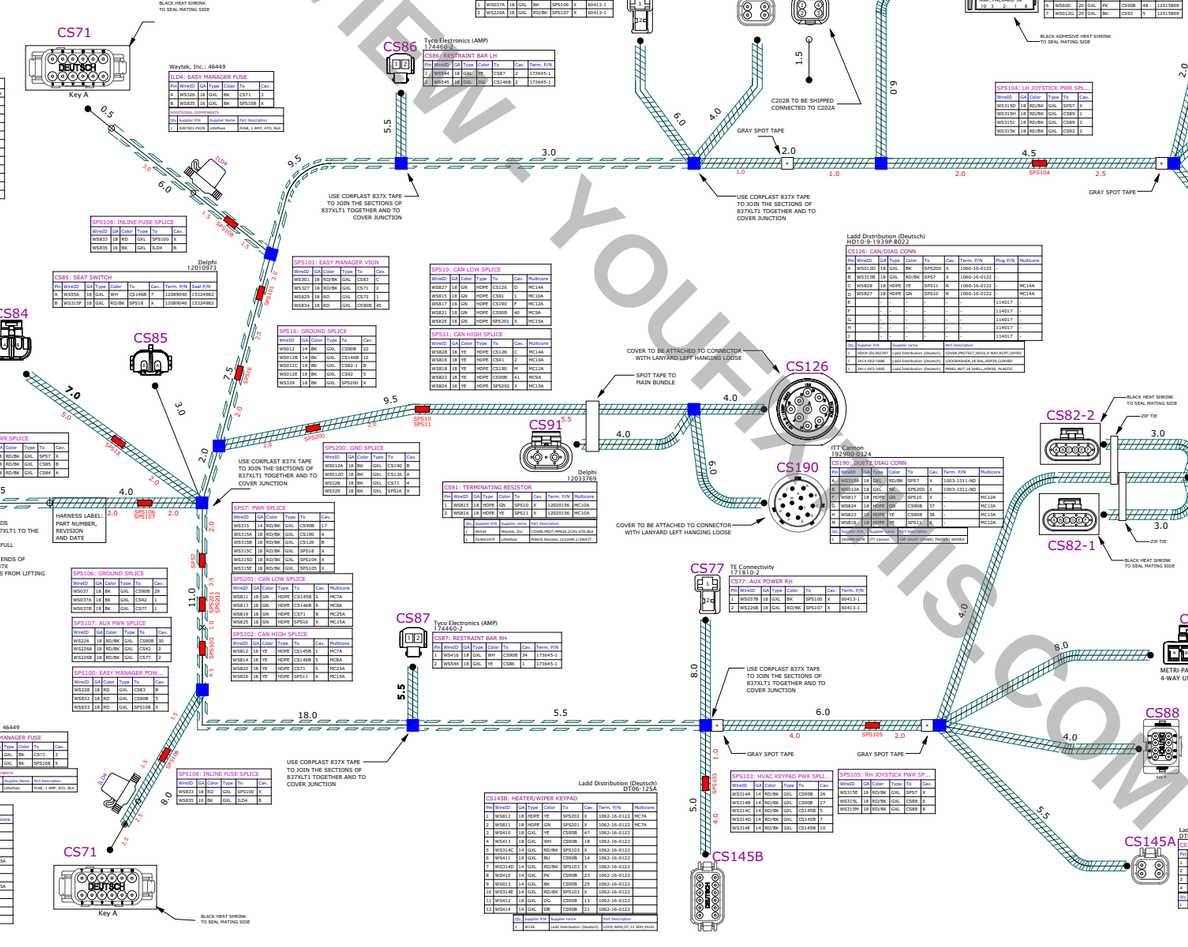
Operator’s Seat Wire Harness Diagram)





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WIRE COLOR CODE:
BK - BLACK
BG - TAN (BEIGE)
BN - BROWN
BU - LIGHT BLUE
CLR - TRANSLUCENT (CLEAR)
DB - DARK BLUE
DG - DARK GREEN
GN - LIGHT GREEN
GY - GRAY
OG -ORANGE
PK - PINK
RD - RED
VT - PURPLE (VIOLET)
WH - WHITE
YE - YELLOW


CS71
CS86
CS42
CS72
CS72A
CS92
CS89
CS146A
CS146B
CS84
CS85
CS90B
CS91
CS126
CS190
CS82-2
CS82-1
CS77
CS87
CS83
CS88
CS145A
CS145B
VIEW A
Key A
DEUTSCH
BLACK HEAT SHRINK TO SEAL MATING SIDE
BLACK HEAT SHRINK TO SEAL MATING SIDE
BLACK HEAT SHRINK TO SEAL MATING SIDE
GRAY SPOT TAPE
GRAY SPOT TAPE
GRAY SPOT TAPE
USE CORPLAST 837X TAPE TO JOIN THE SECTIONS OF 837XLT1 TOGETHER AND TO COVER JUNCTION
USE CORPLAST 837X TAPE TO JOIN THE SECTIONS OF 837XLT1 TOGETHER AND TO COVER JUNCTION
USE CORPLAST 837X TAPE TO JOIN THE SECTIONS OF 837XLT1 TOGETHER AND TO COVER JUNCTION
USE CORPLAST 837X TAPE TO JOIN THE SECTIONS OF 837XLT1 TOGETHER AND TO COVER JUNCTION
C202B TO BE SHIPPED CONNECTED TO C202A
COVER TO BE ATTACHED TO CONNECTOR WITH LANYARD LEFT HANGING LOOSE
COVER TO BE ATTACHED TO CONNECTOR WITH LANYARD LEFT HANGING LOOSE
SPOT TAPE TO MAIN BUNDLE
1) TAPE EXPOSED LEADS WITH CORPLAST 837XLT1 TO THE BACK EDGE OF THE CONNECTOR, TWO(2) FULL TURNS.
2) TAPE AROUND THE ENDS OF THE 837XLT1 WITH 837X TO PREVENT THE ENDS FROM LIFTING
HARNESS LABEL: PART NUMBER, REVISION AND DATE
48 WAY RECEPT ASSEMBLY - X-KEY
12 SIZE 20 CONTACTS (PINS)
12 SIZE 16 CONTACTS (PINS)
24 SIZE 20 CONTACTS (PINS)
SPS108: INLINE FUSE SPLICE
SPS118: PWR SPLICE
SPS200: GND SPLICE
SPS106: GROUND SPLICE
SPS127: AUX PWR SPLICE
SPS100: EASY MANAGER POW...
SPS104: LH JOYSTICK PWR SPL...
SPS105: RH JOYSTICK PWR SP...
SPS103: HVAC KEYPAD PWR SPLI...
SPS101: EASY MANAGER VSSN
SPS110: CAN LOW SPLICE
SPS111: CAN HIGH SPLICE
SPS116: GROUND SPLICE
SPS202: CAN HIGH SPLICE
SPS201: CAN LOW SPLICE
SPS109: EASY MANAGER FUSE
SPS108: INLINE FUSE SPLICE
SPS127: AUX PWR SPLICE
SPS104
SPS105
SPS103
SPS202
SPS201
SPS109
SPS108
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SPS116
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SPS100
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