FL 145

crawler loader

Operation and Maintenance Instruction Manual

Print No. 604.00.516

WARNING

CAREFULLY READ THIS MANUAL BEFORE STARTING,OPERATING, MAINTAINING, FUELING OR SERVICING THIS MACHINE

This symbol is your safety alert sign. It means ATTENTION! BE CAREFUL! YOUR SAFETY IS INVOLVED.

Read and heed every safety instruction indicated by the key words WARNING and DANGER.

The safety signs mounted on the machine which are colour-coded yellow, with black borders and letters, are WARNINGS; those red with white borders and letters indicate points of DANGER.

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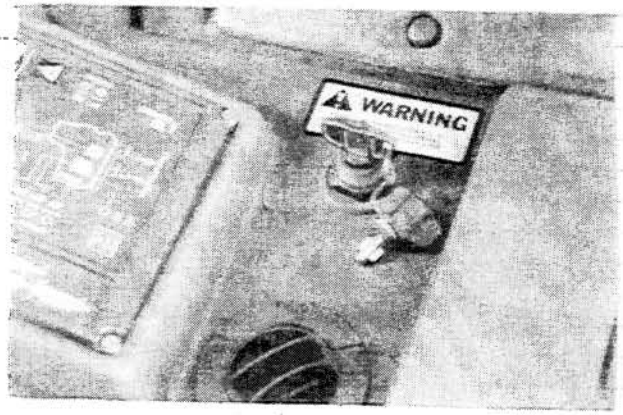
ELECTRICAL SYSTEM

1. Connection socket for external starter
2. Battery
3. Master Switch
4. Starter Motor
5. Starter selector switch
6. Starter contactor
7. Starting aid button.
8. Fuel enrichment solenoid
9. Start pilote electrovalve
10. Safety start contactor.
11. Safety start proximity sensor.
12. Engine stop actuator.
13. Fuse "link" 50A
14. Shunt box
15. Auxiliary services contractor
16. Fuse 4A
17. Light contactor
18. Left instrument panel light
19. Right instrument panel light
20. Front cab work light switch
21. Fuses 7,5A
22. Front left cab work light
23. Front right cab work light
24. Rear cab work light switch
25. Fuses 7,5A
26. Rear left cab work light
27. Rear right cab work light
28. Fuses 7,5A
29. Horn button switch.
30. Horn
31. Back-up alarm pressure switch
32. Back-up alarm
33. Fuse 7,5A
34. Windshield wiper/washer switch
35. Windshield wiper reduction gear
36. Windshield washer electropump
37. Fuse 7,5A
38. Back window wiper/washer switch
39. Back window wiper reduction gear
40. Back window washer electropump
41. Fuse 10A
42. Cab ceiling light
43. Cab fan motor.
44. Cigarette lighter with housing light
45. Fuse 4A
46. Arrangement for radio/aerial connections
47. Fuse "link" 50A
48. Alternator
49. Visual brake warning indicator
50. Left brake effectiveness indicator switch
51. Right brake effectiveness indicator switch
52. Quartz hour meter
53. Fuse 4A
54. Fuel level detector
55. Transmission oil level detector
56. Engine oil level detector
57. Radiator water level detector.
58. Transmission oil low pressure sensor (Tar 11.5 bar)
59. Engine lube oil low pressure sensor (Tar 0.4 bar)
60. Air cleaner restriction indicator switch (Tar 62 mbars)
61. Engine water temperature sensor (Tar 107°C)
62. Transmission oil temperature sensor (Tar 119°C)
63. Hydraulic oil filter restriction indicator (Tar 2 bar)
64. Buzzer
65. Electronic data monitor
66. Pulse generator for tachometer
67. Electronic tachometer

78. Fuse 4A
79. Maximum boom height release switch
80. Maximum boom height release contactor
81. Maximum boom height release valve
82. Bucket levelling proximity sensor
83. Bucket levelling contactor
84. Bucket positioning valve
85. Valve control switch for ripper or bucket 4 in 1
86. Valve for ripper selector (not compatible with (87)).
87. Bucket or ripper 4 in 1 valve (not compatible with (86)).
88. Fuse 20A
89. Cab heater fan selector switch
90. Cab heater fan.
91. Air conditioner control switch
92. Air conditioner thermostat
93. Air conditioner Min/Max pressure switch
94. Fuse 20A
95. Contactor for condenser fan and electromagnetic clutch control
96. Condenser fan motor
97. Compressor electromagnetic clutch

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1.4.1.1 REMOVAL

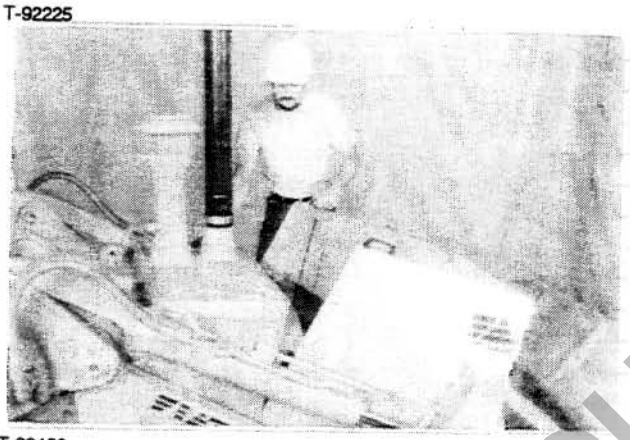
1.4.1.1.1

Turn master switch to the "OFF" position.

WARNING

Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.

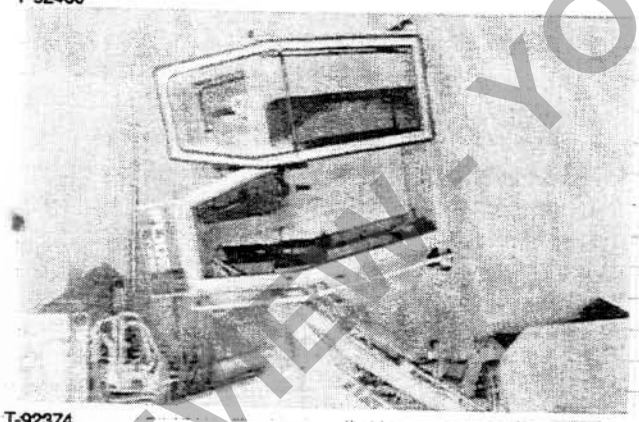
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1.4.1.1.2

Unclasp hood and tilt hood to the full tilt position.

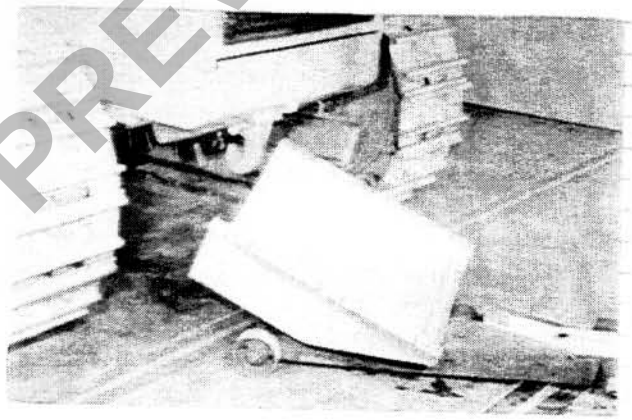
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1.4.1.1.3

Tilt the cab. See Section 8.3.

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1.4.1.1.4

Remove the transmission and converter belly guards.

Study SAFETY RULES in the front of this manual thoroughly for the protection of machine and safety of personnel.

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BOLT AND SCREW TORQUE CHART

Diameter and width of thread mm	Strength class: 10.9				Strength class: 12.9	
	standard ZNT daNm (*/**) lbs ft (°/°°)	self locking ZNT daNm (*/**) lbs ft (°/°°)	standard CDT daNm (*/**) lbs ft(°/°°)	self locking CDT daNm (*/**) lbs ft (°/°°)	standard FOSF daNm (*/**) lbs ft (°/°°)	self locking FOSF daNm (*/**) lbs ft (°/°°)
M6 x 1	1.3 (9.5/6.5) 9.6 (0.37/0.25)	-	-	-	1.4 (12/8) 10 (0.47/0.31)	-
M8 x 1.25	3.2 (12.5/9) 23 (0.5/0.35)	3.5 (12/8) 26 (0.47/0.31)	-	3 (13.5/9.5) 22(0.53/.037)	3.5 (16.5/11) 26 (0.65/0.43)	3.8 (16.5/11) 28 (0.65/0.43)
M10 x 1.25	-	7.9 (18/12.5) 58 (0.70/0.50)	-	6.5 (18/12.5) 48 (0.70/0.50)	-	-
M10 x 1.5	6.5 (16/11) 48 (0.63/0.43)	7 (15.5/10.5) 52 (0.61/0.41)	-	6 (17/11.5) 44 (0.66/0.45)	7 (21/14) 52 (0.82/0.55)	7.8 (21/14.5) 57 (0.82/0.57)
M12 X 1.25	-	13.9 (23/15.5) 102 (0.90/0.61)	-	11.4 (23/15.5) 84 (0.90/0.61)	-	-
M12 X 1.75	11 (19.5/13.5) 81 (0.76/0.53)	12 (18.5/12.5) 88 (0.73/0.50)	-	10.1 (20.5/14) 74 (0.80/0.55)	12 (26/17.5) 88 (1.02/0.68)	13 (26/17.5) 96 (1.02/0.68)
M14 X 1.5	-	22 (26.25/18) 162 (1.04/0.70)	-	18 (26.5/18) 132 (1.04/0.70)	-	-
M14 X 2	18 (23/16) 133 (0.90/0.62)	19 (22/15) 140 (0.86/0.59)	-	16.2 (24/16.5) 119 (0.94/0.65)	19 (30/20) 140 (1.18/0.78)	21 (30/20) 155 (1.18/0.78)
M16 X 1.5	30 (30/20) 221(1.18/0.78)	33 (29/19.5) 243 (1.14/0.76)	25 (31/21) 184 (1.22/0.82)	27 (31/21) 199 (1.22/0.82)	33 (40/26.5) 243 (1.57/1.04)	36 (40/26.5) 265 (1.57/1.04)
M16 X 2	-	-	23 (28.5/19.5) 170 (1.12/0.76)	24.8 (28/19.5) 183 (1.10/0.76)	-	-
M18 X 1.5	45 (34/23) 332 (1.34/0.91)	48 (33.5/22) 354 (1.21/0.86)	36 (35.5/24) 265 (1.39/0.76)	39 (35.5/24) 288 (1.39/0.94)	48 (46/30.5) 354 (1.81/1.20)	52 (46.5/30.5) 383 (1.83/1.20)
M18 X 2.5	-	-	31 (30.5/21) 229 (1.20/0.82)	33.5 (30.5/21) 247 (1.20/0.82)	-	-
M20 X 1.5	60 (38/25.5) 412 (1.50/1.00)	65 (38/25) 479 (1.50/0.98)	50 (39.5/26.5) 369 (1.55/1.04)	-	65 (52.5/34.5) 479 (2.06/1.35)	70 (53/35) 516 (2.08/1.37)
M20 X 2.5	-	-	44 (35/44) 324 (1.37/1.73)	-	-	-
M22 X 1.5	80 (42/28) 590 (1.65/1.10)	90 (42.5/28) 664 (1.67/1.10)	66 (44/29.5) 487 (1.73/1.16)	-	90 (59/38.5) 664 (2.32/1.51)	95 (59.5/39) 700 (2.34/2.32)
M22 X 2.5	-	-	59 (39/26.5) 435 (1.53/1.04)	-	-	-
M24 X 2	100 (44/29.5) 737 (1.73/1.16)	110 (44.5/29.5) 811 (1.75/1.16)	83 (45.5/31) 612 (1.79/1.22)	-	110 (62/40.5) 811 (2.44/1.59)	120 (62/41) 885 (2.44/1.61)
M24 X 3	-	-	74 (41/28) 545 (1.61/1.10)	-	-	-
M27 X 2	100 (54/36) 737 (2.12/1.41)	-	-	-	100 (75/50) 811 (2.95/1.96)	-
M30 X 2	140 (61/40.5) 1032 (2.40/1.60	-	-	-	150 (85/56) 1106 (3.34/2.20)	-
M33 X 2	190 (68/45) 1401 (2.67/1.77	-	-	-	200 (95/63) 1475 (3.74/2.48)	-
M36 X 3	240 (71/47) 1770 (2.80/1.85	-	-	-	250 (97/65) 1844 (3.81/2.55)	-

(-) Minimum thread length in mm, specified for cast iron with 255 N/mm^2 tensile strength- (/**)Minimum thread length in mm, specified for steel with 510 N/mm^2 tensile strength - (°/)Minimum tread length in inches, specified for cast iron with 37,000 psi tensile strength- (/°°)Minimum tread length in inches, specified for steel with 74,000 psi tensile strength.

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SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Low lube oil pressure indicator light turns on with engine running.	Low transmission oil level	Operator's manual	Pull dipstick and check level	Fill transmission with specified oil and to proper level
	Blocked converter pump suction filter			Clean the filter
	External leakage allowing air to enter pump		If oil foams, check for leakage	Correct leakage
	Defective hose		Restriction in suction hose	Replace or clean hose
	Incorrect oil	Operator's manual	Compare oil specification with factory data	Drain old oil and replace with the specified grade and quantity of oil
	Defective indicator		Nothing seems to correct problem	Replace indicator
Low lube oil pressure indicator light turns on with engine running.	Low transmission oil level	Operator's manual	Pull dipstick and check level	Fill transmission with specified oil and to proper level
	Blocked converter pump suction filter			Clean the filter
	External leakage allowing air to enter pump		If oil foams, check for leakage	Correct leakage
	Defective hose		Restriction in suction hose	Replace or clean hose
	Incorrect oil	Operator's manual	Compare oil specification with factory data	Drain oil oil and replace with the specified grade and quantity of oil
	Defective indicator		Nothing seems to correct problem	Replace indicator

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FLUID CAPACITIES

ITEM	QUANTITY	FIAT PRODUCT		REFILL
	Liters	Brand		
Cooling system	35	PARAFLU	PARAFLU11	50-50 mixture of water and coolant. Has adequate protection against: oxidation, foaming, corrosion, scaling and freezing down to -35 °C (-31 °F)
Fuel tank	260	-	-	Diesel fuel ASTM no 2 type TT good brand
Engine	12	AMBRA SUPER	AMBRA SUPER	Engine oil MIL-L- 2104 D or Service API "CD"
Convertor/transmision	27,5	TUTELA	Gl/m	ATF type A SUFFIX A
Bevel-gear, Steering clutches brakes	28	AMBRA SUPER	AMBRA SUPER	Engine oil MIL-L-2104 D or Service API "CD"
Attachment Hydraulic System	81	IDRAULICAR AP	IDRAULI-CAR AP31 and AP51	Engine oil MIL-H-24459 or or DIN 51524/51525
Side Final Drives (each)	15,5	TUTELA	W90/M-DA	Oil for mechanical drives MIL-L-2104D
Track idlers and rollers	2,4 (°)	AMBRA SUPER	AMBRA SUPER	
Grease fittings	-	TUTELA	G9	Lithium-calcium base grease, - N.L.G.I. No 2 consistency
Cab tipping pump	0,5 (°)	TUTELA	Gl/m	

The quantities of oil shown are what is needed for periodical replacements following the rules for discharging and refilling indicated in detail for each group.

(°) - First refill

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SERVICE AND LUBRICATION GUIDE

EVERY 10 HOURS	**BUCKET LOWER LINKAGE ARTICULATIONS** - lubricate.
EVERY 100 HOURS	**BEVEL GEAR, STEERING CLUTCHES/BRAKES** - oil level. **FINAL DRIVES** - oil level. **HYDRAULIC SYSTEM** - oil level. **FUEL SYSTEM TANK** - water drainage **LOADER BOOMS AND BUCKET ARTICULATIONS** - lubricate. **RIPPER LINKS** - lubricate
EVERY 250 HOURS	**FEED PUMP FILTER** - clean **ENGINE OIL** - Change **BELTS** - check .
EVERY 500 HOURS	**ENGINE OIL FILTERS** - replace. **FUEL FILTER** - replace **CONVERTER/TRANSMISSION** - replace oil and delivery oil filter, clean oil filter on intake **HYDRAULIC SYSTEM** - change oil cartridge in oil return filter. **STEERING CLUTCHES AND BRAKES** - change cartridge in oil return filter, clean oil filter on intake.
EVERY 1000 HOURS	**ENGINE** - check valves clearance. **ENGINE** - check injectors. **BEVEL GEAR, BRAKES, STEERING CLUTCHES** - change oil. **FINAL DRIVES** - change oil. **TRANSMISSION IMPUT SHAFT** - lubricate. **TRACK FRAME OUTBOARD SUPPORTS** - lubricate. **BATTERY** - electrolyte level
EVERY 2000 HOURS	**HYDRAULIC SYSTEM** - change oil.
WHEN NECESSARY (when signal lights up)	**ENGINE OIL** - check level **CONVERTER/TRANSMISSION** - check oil level. **RADIATOR** - Add coolant **HYDRAULIC SYSTEM** - change cartridge in oil return filter. **ENGINE AIR CLEANER** - clean and change cartridges
PERIODIC SERVICES	**TRACKS** - check tension **TRACK IDLERS AND ROLLERS** **BLEEDING FUEL SYSTEM** **BRAKES** - adjusting.

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SPECIFICATIONS

ENGINE

Make and Model: FIAT 8045.25.099
Diesel cycle, 4-stroke, direct-injection, with exhaust gas driven turbocharger.
Number of cylinders: 6
Bore x Stroke: 104 x 115 mm (4.1 x 4.53 in)
Total Piston Displacement: 5861 cc (357,6 cu. in)
Compression ratio: 16 to 1
Rated speed: 2100 RPM
Rated speed at max. torque: 1500 RPM

Lubrication System

Type : Force-fed by gear pump.
Oil filters: Strainer on pump suction line. Full flow in delivery line through two replaceable elements.
Low oil pressure warning light in data monitor panel.

Engine valves

Overhead valve, camshaft in cylinder block.
Intake:
- Opens - B.T.D.C. 12°
- Closes - A.B.D.C. 31°

Exhaust:
- Opens - B.B.D.C. 50° 30'
- Closes - A.T.D.C. 16°

Valve clearance:
- Intake 0.30 mm (0.0118 in)
- Exhaust 0.50 mm (0.1968 in)

Fuel system

Fuel pump, piston type.
In line injection pump, integral all-speed governor and automatic advance variator.
Setting of injection pump to engine: 25°±1° before T.D.C. and cyl. 1 in the compression stroke (beginning of delivery).
Firing order : 1-5-3-6-2-4

Fuel injectors release pressure: 230 - 238 bar.
Throwaway cartridge fuel filters.
Dry type, paper - cartridge air cleaner with centrifugal separator. Restriction indicator light on dashboard (EDM).

Cooling System

Coolant, force-circulated by centrifugal pump.
Radiator: 5 tube row core.
Fan: 7 blade, pusher.
Coolant circulation between engine and radiator governed by thermostat.
Engine coolant temperature and level indicators on dashboard.

Starting

By electric motor.

POWER TRAIN

Converter / Transmission

Hydraulic torque converter .
Stall torque ratio 2.6 to 1.
Transmission providing three speeds forward and three reverse, controlled by hydraulic powershift mechanism acting on five clutches.
Gearshift lever located on the left side of the operator.
Safety lock in "locked" position prevents the use of gearshift lever and applies automatically the brakes.
Torque converter/transmission oil cooling through heat exchanger with coolant recirculated from radiator.
Oil filtration: two full-flow filters, one mesh type and magnetic rod on suction line and one with cartridge and built-in by pass valve on delivery line.

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MACHINE OPERATION

⚠ WARNING

Never attempt to use machine or attachment except when seated in the operator's seat. Keep head, body, limbs, hands and feet inside operator's compartment to reduce exposure to hazards outside the operator's compartment.

Keep attachments low or in a position for maximum visibility and control of machine.

Never use the bucket as a man lift.

Do not start suddenly at full speed against a tow chain or cable. Take up slack carefully.

Only designated towing or pulling attachment points are to be used for towing or pulling. Use care in making attachment. Be sure pins and locks, as provided, are secure before pulling.

Keep all people clear of attachments and tools while in raised position, to prevent possible injury.

Do not coast the machine at any time with transmission in neutral.

Always check work area for dangerous features. The following are examples of dangerous work areas: slopes, overhangs, timber, demolitions, fire, high walls dropoffs, back fills, rough terrain, ditches, ridges, excavations, heavy traffic, crowded parking, maintenance and closed areas. Use extreme care when in areas such as these.

Work on sloping ground is dangerous.

Be particularly careful when working near overhanging banks or where cave - ins may occur. Use a signal person when visibility of the work area by the Operator is inadequate. The signal person must be in direct communication with the operator who must pay close attention to the signals.

Be on the lokout for caving edges, slides or falling objects. Beware of concealment by brush and undergrowth or other obstacles of these dangerous conditions.

When working in or nearby wells, trenches or in proximity of high banks, shore or brace as required to prevent cave-ins.

Before working in the vicinity of gas lines or other utility lines always contact the nearest utility office before beginning work.
You and the utility representative must jointly determine what specific precautions must be taken to insure safety.

Work in proximity of overhead or underground power lines involves serious body injuries and death hazards, thus special precautions must be taken according to national and local safety regulations.

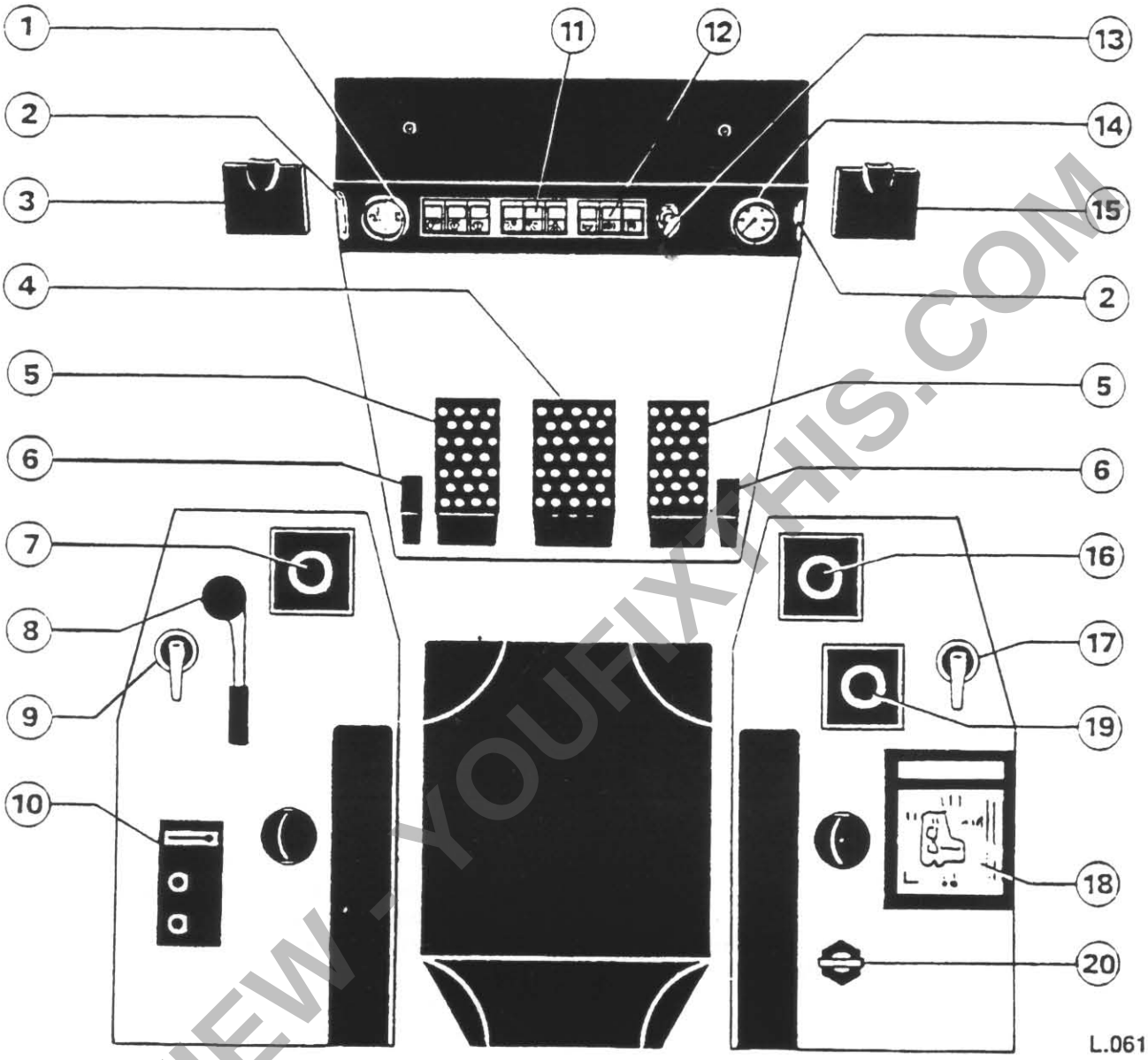
For the purposes of this Manual you are considered to be working in the proximity of power lines when the attachment or the load raised by machine, in any position, can reach to within the minimum distances specified by local and national safety regulations.

Slow down the operating cycle. Reaction time may be too slow and distances may be misjudged.

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CONTROLS AND INSTRUMENTS



1. HOURMETER
It totalizes the hours and fractions of hour of operation. It begins counting as soon as the engine is started.

2. DASHBOARD LIGHTS

3. FUSEBOX

4. BRAKE PEDAL
By pushing the pedal both tracks brakes are controlled.

5. STEERING CLUTCH/BRAKES LEVERS
At the end of the firts part of lever travel the corresponding steering clutch is disengaged and the affected track is allowed to slow down, and machine turns
By pulling further the lever, also the track brake is applied ant the machine steers in tighter space.
When going down steep slopes, the steering clutch manoevers must be reversed; for example, to turn right you need to disengage the left clutch, to allow the track to go faster than the right one, which is held back by the engine.

6. ENGINE DECELERATION PEDALS
They are used for temporary engine R.P.M. speed reduction.

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SAFETY RULES

GENERAL

Study the Operation and Maintenance Instruction Manual before starting, maintaining, fueling, or servicing machine. Read and heed all machine-mounted safety signs before starting, operating, maintaining, fueling, or servicing machine.

Machine-mounted safety signs have been color coded yellow with black borders and lettering for **warning** and red with white borders and lettering for **danger** points.

Do not allow unauthorized personnel to service or maintain this machine.

Do not wear rings, wrist watches, jewelry, loose or hanging apparel, such as ties, torn clothing, scarves, unbuttoned, or unzipped jackets that can catch on moving parts. Wear proper safety equipment as authorized for the job. Examples: hard hats, safety shoes, heavy gloves, ear protectors, safety glasses or goggles, reflector vests, or respirators, depending on job conditions. Consult your employer for specific safety equipment requirements.

Keep operator's compartment, stepping points, grab rails and handles clean and free from foreign objects, oil, grease, mud or snow accumulation to minimize the danger of slipping or stumbling. Clean mud or grease from shoes before attempting to mount or operate machine.

Do not jump on or off machine. Keep two hands and one foot, or two feet and one hand, in contact with steps and grab rails and handles at all times.

Do not use controls or hoses as handholds when climbing on or off machine. Hoses and controls are movable and do not provide a solid support. Controls also may be moved inadvertently causing accidental machine or equipment movement.

Never attempt to operate the machine or its tools from any other position than seated in the operator's seat. Keep head, body, limbs, hand and feet inside operator's compartment at all times to reduce exposure to hazards outside the operator's compartment.

Be careful of slippery conditions on stepping points, hand rails, and on the ground.

Always wear non-slip safety boots or shoes.

Get off machine only when it is fully stopped. Always check height, width and weight restrictions in the working area, and be sure the machine will not exceed these limitations.

Be sure the exact locations of gas lines, utility lines, sewers, overhead and buried power lines and other obstructions or hazards are known. Such locations should be precisely marked by the proper authorities to reduce the risk of accidents. Obtain shutdown or relocation of any such facilities before starting work, if necessary. Know the working range of the machine.

Provide clearance for rear superstructure swing by barricading area to discourage entry.

Never exceed the lifting capacity of the machine. Stay within the lifting limits shown on the load charts provided with the machines.

START UP

Do not start or operate an unsafe machine. Walk completely around machine before mounting. Before working the machine, be sure that any unsafe condition has been satisfactorily remedied. Check that steering and attachment controls are in hold (neutral) position and, also, that safety lever is released before moving. Advise the proper maintenance authority of any malfunction part or system. Be sure all protective guards or panels are in place, and all safety devices provided are in place and in good operating condition.

Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine. Be sure all people in the area are clear of the unit before moving the machine or its attachments. Sound horn.

Obey flagman, safety signals and signs.

Due to the presence of flammable fluid, never check or fill fuel tanks, storage batteries, or use starter fluid near lighted smoking materials or open flame or sparks.

Starting fluid is flammable. Follow the recommendations as outlined in the Operation and Maintenance Instruction Manual and as marked on the containers. Store containers in cool, well ventilated place secure from unauthorized personnel. **Do not puncture or burn containers.** Follow the recommendations of the manufacturer for storage and disposal.

Never use starter fluid near lighted smoking materials or open flame or sparks due to the presence of flammable fluid.

Make sure nobody is near the work area of the excavator before starting the machine, or before swinging or moving in any direction.

Adjust all mirrors for visibility towards the rear of the machine.

Be sure the throttle setting is adequate for the contemplated operation.

If controls or other hydraulic systems feel spongy have the machine checked for air in the systems. Presence of air in these systems could cause improper control and result in an accident. See the Operation and Maintenance Instruction Manual for corrective procedures.

OPERATING

Do not run the engine of this machine in closed areas without proper ventilation to remove deadly exhaust gases which would otherwise concentrate in the ambient air.

Keep operator's compartment clear of loose objects. Do not use machine to carry loose objects by means other than attachments designed for such objects.

Do not carry riders.

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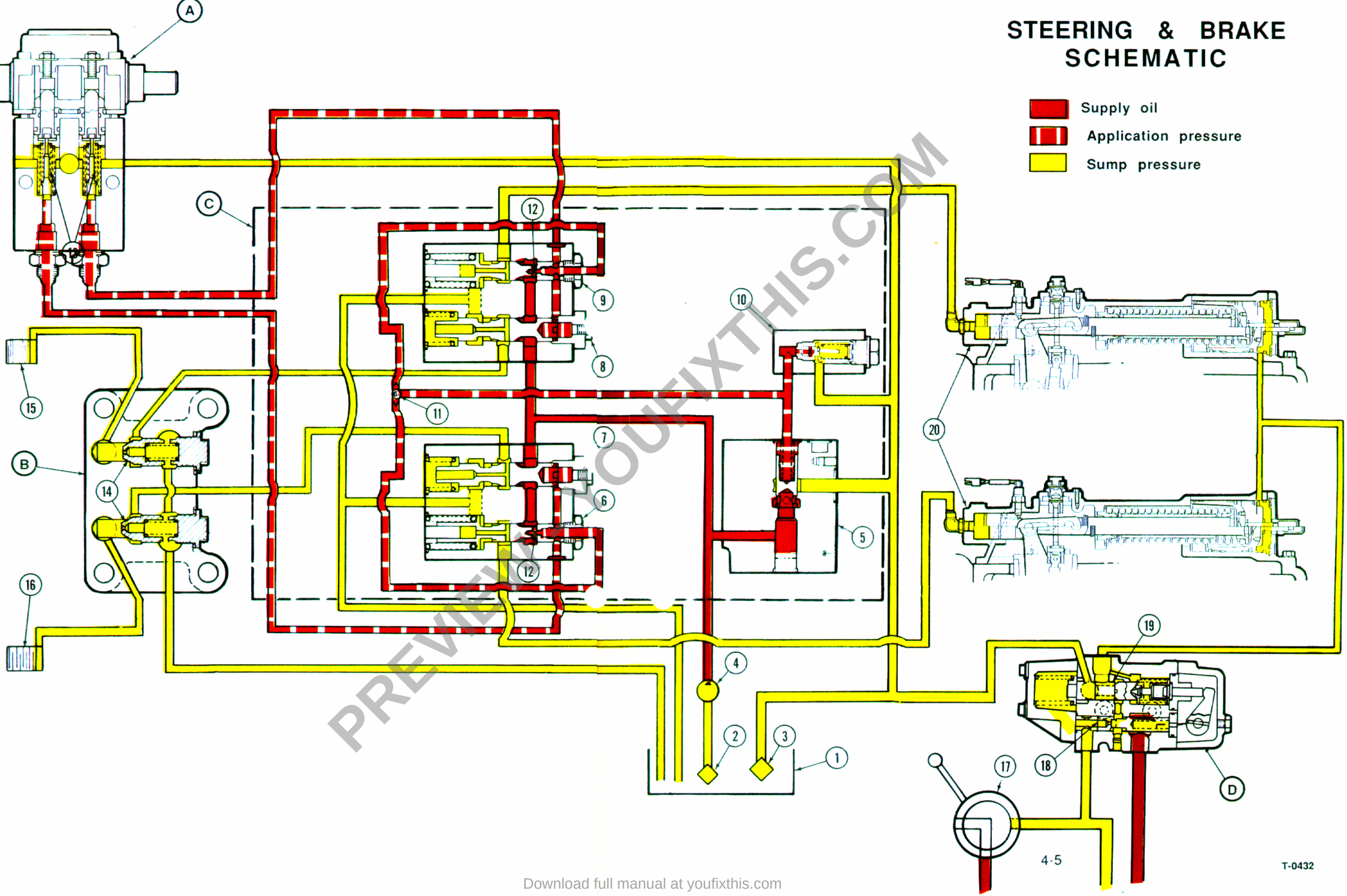
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STEERING & BRAKE SCHEMATIC

Supply oil

Application pressure

Sump pressure



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T-0432

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Observe and know the mechanics of alternate exit routes. For your personal protection, do not attempt to climb on or off machine while machine is in motion.

Be sure exposed personnel in the area of operation are clear of the unit before moving the machine or its attachments. Sound horn. Obey flagman, safety signals and signs.

When backing, always look to where the machine is to be moved. Be alert to the position of exposed personnel. **Do not operate** if exposed personnel enter the immediate work area.

Maintain a safe distance from other machines. Provide sufficient clearance for ground and visibility conditions. Yield right-of-way to loaded machines.

Maintain clear vision of all areas of travel or work. Keep cab windows clean and repaired.

When pulling or towing through a cable or chain, do not start suddenly at full throttle. Take up slack carefully. Guard against kinking chains or cables. Inspect carefully for flaws before using. Do not pull through a kinked chain or cable due to the abnormal high stresses and possibility of failure of the kinked area. Always wear heavy gloves when handling chain or cable.

Be sure cables are anchored securely and the anchor point is strong enough to handle the expected load. Keep exposed personnel clear of anchor point and cable or chain. **Do not pull or tow unless operators compartments of machines involved are guarded against potential cable or chain backlash.**

Be alert to soft ground conditions close to newly constructed walls. The fill material and weight of machine may cause the wall to collapse under the machine.

In darkness, check area of operation carefully before moving in with machine. Use all lights provided. Do not move into areas of restricted visibility.

If engine has a tendency to stall for any reason under load or idle, report this for adjustment to a proper maintenance authority immediately. Do not continue to operate machine until condition has been corrected.

Be sure to periodically check all engine exhaust parts for leaks as exhaust gases are dangerous to the operator.

An operator must know the machine's capabilities. When working on slopes or near dropoffs be alert and avoid loose or soft conditions that could cause sudden tipping or loss of control.

Where noise exposure exceeds 90 dBA for 8 hours, wear authorized ear protective equipment per local and other national safety requirements that apply.

Do not operate machinery in a condition of extreme fatigue or illness. Be especially careful towards the end of the shift.

When demountable counterweights have been provided, do not work machine if they have been removed.

When operating machine know what clearances will be encountered; overhead doors, wires, pipes, aisles, roadways; also weight limitation of ground, floors, and ramps. Be aware of fog, smoke or dust elements that obscure visibility.

Always check work area for dangerous features. The following are examples of dangerous work areas: slopes, overhangs, timber, demolitions, fire, high walls, dropoffs, backfills, rough terrain, ditches, excavations, traffic, parking lots, crowded maintenance and closed areas. Use extreme care when in areas such these.

Avoid going over obstacles such as rough terrain, rocks, logs, curbs, ditches, ridges and railroad tracks whenever possible. When obstructions must be crossed, do so with extreme care and perpendicularly. Reduce speed. Ease up to the breakover point - pass the balance point slowly on the obstruction and ease down on the other side, using attachment as an aid if necessary.

Cross gullies or ditches at an angle (possibly using attachment as an aid) with reduced speed after insuring ground conditions will permit a safe traverse.

The grade of slope you should attempt will be limited by such factors as condition of the ground, load being handled, the type of machine, speed of machine and visibility. There is no substitute for good judgement when working on slopes.

Avoid operating equipment too close to an overhang or highwall either above or below the machine. Be on the lookout for caving edges, falling objects and slides. Beware of concealment by brush and undergrowth of these dangers.

Avoid brushpiles, logs or rocks. **Do not drive the machine onto brushpiles, logs, large rocks** or other surface irregularities that break traction with the ground especially when on slopes or near dropoffs.

Be alert to avoid changes in traction conditon that could cause loss of control. Work the machine with extreme caution on ice or frozen ground conditions, on steep slopes or near dropoffs.

Operating in virgin rough terrain that includes previously mentioned hazards is called pioneering. Be sure you know how this is done. Danger from falling branches and upturning roots is acute in these areas.

Place the machine in relationship between the excavation and the dump area to swing to the left for discharge of material, for best visibility. **Never use the bucket or attachment as a man lift or allow riders on the machine.**

No machine should ever be used as a work platform or scaffolding. Other uses that depart from machine design intended purposes (such as pushing or towing rail wagons, trucks or other machines) should be avoided.

Always be aware of presence of people in the work site.

Never swing or position bucket, load or attachment over ground crew or truck cab.

Before loading a truck be sure the driver is in a safe place.

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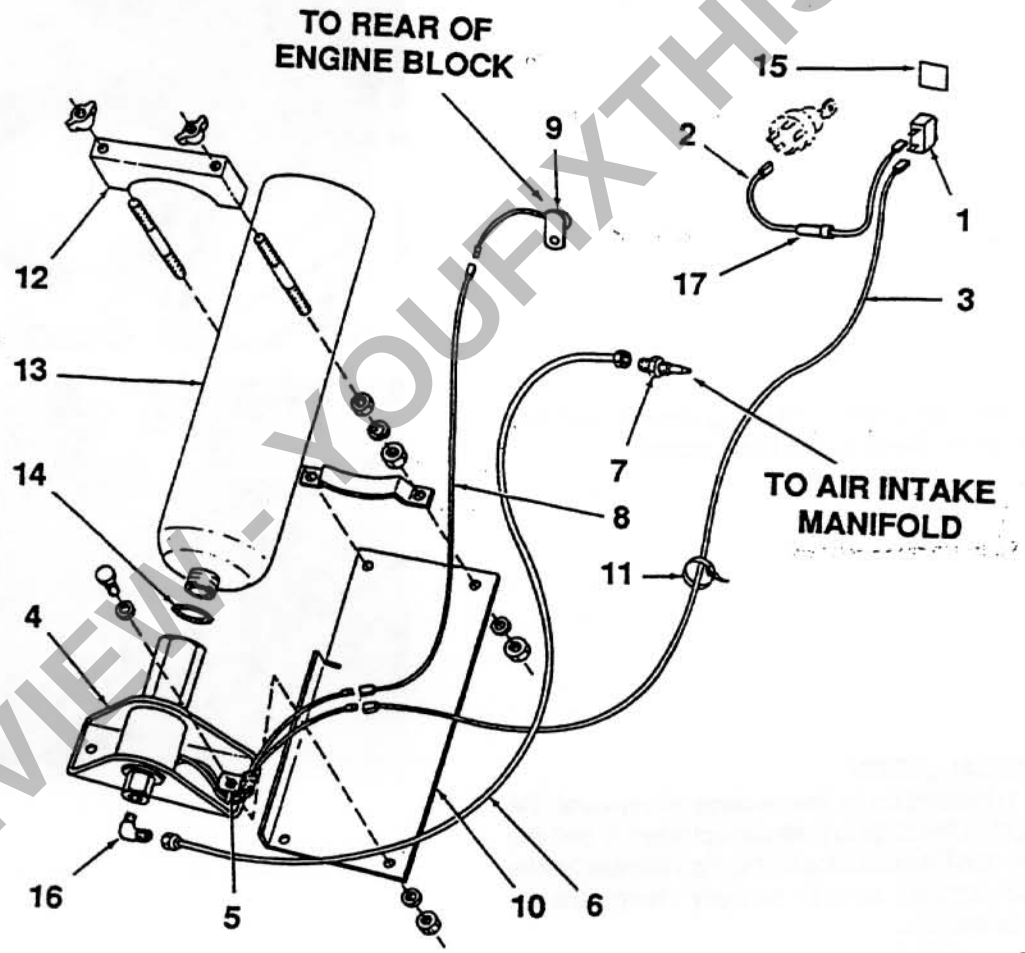
1.4.10 COLD WEATHER STARTING AID
(Special Equipment)

⚠ WARNING

Starting fluid is flammable - Do not puncture or burn containers. Follow precautions printed on containers for storage and disposal.

1.4.10.1
Cold weather starting aid is a system of injecting a measured amount of ether into the engine air intake to help start the engine in cold climates. The system consists of a cylinder of ether, a switch, valve, atomizer and the necessary tubing and wiring.

1.4.10.2
Incorporated in the electrical circuit is a temperature sensing device called a thermoguard. The purpose of the thermoguard is to break the electrical ground connection at a temperature of approximately 27°C (80°F) so the starting aid cannot be used when the engine is warm.



T-100791

COLD WEATHER STARTING AID

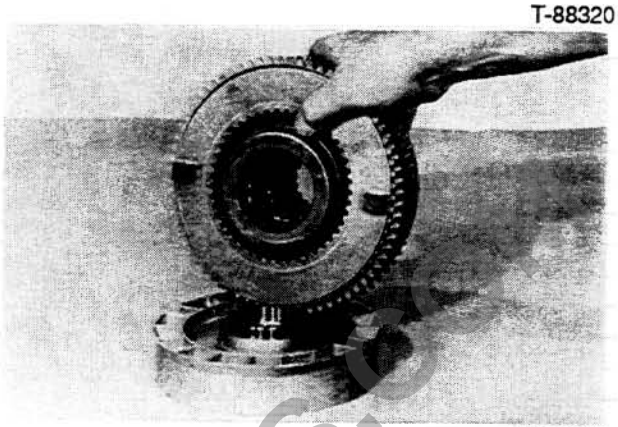
1. Switch
2. Wire
3. Wire
4. Valve
5. Clamp
6. Tube
7. Atomizer (punch mark on hex must be "up")
8. Wire
9. Thermoguard
10. Bracket
11. Tie
12. Clamp
13. Cylinder
14. Gasket
15. Decal
16. Elbow
17. Fuse (15 amp)

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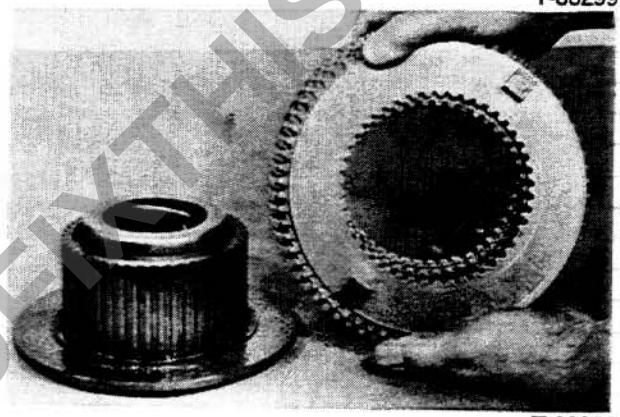
2.4.4.1.61.3
Remove clutch pack and hub assembly from piston and housing assembly.

T-88320



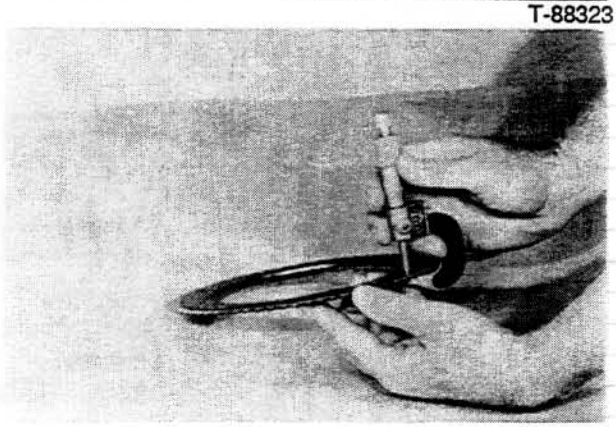
2.4.4.1.61.4
Remove clutch pack from hub.

T-88299



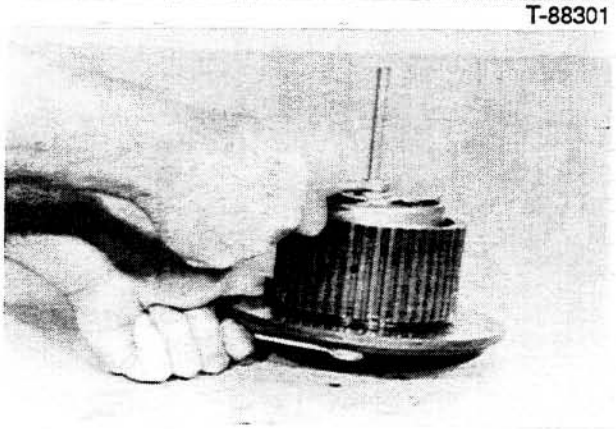
2.4.4.1.61.5
Check all clutch disc and steel plates for proper thickness; replace if not within specifications.

T-88323



2.4.4.1.61.6
Using a long threaded capscrew, compress return spring.

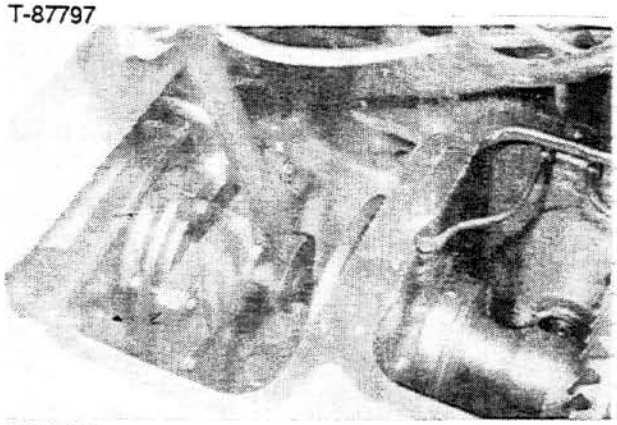
T-88301



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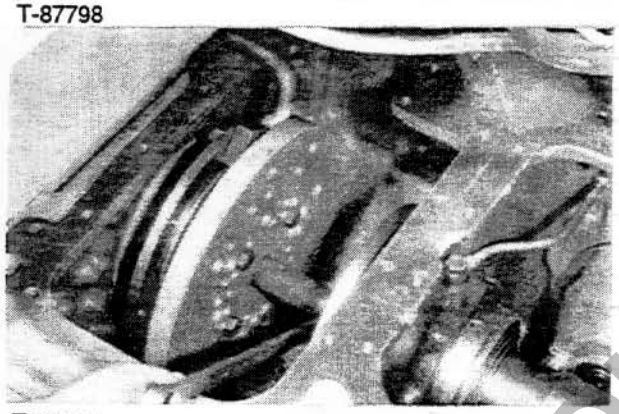
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T-87797



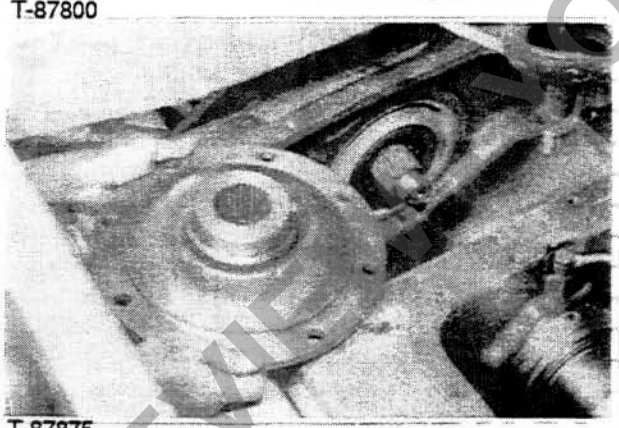
3.4.1.36
Prior to installing clutch hub puller tool (75291578) check for alignment marks on the hub and end of drive gear shaft. If none appear, mark both parts to aide in reassembly. Remove the steering clutch hub.

T-87798



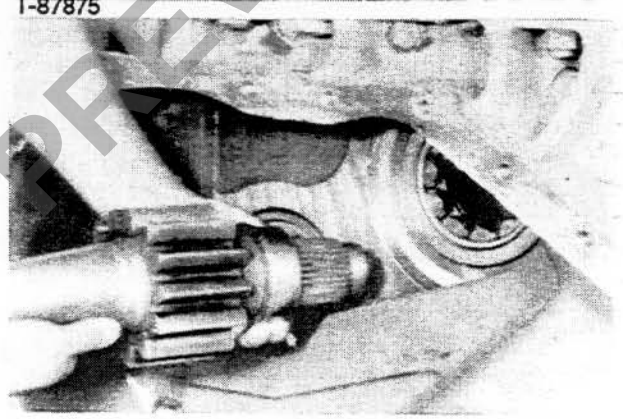
3.4.1.37
An alternate puller (75300080) may also be used to remove the steering clutch hub as shown.

T-87800



3.4.1.38
Remove the steering clutch hub.

T-87875

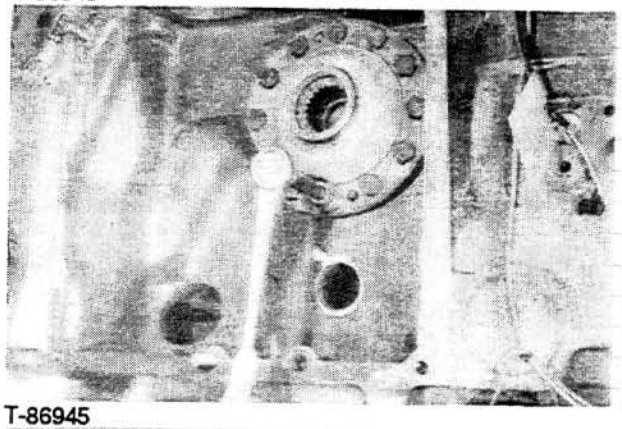


3.4.1.39
Remove the drive gear and shaft. (Refer to 3.4.7 for rebuild)

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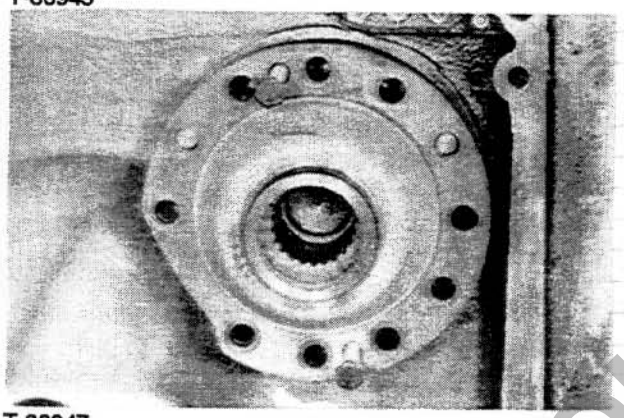
T-86943



4.4.2.4 BEVEL PINION REMOVAL

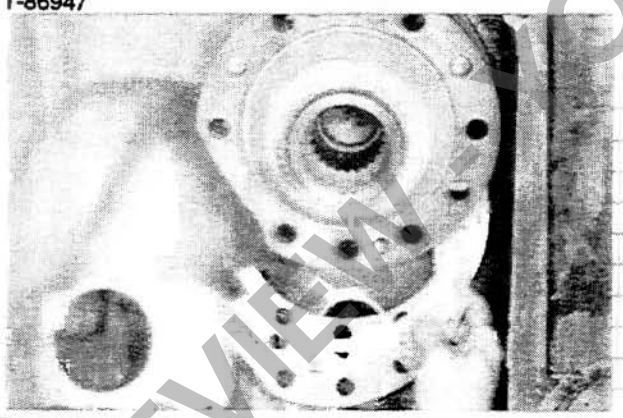
4.4.2.4.1
Remove capscrews securing bevel pinion.

T-86945



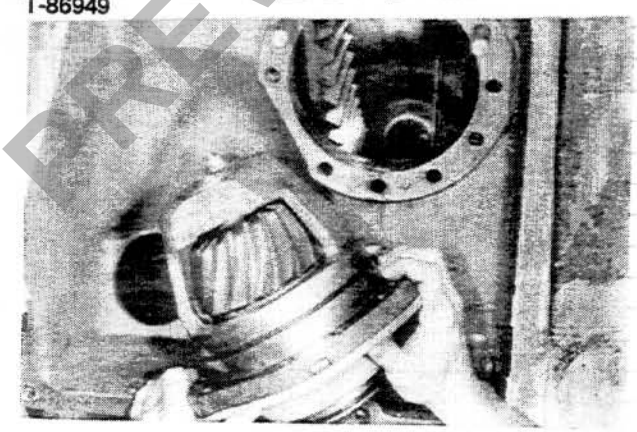
4.4.2.4.2
Install guide studs and pusher screws.

T-86947



4.4.2.4.3
Remove shims and identify.

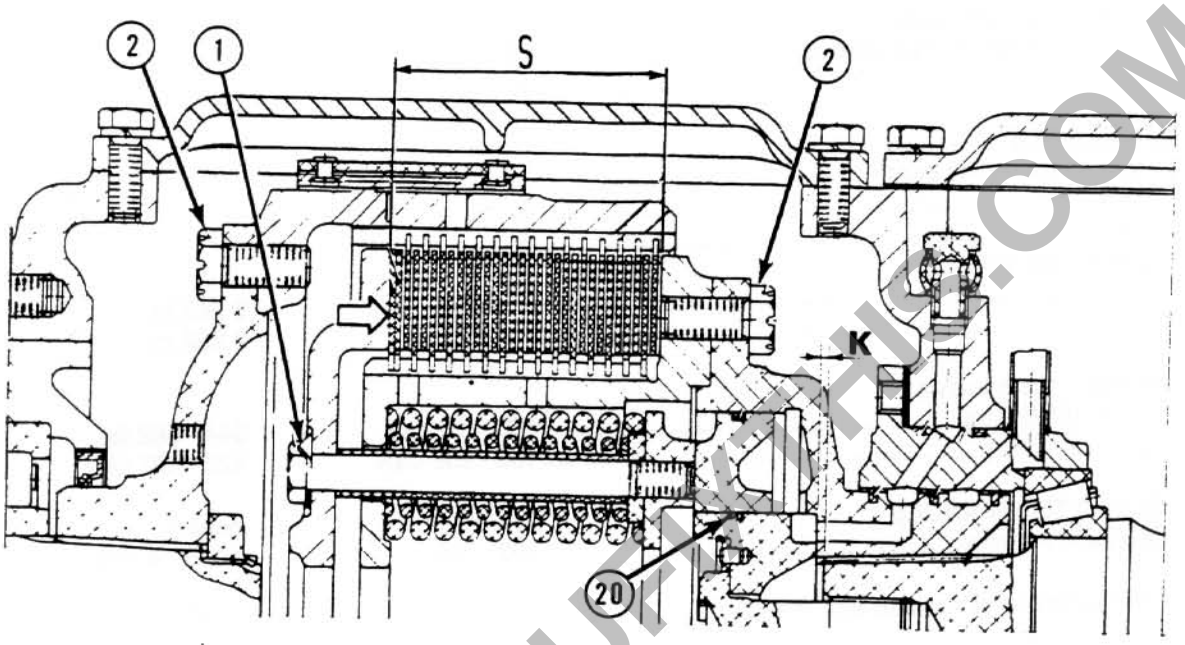
T-86949



4.4.2.4.4
Remove pinion from housing.

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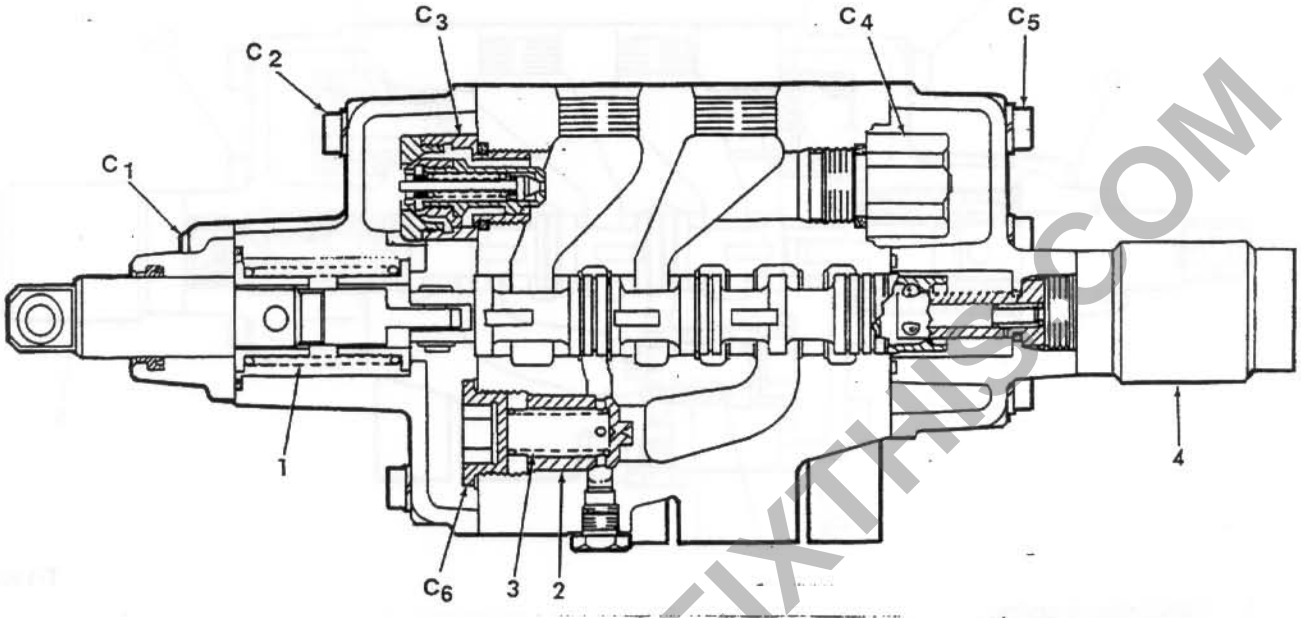


T-85803

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5.6.2.2 BUCKET CIRCUIT



T-100461

1. Spool return spring
   - Free length ..... 84.5mm (3.33 in)
   - Load when compressed to 53mm (2.09 in) ..... 8.55 - 9.45 daN (19.22 - 21.24 lbs)
   - Load when compressed to 37mm (1.46 in) ..... 12.9 - 14.3 daN (29.00 - 32.15 lbs)

2. Check valve O.D. ..... 24.979 - 25.000mm (.983 - .984 in)
   Bore in body for check valve ..... 25.040 - 25.092mm (.986 - .988 in)
   Clearance ..... 0.040 - 0.113mm (.0016 - .0044 in)

4. Automatic Bucket Leveler Solenoid
   - Solenoid to valve torque ..... 11.0 - 12.0 daNm (81.13 - 88.51 lbs. ft)
   - Adjust with spacers to obtain a stroke of ..... 5.0mm (0.197 in)

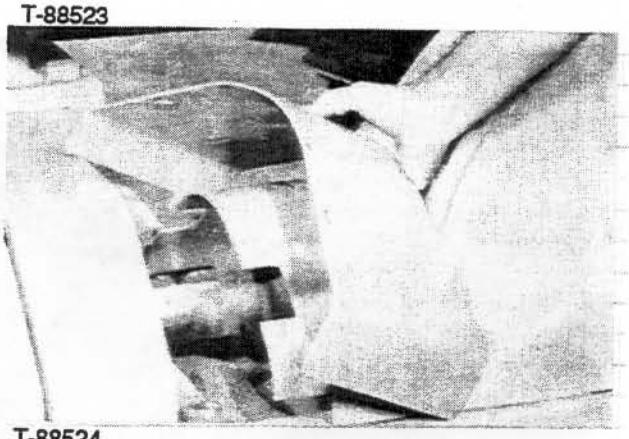
   Spool neutral return spring
   - Free length ..... 22mm (0.87 in)
   - Load when compressed to 18mm (0.71 in) ..... 1.24 - 1.36 daN (2.79 - 3.06 lbs)
   - Load when compressed to 15mm (0.59 in) ..... 2.16 - 2.38 daN (4.86 - 5.35 lbs)

TORQUES

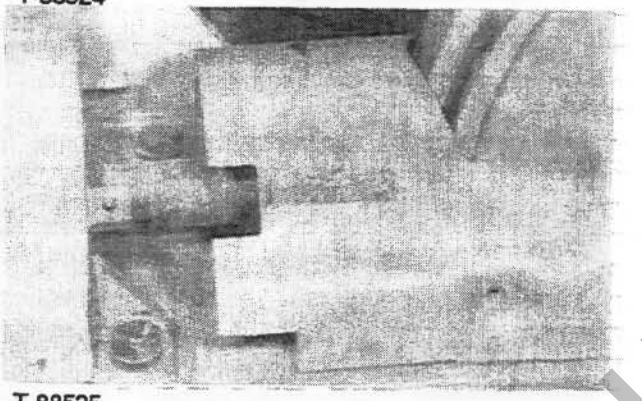
C_1	1.9 - 2.1 daNm	(14.01 - 15.49 lbs. ft.)
C_2	1.9 - 2.1 daNm	(14.01 - 15.49 lbs.ft.)
C_3	11.0 - 12.0 daNm	(81.13 - 88.51 lbs.ft.)
C_4	11.0 - 12.0 daNm	(81.13 - 88.51 lbs.ft)
C_5	1.9 - 2.1 daNm	(14.01 - 15.49 lbs. ft.)
C_6	1.9 - 2.1 daNm	(14.01 - 15.49 lbs. ft.)

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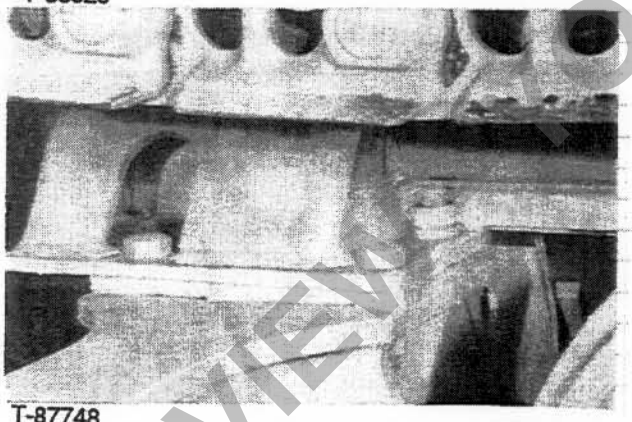
T-88523



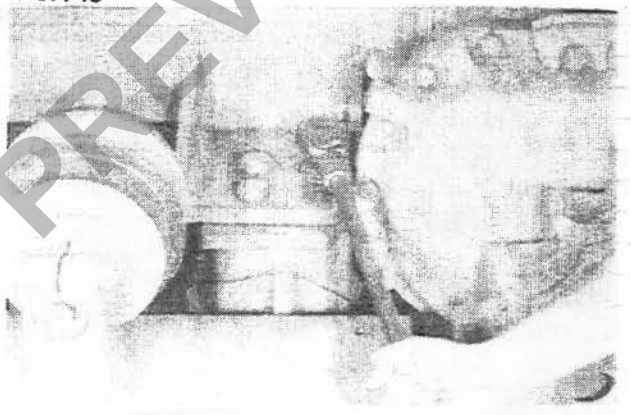
T-88524



T-88525



T-87748



6.4.9.1.5
Remove track release spring covers from right side.

⚠ WARNING

Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

6.4.9.1.6
Support right track frame assembly. Remove capscrews attaching cross beam to track frame. Tag any shims so they can be put back in their original position.

6.4.9.1.7
Place a floor jack under cross beam. Remove capscrews attaching cross beam to main frame. Remove cross beam. Tag any shims so they can be put back in their original position.

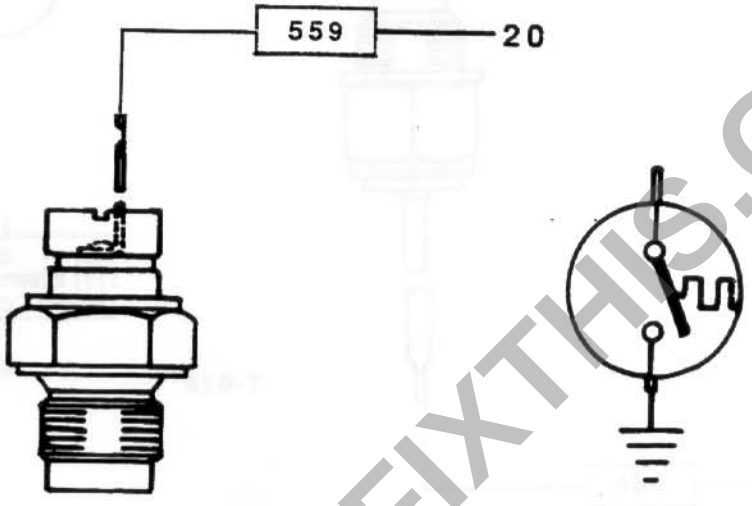
6.4.9.2 INSTALLATION
6.4.9.2.1
Position cross beam under machine. Using original shims, bolt cross beam to main frame. Tighten attaching capscrews to specified torque.

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ELECTRONIC DATA MONITOR (E.D.M.) GROUP

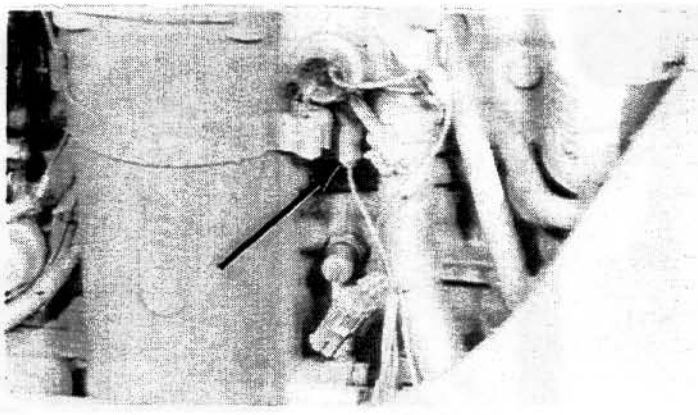
TRANSMISSION OIL TEMPERATURE SWITCH "EG"



T-014

ITEM #	WIRE #	
20	559	To Connector "H", Position "3", Connector "H" to Connector "D", Position "4", E.D.M., "EA".

LOCATION: Center of engine on left hand side, in oil cooler manifold block on bottom side.

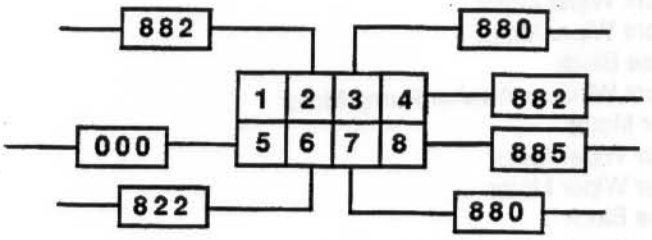


T-92933

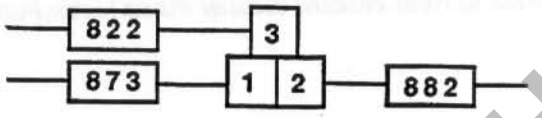
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WIPERS & WASHERS GROUP

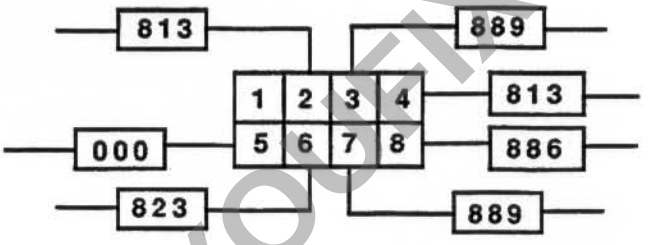
Cab Wire Group, Connector "D1"



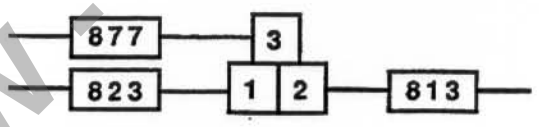
Cab Wire Group, Connector "E1"



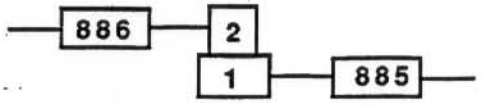
Cab Wire Group, Connector "F1"



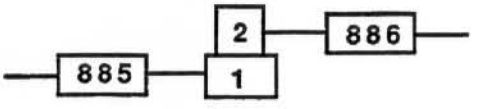
Cab Wire Group, Connector "G1"



Cab Wire Group, Connector "H1"



Window Washer Wire Group, Connector "H1"

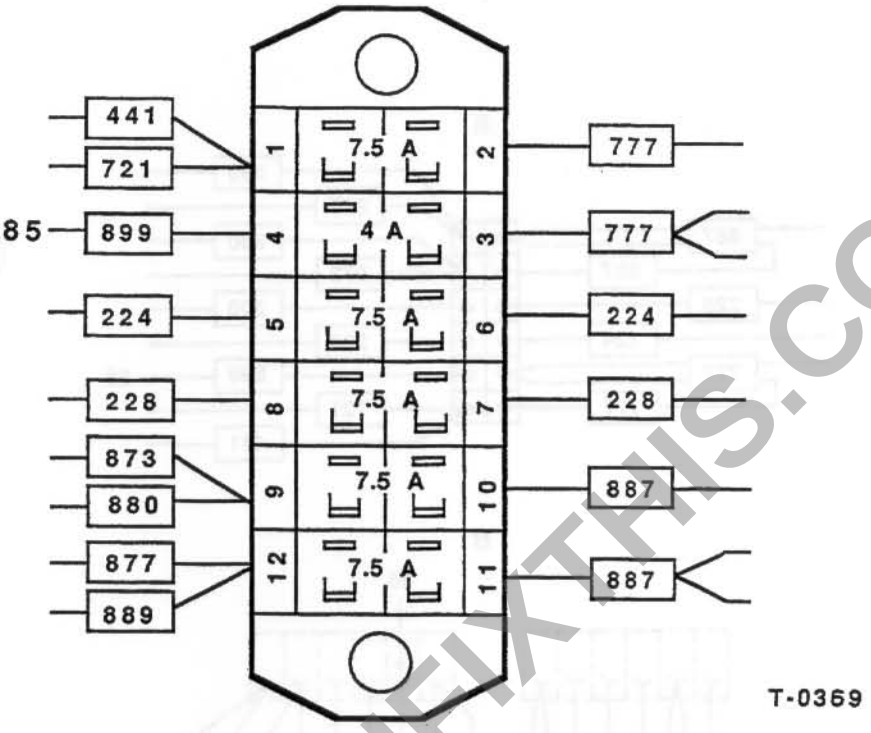


NOTE: Connectors viewed from back side (wire side)

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RADIO GROUP

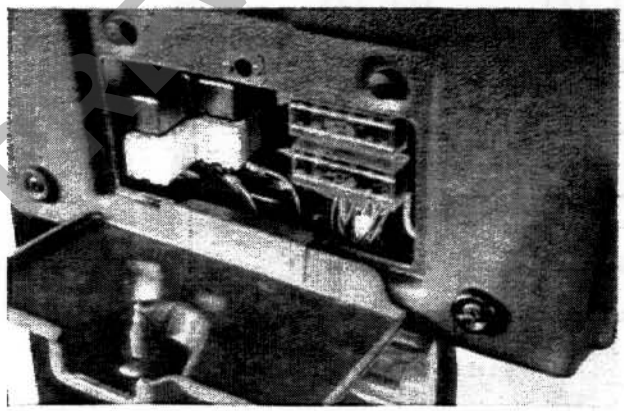
FUSE BLOCK "B" (Cab)



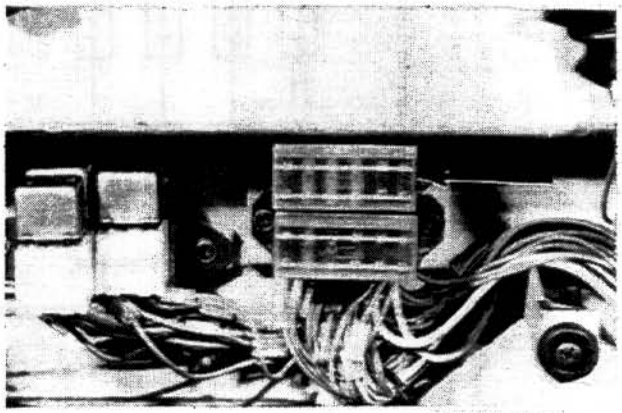
T-0369

ITEM #	WIRE #	
85	899	Position "4" to Connector "H2", Position "2", Radio Voltage Regulator "RA".
85	899	Position "4" to Radio & Antenna "RB" (units without Radio Voltage Regulator)
—	224	See Lighting Group.
—	228	
—	441	
—	721	
—	777	See Ignition & Starter Group.
—	887	
—	873	See Wiper & Washer Group.
—	877	
—	880	
—	889	

LOCATION: Left hand side of front dash console panel.



T-92102



T-93029

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