

LUBRICATION & MAINTENANCE

BTI MOBILE EQUIPMENT



- PRE-START CHECKS
- OIL TABLES
- PREVENTATIVE MAINTENANCE
- LUBE AND FILTER SERVICE SHEETS
- CONVERSION FACTORS
- BOLT TORQUE VALUES



BREAKER TECHNOLOGY



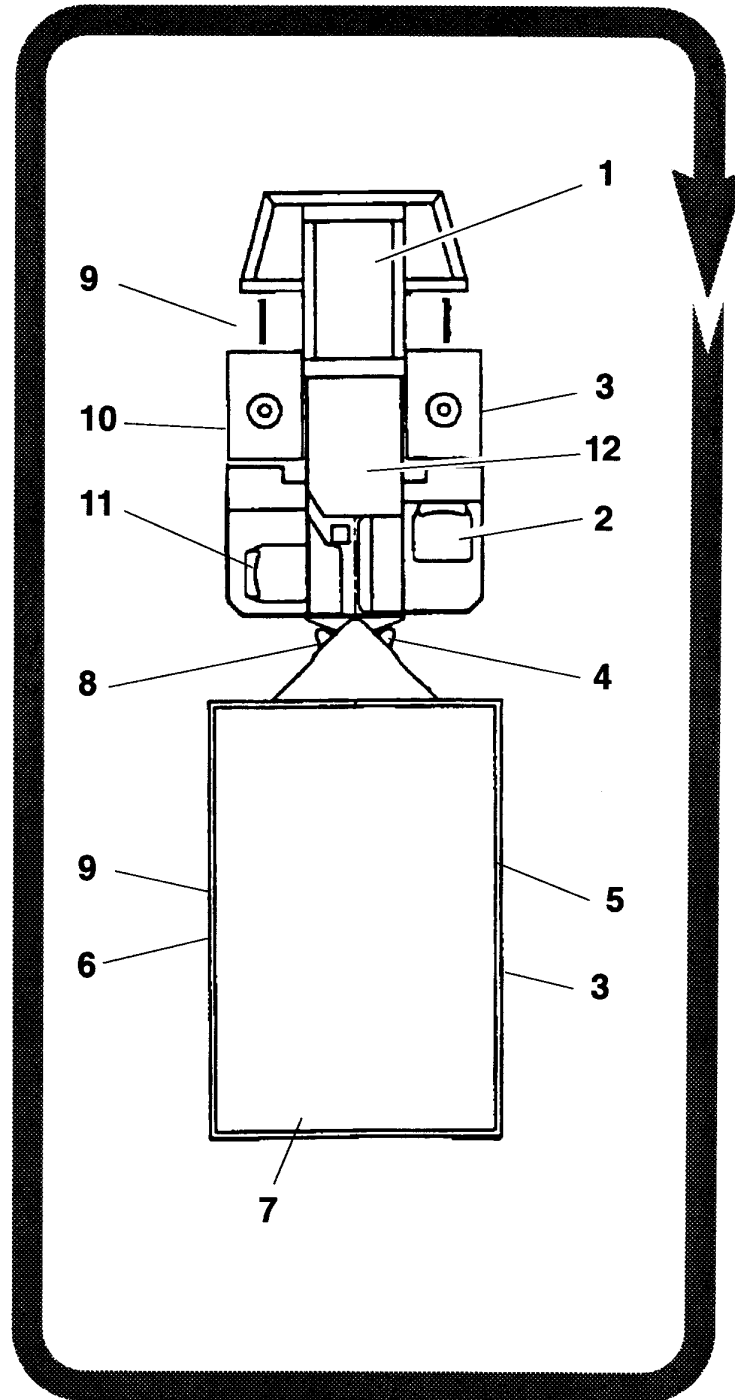
**BREAKER
TECHNOLOGY,
INC.**

an Astec company



Pre-Start Checks	4
Oil Tables	8
Maintenance - Every Shift	10
Maintenance - Every 100 Hours ...	11
Maintenance - Every 250 Hours ...	12
Maintenance - Every 500 Hours ...	16
Maintenance - Every 1000 Hours..	16
Maintenance - Every 2000 Hours..	17
Conversion Factors	20
General Torque Values	21
Notes	22

VEHICLE WALK-AROUND



VEHICLE WALK-AROUND

Before operating the vehicle, perform the following checks at the beginning of each shift. These checks are organized in a "**walk around the vehicle**" approach. Visual inspection for leaks, loose bolts or fittings, cracks, or early signs of component failure, can minimize equipment failures in difficult and hazardous locations. It can also minimize major repairs later. Also, perform the preventative maintenance checks as outlined on page 6.

1. ENGINE END

Check engine oil. Add oil if level is below 'ADD' on the dipstick.

Check the vee belts for excessive wear or play.

Inspect the service indicator on the air cleaner. If the red piston is locked in the raised position, service the air cleaner.

Visually inspect the engine compartment and underneath the vehicle for oil or fuel leaks.

Check that the lid of the battery box is secure.

2. PASSENGER COMPARTMENT

Check seatbelt operation, and location of fire suppression activation button.

3. FRONT AND REAR WHEELS

Check that wheel nuts are tight and not missing.

4. ARTICULATION

Check for excessive play or damage. Ensure that the hinge area is free from mud, debris, or other foreign material.

Inspect the steer cylinders for leaks or loose fittings.

5. REAR DECK COMPONENTS

Check that hoses are secure.

Check that there has been no fluid leakage from cylinders or hoses. Check for cracks or loose hydraulic fittings.

Check that all light mounting brackets are secure.

Check that all pin retainer bolts are in place.

6. REAR DECK COMPONENTS

(Opposite side)

Same as in 5.

7. MAIN CONTROL VALVE

Check that the hoses are secure.

Check that there is no fluid leakage.

8. ARTICULATION

Check articulation same as in 4.

9. FRONT AND REAR WHEELS

Same as in 3.

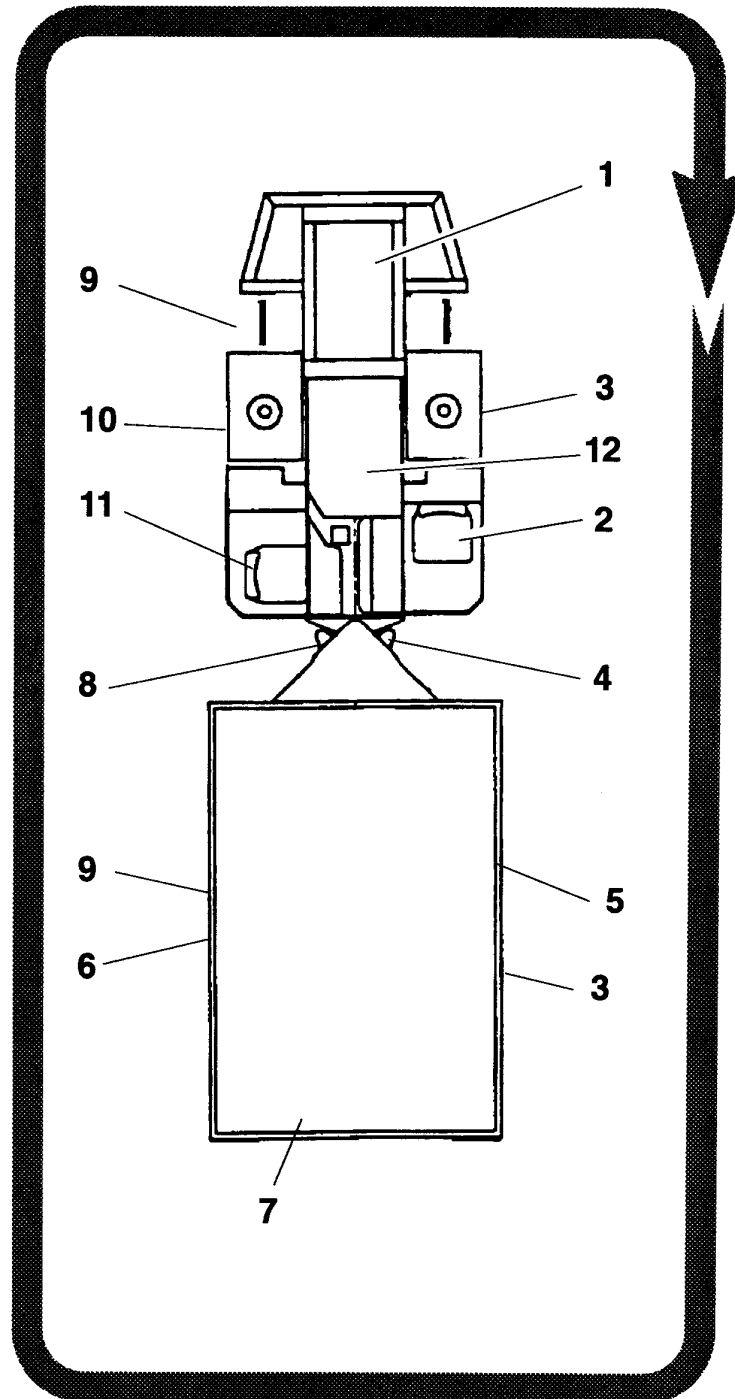
10. ENGINE END

Check hydraulic oil level. Fill as required.

Check fuel tank level. Fill as required.

Note the location of the fire extinguisher.

VEHICLE WALK-AROUND



VEHICLE WALK-AROUND**11. OPERATORS COMPARTMENT**

- Check that the seatbelt is functional.
- Check location of fire suppression button.
- Check that the selector valve is pushed down to the tram mode.

12. TRANSMISSION/TORQUE CONVERTER

- Check fluid level.
- Engine must be running, with transmission fluid at operating temperature.

 WARNING

Vehicle must be in neutral with the emergency brake on, while checking the transmission/torque converter fluid level.

OIL TABLES

TABLE 1-1


For Use At Outside Temperatures From -30°C (-22°F) To +50°C (+122°F)											
OUTSIDE TEMP.	°C °F	-30 -22	-20 -4	-10 +14	0 +32	+10 +50	+20 +68	+30 +86	+40 +104	+50 +122	
<div style="display: flex; flex-direction: column; align-items: center;"> <p>ENGINE OIL</p>  </div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="width: 25%; height: 20px; background-color: #e0e0e0; border: 1px solid black; margin-bottom: 5px;">SAE 5W-20</div> <div style="width: 35%; height: 20px; background-color: #e0e0e0; border: 1px solid black; margin-bottom: 5px;">SAE 10W</div> <div style="width: 50%; height: 20px; background-color: #e0e0e0; border: 1px solid black; margin-bottom: 5px;">SAE 10W-30, 10W-40</div> <div style="width: 40%; height: 20px; background-color: #e0e0e0; border: 1px solid black; margin-bottom: 5px;">SAE 15W-40</div> <div style="width: 30%; height: 20px; background-color: #e0e0e0; border: 1px solid black; margin-bottom: 5px;">SAE 30</div> <div style="width: 25%; height: 20px; background-color: #e0e0e0; border: 1px solid black;">SAE 40</div> </div>										
	OUTSIDE	°C	-30	-20	-10	0	+10	+20	+30	+40	+50
	TEMP.	°F	-22	-4	+14	+32	+50	+68	+86	+104	+122

TABLE 1-2


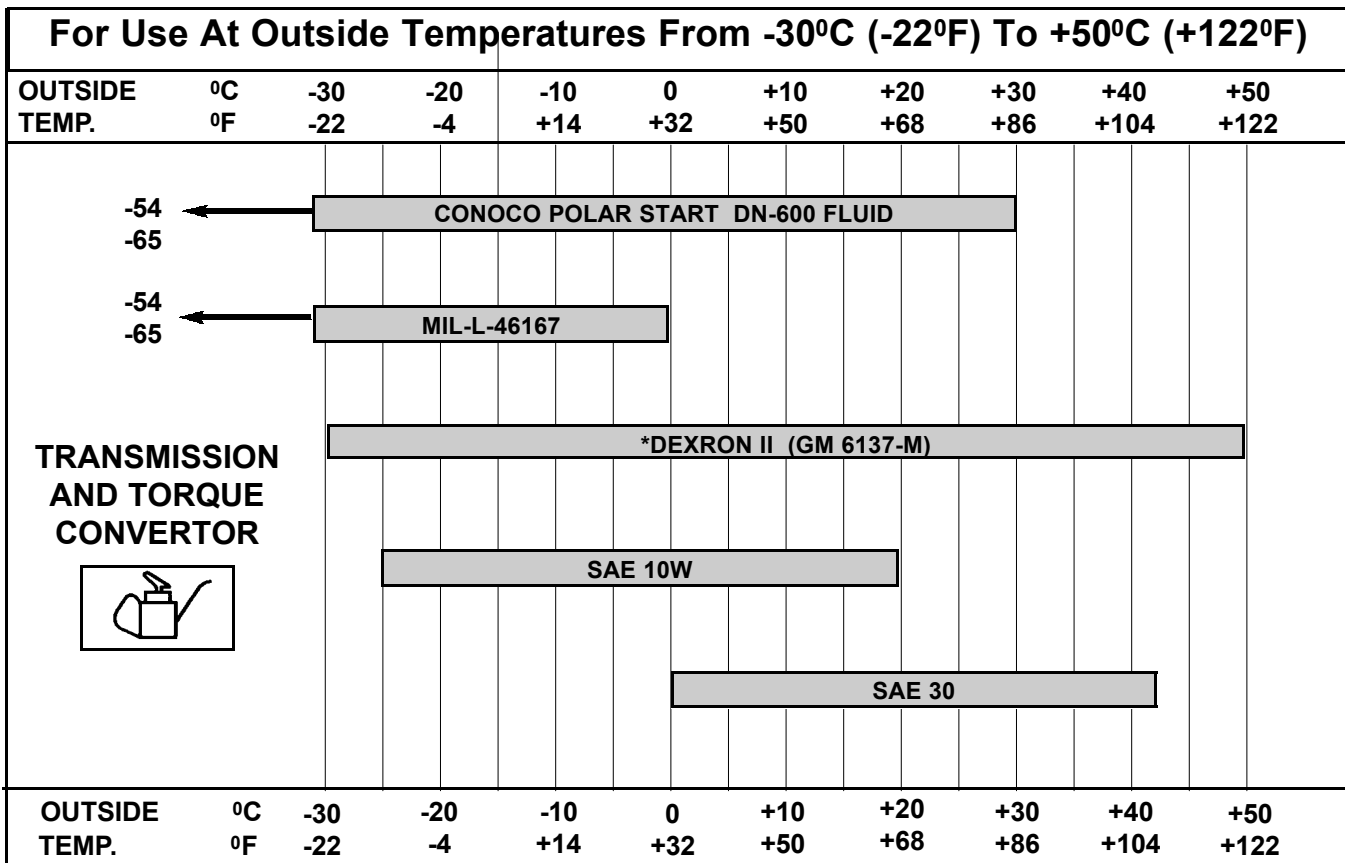
For Use At Outside Temperatures From -30°C (-22°F) To +50°C (+122°F)											
OUTSIDE TEMP.	°C °F	-30 -22	-20 -4	-10 +14	0 +32	+10 +50	+20 +68	+30 +86	+40 +104	+50 +122	
<div style="display: flex; flex-direction: column; align-items: center;"> <p>HYDRAULIC SYSTEM AND BRAKE CIRCUIT</p>  </div>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="width: 25%; height: 20px; background-color: #e0e0e0; border: 1px solid black; margin-bottom: 5px;">SAE SPC5W-20</div> <div style="width: 35%; height: 20px; background-color: #e0e0e0; border: 1px solid black; margin-bottom: 5px;">SAE 5W-20</div> <div style="width: 30%; height: 20px; background-color: #e0e0e0; border: 1px solid black; margin-bottom: 5px;">SAE 10W</div> <div style="width: 100%; height: 20px; background-color: #e0e0e0; border: 1px solid black; margin-bottom: 5px;">* NO. 32 HYDRAULIC OIL (RECOMMENDED)</div> <div style="width: 50%; height: 20px; background-color: #e0e0e0; border: 1px solid black; margin-bottom: 5px;">SAE 10W-30</div> <div style="width: 60%; height: 20px; background-color: #e0e0e0; border: 1px solid black;">SAE 15W-40</div> </div>										
	OUTSIDE	°C	-30	-20	-10	0	+10	+20	+30	+40	+50
	TEMP.	°F	-22	-4	+14	+32	+50	+68	+86	+104	+122

TABLE 1-3



* DEXRON II IS A GM TRADEMARK.

Component	Recommended Lubricant	Capacity gal U.S. (liters)
Engine Deutz B/FL 413F Deutz F3-6L 912/W	API Classes CC/SE, CD/SE, CE/SF, CC/SF, CD/SF. CE, SG (see table 1-1).	5.5 gal (21 l) 3.7 gal (14 l)
Transmission Clark R28000 Clark R18000	Dexron Type ATF (see table 1-2)	*7 gal (26.5 l) *7.9 gal (30 l)
Torque Converter Clark C270 Clark 2000	Dexron Type ATF (see table 1-2)	7 gal (26.5 l) 7.9 gal (30 l)
Axles New Holland D64	FNH 134 Universal Tractor Oil	7 gal (26.5 l) approx
Hydraulic Circuit	No.32 Hydraulic Oil (see table 1-4)	80 gal (303 l) approx
Hydraulic Tank	No.32 Hydraulic Oil (see table 1-4)	50 gal (190 l)
Fuel Tank	Distillate Fuels ASTM D975-81; 1-D and 2-D	50 gal (190 l)
General Greasing	Use a good quality Multi-purpose EP Grease	as required

* THE TRANSMISSION AND TORQUE CONVERTOR ARE CONSIDERED AS ONE CIRCUIT.

PREVENTATIVE MAINTENANCE

DATE _____ TIME _____ SHIFT _____

UNIT _____ WORK STARTED _____

HOURS _____ WORK COMPLETED _____

PERFORMED BY: _____ REVIEWED BY: _____

PERFORM THE FOLLOWING AND INITIAL

EVERY SHIFT				
GENERAL				
	GOOD	NEED PARTS	REPAIRED	INITIAL
1) Perform the pre-start checks as outlined on page 3.				
2) Check the transmission oil level. The unit must be warmed to operating temperature (180°-200°F) and idling in neutral.				
3) Check the back-up alarm is operational.				
4) Check the operation of tramming and work lights.				
5) Check the operation of the horn.				

COMMENT

Document any comments relative to any PM findings _____

PREVENTATIVE MAINTENANCE

UNIT _____ DATE _____ TIME _____ SHIFT _____
 WORK STARTED _____
 HOURS _____ WORK COMPLETED _____
 PERFORMED BY _____ REVIEWED BY: _____

PERFORM THE FOLLOWING AND INITIAL

100 HOUR				
GENERAL	GOOD	NEED PARTS	REPAIRED	INITIAL
1) Change engine oil and filter element.				
2) Change hydraulic pressure filter element.				
3) Change hydraulic return filter element.				
4) Check air filter indicator.				
5) Observe battery electrolyte level.				
6) Grease the oscillation on the front axle.				
7) Grease the boom.				

COMMENT

Document any comments relative to any PM findings _____

PREVENTATIVE MAINTENANCE

DATE TIME SHIFT

UNIT _____ WORK STARTED _____

HOURS _____ WORK COMPLETED _____

PERFORMED BY: _____ REVIEWED BY: _____

PERFORM THE FOLLOWING AND INITIAL

250 HOUR PREVENTATIVE MAINTENANCE
--

ENGINE AND COOLING SYSTEM	GOOD	NEED PARTS	REPAIRED	SIGN
1) Visual check on air intake system, including: hoses, clamps, an connections.				
2) Check for engine oil leaks.				
3) Check engine mounts for condition and secureness.				
4) Check V belts for tension and wear (always replace belts as a set). Adjustment 9/16" to 13/16" with 25lb. of force applied midway between pulleys.				
5) Check fan and fan hub.				
6) Check exhaust system: pipes, muffler, clamps, mounting and brackets.				
7) Check fuel system lines, connections, governor, and pump for leaks.				
8) Check engine wiring, gauges, glow plugs, warning lights, for frays, connection and operation.				
9) Check battery cables source, connections and electrolyte level. Clean batteries.				

If required have unit steam cleaned

COMMENT

Document any comments relative to PM findings. _____

BRAKE SYSTEM	GOOD	NEED PARTS	REPAIRED	INITIAL
1) Check parking brake operation.				
2) Check main braking system.				
3) Check brake lines, fittings and any accumulators for leaks.				
4) Check brake linings on emergency brake.				

COMMENT

Document any comments relative to PM findings _____

STEERING SYSTEM	GOOD	NEED PARTS	REPAIRED	INITIAL
1) Check condition of steering cylinders, hoses and valves.				
2) Check condition of all steering cylinder bearings, pins, bushings, linkages.				

COMMENT

Document any comments relative to PM findings _____

PREVENTATIVE MAINTENANCE

HYDRAULIC SYSTEM	GOOD	NEED PARTS	REPAIRED	INITIAL
1) Check hydraulic control linkages for excess wear.				
2) Check hydraulic cylinders for loose head caps and packing seal leaks.				
3) Check hydraulic hoses and mountings for condition and leaks.				
4) Check all hydraulic valve blocks for condition and leaks.				
5) Check any cylinder bearing pins, bushings and rod ends for excessive wear.				

COMMENT

Document any comments relative to PM findings _____

GENERAL	GOOD	NEED PARTS	REPAIRED	INITIAL
1) Check back-up alarm.				
2) Check all wiring for loose connections, fraying and corrosion.				
3) Check the condition of the seat.				
4) Check condition and operation of seat belts.				
5) Check the hand held fire extinguisher.				
6) Check the tires and rims for wear and damage.				
7) Spot check wheel lugs and nut torque at 300lbs.				
8) Lubricate throttle and brake peddle linkages.				
9) Lubricate transmission shift linkages.				
10) Lubricate drive shaft fittings.				
11) Check and clean axle breather vents.				
12) Check front and rear axle oil level.				
13) Check the operation of the Fire Suppression system.				

COMMENT

Document any documents relative to PM findings

PREVENTATIVE MAINTENANCE

DATE _____ TIME _____ SHIFT _____

UNIT _____ WORK STARTED _____

HOURS _____ WORK COMPLETED _____

PERFORMED BY: _____ REVIEWED BY: _____

PERFORM THE FOLLOWING AND INITIAL

500 HOURS PREVENTATIVE MAINTENANCE	PLUS INCLUDE ALL 250 HOUR WORK			
GENERAL	GOOD	NEED PARTS	REPAIRED	INITIAL
1) Check hydraulic pump pressures.				
2) Check differential for loose moving bolts.				
3) Clean engine breather.				
4) Change fuel filter.				
5) Change transmission filter.				

COMMENT

Document any comments relative to PM findings _____

1000 HRS. PREVENTATIVE MAINTENANCE	PLUS INCLUDE ALL ABOVE WORK			
GENERAL	GOOD	NEED PARTS	REPAIRED	INITIAL
1) Change engine fuel strainer / screen.				
2) Check engine shut off controls.				
3) Change hydraulic oil.				
4) Check pressure relief and flow settings in hydraulic circuit.				
5) Change transmission filter.				
6) Clean the transmission sump screen.				
7) Inspect structure of boom and components				

COMMENT

Document any comments relative to PM findings _____

PREVENTATIVE MAINTENANCE

UNIT _____ DATE _____ TIME _____ SHIFT _____
 WORK STARTED _____
 HOURS _____ WORK COMPLETED _____
 PERFORMED BY: _____ REVIEWED BY: _____

PERFORM THE FOLLOWING AND INITIAL
PLUS
 INCLUDE ALL ABOVE WORK

2000 HRS. PREVENTATIVE MAINTENANCE				
STRUCTURAL	GOOD	NEED PARTS	REPAIRED	INITIAL
1) Check handrails and steps for condition and 3 point stance.				
2) Check hood, engine canopy and grill area.				
3) Check bumpers				
4) Check fuel tanks and mounts.				
5) Check main frame.				
6) Check condition of stabilizers, plus their up-down operation.				
7) Check stabilizer mounts.				

COMMENT

Document any comments relative to PM findings _____

PREVENTATIVE MAINTENANCE

2000 HRS. PREVENTATIVE MAINTENANCE

GENERAL	GOOD	NEED PARTS	REPAIRED	INITIAL
11) Adjust engine valve lash (see Engine Operational manual in Engine Section)				
12) Lubricate pillow blocks on driveline 2-3 shots MPG grease.				

COMMENT

Document any comments relative to PM findings _____

PREVENTATIVE MAINTENANCE

PROCEDURE	250hr	500hr	1000hr	2000hr
1) Change engine oil and filter element.	A T 1 0 0 H O U R I N T E R V A L S			
2) Change hydraulic oil.			✓	
3) Clean or replace suction strainer in hydraulic tank.			✓	
4) Change transmission oil.*			✓	
5) Change axle oil (differential fluid).				✓
6) Change fuel filter element.		W H E N R E Q U I R E D		
7) Change air filter element.		W H E N R E Q U I R E D		
8) Change transmission filter element.**		✓		
9) Change hydraulic oil return filter element.	A T 2 0 0 H O U R I N T E R V A L S			
10) Change hydraulic oil pressure filter element.	A T 2 0 0 H O U R I N T E R V A L S			
11) Grease articulation.		E V E R Y S H I F T		

* See transmission service manual in "**Powertrain Section**" for oil change procedure.

** It is recommended that the transmission filter element be changed after 50 and 100 hours of operation on new and rebuilt or repaired units.

CONVERSION FACTORS

QUANTITY	SI UNIT OF MEASURE	US UNIT OF MEASURE	CONVERSION
Length	Millimeter (mm)	Inch (in)	1 in. = 25.4 mm
Pressure (note 1)	Bar (assumed to be "gauge" unless otherwise stated)	Pounds per square inch (psi or psig)	1 Bar = 14.5 psi
Pressure (see note 2)	Bar (a value less than 1.0 is shown as a decimal, i.e. 0.95 bar)	Inches of mercury (in Hg)	1 in Hg (@ 60° F) = 0.034 bar
Flow (note 3)	Liters per minute (l/min)	Gallons per minute (gpm)-U.S.	1 gpm = 3.79 l/min
Flow (note 3)	Liters per second (l/sec)	Gallons per minute (gpm)- U.S.	1 gpm = 0.063 l/sec
Flow (note 4)	Cubic decimeters per second (dm ³ /s)	Cubic feet per minute (cfm)	1 dm ³ /s = 2.12 scfm
Force	Newton (N)	Pound (f) lb(f)	1 lb(f) = 4.44 N
Mass	Kilogram (kg)	Pound (m) lb(m)	1 kg = 2.20 lb(m)
Time	Second (s)	Second (s)	
Volume (note 3)	Liter (l)	Gallon (gal) U.S.	1 U.S. gal = 3.79 l
Temperature	Degrees Celsius (°C)	Degrees Fahrenheit (°F)	°C = 5/9 (°F -32)
Torque	kilogram - meters (kg-m)	Foot -pounds (ft-lbs)	1 kg.m = 7.23 ft-lbs
Power	Kilowatt (kW)	Horsepower (HP)	1 kW = 1.34 HP
Shaft speed	Revolutions per minute (rev/min)	Revolutions per minute (RPM)	-
Frequency	Hertz (Hz)	Cycles per second (cps)	1 Hz = 1 cps
Displacement (note 3)	Milliliters per revolution (ml/rev)	Cubic inches per revolution (cip)	1 ml / rev = 0.061 cipr
Kinematic viscosity	Centistokes (cSt)	Saybolt (SUS)	cSt = (4.635) (SUS) (note 5)
Velocity	Meter per second (m/s)	Feet per second (fps)	1 m/s = 3.28 fps
Material stress	Deka newtons per sq. millimeter (da N /mm ²)	Pounds per sq. inch (psi)	1 da N / mm ² = 1450 psi

NOTE 1 : PRESSURE ABOVE ATMOSPHERIC
 NOTE 2 : PRESSURE BELOW ATMOSPHERIC
 NOTE 3 : LIQUID

NOTE 4 : GAS -UNDER STANDARD TEMPERATURE, HUMIDITY, AND PRESSURE CONDITIONS

NOTE 5 : @ 38 ° C; FACTOR IS 4.667 @ 99 ° C

GENERAL TORQUE VALUES

THREAD SIZE	HEX SIZE	SAE GRADE 5				SAE GRADE 8			
		DRY		LUBRICATED		DRY		LUBRICATED	
		Ft-lb	kgm	Ft-lb	kgm	Ft-lb	kgm	Ft-lb	kgm
1/4 -20	7/16	8	1.1	*75	0.86	12	1.7	9	1.2
1/4 -28	7/16	10	1.4	*86	0.99	14	1.9	10	1.4
5/16 -18	1/2	17	2.4	13	1.8	25	3.5	18	2.5
5/16 -24	1/2	19	2.6	14	1.9	25	3.5	20	2.8
3/8 -16	9/16	30	4.1	23	3.2	45	6.2	35	4.8
3/8 -24	9/16	35	4.8	25	3.5	50	6.9	35	4.8
7/16 -14	5/8	50	6.9	35	4.8	70	9.7	55	7.6
7/16 -20	5/8	55	7.6	40	5.5	80	11.1	60	8.3
1/2 -13	3/4	75	10.4	55	7.6	110	15.2	80	11.1
1/2 -20	3/4	90	12.4	65	9.0	120	16.6	90	12.4
9/16 -12	13/16	110	15.2	80	11.1	150	20.7	110	15.2
9/16 -18	13/16	120	16.6	90	12.4	170	23.5	130	18.0
5/8 -11	15/16	150	20.7	110	15.2	280	38.7	170	23.5
5/8 -18	15/16	180	24.9	130	18.0	240	33.2	180	24.9
3/4 -10	1 1/8	260	40.0	200	27.7	380	52.6	280	38.7
3/4 -16	1 1/8	300	41.5	220	30.4	420	58.1	320	44.3
7/8 -9	1 5/16	430	59.5	320	44.3	600	83.0	460	63.6
7/8 -14	1 5/16	470	65.0	360	49.8	660	91.3	500	69.2
1 -8	1 1/2	640	88.5	480	66.4	900	124	680	94.0
1 -14	1 1/2	730	101	540	74.7	1020	141	760	105
1 1/8 -7	1 11/16	800	111	600	83.0	1280	177	960	133
1 1/8 -12	1 11/16	880	122	660	91.3	1440	199	1080	149
1 1/4 -7	1 7/8	1120	155	840	116	1820	232	1360	188
1 1/4 -12	1 7/8	1240	171	920	127	2000	277	1500	207
1 3/8 -6	2 1/16	1460	202	1100	152	2380	329	1780	246
1 3/8 -12	2 1/16	1680	232	1260	174	2720	376	2040	282
1 1/2 -6	2 1/4	1940	268	1460	202	1360	437	2360	326
1 1/2 -12	2 1/4	2200	304	1640	227	3560	492	2660	368

* in-lb.

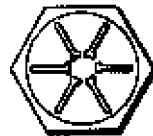
NOTES:

1. Always use the torque value listed above when specific torque are not available.
2. Do not use above values in place of those specified in other sections of this manual or other manuals pertaining to this equipment.
3. The torque values listed in the "dry" columns are based on use of clean, dry threads.
4. The torque values listed in the "lubricated" columns are based on the use of cleans threads lubricated with oil, grease, molybdenum disulphide based grease, and usage of hardened washers.
5. Bolts threaded into aluminum may require reduction in torque values of up to 30 %, unless inserts are used.

Grade 5 and grade 8 bolts can be distinguished by their head markings.



GRADE 5 BOLT, CARBON STEEL, HEAT TREATED



GRADE 8 BOLT, ALLOY STEEL, HEAT TREATED



**BREAKER
TECHNOLOGY,
INC.**

an Astec company

SOLON FACILITY
30625 Solon Industrial Drive,
SOLON OHIO,
44139 U.S.A.
PH. 440-542-3720
FAX. 440-542-3721

RIVERSIDE FACILITY
3464 DURAHART ST.
RIVERSIDE,CALIF.
92507 U.S.A.
PH. 909-369-0878
FAX. 909-369-8281

THORNBURY FACILITY
35 ELGIN ST.,
THORNBURY,ONT.
N0H 2P0 CANADA
PH. 519-599-2015
FAX. 519-599-6803

