

**SERVICE MANUAL**

Loader / Backhoe

M  
Series  
2

6-74432

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

**SERVICE MANUAL**

Loader / Backhoe

M  
Series  
2

6-74432

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

**SERVICE MANUAL**

Loader / Backhoe

M  
Series  
2

6-74432

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

**SERVICE MANUAL**

Loader / Backhoe

M  
Series  
2

6-74432

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

# M SERIES 2 LOADER/BACKHOE

## Service Manual

### Bur 6-74432

#### Table of Contents

Description	Section Number	Publication Form Number
<b>General</b>		
Section Index - General	<b>Tab 1</b>	6-74450
Standard Torque Specifications	1001	8-71603
Fluids and Lubricants	1002	6-74461
Metric Conversion Chart	1003	7-52950
 <b>Engine</b>  		
Section Index - Engine	<b>Tab 2</b>	6-74470
Engine and Radiator Removal and Installation	2000	6-74481
Stall Test	2002	6-74492
In Vehicle Injector Pump Removal and Installation	2445	6-79380
Counter Balance Removal and Installation	2447	6-74700
Engine Service Manual	<b>Tab 3</b>	6-74500
 <b>Fuel System</b>  		
Section Index - Fuel System	<b>Tab 3</b>	6-74510
<i>NOTE: For Fuel System Repair See Engine Service Manual.</i>		
 <b>Electrical</b>  		
Section Index - Electrical	<b>Tab 4</b>	6-74520
Removal and Installation of Electrical Components	4000	6-74530
Electrical Specifications and Troubleshooting	4001	6-74541
Batteries	4003	6-74550
Starter and Starter Solenoid	4004	6-74560
Instrument Cluster	4005	6-74570

**Reprinted**

**M SERIES 2 LOADER/BACKHOE**  
**Service Manual**  
**Bur 6-74432**

**Table of Contents (Continued)**

Description	Section Number	Publication Form Number
<b>Steering</b>	<b>Tab 5</b>	
Section Index - Steering	6-74590	
Removal and Installation of Steering Components	5000	6-74600
Steering Specification, Pressure Checks and Troubleshooting	5001	6-74610
Steering Control Valve	5002	6-74621
Steering Cylinders	5003	6-74630
Front Axle - Two Wheel Drive	5005	6-74640
Front Axle - Four Wheel Drive 580M, 580SM, and 580SM+	5006	6-74650
Front Axle - Four Wheel Drive 590SM	5006	6-74670
<b>Power Train</b>	<b>Tab 6</b>	
Section Index - Power Train	6-74680	
Removal and Installation of Power Train Components	6000	6-74690
Standard Transmission Specifications, Pressure Checks, and Troubleshooting	6002	6-74710
Power Shift Transmission Specifications, Pressure Checks, and Troubleshooting	6002	6-74720
Wheels and Tires	6003	6-74730
Rear Axle and Planetaries - 580M, 580SM, and 580SM+	6004	6-74751
Rear Axle and Planetaries - 590SM	6004	6-74770
Standard Transmission	6007	6-74782
Power Shift Transmission	6007	6-74790
<b>Brakes</b>	<b>Tab 7</b>	
Section Index - Brakes	6-74800	
Removal and Installation of Brake Components	7000	6-74810
Hydraulic Brake Troubleshooting	7002	6-74820
Master Cylinder	7003	6-74830
<b>Hydraulics</b>	<b>Tab 8</b>	
Section Index - Hydraulics	6-74842	
Removal and Installation of Hydraulic Components	8001	6-74850
Removal and Installation of Hydraulic Components 590SM With Pilot Controls	8001	6-74761
Hydraulic System Specifications and Troubleshooting With Mechanical Controls	8002	6-74862
Hydraulic System Specifications and Troubleshooting 580M, 580SM, and 580SM+ With Pilot Controls	8002	6-74872
Hydraulic System Specifications and Troubleshooting 590SM With Pilot Controls	8002	6-74741
Cleaning the Hydraulic System	8003	6-74880
Hydraulic Pump 580SM, 580SM+ (all versions), and 590SM With Mechanical Controls	8004	6-74900

**M SERIES 2 LOADER/BACKHOE**  
**Service Manual**  
**Bur 6-74432**

**Table of Contents (Continued)**

Description	Section Number	Publication Form Number
<b>Hydraulics (Cont)</b> <span style="float: right;"><b>Tab 8</b></span>		
Hydraulic Pump 590SM With Pilot Controls	8004	6-80010
Loader Control Valve 580M, 580SM 580SM+ (all versions), and 590SM With Mechanical Controls	8005	6-74912
Loader Control Valve 590SM With Pilot Controls	8005	6-79930
Cylinders	8006	6-74920
Backhoe Control Valve With Mechanical Controls	8007	6-74931
Backhoe Control Valve With Pilot Controls 580M, 580SM and 580SM+	8007	6-74941
Backhoe Control Valve With Pilot Controls 590SM	8007	6-79940
Accumulator for Machines With Ride Control and Pilot Control Accumulator	8009	6-74960
Solenoid Valve for Machines with Optional Ride Control	8010	6-74970
Boom Lock Solenoid Valve	8011	6-74980
Quick Coupler	8012	6-74990
Swing Dampening Valve	8013	6-75000
Pilot Control Unit	8014	6-79950
Proportional Pilot Pressure Control	8015	6-79960
<b>Mounted Equipment</b> <span style="float: right;"><b>Tab 9</b></span>		
Section Index - Mounted Equipment	6-75011	
Pedals and Levers	9001	6-75020
Air Conditioning Troubleshooting	9002	6-75031
Air Conditioning System Service	9004	6-75051
Air Conditioning Components Service	9005	6-75061
Loader	9006	6-75070
ROPS Cab and Canopy	9007	6-75080
Backhoe	9008	6-75090
Standard and Mechanical Suspension Seat	9009	6-75100
Sears Mechanical and Standard Suspension Seat	9009	6-80000
Air Suspension Seat	9010	6-75111
Rear Window Replacement	9012	6-75040
<b>Schematic Set</b>		
Hydraulic and Electrical Schematics	In Rear Pocket	6-75122

**NOTE:** CNH Corporation reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.

## SECTION INDEX

### GENERAL

Section Title	Section Number
Standard Torque Specifications .....	1001
Fluid and Lubricants .....	1002
Metric Conversion Chart .....	1003

# Section

# 1001

## GENERAL TORQUE SPECIFICATIONS

## TABLE OF CONTENTS

TORQUE SPECIFICATIONS - DECIMAL HARDWARE .....	3
TORQUE SPECIFICATIONS - METRIC HARDWARE .....	4
TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS .....	5
TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS .....	6

## TORQUE SPECIFICATIONS - DECIMAL HARDWARE

Use the torques in this chart when special torques are not given. These torques apply to fasteners with both UNC and UNF threads as received from suppliers dry, or when lubricated with engine oil. Not applicable if special graphitics, Molydisulfide greases, or other extreme pressure lubricants are used.

<b>Grade 5 Bolts, Nuts, and Studs</b>		
  		
Size	Pound- Inches	Newton metres
1/4 inch	108 to 132	12 to 15
5/16 inch	204 to 252	23 to 28
3/8 inch	420 to 504	48 to 57
Size	Pound- Feet	Newton metres
7/16 inch	54 to 64	73 to 87
1/2 inch	80 to 96	109 to 130
9/16 inch	110 to 132	149 to 179
5/8 inch	150 to 180	203 to 244
3/4 inch	270 to 324	366 to 439
7/8 inch	400 to 480	542 to 651
1.0 inch	580 to 696	787 to 944
1-1/8 inch	800 to 880	1085 to 1193
1-1/4 inch	1120 to 1240	1519 to 1681
1-3/8 inch	1460 to 1680	1980 to 2278
1-1/2 inch	1940 to 2200	2631 to 2983

<b>Grade 8 Bolts, Nuts, and Studs</b>		
  		
Size	Pound- Inches	Newton metres
1/4 inch	144 to 180	16 to 20
5/16 inch	288 to 348	33 to 39
3/8 inch	540 to 648	61 to 73
Size	Pound- Feet	Newton metres
7/16 inch	70 to 84	95 to 114
1/2 inch	110 to 132	149 to 179
9/16 inch	160 to 192	217 to 260
5/8 inch	220 to 264	298 to 358
3/4 inch	380 to 456	515 to 618
7/8 inch	600 to 720	814 to 976
1.0 inch	900 to 1080	1220 to 1465
1-1/8 inch	1280 to 1440	1736 to 1953
1-1/4 inch	1820 to 2000	2468 to 2712
1-3/8 inch	2380 to 2720	3227 to 3688
1-1/2 inch	3160 to 3560	4285 to 4827

**NOTE:** Use thick nuts with Grade 8 bolts.

## TORQUE SPECIFICATIONS - METRIC HARDWARE

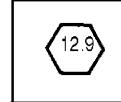
Use the following torques when specifications are not given.

These values apply to fasteners with coarse threads as received from supplier, plated or unplated, or when lubricated with engine oil. These values do not apply if graphite or Molydisulfide grease or oil is used.

Grade 8.8 Bolts, Nuts, and Studs		
8.8		
Size	Pound-Inches	Newton metres
M4	24 to 36	3 to 4
M5	60 to 72	7 to 8
M6	96 to 108	11 to 12
M8	228 to 276	26 to 31
M10	456 to 540	52 to 61
Size	Pound-Feet	Newton metres
M12	66 to 79	90 to 107
M14	106 to 127	144 to 172
M16	160 to 200	217 to 271
M20	320 to 380	434 to 515
M24	500 to 600	675 to 815
M30	920 to 1100	1250 to 1500
M36	1600 to 1950	2175 to 2600

Grade 10.9 Bolts, Nuts, and Studs		
10.9		
Size	Pound-Inches	Newton metres
M4	36 to 48	4 to 5
M5	84 to 96	9 to 11
M6	132 to 156	15 to 18
M8	324 to 384	37 to 43
Size	Pound-Feet	Newton metres
M10	54 to 64	73 to 87
M12	93 to 112	125 to 150
M14	149 to 179	200 to 245
M16	230 to 280	310 to 380
M20	450 to 540	610 to 730
M24	780 to 940	1050 to 1275
M30	1470 to 1770	2000 to 2400
M36	2580 to 3090	3500 to 4200

## Grade 12.9 Bolts, Nuts, and Studs



Usually the torque values specified for grade 10.9 fasteners can be used satisfactorily on grade 12.9 fasteners.

## TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

Tube OD Hose ID	Thread Size	Pound- Inches	Newton metres
<b>37 Degree Flare Fitting</b>			
1/4 inch 6.4 mm	7/16-20	72 to 144	8 to 16
5/16 inch 7.9 mm	1/2-20	96 to 192	11 to 22
3/8 inch 9.5 mm	9/16-18	120 to 300	14 to 34
1/2 inch 12.7 mm	3/4-16	180 to 504	20 to 57
5/8 inch 15.9 mm	7/8-14	300 to 696	34 to 79
Tube OD Hose ID	Thread Size	Pound- Feet	Newton metres
3/4 inch 19.0 mm	1-1/16-12	40 to 80	54 to 108
7/8 inch 22.2 mm	1-3/16-12	60 to 100	81 to 135
1.0 inch 25.4 mm	1-5/16-12	75 to 117	102 to 158
1-1/4 inch 31.8 mm	1-5/8-12	125 to 165	169 to 223
1-1/2 inch 38.1 mm	1-7/8-12	210 to 250	285 to 338

Tube OD Hose ID	Thread Size	Pound- Inches	Newton metres
<b>Straight Threads with O-ring</b>			
1/4 inch 6.4 mm	7/16-20	144 to 228	16 to 26
5/16 inch 7.9 mm	1/2-20	192 to 300	22 to 34
3/8 inch 9.5 mm	9/16-18	300 to 480	34 to 54
1/2 inch 12.7 mm	3/4-16	540 to 804	57 to 91
Tube OD Hose ID	Thread Size	Pound- Feet	Newton metres
5/8 inch 15.9 mm	7/8-14	58 to 92	79 to 124
3/4 inch 19.0 mm	1-1/16-12	80 to 128	108 to 174
7/8 inch 22.2 mm	1-3/16-12	100 to 160	136 to 216
1.0 inch 25.4 mm	1-5/16-12	117 to 187	159 to 253
1-1/4 inch 31.8 mm	1-5/8-12	165 to 264	224 to 357
1-1/2 inch 38.1 mm	1-7/8-12	250 to 400	339 to 542

<b>Split Flange Mounting Bolts</b>		
Size	Pound- Inches	Newton metres
5/16-18	180 to 240	20 to 27
3/8-16	240 to 300	27 to 34
7/16-14	420 to 540	47 to 61
Size	Pound- Feet	Newton metres
1/2-13	55 to 65	74 to 88
5/8-11	140 to 150	190 to 203

# TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

Nom. SAE Dash Size	Tube OD	Thread Size	Pound- Inches	Newton metres	Thread Size	Pound- Inches	Newton metres
<b>O-ring Face Seal End</b>						<b>O-ring Boss End</b>	<b>Fitting or Lock Nut</b>
-4	1/4 inch 6.4 mm	9/16-18	120 to 144	14 to 16	7/16-20	204 to 240	23 to 27
-6	3/8 inch 9.5 mm	11/16-16	216 to 240	24 to 27	9/16-18	300 to 360	34 to 41
-8	1/2 inch 12.7 mm	13/16-16	384 to 480	43 to 54	3/4-16	540 to 600	61 to 68
					Thread Size	Pound- Feet	Newton metres
-10	5/8 inch 15.9 mm	1-14	552 to 672	62 to 76	7/8-14	60 to 65	81 to 88
Nom. SAE Dash Size	Tube OD	Thread Size	Pound- Feet	Newton metres	1-1/16-12	85 to 90	115 to 122
					1-3/16-12	95 to 100	129 to 136
-12	3/4 inch 19.0 mm	1-3/16-12	65 to 80	90 to 110	1-5/16-12	115 to 125	156 to 169
-14	7/8 inch 22.2 mm	1-3/16-12	65 to 80	90 to 110	1-5/8-12	150 to 160	203 to 217
-16	1.0 inch 25.4 mm	1-7/16-12	92 to 105	125 to 140	1-7/8-12	190 to 200	258 to 271
-20	1-1/4 inch 31.8 mm	1-11/16-12	125 to 140	170 to 190			
-24	1-1/2 inch 38.1 mm	2-12	150 to 180	200 to 254			

# Section 1002

1002

## FLUIDS AND LUBRICANTS

## TABLE OF CONTENTS

CAPACITIES AND LUBRICANTS .....	3
ENGINE OIL RECOMMENDATIONS .....	4
DIESEL FUEL .....	6
Fuel Storage .....	6
Specifications for Acceptable No. 2 Diesel Fuel .....	6
DYE AND BLACK LIGHT PROCEDURE FOR DETECTING OIL LEAKS .....	7

## CAPACITIES AND LUBRICANTS

Engine Crankcase		
All Machines .....	13.6 litres (14.4 U.S. quarts)	
Specifications .....	Case AKCELA No. 1 15W-40 API CH-4	
Fuel Tank		
Capacity, usable (580M and 580SM) .....	119 litres (31.4 U.S. gallons)	
Capacity, usable (580SM+ and 590SM) .....	159 litres (42 U.S. gallons)	
Optional tank (580M and 580SM only) .....	151 litres (40 U.S. gallons) usable	
Specifications .....	See page 6	
Cooling System		
Capacity with heater (580M) .....	16.8 litres (17.8 U.S. quarts)	
Capacity without heater (580M) .....	16.1 litres (17 U.S. quarts)	
Capacity with heater (580SM, 580SM+ and 590SM) .....	18 litres (19 U.S. quarts)	
Capacity without heater (580SM, 580SM+ and 590SM) .....	17.3 litres (18.3 U.S. quarts)	
Specifications .....	50% water and 50% ethylene glycol	
Hydraulic System		
Total System		
580M .....	106 litres (28 U.S. gallons) add 5.7 litres (6 U.S. qts) for extendahoe	
580SM and 580SM+ .....	119 litres (31.5 U.S. gallons) add 5.7 litres (6 U.S. qts) for extendahoe	
590SM .....	130 litres (34.3 U.S. gallons) add 5.7 litres (6 U.S. qts) for extendahoe	
Capacity with filter change .....	54.9 litres (14.5 U.S. gallons)	
Capacity without filter change .....	53 litres (14 U.S. gallons)	
Specifications .....	Case AKCELA Hy-Tran® Ultra	
Transmission		
Standard Transmission		
2 Wheel Drive		
Total system capacity .....	18.5 litres (19.5 U.S. quarts)	
Refill capacity with or without filter change .....	11.9 litres (12.6 U.S. quarts)	
Type of Fluid .....	Case AKCELA Hy-Tran® Ultra	
4 Wheel Drive		
Total system capacity .....	20.8 litres (22 U.S. quarts)	
Refill capacity with or without filter change .....	14.4 litres (15.2 U.S. quarts)	
Type of Fluid .....	Case AKCELA Hy-Tran® Ultra	
Powershift Transmission		
4 Wheel Drive		
Total system capacity .....	21.0 litres (22.2 U.S. quarts)	
Refill capacity with filter change .....	14.4 litres (15.2 U.S. quarts)	
Refill capacity without filter change .....	13.4 litres (14.2 U.S. quarts)	
Type of Fluid .....	Case AKCELA Trans-XHD	
Front Drive Axle - 4 Wheel Drive		
580M and 580SM		
Capacity - center bowl .....	5.5 litres (5.8 U.S. quarts)	
Capacity - each wheel end .....	0.66 litres (0.7 U.S. quarts)	
Type of Fluid .....	Case AKCELA Hy-Tran® Ultra	
580SM+		
Capacity - center bowl .....	7.6 litres (8 U.S. quarts)	
Type of Fluid .....	Case AKCELA Transaxle Fluid MS1317	
Capacity - each wheel end .....	0.7 litres (0.74 U.S. quarts)	
Type of Fluid .....	Case AKCELA Hy-Tran® Ultra	
590SM		
Capacity - center bowl .....	6.5 litres (6.9 U.S. quarts)	
Capacity - each wheel end .....	1 liter (1.1 U.S. quarts)	
Type of Fluid .....	Case AKCELA Hy-Tran® Ultra	

## Rear Axle

580M, 580SM and 580SM+

Capacity - center bowl .....	14.2 litres (15 U.S. quarts)
Capacity - each wheel end .....	1.5 litres (1.6 U.S. quarts)
Type of Fluid.....	Case AKCELA Hy-Tran® Ultra
Center Bowl Oil Additive .....	Case AKCELA Axle Oil Additive

## 590SM

Capacity - center bowl .....	14.2 litres (15 U.S. quarts)
Capacity - each wheel end .....	2 litres (2.1 U.S. quarts)
Type of Fluid.....	Case AKCELA Hy-Tran® Ultra
Center Bowl Oil Additive .....	Case AKCELA Axle Oil Additive

Brake Master Cylinder .....(Brake fluid supplied by hydraulic reservoir, see Hydraulic System.)

## ENGINE OIL RECOMMENDATIONS

Case AKCELA No.1 Engine Oil is recommended for use in your Case Engine. Case AKCELA No.1 Engine Oil will lubricate your engine correctly under all operating conditions. If Case AKCELA No. 1 Multi-Viscosity Engine Oil is not available, Case AKCELA No. 1 Single Grade Engine Oil can be used.

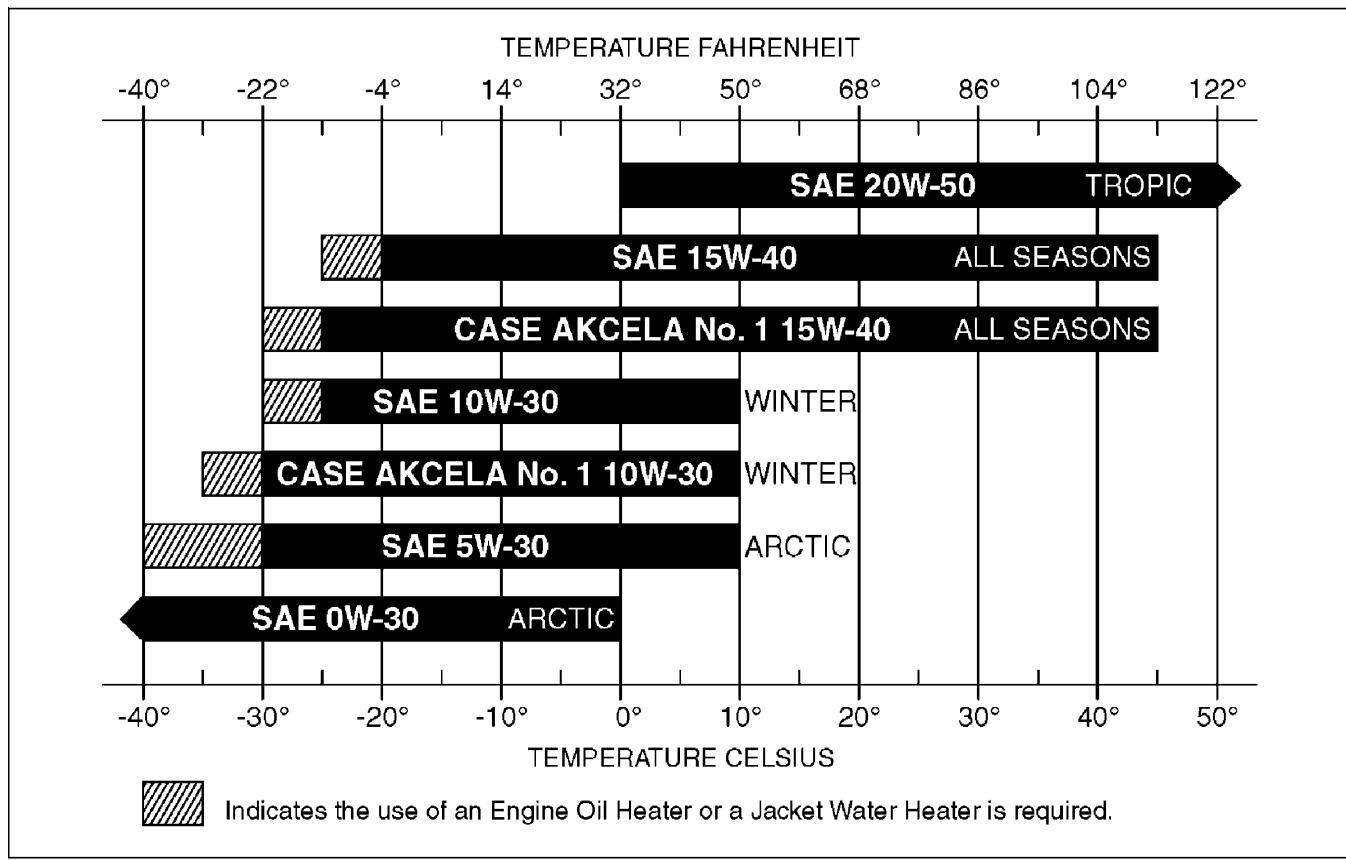


If Case AKCELA No.1 Multi-Viscosity or Single Grade Engine Oil is not available, use only oil meeting API engine oil service category CH-4.

See the chart for recommended viscosity at ambient air temperature ranges.



**NOTE:** Do not put Performance Additives or other oil additive products in the engine crankcase. The oil intervals given in the operators manual and service chart are according to tests with Case AKCELA lubricants.



BC02N250

## DIESEL FUEL

Use No. 2 diesel fuel in the engine of this machine. The use of other fuels can cause the loss of engine power and high fuel consumption.

In very cold temperatures, a mixture of No. 1 and No. 2 diesel fuels is temporarily permitted. See the following Note.

**NOTE:** *See your fuel dealer for winter fuel requirements in your area. If the temperature of the fuel is below the cloud point (wax appearance point), wax crystals in the fuel will cause the engine to lose power or not start.*

The diesel fuel used in this machine must meet the specifications in the chart below or Specification D975-81 of the American Society for Testing and Materials.

### Specifications for Acceptable No. 2 Diesel Fuel

API gravity, minimum .....	34
Flash Point, Minimum .....	60° C (140° F)
Cloud point (wax appearance point), maximum .....	-20° C (-5° F) See Note above
Pour point, maximum .....	-26° C (-15° F) See Note above
Viscosity, at 100° F (88° C)	
Centistokes .....	2.0 to 4.3
Saybolt Seconds Universal .....	32 to 40

### Fuel Storage

If you keep fuel in storage for a period of time, you can get foreign material or water in the fuel storage tank. Many engine problems are caused by water in the fuel.

Keep the fuel storage tank outside and keep the fuel as cool as possible. Remove water from the storage container at regular periods of time.

## DYE AND BLACK LIGHT PROCEDURE FOR DETECTING OIL LEAKS

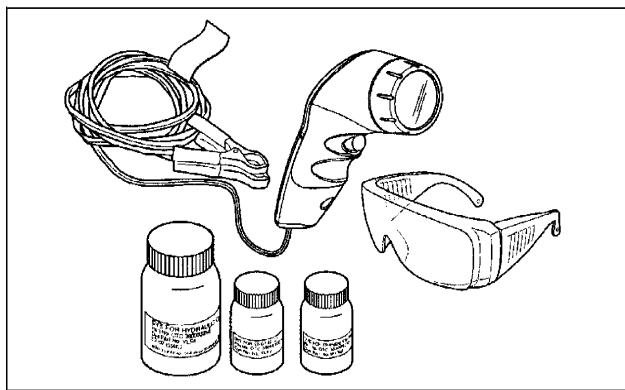
Oils and grease have natural phosphors and will illuminate differently under the black light.

Oil, bluish-white, grease, brilliant-white, anti-freeze, greenish-yellow, sealing compounds, red to orange.

Kit part number 380040182 consisting of:

Part Number	Description	U/M	Comments	Usage
380002254	Black Light		12 Volt Ultra Violet Light	
380002357	Dye-uniglow F2HF	10 ML	Glows Green in Black Light	Engine Oil/Crankcase
380002358	Dye-uniglow F4HF	65 ML	Glows Yellow in Black Light	Hydraulic Oil
380002359	Dye-uniglow 1750	10 ML	Glows Purple in Black Light	Transmission Oil

**NOTE:** Each dye is formulated to work in conjunction with a specific fluid, therefore the dyes are not interchangeable and should only be used as described.



1. Prior to adding dye, connect the black light to the machines battery and investigate suspected areas.
2. Once suspected leak areas are found, attempt to trace the leak completely to the origin.

**NOTE:** At the origin, the leak should be the brightest in color.

3. After confirmation of the suspected leak, thoroughly clean the area of the leak to remove any existing fluids. Recheck the area with the black light to assure the area is clean.

**NOTE:** Good cleaning is important for the following reasons.

- A. Fluids captured by threaded joints or other cavities will continue to show signs of leakage unless completely clean.
- B. Casting surfaces can hold residual oil.

4. Use the entire contents of the bottle of dye in the system/systems of the suspected leak.

5. Run the unit for 5 to 10 minutes and cycle through suspect system functions to ensure that the dye is available to all possible leak points.

**NOTE:** The hydraulic oil should be heated to 160° F (71° C), engine at normal operating temperature, and transmission should be in the normal operating range on the gauge.

6. Use a clean cloth and wipe the dipstick or the inside surface of the filler tube on each of the 3 sumps.
7. View traces of dyed fluid on the cloth under the black light to ensure good samples.
8. Use these 3 samples as your baseline when inspecting the unit with the black light.

**NOTE:** High hour engine oil can reduce the effectiveness of the dye. In this event change the oil.

9. Avoid common errors.
  - A. Fan airflow blowing leaking fluid.
  - B. Gravity pulling leak paths down.
  - C. When paint at a joint is not broken, the joint is not leaking.

**NOTE:** It is not necessary to change oils after this check.

**Thank you for choosing  
CasetractorManuals**

**Please click the following link to  
download and purchase**

