

1984 SEAGRAVE TRIPLE

STATISTICAL INFORMATION

Make SEAGRAVE TRIPLE Model HB-500CH Year 1984

Laden Weight 32,080 Front 13,880 Rear 17,760

Tire Size Front 385/65 Rear 12R-22.5

Make of Engine CUMMINS Model NTC-400 Horsepower 400

No. of Cylinders 6 Cubic Inches 855

Capacity:

Fuel 50 gal

Crankcase 36 qts SAE 15w-40
+ 8 qts for filter

Transmission 5.1 gal SAE 50

Pump Transmission 22 pts SAE Dextron II

Differential 43 pts SAE 90-140

Power Steering *ar pts SAE 10w

Water Tank 500 gal

Transmission SPICER SST-2 6 SPEED

Main Pump WATEROUS CMUYCX Type 2-STAGE CENTRIFUGAL

Rated Capacity 1500 gpm @ 150 psi

Pump – WATEROUS Type ROTARY VANE- POSITIVE-DISPLACEMENT

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STATISTICAL SHEET FOR A 1984 SEAGRAVE TRIPLE

Cylinders.....6;Cummins; Diesel

Cubic Inches & Horsepower.....855 cu. In.; 400 HP @ 2100 rpm

Transmission.....Spicer (Manual) 6 speed

Gear Start.....2nd gear

Operating Range.....1350 rpm to 2100 rpm

Pump Type & Capacity.....Waterous - 1500 GPM

Oil Capacity.....44 quarts

Fuel Tank Capacity.....50 gallons

Water Capacity.....500 gallons

Operating Oil psi.....35 psi to 1200 rpm
45 psi at 2100 rpm

Minimum Oil psi.....10 psi at idle

Operating Water Temperature.....160° –185° DO NOT EXCEED 200°

Transfer Valve.....Manual

Pumping Gear.....6th gear

Priming Pump.....Rotary Vane

Spring Brake.....Anchorlock

Minimum Brake psi.....90 psi, Warning @ 60 psi

Relief Valve.....Waterous

Relief psi.....75 - 300 psi

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ENGINE:

- ◆ Cummings NTC-400 diesel, 6 cylinder valve-in head type.
- ◆ 5½” bore and 6” stroke.
- ◆ 855 cubic inch.
- ◆ Compression ratio - 13.9 to 1
- ◆ Highest torque - 1245-ft. lbs. at 1350 rpm.
- ◆ Highest horsepower - **400 at 2100 rpm.**
- ◆ Operating range - 1350 rpm to 2100 rpm.
- ◆ Engine operating speed should be maintained at 1900 rpm.
- ◆ Can run an additional 7% on high idle.
This can be very harmful if engine is cold, due to minimal lubrication.
- ◆ Fuel pump is equipped with a solenoid valve that is operated by switch labeled “ignition” on the dash. Controls fuel to injectors.

Governor has two functions:

1. Provides the exact amount of fuel needed for idling when the throttle is in the idle position.
 2. Overrides the throttle and shuts off the fuel if the engine RPM exceeds the maximum rated speed.
- ◆ Engine temperature-operating range – 160° to 185° degrees. Red warning light 212°
 - ◆ During prolonged idling - maintain at least **900 - 1100 rpm** to keep temperature from falling below normal operating temperature.
 - ◆ Excessive idling creates two problems:
 1. Burn ½ gallon per hour.
 2. Cause engine to operate at low temperatures causing carbon deposits around injector valves, piston and valve seats. Also could cause misfiring due to injector carboning and damage to turbo shaft seals.
 - ◆ After heavy use - idle for **3 to 5 minutes to cool** engine prior to shutdown.

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ENGINE LUBRICATION SYSTEM:

- ◆ Force-feed wet sump system (gear pump).
- ◆ An oil cooler - heat exchanger type is located on right side of engine block.
- ◆ Lower case holds 36 qts. of oil.
- ◆ Full flow oil filter hold 8 qts.

- ◆ Minimum 10 psi at idle. If no psi reading upon ignition, slightly depress throttle. If no rise shut off engine.

- ◆ 35 to 45 psi at 2100 rpm.
45 psi at 2100 rpm

ENGINE COOLING SYSTEM:

- ◆ Water pump has packless seal and **requires no lubrication**.
- ◆ Delivers 100 gpm at 2100 rpm.

- ◆ Cooling system is equipped with a cooling system conditioner, which is designed to filter coolant anytime engine is running. Provides electrolytic protection and as a rust inhibitor.

- ◆ Thermostatic sensor **automatically** engages the cooling fan clutch at approximately 190° degrees.

- ◆ A temperature sensitive air valve controls the FD-1 fan clutch. This valve is installed in the engine block, it directly senses coolant temperature.

- ◆ Clutch is pneumatically operated and thermostatically controlled.
- ◆ Spring pressure engages clutch, loss of air will engage fan.
- ◆ During pumping mode, air pressure is exhausted causing full fan operation.

- ◆ If a grease fitting is noted on fan clutch, lube with two cubic inches of general-purpose grease every 15,000 miles.

- ◆ Water circulates through the oil cooler until temperature reaches about 170 degrees, then water circulates from top to bottom of radiator.

- ◆ Radiator Cap is pressure relief type with 7-lbs. rating. Allows water temperature to rise to 233 degrees before boiling.

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- ◆ Deaeriation tank purges air, which could become trapped in the cooling system from circulating through the system.
- ◆ Maintain engine coolant temperature @ 180° degrees for maximum engine efficiency.
- ◆ If possible, do not permit engine water temperature to exceed **200° degrees**.

FUEL SYSTEM:

- ◆ Shut-off is mounted forward of the fuel tank above the rear axle.
- ◆ Fuel pump is equipped with a knurled knob, (mechanical valve) for opening in an emergency. This controls the flow of the fuel.
- ◆ Ignition switch on instrument panel operates fuel pump with a solenoid valve.
- ◆ To insure correct fuel temperature, a full fuel tank should be maintained.
- ◆ Fuel system has one fuel filter.

ELECTRICAL SYSTEM:

- ◆ See Training Bulletin # 65 for information about batteries
- ◆ When shutting down engine, do not switch battery master switch to "off" position until engine is completely stopped. **Turning switch "OFF"** while engine is still in operation can the voltage regulator and destroy the alternator diodes.
- ◆ Ignition switch on instrument panel turns on fuel pump solenoid which pumps fuel into injectors.
- ◆ When ignition switch is shut-off, engine is deprived of fuel.
- ◆ When battery readings are below full-charge, or battery overcharges, and liquid has been over-boiling, NOTIFY THE SHOPS.
- ◆ Fuses and breakers protect electrical system. Operating and cooling of breakers will produce clicking sound. Notify shops.
- ◆ 12 volt starting motor - Do not crank over 30 seconds. Hesitate about 30 seconds before retrying. Frequently inspect external connections and wiring for loosening and corrosion.
- ◆ Alternator capacity of 140 amps at 14 volts
- ◆ Built in rectifier changes AC to DC.

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- ◆ Idling slightly above idle speed will be enough to supply the entire electrical system with adequate voltage.

Voltmeter reading:

Engine not running:

12.2 – 12.8	Battery ok
below 12	Charge

Engine running (1 min. or more) @ 1000 rpm

13.8 – 14.8	Charging System ok
below 13.8	Check belts – alternator

Engine running (1 min. or more) @ 1000 rpm underload

13.5 – 14	Charging System ok
below 13.5	Check alternator – belt tension

BRAKE SYSTEM:

- ◆ Dual brake system (also called split brake system). Heart of system is the E-7 brake application valve made by BENDIX – WESTINGHOUSE. The E-7 brake valve provides a graduated control for applying and releasing the apparatus brakes.
- ◆ Anchorlock spring brake system on rear brakes only. Brake is applied by absence of air by spring pressure.
- ◆ There are **THREE** PRIMARY USES for spring brake:
 1. Emergency brake
 2. Parking brake
 3. "Low pressure starting" protective device
- ◆ Brakes are self-adjusting

Adjusting Procedure:

1. Start engine and achieve full system pressure (120 psi)
 2. Depress brake pedal fully and hold for one second.
 3. Repeat four or more times as needed to bring stack adjusters' back.
- ◆ New pads are different thickness on rear brakes
 1. Front pads - 5/8"
 2. Rear pads – outer pad 9/16" when new; inner pad 7/8" when new

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- ◆ Brake wear inspection - Weekly

1. Check outboard pads for wear.
2. At least 4/32" of slide pin should show.
3. Check rotors for checks and cracks.

- ◆ Auxiliary hand brake, control is not to be used as a parking brake. Can be used as hill holder. Air pressure is applied to all of the brakes.

Can use to apply a slight drag to all brakes when descending grades. Extreme caution must be taken not to overheat brake motor and pads.

AIR RESERVOIR SYSTEM:

- ◆ Consists of four tanks. One primary; three secondary.
Components: air compressor, air dryer, air reservoir tanks, air pressure indicator switch, quick release valves, safety valves, check valves, and brake chamber at each wheel. Foot throttle on this apparatus is air-activated if engine is started with no air pressure in system. Engine will idle until 30 psi of air is pumped into system.
- ◆ Secondary tanks will not fill until **primary reaches 90 psi**.
- ◆ Apparatus may be moved when primary reaches 90 psi, **however, only rear brakes have full braking power** until secondary tanks reaching 90 psi.
- ◆ Red lights and buzzer on dash will operate when pressure falls below 60 psi and ignition switch is on.
- ◆ Moisture ejection system - Desiccant type, removes both liquid and water vapor from the compressor discharge before it reaches air brake reservoir. Serviced yearly in shops. See handout for explanation of how this system works.
- ◆ Operate automatic bleeder valve by hand weekly to insure it is functioning correctly.
- ◆ Two air gauges on dash. Left gauge indicates pressure in PRIMARY tank.
- ◆ Under NO CONDITION shall the air outlet be used for operating a paint spray gun or have an air bottle connected to it.
- ◆ Any air powered auxiliary equipment is supplied from secondary system.

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AIR FILTER:

- ◆ Has an exterior "FARR" intake screen located on outside of apparatus behind transverse bed, on curbside of apparatus.
- ◆ Dry type, replaced or serviced yearly at shops

Procedure for determining need to replace air filter: (As per logbook insert)

1. Obtain reading on air restriction gauge at tog governed rpm's under load when filter is new. Normally on a new filter this will read two to 8 inches of H₂O.
 2. An increase of 10 inches above original reading indicates need for replacement by shops.
- ◆ If the dash gauge reads **20 or above, check for restrictions** at the filter intake screen restriction gauge must not exceed 25" vacuum.
 - ◆ When washing apparatus, avoid direct water into filter intake.
 - ◆ An aftercooler intercooler, is a device in the engine intake system designed to reduce Intake air temperature and/or preheat Intake air temperatures.

TRANSMISSION:

Spicer SST-2, 6 speed, manual shift.

Maximum speed in each gear:

1 st -	7.1 MPH
2 nd -	12.4 MPH
3 rd -	20.2 MPH
4 th -	32.0 MPH
5 th -	45.6 MPH
6 th -	63.0 MPH
Rev. -	7.1 MPH

REAR AXLE:

Rockwell, model R-170; 4.111 to 1.

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CLUTCH:

- ◆ 15½ inches in diameter
- ◆ Spicer twin plates dry disc equipped with a clutch brake.
- ◆ Clutch brake should engage 1" inch above floor.
- ◆ When free travel is reduced to ½" - call shops
- ◆ **Never allow weight of foot to rest on the clutch.** This will result In short life of the clutch release bearing. (Throw-out bearing)
- ◆ Ordinary starts are in second gear
- ◆ Never coast with clutch disengaged or trans. in neutral – **UNSAFE!**
- ◆ Shift to next gear approximately 2100 rpm.
- ◆ Operate at 1800 - 1900 rpm. When descending a grade.

NOTE: Governor **WILL NOT** control engine speed when descending hill. Back wheels are driving the engine.

When engine rotation exceeds 200 to 300 rpm above rated speed, valves hitting the pistons (valve float), increased oil consumption, injector plunger seizure could occur.

FOOT THROTTLE:

- ◆ Air actuated
- ◆ Requires 30 psi to be operational.

JAKE BRAKE:

- ◆ "On-off" switch on gearshift lever, dash mounted multi-position switch.
 1. Minimum engine retarding
 2. Moderate engine retarding
 3. Maximum engine retarding
- ◆ Selector switch may be moved at anytime without damaging engine components. No time limit to operational time. Engine cooling system will absorb heat from use.

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TURBOCHARGER:

- ◆ Consists of a turbine wheel and a centrifugal blower, or compressor wheel, separately encased but mounted on and rotating with a common shaft.
- ◆ Forces additional air into engine so it can:
 1. Burn more fuel
 2. Develop more horsepower
 3. Maintain engine's efficiency.
- ◆ The power to drive the turbine wheel, which in turn drives the compressor, is obtained from energy of engine exhaust gases. It is cooled and lubricated by engine lubricating oil.
- ◆ **Do not** over rev the engine on cold starts. This can cause damage due to poor oil circulation.
- ◆ Oil lag or all starvation to the turbo will cause premature wear on the bearings.
- ◆ Do not shut down engine while hot. May cause temperature of turbocharger to rise **100 degrees** above engine temperature of this extreme heat may **damage bearings**.
- ◆ **Monthly** inspect the connections, clamps, and couplings between the air cleaner and the turbocharger.
- ◆ Rebuild turbos at every 40,000 miles.

STEERING:

- ◆ Ross hydropower integral power steering gear.

Contains:
 1. Manual steering mechanism
 2. Hydraulic control valve
 3. Hydraulic power cylinder all in a single compact assembly
- ◆ This system can steer a vehicle with a front-end weight rating of about 14000 lbs. through a turn at low speed and engine idle.
- ◆ Maximum operating pressure is **2000 psi**
- ◆ Maximum flow rate 6 gpm recommended minimum flow at 1½ hand wheel turns/second must be no less than 2.9 gpm.

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PUMP:

- ◆ Watrous Centrifugal - 2 stage pump
Series/parallel type.
Chain driven
Capacity - 1500 gpm @ 150 psi
150 gpm @ 600 psi
- ◆ Pump is hydrostatically tested at **600 psi**.

Pump packing -

- ◆ Acceptable leakage - 10 drops per min to 1 to 2 per second
- ◆ To keep packing gland from drying out, pump should be operated for at least ten minutes each month at a minimum pressure of **150 psi**. Unless pump has been used in normal service.
- ◆ To prevent pump from overheating during prolonged operation, allow a stream of water at least ½” in diameter to discharge from the pump.
- ◆ Electric driven rotary vane priming pump

PUMP TRANMISSION:

- ◆ Lubrication is provided to pump transmission by two methods:
 1. Splash System
 2. Externally mounted oil pump
- ◆ Splash System; lubricates lower section of the pump transmission when in “road” position.
- ◆ Externally mounted oil pump is connected to the pump shaft. Will supply oil to the upper section of the pump transmission at a very low pressure.
- ◆ Expect to see a transmission oil pressure reading of @ 2 to 5 psi in the transmission oil pressure gauge on the pump panel.

FRONT SUCTION:

- ◆ Air operated front suction valve.
- ◆ Carried in closed positions with control handle in “neutral” position.
- ◆ This will prevent air leaks when using side suction when pumping.

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TRANSFER VALVE:

- ◆ Manually operated transfer valve.
- ◆ **Reduce pressure to 75 psi or less to transfer during pumping operation.**

RELIEF VALVE:

- ◆ Waterous relief valve.
- ◆ A spring-loaded, pressure actuated unit that is installed between the discharge and suction sides of the pump.
- ◆ The WATEROUS relief valve system consists of two units
 1. The relief valve proper,
 2. The pilot valve, which controls the relief valve proper.
- ◆ **Discharge pressure** cannot be controlled to a pressure lower **than the** intake (suction) pressure
- ◆ Controls discharge of **75 psi to 300 psi**
- ◆ When operating from draft or tank no less than 75 psi.
- ◆ When operating from positive pressure water source no less than a suction pressure plus 50.
- ◆ Do not turn the pilot valve from "on" to "off" when the pump and engine are turning at high speed.

WATER TANK:

- ◆ 500 gallons 3/16" steel tank
- ◆ Flow capacity from tank to pump is 600 gpm.
- ◆ The overflow capacity is rated at 600 gpm and will not overflow at a maximum grade of 23%.
- ◆ Fill only through inlets with **strainers**
- ◆ Six cathodic rods protect tank from corrosion.

NOTE: A check valve (clapper valve) is provided in the tank to pump piping to prevent reverse flow of water from pump back to tank.

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SUCTION INLETS:

- ◆ 2, 6" inlets, one on each side, reduced to 4" with 4" keystones attached
- ◆ 1, 4" front suction - Air actuated from engineer's panel. In this closed position with the control handle in the neutral position. This will prevent air leaks when using side suctions when pumping.
- ◆ 2, 3" auxiliary Inlets, on each side; with 3½ fittings.

DISCHARGE OUTLETS:

- ◆ 4 – 3½" discharge outlets two on each side

PUMPING PROCEDURES:

1. Spot apparatus at hydrant and apply spring brake. Set chocks blocks.
2. With engine at idle depress clutch pedal.
3. Shift gear selector lever to direct drives (6th gear).
4. Engage fire pump by raising pump shift lever handle high enough to allow **lock pins** to clear pin lock grooves, move shift lever forward until **lock pins** fall into forward pin grooves thus locking pump shift lever into pumping mode.
5. CAUTION: Do not open the throttle to start pumping unless the green light is ON. This indicates the pump shift has been completed into pump position and it is safe to open throttle.
6. Close all discharge valves and drain openings INCLUDING those between tank and pump.
7. Connect suction
8. Open suction
9. Switch transfer valve to desired position.
10. Open discharge valves and accelerate engine to obtain desired pressure.

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MISCELLANEOUS:

- ◆ Make sure pump is completely full or completely drained – Never partially fill.
- ◆ After drafting salty or dirty water or after handling chemicals, flush pump for several minutes with fresh water to remove all traces of impurities.