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## THE WEST COAST CHALLENGER: AN OFF-HIGHWAY LOGGING TRUCK

Challenger Manufacturing Ltd. of Port Alberni, B.C. is now marketing a heavy-duty off-highway logging truck capable of hauling 100-tonne (220 000-lb) payloads (Figure 1). The tractor unit itself weighs 28 000 kg and is designed to accommodate a variety of popular engines and drivetrain components. It has many unique features that may be of interest to member companies considering such a purchase.

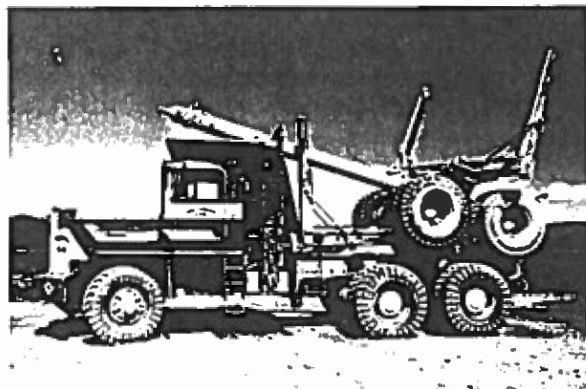


Figure 1. Challenger off-highway logging truck.

### SPECIAL FEATURES

**Radiator Support.** The radiator is cradled in rubber cushions to dampen both lateral and fore/aft movement. The only bolted connection is at the radiator base; this arrangement is designed to isolate the radiator from chassis-originated stresses.

**Transmission Cooler.** On vehicles equipped with the power-shift transmission option, an oil-to-air heat exchanger is installed which is independent of the engine's cooling system. This feature protects the engine from high transmission-oil temperatures experienced during severe retarding. Located forward of the radiator, the cooler is rubber mounted and protected by a substantial grillwork.

**Main Frame.** The main frame is a welded wide-flange beam made from C.S.A. G40.21M-350 AT (category 2) material and is 527 mm (20.75 in) deep at mid-wheelbase. The web is 15.9 mm (0.625 in) thick and the flanges both measure 25.4 mm by 178 mm (1 in by 7 in) for the full length of the frame.

**Rear Axle and Suspension.** The spring assembly has 15 leaves, each being 25.4 mm (1 in) thick and 152 mm (6 in) wide, and is retained by means of 44.5-mm (1.75-in) diameter U-bolts. The axle housings are protected by 31.8-mm (1.25-in) spring wear plates and four main leaves extend over the axle. A reinforcement rib is welded along the top of the axle housing prior to mounting, as are the spring saddles which are designed to strengthen the overall axle assembly.

**Front Bunk.** The 127-mm by 228.6-mm (5 in by 9 in) nominal size stakes have the retention-cable eyes located within the body of the stake, rather than on the outside. This feature minimizes overall vehicle width without sacrificing bunk capacity. The front bunk rotates on a 2.74-m (9-ft) diameter turntable supported by four 152.4-mm (6-in) diameter bunk rollers on 63.5-mm (2.5-in) chromed pins. A replaceable teflon wear plate is used in the cup-and-saucer assembly and the bunk centre pin is 139.7 mm (5.5 in) in diameter. Replaceable turntable wear plates simplify roller-path maintenance.

**Walkways and Handrails.** The steps that are fabricated into the rear face of the water tank are extra deep to accommodate oversized footwear, and the handholds are positioned to maximize safe operator movement about the rear corners of the cab/tank area. The running boards that flank the cab do not extend beyond the protective overhang of the cab guard. This feature limits the width, but extra foot clearance is provided by a liberal undercut of the cab and water tank along the deck length.

**Water Tank.** The 2410-L (530-gal) water tank is an integral part of the cab guard. Internal full-height baffles, spaced at 300-mm (1-ft) intervals across the width of the tank, reinforce the structure. Two rear mounts, one at each frame rail, anchor the tank while front supports are simply cradled into reinforced frame-mounted pockets. This mounting method provides isolation from stresses created by frame flexure.

**Compensator.** To reduce binding, the compensator barrel slides in teflon bushings and the entire assembly is enclosed in a dedicated oil reservoir. The 135-L (30 gal) reservoir uses waste engine oil to provide a constant "soak" of the sliding interface.

The compensator itself is released by means of a cab-controlled air chamber and linkage.

**Cab.** The four corners of the cab are individually supported by square, rubber, block-and-steel, tube assemblies similar to bulldozer canopy mounts. The rubber, besides providing vibration and shock insulation, is slotted to allow some independent vertical movement. An optional "air bag" cab-mounting system is also available. The cab is equipped with intermittent electric windshield wipers, a tilt steering wheel, and interior cab noise suppression.

## MAINTAINABILITY

The radiator, engine, and transmission (manual models only) are mounted onto a sub-frame that sits within the two main frame rails. The entire power-train module can be easily removed by pivoting the grille/radiator guard out of the way, unbolting channels from the main frame, detaching the drive shaft, and sliding the subframe forward out of the chassis. All remote-mounted filters are of the "spin-on" type and are located at chest height just behind the driver's cab access ladder. This location offers protection for the components, easy access for the mechanic, and open drainage for the oil. The steering box, underside cab plumbing, air valves, and wiring are all within easy reach and have good clearance for hand tools.

Four compressed-air tanks are protected within the frame rails, but drain cocks are located remotely to facilitate daily drainage.

The water tank is designed to tilt rearward providing uninhibited access to the power-shift transmission (if so equipped) and the back of the cab. The brake water is filtered through a stainless-steel strainer to eliminate rust and corrosion blockages in the distribution plumbing and nozzles.

Lift-out engine side panels and pivoting front fenders enhance engine access.

Air controls and gauges are clustered separately from the electrical switches and gauges for ease of operator reference. This modular feature, combined with four separate fold-down dash panels, simplifies troubleshooting and maintenance.

## COMMENTS AND OBSERVATIONS

The Challenger has many more maintenance and labour-saving features as well as operational and safety enhancements. Some of these include:

- a remote-controlled (from driver's position), power-

- operated, raise/lower, passenger door window.
- a large tool box on passenger side (outside) is used for storage and is easy to reach from ground level.
- two removable interior cover plates, above the windshield, allow convenient access to the wiring and air lines within the cab ceiling.
- a custom-built radiator, which includes a removable cover plate on the top tank that exposes the de-aeration tube for easy inspection and cleaning.
- a generous use of castings throughout the vehicle in place of the more traditional weldments; the comparative strength of a casting should improve the fixture's life and reduce maintenance welding.
- a cab ladder which is hinged to improve access for maintenance; the rear deck is also hinged to facilitate bark removal.
- spring-mounted rear fenders which help reduce vibration, road-shock transfer, and damage from falling logs.

Existing user reports reflect a quality product with very little downtime other than for scheduled maintenance. At the time of printing, five units have been built and are in service on Vancouver Island. Two 1987 models are in operation at Canal Transport. Both are powered by a Mack V-8, Model E9 engine coupled to a Mack 12-speed transmission and have 5000 and 3500 hours of service to date.

The third and fourth units were built in 1988 and have 2500 and 1500 in-service hours respectively. Both are owned by Mill Stream Timber in Nanaimo. These two trucks are equipped with the Mack E9 model V-8 engine and, again, are used in conjunction with the Mack 12-speed transmission.

The fifth vehicle has just recently been purchased by MacMillan Bloedel Limited and is at work in the Franklin River Division. This was the first unit to be equipped with a Cummins KTA 600 engine and an Allison Model 6062 ATEC transmission.

## INFORMATION

The information contained in this report is based on limited field observation and is published only to disseminate information to FERIC member companies. More information may be obtained from:

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