

AUXILIARY HYDRAULIC WINCHES

Dallas C. Hemphill, Consultant Logging Engineer, Eugene , Oregon, U.S.A.

INTRODUCTION

Hydraulically-driven auxiliary winches are increasingly used by American loggers and have been mounted on a wide variety of logging machines. Some applications are :-



Loader conversion using hydraulic winches

- as "piggyback" or "pencil-line" winches on tractors, to power a small tailrope.
- on self-loading log trucks, front-end loaders, and even a log processor, for recovery of stray logs.
- as recovery winches on most types of construction machines and trucks.
- as a second skidding winch.
- for extended line capacity not available on stock skidder winches.
- most commonly, as a loader conversion for cable logging, usually on a hydraulic boom loader but sometimes on a front-end loader, using the boom or forks to provide lift.

INSTALLATION

The engineering for each application should involve the supplier as practically every application has its own special requirements. The winch must be compatible with the hydraulic circuitry of the prime mover, and the mounting and the prime mover itself must be structurally suitable. It is necessary to provide adequate lead angles to allow clean spooling and to avoid having lines abrade or bind on the carrier machine.

Optimum winch performance will be achieved only if the full oil flow rates and pressures assumed by the manufacturer in rating the winch are actually available on the prime mover. Otherwise, line pull and/or speed will be less than maximum. Prime mover flow rates should be at least 50% of the maximum flow that the winch is designed for. Different winch brands should never be compared simply on the basis of quoted line pulls and speeds.

Pressurised hydraulic tanks, and sometimes small-micron filters, can create problems for winch models using a return line to clear the brake chamber of oil. High pressure systems can damage the winch seals where winches are designed for lower pressures. Reducing the pressure by means of a valve may be difficult and expensive.

The winch mounting must be structurally sound. Components such as outriggers can fail if the winch is over-sized for the prime mover. Guying is not normally recommended for hauler conversions, because of the increased risk of overstressing the carrier.

A POPULAR APPLICATION

Nearly every application of auxiliary winches is different, in mounting, plumbing, and purpose. However, it is instructive to examine one application in detail. This is the most popular type of winch application in western American logging, that of a hauler conversion for a loader.

Oregon contractors, Enoch Skirvan and Sons, Inc. ("ESSI") added a pair of Pullmaster H25 winches to their Koehring Bantam 366L loader. The 366L is a tracked hydraulic boom loader rated at 170 kW, with a theoretical tipping load of 9,000 kg at 9 m radius. The winches are mounted on the rear part of the loader body. The lines pass through a shop-built fairlead to clear the boom, and through 25 cm blocks hung on the lower end of the live heel. The term "live heel" refers to the top section of the boom, as it can be raised or lowered during hauling. The mainline winch spools 145 m of 19 mm line, and the tailrope winch 330 m of 13 mm. Both winches are identical and may be free-wheeled, or powered out. On this particular machine, a cross-over port between the winches allows the option of automatic brake release on one drum while the other is being powered in.

The machine was originally purchased to haul and load road-line logs. It is now used to log small pockets of timber short distances. Such areas are those found in any logging operation - strips between roads and streamside zones, small isolated acreages, and small roadside gullies topographically isolated from a landing. In these circumstances, the modified Bantam has been found to be more economical than moving in a conventional tower.

The machine can be used for :

- "cherry picking" (single line, manual outhaul) at distances up to about 40 m.
- highlead logging downhill on distances over 40 m.
- skyline logging uphill with a gravity-return Christy carriage.

It usually operates without a landing and decks the logs at the roadside for subsequent loading. The timber is cut to lengths of 14 m or less at the stump. The machine operates with a three-man crew, although two can be used if the operator unhooks the logs.

ESSI's machine was observed to cherry pick twelve pieces averaging about 1 m³ in twenty minutes. With a gravity carriage and at an average distance of 60 m, it was seen to log twenty pieces averaging about 2 m³ in thirty-two minutes. Productivity would, however, be expected to fall off at longer distances. Observed mainline speeds for turns of 3 m³ were about 1.1 m/sec.

The boom is positioned vertically for carriage logging, and partially lowered for cherry picking, from which position it can be lifted to eliminate hangups. For skyline logging, the live heel is positioned vertically, grapple end up, giving an effective block height of 10 m. The mainline is powered out in cherry picking and skyline logging. When a winch stops, the brake is automatically set, with a braking force of 34,000 kg, sufficient to hold the skyline.

The Koehring and Pullmasters were compatible for both mounting and hydraulics. A simple mounting frame was fabricated to fit over the well of the stock Bantam body and the hydraulics were plumbed directly to one Koehring pump. Installation of the other components - controls, control valve box, and the two cross-over ports - was simple. ESSI will ultimately consider increasing winch power by connecting to two Koehring pumps. The flow rate in the Koehring - 247 l/min - was lower than the maximum desired volume of 437 l/min for maximum winch speed, but a smaller-than-stock rotor was used in the winch motors to keep up a reasonable line speed.

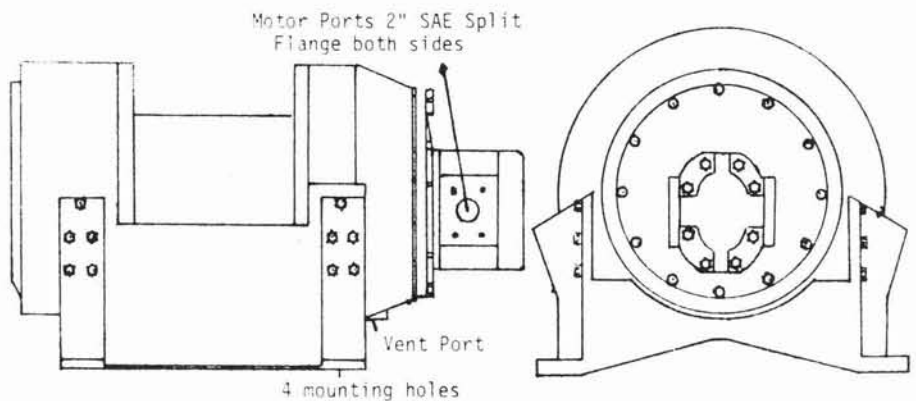
ESSI have ensured small lead angles by fabricating a fairlead that is located part way up the boom. Other operators have mounted winches on various parts of loader bodies, although some mounted on one side of the loader have given problems with spooling. Finding the best mounting location can be critical in determining the success of a winch application.

MANUFACTURER'S SPECIFICATIONS

DRUM CABLE STORAGE CAPACITY FOR WIRE ROPE

MODEL NUMBER	DRUM SIZE			WIRE ROPE DIAMETER			
	BARREL	FLANGE	LENGTH	5/8"	3/4"	7/8"	1"
H25-3-76-1	10" 254mm	17" 432mm	11" 279mm	315ft 96 m	222ft 68m	160ft 49m	124ft 38m
H25-3-76-2	10" 254mm	24" 610mm	11" 279mm	795ft 242m	560ft 171m	403ft 123m	313ft 95m
H25-3-76-3	10" 254mm	24" 610mm	17" 432mm	1228ft 374m	866ft 264m	623ft 190m	484ft 148m
H25-3-76-4	10" 259mm	24" 610mm	22" 559mm	1589ft 484m	1121ft 342m	806ft 246m	626ft 191m

MODEL NO.	MID-DRUM		
	LINE PULL	LINE SPEED	
		FORWARD	REVERSE
76-1	20105 lb	184 fpm	859 fpm
	9119 kg	56m/min	262m/min
76-2	18378 lb	218 fpm	1018 fpm
76-3			
76-4	8336 kg	66m/min	308m/min



PULLMASTER PLANETARY WINCH SPECIFICATIONS

POTENTIAL FOR NEW ZEALAND

Most of the applications for auxiliary winches mentioned have potential for New Zealand operations.

One of the best opportunities is probably the hauler-loader concept. It is worthy of consideration by most owners of hydraulic boom loaders, and it could also have a considerable application with front-end loaders. The front-end loader would not have the same lift or decking capability but such a machine would have the most potential in smaller remote operations where versatility is more important. The advantages conferred by the winches could be sufficient to influence the initial selection of a prime mover in some cases.

It should be noted that American operators log pieces 14 m or less with this type of machine. It would be suited to tree-length operation only if a suitable landing area were available and if the system were structured for subsequent economic handling of tree lengths. Crosscutting at the stump would normally be preferred, and could work well in most New Zealand operations.

It is likely that winches with line capacities greater than stock skidding winches, and "piggyback" tailrope winches, have potential in New Zealand steep country tractor logging. Some system development is undoubtedly in order, as the use of auxiliary winches would be a relatively inexpensive method of pushing ground-based systems further up the hill.

This Technical Release is the work of the author and is not the result of LIRA project work. LIRA publishes it in the interests of wider dissemination of knowledge in the industry. LIRA takes no responsibility for the accuracy of figures nor does it necessarily support or disagree with the opinions and conclusions shown.

For Further Information Contact: N.Z. LOGGING INDUSTRY RESEARCH ASSOC. INC.
P.O.Box 147,
ROTORUA, NEW ZEALAND. Phone 87-168

