

BELLIS BE85 - MACHINERY EVALUATION

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INTRODUCTION

Over 10 years ago the original Bellis hauler was designed and built to the specifications of a Nelson contractor. Features included an integral spar and better brakes than had previously available on New Zealand machines. Since then numerous modifications have been made to the Bellis, and the model lineup includes 50' (15.25m), 60' (18.3m) and 70' (21m) machines.

Brightwater Forest Equipment's (BFE) latest development involves two new large slackline haulers. Both are self-propelled on fully reconditioned 35 tonne Cat D-7 bases and feature 300kW (400hp) and 338kW (450hp) power plants, the choice of three or six speed Twin Disc or Allison transmissions, telescopic 26m (85') towers and eight guylines. Both are in the 47 to 52 tonne weight range.

The 300kW machine was finished in September, 1995 and was destined for overseas work. While the machine was being tested prior to being sent overseas a brief study was undertaken with the objective of describing the hauler, and recording the impressions of the crew who trialled it.

ACKNOWLEDGEMENTS

LIRO acknowledges the co-operation of Zeke Bellis and his crew, and the assistance of Wayne Gray (Brightwater Forest Equipment) and Tasman Forestry Limited (Nelson) during this study.

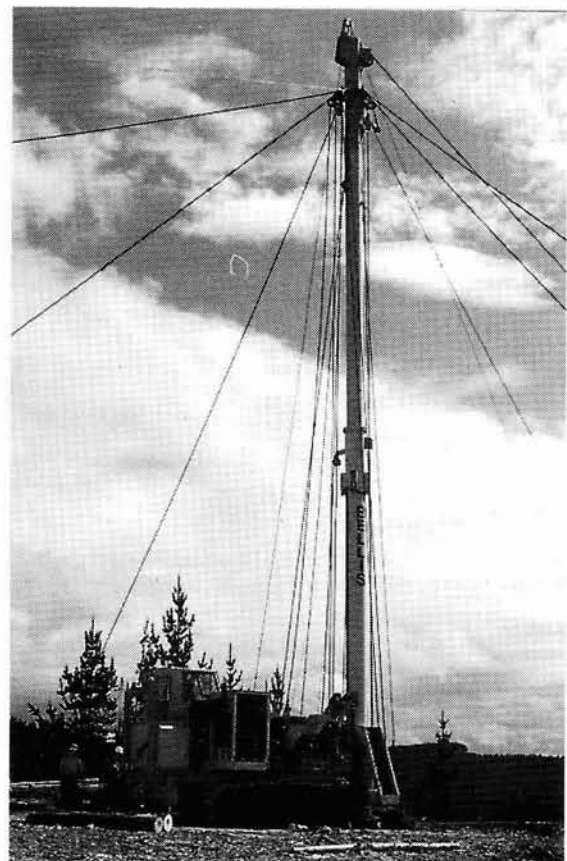


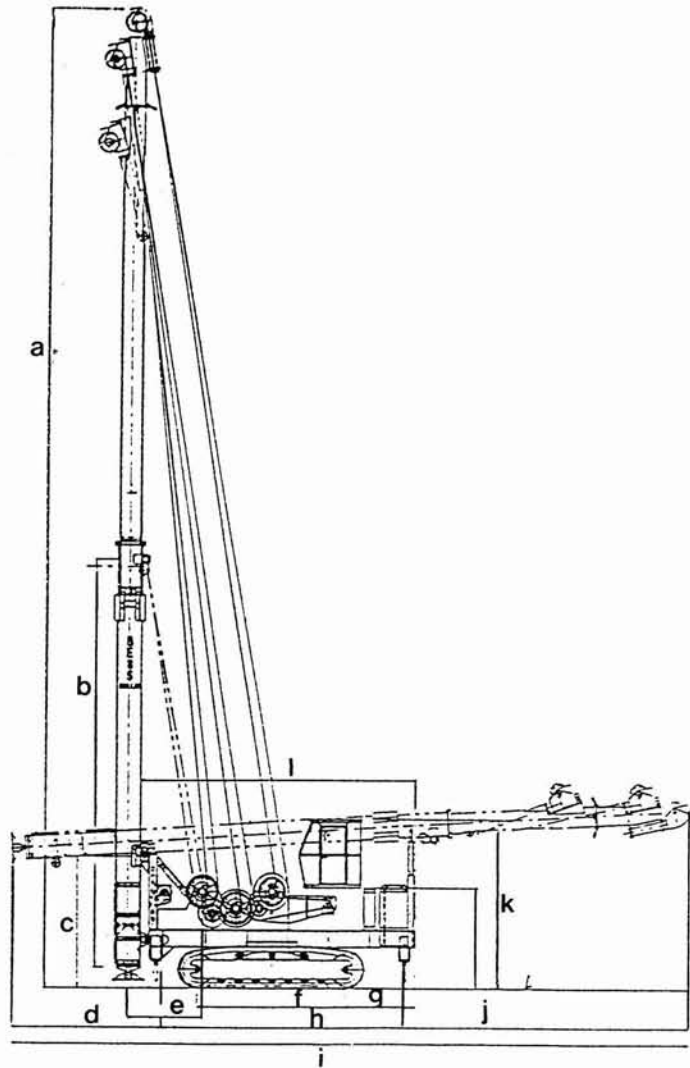
Figure 1 - Bellis BE85 hauler

HAULER DIMENSIONS

Figure 2: BE85 dimensions.

Key:

a	25.56m (84')
b	10.86m (35')
c	3.51m (11' 6")
d	3.76m (12' 4")
e	1.695m (5' 6")
f	4.025m (13' 1")
g	1.86m (6' 1")
h	6.5m (21' 4")
i	17.89m (58' 7")
j	7.626m (25')
k	4.5m (14' 9")
l	7.35m (24')



SPECIFICATIONS

Make: Bellis

Model: BE85 Mobile tower slackline hauler

Manufactured by: Brightwater Forest Equipment, Brightwater Nelson, New Zealand.

Price: NZ\$770000 including ropes at September 1995, for machine detailed here.

Warranty: 1 year

Power unit: Cummins NTA855-C400 M-series 6cyl. turbocharged diesel; 300kW (400hp). 24 Volt electrical system.

Torque converter: Allison TC500 single-stage torque converter (2.8:1)

Transmission: Allison CRT5633 (3 forward/3 reverse)

Primary drive: 5-row transmission chain; fully enclosed in oil bath

Carrier: 35 tonne, long-frame Caterpillar D-7 type undercarriage. Counter-rotating tracks with 800mm wide dual-grouser pads.

Night brakes: Shoe-type (semi-band) night brakes on Skyline and main rope drums.

Winch brakes: Skyline: 5" double band spotting brakes

Wichita air operated water-cooled brakes:

Skyline drum:	221 (2×21")
Main drum:	218
Tail drum:	221
Strawline drum:	band brake

Drum capacities:

Drum (max rope B.S.) (t)	Dimension (mm)	Line size capacity (mm) (m)
Skyline (50)	Flange dia 1000	26 850
	Core dia 330	28 700
	Core length 760	
Main (43)	Flange dia 900	22 850
	Core dia 330	26 650
	Core length 760	28 510
Tail (23)	Flange dia 970	16 1700
	Core dia 330	19 1400
	Core length 760	
Strawline	Flange dia 800	9 1000
	Core dia 360	
	Core length 250	

Winch clutches: Wichita air operated, multi-disc clutches;

Skyline drum:	321 (3×21")
Main drum:	321

Tail drum: 318
Strawline drum: 214

Drum gears: Cast, one-piece gears; straight cut; manual lubrication with open gear lube ('black-tac').

Tower type: Free-standing, end-mounted, two-part, high tensile tubular steel; bottom section 610mm O/D (12mm thick), top section 510mm O/D (16mm thick).

Tower raised by hydraulic winch (Brevini RR300D) and 5-sheave multi-purchase block. Tower telescoped by 3 stage hydraulic ram. Vertical (90°) operating tower angle.

Height: Two working heights: when extended; 25.6m (84') to top of tailrope sheave (24.6m (80'6") to top of skyline sheave). Or; 18m (60') to tailrope (17m (56') to skyline) sheave.

Locking: 4 air-operated locking dogs.

Lead: 160°

Guylines: Tower-mounted guy drums: Single part guylines; 4 back, 2 square lead and 2 front guys. Each drum holds 90m (295') of 28mm rope.

Air compressor: 20cfm compressor. System pressure was set at 110psi (150psi max)

Cab: Left hand drive; side entry. Contains winch unit and travel controls

SPECIFICATION OPTIONS

Power unit: 338kW (450hp) NTA855-C450 Cummins engine.

Transmission: 3 or 6 speed Twin Disc or Allison transmissions.

Carrier: Trailer: 2 rows of 8, 15" low-profile tyres. 1.9m axle spacing. 3.2m wide (plus walkway (300mm)). Weight 42 tonnes with ropes.

Rubber: Twin drive axles with cross-lock differentials. Power to diffs via mechanical down drive. 20" wide series dual tyres. Twin steer with 15R22½" tyres. 3.2m wide (plus walkway (300mm)). Max. speed, approximately 50km/hr.

Tower: Manual telescoping (eg: with loader) with tower down. Then locked with air actuated dogs (standard) and tower raised fully extended.

Cab: Shape, dimensions, height above drums, window area, and control layout are all customer-specified.

GENERAL

The Bellis BE85 can operate fall block systems as live or standing skyline, and can be used to highlead or to operate a gravity return system. The optional tagline drum would give greater carriage control with fall block systems, and enable the use of

Danebo or Interstate-type dropline carriages, further increasing the hauler's versatility.

The BE85 has a travel speed up to approximately 6km/hr and is expected to be able to negotiate grades of up to 40%.

The tower, when vertical, is held in place by eight guy ropes and rests on the steel 'foot' at its base, which requires a 30cm high block on the ground beneath it. Guyrope drums are hydraulically tightened with controls mounted in two banks of four levers; one bank on each side of the tower, corresponding with the guy drum arrangement. Guyropes are single part and terminate in pressed eyes with fitted thimbles, for shackle connection to anchors. The guyrope blocks are BFE's own design and are attached to a pivoting guy-ring, allowing rotation about the tower's centreline.

Controls for the four hydraulic levelling rams, for raising, lowering and telescoping of the tower and for operating the tower locking dogs are located in one cluster, between the levelling ram and the track, on the right hand side of the hauler. The telescoping ram in the tower features variable return valves so that should a hose or seal failure occur during telescoping, the tower will come down slowly. The raising winch for the tower is located in front of the drumset and is visible to the operator from the tower-raising controls.

The master switch for the batteries is located near the engine oil dipstick, the batteries themselves being concealed beneath a deck plate between the engine and the tailrope drum. Fluid levels are all readily checked and corrected at their respective tanks. The air tank, its gauge, water collection bowl and the airline mist-oil reservoir are located beneath the engine, between the tracks, making access awkward. Winch drum gears, band and night brakes, and grease nipples are located beneath inspection plates above the

drumset. Greasing the drum bearings requires two people, as one must rotate the drums while the other 'spots' the nipples. The primary drive chain casing has an inspection window enabling easy checking of the oil level and of the chain tension. The engine, transmission and cab are mounted on a sliding subframe enabling the chain tension to be set at the desired level.

HAULER OPERATION AND CREW IMPRESSIONS

The Bellis BE85 was easy to position on the landing. The raising and telescoping of the tower, and tightening of the guylines was "smooth and precise". Having 90m of rope on the guy drums meant extensions were not necessary on this landing. Access to the cab was via removable steps, compared to the more common ladder. The ease of this access meant it was practical for the hauler operator to unhook occasional drags.

A free-standing tower meant the small shocks and jarring vibrations of normal logging were not transferred to the hauler or its operator, as they are with chassis-mounted towers.

Bellis hauler cabs are built to customer specifications, but this example was felt to be unsatisfactory. Visibility from the operator's position was inadequate, both of the landing and the top of the tower. The rearward-sloping front windscreen meant rain always obscured operator vision, particularly as the arc cleared by the wiper was too small and too high to be effective. The control layout also drew criticism for having the drum clutches at one end of the dashboard, and the water cooled brake controls in a group at the other end. The skyline band brakes were not adjustable for slippage although this was to be changed before the hauler left the country. The operator's whistle control was remotely mounted and difficult to get at. A New

Zealand purchaser could specify a far more suitable cab design and control layout.

Due to a teething problem with a transmission bearing oil seal, the hauler was only able to be trialled intermittently for four days. However, that was long enough for the crew to feel the hauler was a "good machine" and that they would be "happy to have one".

CONCLUSIONS

The hauler contains components familiar to loggers, and manufacturing quality looks to be of a high standard. The trial period was too short to obtain any substantial production data on the BE85, although the crew was enthusiastic about it and felt that it would perform well. The only points that caused real concern were with the operator's station, which was built to the customers' specifications.

Contractors moving into the cable logging scene or upgrading from their current haulers into new machinery have had limited choice in the 21m+ tower-height range; the new BE85 from Brightwater Forest Equipment appears to combine the best of several worlds. It has the manoeuvrability and gradeability of the 21m tracked machines with similar power plants and drum capacities, an extra 4.5m (15') of tower height, a range of customer-specified options and costs more than \$200,000 less than its closest rival.

It remains to be seen how the Bellis BE85 performs in the long term but first impressions indicate that this machine has a definite future in the New Zealand logging industry.

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