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AUTOMATIC RELEASING CHOKERS

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INTRODUCTION

Unhooking chokers at the landing is an activity that it would be convenient to dispose of. It is time consuming, commonly accounting for 10 to 20% of the productive cycle time and can be dangerous, particularly on hauler landings. Furthermore, having a person occupy a particular work station to unhook logs constrains options of logging system configuration. It can be attractive to perform the various landing activities independently of the unhooking function.

Since 1950, various designs for chokers that release automatically have been developed, mainly in Europe, for cable logging systems. They have all been mechanically actuated, releasing the load upon the relaxation of tension in the choker and/or mainline. The application of these mechanically actuated devices was found to be limited.

An American invention that has been successfully proven to have a wider application is the radio-controlled choker ("RCC") developed by Weyerhaeuser Company and tested in its logging operations.

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EVOLUTION OF DESIGN CONCEPTS—
Mechanically actuated devices.

An Austrian design used with the Grabinski or scab skyline system is the loop choker, illustrated in Figure 1. When the carriage is run backward, it tips forward, dropping the ring at the end of the choker. The choker then pulls loose from the log.

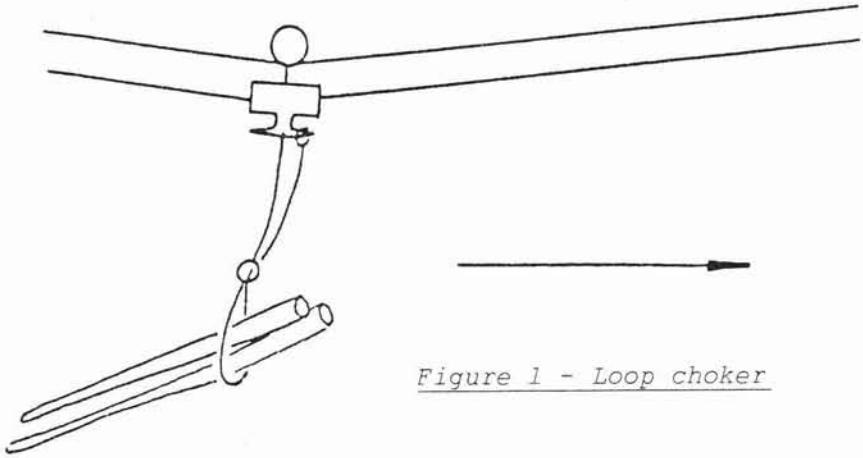


Figure 1 - Loop choker

The Austrians use this design with the "secondary skylines" that they use to swing logs from the landing to a decking area. It is not possible to fight hangups when using this choker, since it releases as soon as the carriage is run back. It does not release easily from limby logs, or from drags with multiple chokers. Therefore, it has little potential for most New Zealand logging operations. Various other chokers have been devised that release when tension in the choker itself is relaxed. These designs also have a fundamental disadvantage in that it is not possible to fight hangups when they are used. Also, some models can release prematurely, and most are too clumsy to use more than two chokers per drag.

Another Austrian design, the Steyr hook (Figure 2) also releases upon relaxation of choker tension, but a hydraulic damping mechanism provides for a delay of three to five seconds. This delay capability is sufficient to fight most hangups. However, the mechanism can fail to work properly when it is wedged between logs in a multiple-choker drag, or if it is fouled by sticks or ice. It does not permit unhooking logs separately.

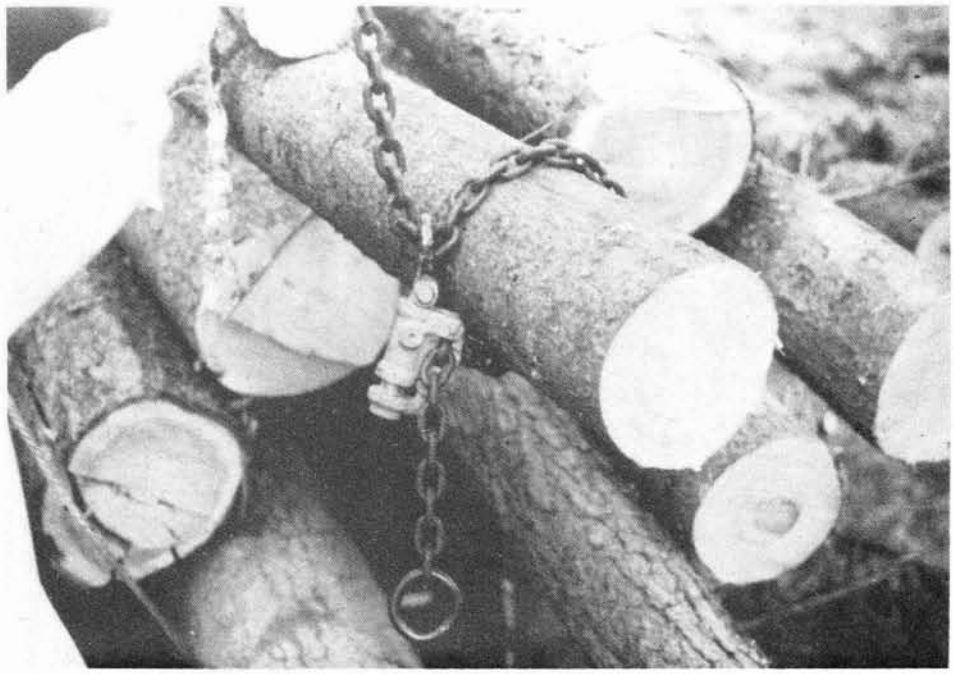


Figure 2 - The Steyr hook

Other mechanically actuated devices have also been used, but none has application in logging systems that are common in New Zealand. The idea of mechanical actuation has been extensively explored by inventors, but it appears to represent an evolutionary "dead end".

RADIO CONTROLLED CHOKER

The Weyerhaeuser design (Figures 3, 4, and 5) is actuated by radio control. The choker ferrule is held by a latch arm on the side of the hook. The latch arm opens when a sliding pin is withdrawn upon radio command.

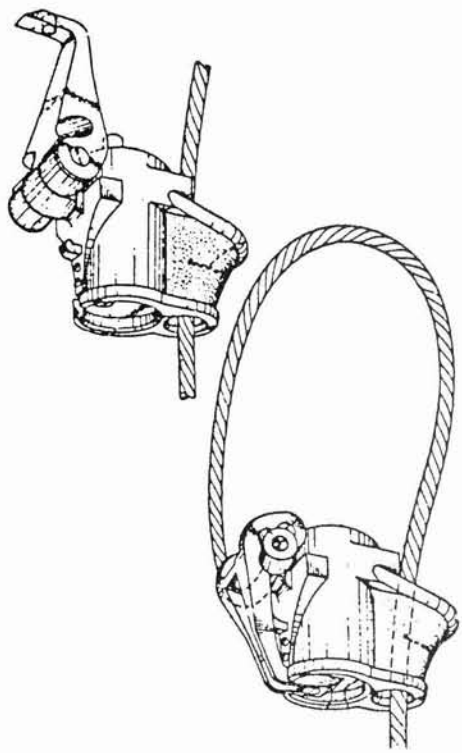


Figure 3 - Radio-controlled choker

In using the radio-controlled choker, the breakerout cocks the spring loaded sliding pin by opening the latch arm as far as possible, pushing the pin up with the lower end of the latch arm. This also turns on the radio receiver. The log is then choked, and the line is trapped under the latch arm when it is closed. The sliding pin snaps into the hole in the latch arm.

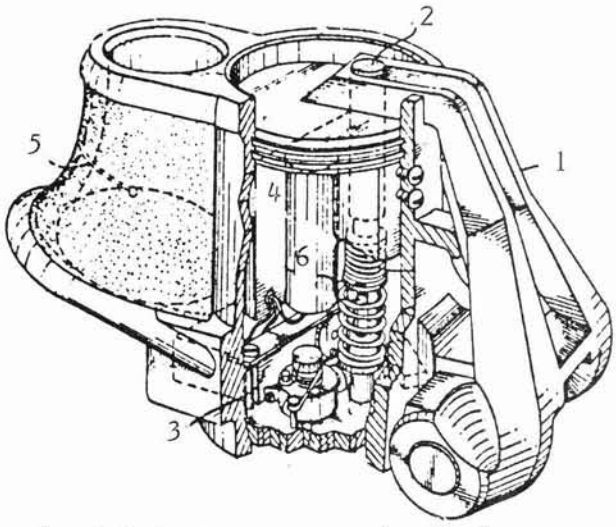
At the landing, the hauler operator pushes a button to send a radio signal to retract the sliding pin, allowing the latch arm to open and release the choker ferrule. The pin will not release unless tension in the choker line is relaxed.

The radio that operates the RCC is powered by a rechargeable nickel-cadmium battery with a 30 hour charge life. The radio antenna is contained within a rugged polymer covering around the eye of the choker hook. To prevent interference, the radio signal is coded.

The choker can be actuated by a signal from either the panel unit in the hauler cab, or from a light portable transmitter carried by the breakerout. The range is about 200 m. It is also possible to release the RCC manually.

APPLICATION OF THE RADIO CONTROLLED CHOKER.

Weyerhaeuser Company fabricated 100 choker hooks of its prototype design in 1982 for production testing, with the emphasis on small timber. Most were flown from gravity return carriages, with some being used with running skylines and skidders. Over half are still in use.



1 Latch arm
2 Sliding latch pin
3 Servo mechanism
4 Radio receiver
5 Antenna
6 Battery

Figure 4 - RCC components

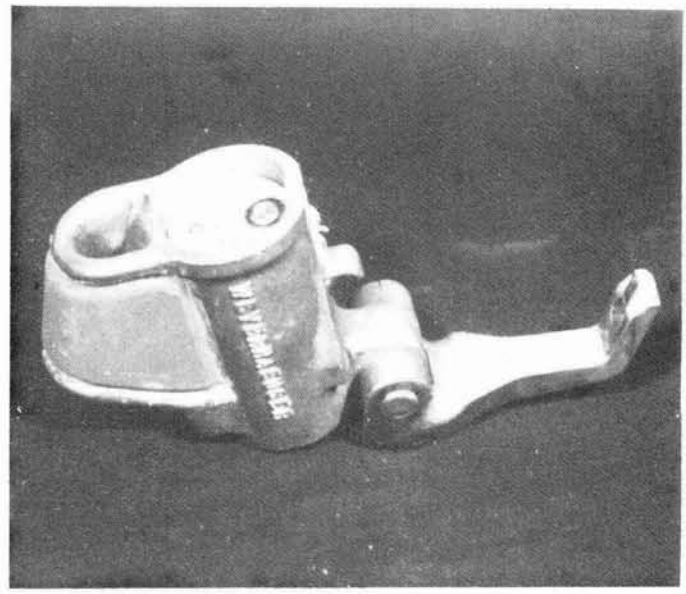


Figure 5 - RCC choker hook

Weyerhaeuser flies as many as nine chokers per carriage. The chokers and the buttons on the hauler radio control panel are colour-coded so that they can be released singly or in multiples. This is an important feature for American loggers, who often operate with extremely small landings and need to be able to pull all logs as close as possible to the tower. It has been found easier to land drags by unhooking logs separately, enabling the logs in the rear chokers to be brought closer to the tower. This makes for a safer, more productive landing, and in some cases it has been possible to reduce the landing crew by one man.

A substantial reduction in unhooking time was experienced. With the radio-controlled chokers, typical average unhooking times range from about 0.4 minutes for 4 chokers, up to about 0.8 minutes for 9 chokers. Manual unhooking times would be about 1.2 minutes for 4 conventional chokers, and about 2.5 minutes for 9 conventional chokers. Minimal additional hooking times were found with the prototype model, for non-slackpulling cable systems such as the gravity carriage. However, breakout times are increased in systems where line must be pulled out to the logs, such as in tractor and skidder logging. This is because the weight and shape of the RCCs make them awkward to handle.

Benefits are also realised in the choice of logging systems, since unhooking can be done independently of other landing operations. It is more often feasible for haulers to cold deck with the RCC chokers, than with conventional chokers, enabling a reduction in costs. The landing has also become a safer place to work, as there is no longer a need for a person to approach rigging and logs that may not have finished moving.

In skidder logging, the main advantages of the RCC are in reduced unhooking times, and in reduced operator fatigue where he does his own unhooking.

The prototype model had certain limitations :

- It was too heavy and clumsy to use with systems where slack mainline is pulled, as in tractor or slackpulling carriage logging.
- It can eventually be damaged in systems where the chokers are dragged on the ground, as in highlead.

AVAILABILITY

Weyerhaeuser has re-designed the RCC hook, based on its experience with the production prototypes. The Company is in the process of concluding an agreement with Johnson Industries of Vancouver, British Columbia, Canada, for serial manufacture of the new design, and sale to the forest industry, beginning in 1986.

The new model will have greater mechanical reliability, and be much easier to operate, so that hooking times should be no greater than with conventional chokers. It is designed for 19 mm line, and will weigh about 4 kg - the same as a conventional bell used with a 25 mm choker.

The price is not yet known. Weyerhaeuser has indicated that the daily cost of owning and operating the system of a transmitter and 10 chokers (including spares) is substantially less than the daily cost of a crewman. At current exchange rates, this translates to substantially less than $320 per day. How much less is not known.

POTENTIAL FOR NEW ZEALAND

The same benefits that have been observed in the United States are of course available to New Zealand loggers.

The benefit in productivity is greatest when the largest numbers of chokers are flown, and where unhooking consumes a large part of the cycle time for conventional chokers. Where only two or three chokers are used, the cycle time advantage of the RCC is likely to be considerably less than a minute per drag.

The RCC works best in systems that are not especially common in New Zealand - non-slackpulling skylines. The gravity return system is an excellent application, but the systems most common in New Zealand - tractor, skidder, and highlead - are not suited to the present model. The North Bend system would be suitable when used for downhill logging, but in uphill logging there could be difficulties getting the lines loose enough for the RCCs to release. The running skyline is suitable, but only where there are not extensive slackpulling requirements.

Pre-setting of the chokers might help overcome the slackpulling problems and enable the RCCs to be used with skidders and slackpulling carriages.

Flexibility in cable system options could be the most important advantage for New Zealand loggers. By divorcing the unhooking phase from the processing and loading activities, it should be possible to configure systems capable of operating at lower costs per m^3 than at present. An example might be to cold deck in windrows with a swing hauler for subsequent processing and loading.

Safety advantages would accrue from not having to approach logs and rigging that might still move, and through changing the logging system to have processing done remotely from the cable system itself.

Even where the RCC is matched to a suitable logging system, two other considerations are apparent. Firstly, there must be adequate facilities to service and maintain the devices, including radio servicing. Secondly, the cost may be too high to be economic.

CONCLUSIONS

(1) The radio-controlled choker would yield advantages to New Zealand logging companies in productivity, and safety, when used with suitable systems. The greatest advantages would accrue to those making substantial systems changes.

(2) The present model is not suitable for the most common logging systems in New Zealand, but it should be feasible to modify the design to operate with these systems.

(3) The economies can be compared to conventional choker bells only after the price and operating costs are known.

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