LOGGING INDUSTRY RESEARCH ASSOCIATION

NEW ZEALAND

PROJECT REPORT

FIME '86 AND ASSOCIATED VISITS

P.R.29 1986

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FIME 86 AND ASSOCIATED VISITS

INTRODUCTION

The third Forest Industries Machinery Exhibition was run in Myrtleford, Australia, from 16 to 19 April 1986. Over the weekend of 12 and 13 April a pre-FIME conference for both sawmilling and logging was held. FIME is a logging and wood processing machine exhibition held in Australia every four to six years. It is organised by the Australian Forest Industries magazine and attracts exhibitors and participants from all over the world. One of the features of FIME is the facility to demonstrate machines under working conditions.

The exhibition is based around 3½ days of static displays set up in the Myrtleford showgrounds, and 2 days of in-forest demonstrations run concurrently.

John Galbraith and Rob Prebble of LIRA attended FIME to present papers at the conferences and to look at the exhibition. Prebble's trip was extended to visit operations in Tumut, Morwell and Mt Gambier. This report covers the Logging Conference, some items of interest observed at FIME, and notes on the visits to other areas. The objective is to provide a brief description of what was seen or heard during our visit and to invite you to seek more information from LIRA on any item of particular interest. The proceedings from the two conferences (reference 1 and 2) are available from LIRA's library.

In all cases the costs quoted in this report are in New Zealand dollars, and where they have been converted from Australian dollars, an exchange rate of NZ$1.00 = $A0.78 has been used. This rate is close to the average exchange rate at the time. Machine prices quoted are only relevant to the time of writing, and may alter with the fluctuating exchange rate.

SUMMARY

It is obvious that, since the last FIME exhibition in 1980, comprehensive mechanisation of pine harvesting in Australia has taken place. A wide range of harvesting machines are available to Australian operators and most applications are past the prototype stage.

Australian logging managers and contractors consider a wider range of factors than just direct dollars per tonne, when evaluating mechanisation of their operations. These factors include labour availability and skills, company image, flexibility and environmental effects.

As the only large scale example of mechanised harvesting of *P. radiata* plantations in the world, the Australian industry is the obvious first port of call for New Zealand operators looking for suitable machinery.

The 1986 FIME exhibition was an excellent presentation of a wide range of harvesting equipment in both static and working roles.

Ref. 1 - FIME '86 International Conferences April 12-13; Sydney, N.S.W. : Australian Forest Industries Journal and Logger Magazine, 1986. Vol. 1 - Logging Conference Papers.

Ref. 2 - FIME '86 International Conferences April 12-13, Sydney, N.S.W. : Australian Forest Industries Journal and Logger Magazine, 1986. Vol. 11 - Sawmilling Conference Papers.

I - THE FIME EXHIBITION

ITEMS OF INTEREST AT FIME (R. PREBBLE)

At FIME, LIRA's Director and I divided the areas of interest up between us so that we got a reasonable coverage of the show. My main responsibilities were to look at log extraction equipment and new developments in chainsaws and accessories. Only 3 of the 3½ days of the exhibition were attended, and unfortunately some of the field demonstrations were cancelled due to the poor weather conditions.

1. Chainsaws and Accessories

In the chainsaws and accessories area there was virtually nothing new of interest to the New Zealand industry. The range of protective equipment on display was also relatively limited, although the major chainsaw distributors did include safety gear in their displays. It appears that with the increased mechanisation in Australian logging, there has been a decline in the development and promotion of motor- manual felling and delimbing equipment.

2. Extraction Machines

Exhibitors in the extraction machines area at FIME had concentrated entirely on ground based logging systems. There was no cable logging equipment on display and only Madill and Washington were represented indirectly through the Canadian Trade Commission and Weyerhaeuser displays. The section on extraction machinery can be divided into three categories :

(i) Log skidders
(ii) Crawler tractors
(iii) Clambunk skidders

A number of different brands of forwarders were on display at FIME, but unfortunately no information was collected on them. LIRA can obtain information on specific machines, if required.

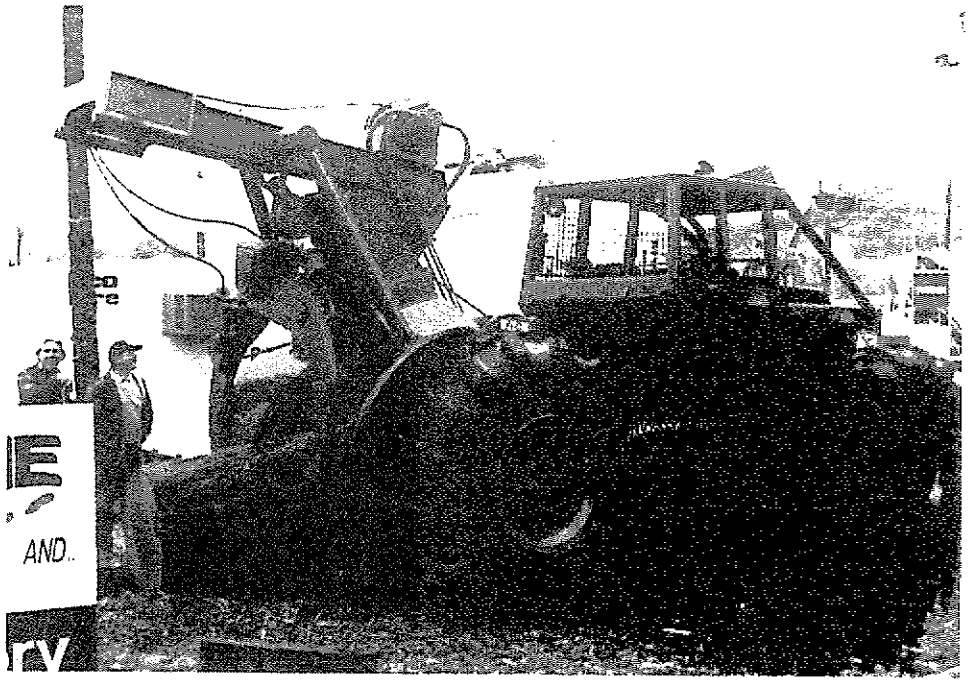
2.1 Log Skidders

As a result of the increased mechanisation and a consequent move to shortwood systems, skidders have assumed a less important role in Australian logging. While all of the major brands of skidder were represented at FIME, it was the attachments to the machines that generated the most interest. Nearly every dealer featured one or more different types of grapple combinations and from discussions with a number of locals, it appears that this trend is a direct result of market demands. Very few cable skidders have been sold in New South Wales, Victoria and South Australia over recent years. The various grapples on display were as follows :

(a) The Johnson Grapple

One of the biggest disadvantages with a grapple skidder is its inability to drop and winch its load (unless the operator gets off his machine and wraps a strop around the logs). A recent development on display at FIME was the Johnson Skidding Grapple. This grapple can be attached to the mainrope of the skidder, and so if the machine loses traction, the load can be dropped without releasing the grapple. A modified fairlead suspending a jockey pulley out beyond the fairlead rollers is necessary to accommodate the Johnson grapple (see figure 1). This jockey pulley keeps the grapple out from the butt plates of the machine.

Fig 1 - The Johnson Grapple fitted to a Timberjack 550 Skidder



A small hydraulic winch used to open the grapple is mounted on top of the modified fairlead. It contains a length of wire rope equivalent to what is on the main skidder winch. This rope is usually lighter in gauge and divides into two to attach to either side of the grapple. By winching in on this rope the grapple tongs are pulled open. Fully extended they open to 2.79 m and the reach of the grapple when lowered from the boom is 2.29 m behind the rear axle of the skidder.

The approximate weight of the grapple is 726 kg. The main winch rope of the skidder is connected to the grapple in a similar fashion to the closing/lifting line on a rope crane, so as the drag is winched in the grapple closes on the logs.

Two machines on display at FIME were fitted with the Johnson grapple - a Timberjack 550 (150 kW) as shown in Fig. 1, and a 130 kW Cat 528 fitted with 44 inch wide tyres. The Cat 528 was observed operating in the hardwood display area, hauling two eucalypt logs around a short circuit. The facility to drop and winch in the load was certainly demonstrated on the uphill section of the circuit (refer to Figs 2 and 3), but care had to be taken to ensure that a log didn't slip out of the tongs. The cost of the Johnson grapple would be around $33,000.

Fig 2 - The Cat 528 with Johnson Grapple travelling loaded up the circuit

Fig 3 - Dropping and winching in the load with the Johnson Grapple

(b) The John Deere Grapple

The John Deere parallelogram grapple, mounted on a 740 John Deere skidder, is shown in Fig. 4. Fully extended the grapple can reach out 2.87 m behind the rear axle of the machine, and has a maximum opening of 3.05 m. It has a closing force of 3175 kg and a maximum lifting capacity of 13,948 kg. The price of the John Deere grapple is $58,500.

Fig 4 - The John Deere Parallelogram grapple on a 740 Skidder

(c) The Esco Grapple

The Esco 36E grapple was fitted to a 93 kW 350 Timberjack skidder at FIME (see Fig. 5). This grapple has a maximum reach of 2 m from the hinge point of the boom, and can open out to 1.83 m. It is suited to a machine size of 67 kW up to 112 kW and costs about $40,000.

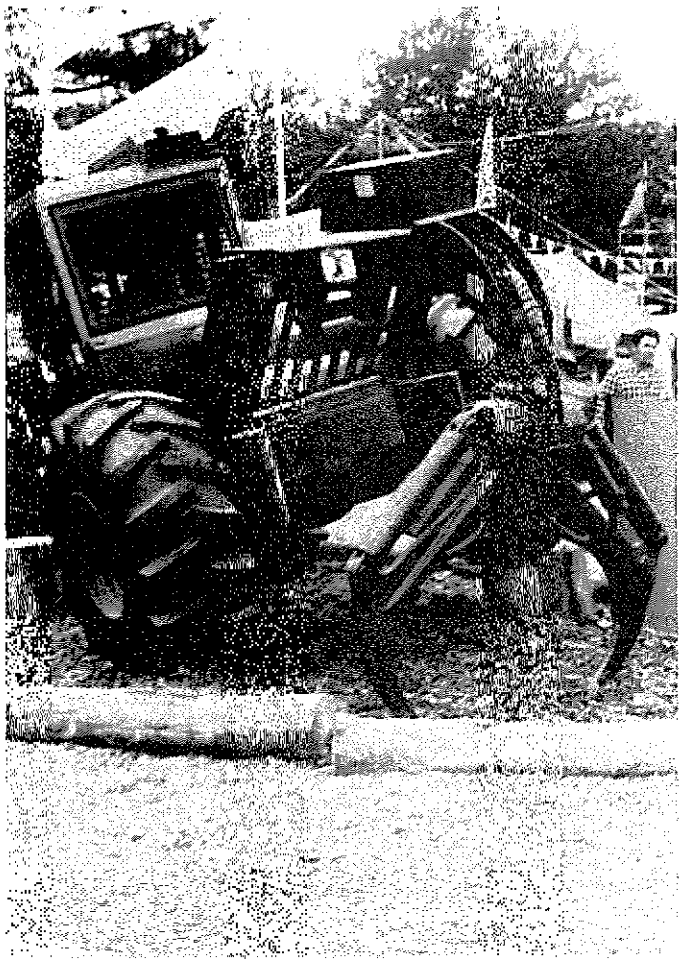


Fig 5 - The Esco 36E Grapple on a 350 Timberjack Skidder

2.2 Crawler Tractors

As with skidders, crawler tractors had assumed a much lower priority in the exhibition at FIME 86. In fact only three major crawler tractor distributors were represented - Caterpillar, Komatsu and Dresser (formerly International). The only new development that would be of benefit to loggers is described below.

(a) The Cat D6H Custom Skidder

The elevated drive sprocket on the new Cat crawler tractors has a number of advantages such as improved serviceability reduced shock loading to the drive components and being elevated above the work environment. But the feature of most interest to the logging

industry is the custom skidder option. As a direct result of the high drive concept, track length and track location on these machines can be customised to suit the intended application. With the custom skidder option, the balance of the machine is altered by moving the whole machine on the track frame. This results in a much improved weight distribution when skidding logs (see Fig. 6). The 17 tonne D6H develops about 123 kW at the flywheel, and was seen pulling a large eucalypt log (estimated at 6 m3 plus) around a demonstration circuit. The circuit included some uphill pulling, about +7° on wet clay soils on which the D6H was able to climb loaded without dropping and winching. A new D6H would cost around $300,000.

Fig 6 - The D6H Cat Custom Skidder Tractor

2.3 Clambunk Skidders

There has been some guarded interest in the potential of clambunk skidders in New Zealand (Ref. 3). However the cost and the need for other equipment to balance the system have tended to hinder progress. Both AMN and APM in Australia have used purpose-built clambunk skidders in their operations, and one ANM contractor in New South Wales has modified a forwarder to become a clambunk (refer visit to J. Crozier's operation, Carabost, later in this report). The one

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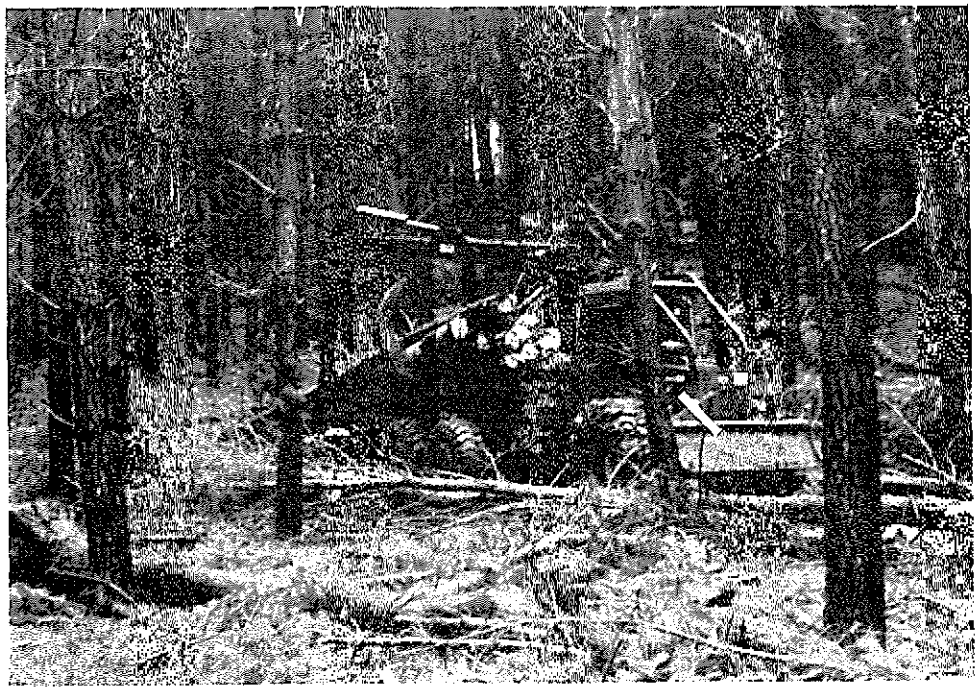
Ref. 3 - Gleason, A.P. "Clambunk Skidders (Do They Have a Place in the New Zealand Logging Industry?)", Project Report 26, LIRA , 1985

clambunk skidder on show at FIME was a Timberjack 520.

(a) The Timberjack 520 Clambunk Skidder

The Timberjack 520 Clambunk is a six-wheel drive, pivot steer machine, powered by a 138 kW GM diesel, and it is fitted with a 9025 Cranab crane which has a 6.3 m reach from the centre of the machine. The grapple on the bunk can open to 2.9 m and payload, according to specification, is around 13 to 14 tonnes. From observations and discussions with people who have used these machines, they are best suited to smaller wood such as production thinnings or clearfell of minor species. Generally their travel and loaded speeds are slow, but they make up for it with large payloads. There is mixed opinion about the traction and overall performance of clambunks, although in some applications they can compete with conventional skidders. The 520 at FIME was seen in the second thinning demonstration area, and while it was difficult to discern whether the operator was unskilled or the machine particularly slow, cycle times were very long and payloads small (see Fig. 7). (This may have been influenced by the limited wood available in the demonstration area.) The approximate cost of a Timberjack 520 clambunk skidder would be $350,000.

Fig 7 - The Timberjack 520 Clambunk Skidder



3. Mechanised felling/delimbing (J.E. Galbraith)

Since the 1980 FIME, when the Kockums Logma slide boom delimber, the John Deere 743 harvester and the "Skogsjan" grapple processor, were the main processing units demonstrated, a full range of different slide boom delimbers/processors and grapple processors have been introduced to the Australian industry. Such units have obviously moved from being prototypes (in the Australian industry) to commonly used and well accepted machines.

Grapple Processor/Harvesters

The Scandinavian trend to "single grip" harvesters has seen the grapple processors develop into full harvesting heads by adding chainsaw felling bars. Three examples exhibited at FIME were :

- LAKO 3T grapple harvester
- Valmet 940 processor/harvester
- Kockums GSA 62

The **LAKO** harvester was unfortunately not seen in operation in the FIME first thinning demonstrations as it had a broken saw chain. However a similar unit has since been introduced into New Zealand and operated in Kaingaroa Forest thinnings. The N.Z. unit, mounted on a Martimex skidder, cost approximately NZ$380,000.

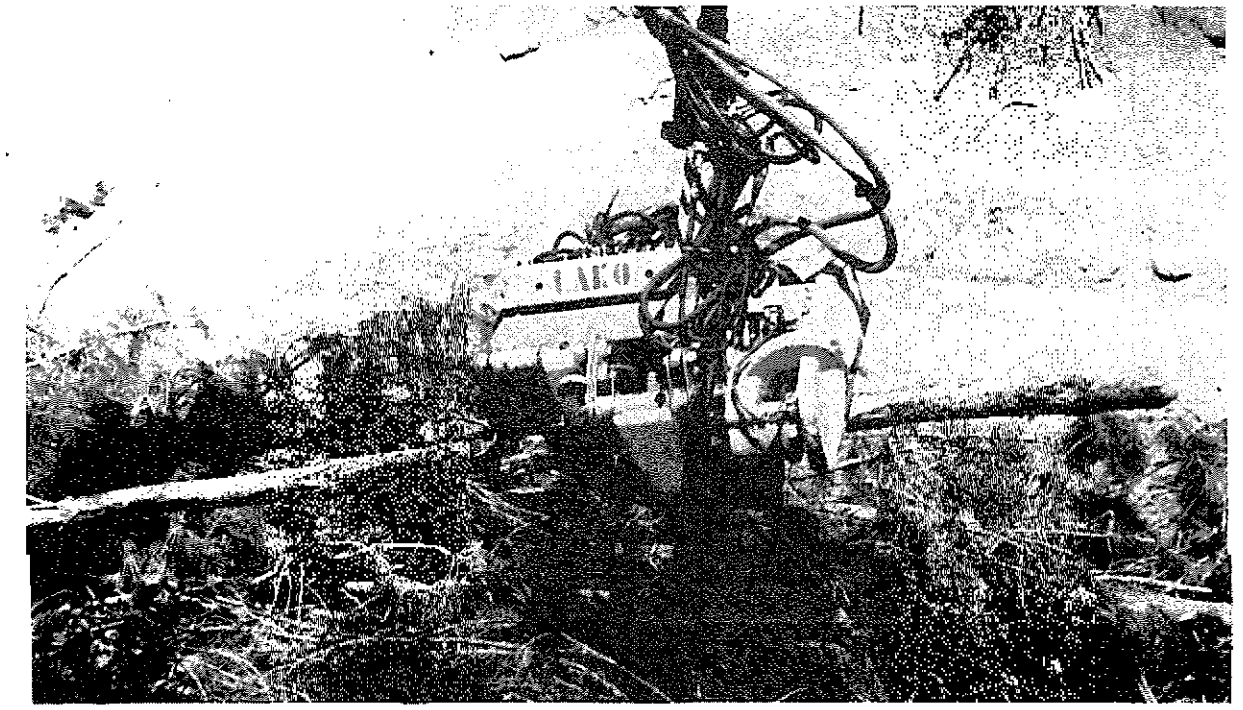


Figure 8 - LAKO 3T grapple harvester

The **Valmet 940** processor/harvester head was seen demonstrated on a purpose-built Valmet 901 base machine. The 901 is an impressive machine featuring a very comfortable operator cab with excellent all-round visibility. The maximum felling diameter of the 940 head was stated to be 45 cm, and maximum delimbing diameter 42 cm.

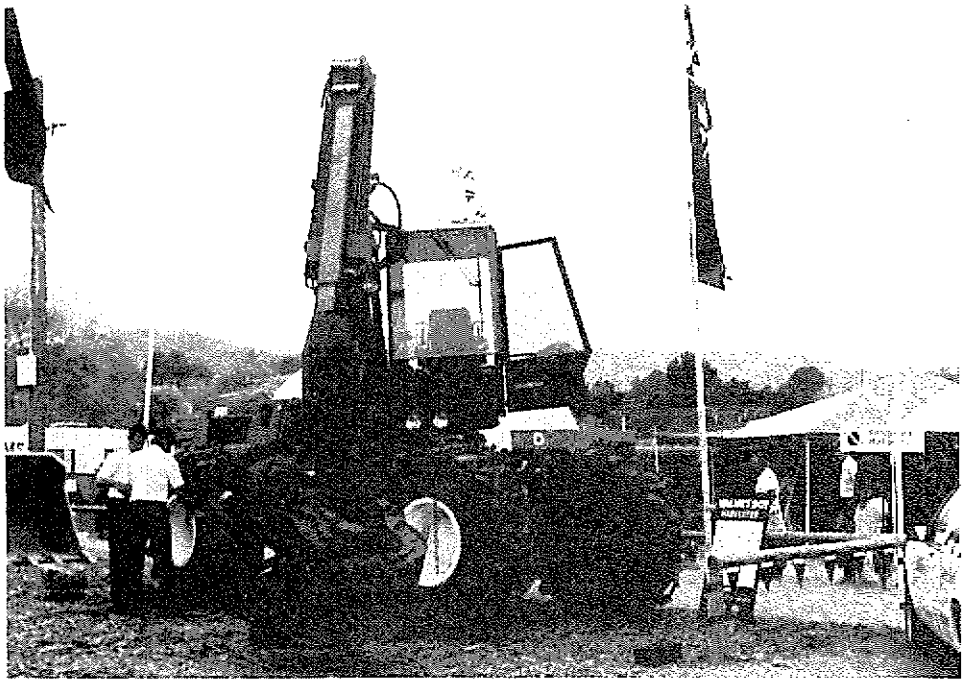


Figure 9- Valmet 901 harvester fitted with Valmet 940 head

The **Kockums GSA** 62 harvesting head was seen operating in the FIME first thinning demonstration area. Mounted on a Kockums 84-62 forwarder, the total price of the unit was $A345,000. The head has a stated maximum felling diameter of 50 cm and a maximum delimbing diameter of 45 cm.

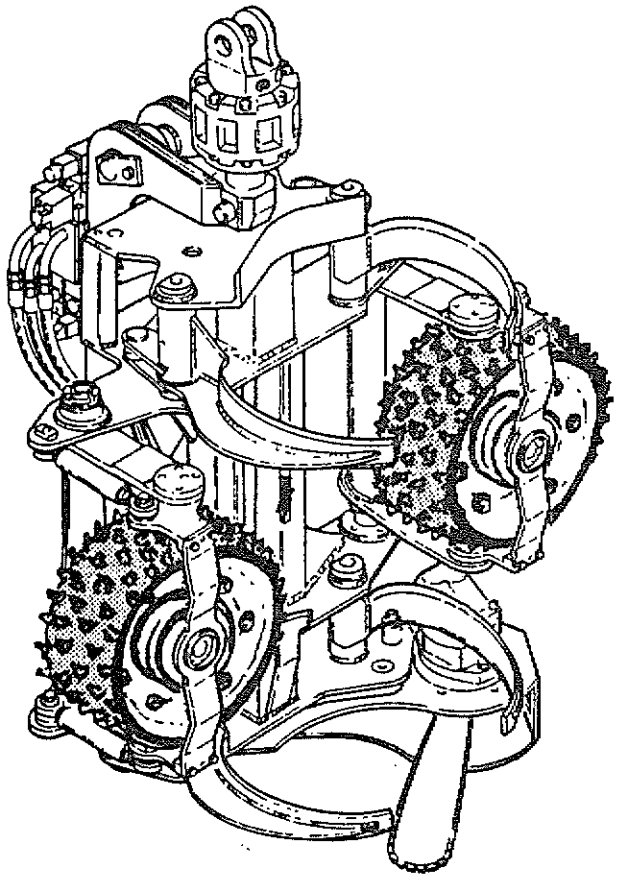


Figure 10 - Kockums GSA 62

All the above units featured pre-programmable automatic length measurement.

The **Steyr KP40** processor was seen on static display at the exhibition (see R. Prebble's notes on the KP40 field operation in South Australia). The Steyr unit is unique in that it uses a large circular saw for cutting to length. It is a processor only and is not used for felling. It has a reputation for very accurate length measurement and is finding use in Australian post and pole processing operations.

The **Bell T1 feller buncher** was demonstrated in the second thinning demonstration area. The unit is highly manoeuvrable and while it is primarily a feller-director, it is able to move the felled butt around to achieve some degree of bunching. Also new in the Bell camp was a 4-wheel Bell fitted with a stump grinder head.

Figure 11- Bell T1 Feller-buncher

. Log Transport

.1 Trailers

Jinker trailers for carting hardwood and pine sawlogs are commonly folding-pole, self-piggybacking type. They have been used for many years in Australia and there are some differences in design and operation to the self-piggybacking trailers more recently introduced to New Zealand. The Australian folding-pole trailers commonly have a hitch point up behind the truck bolster. The reason for this placement seems to be to achieve

initial lift to start the folding action on the pole as the trailer is reversed against a bank or barrier. In this way the pole can be folded without the use of air or hydraulic rams (as used in New Zealand). A disadvantage of the high hitch point is the reduction in "rear axis" length on the truck, providing very little "sting" for the trailer. This produces in-tracking of the trailer, much like a semi-trailer.

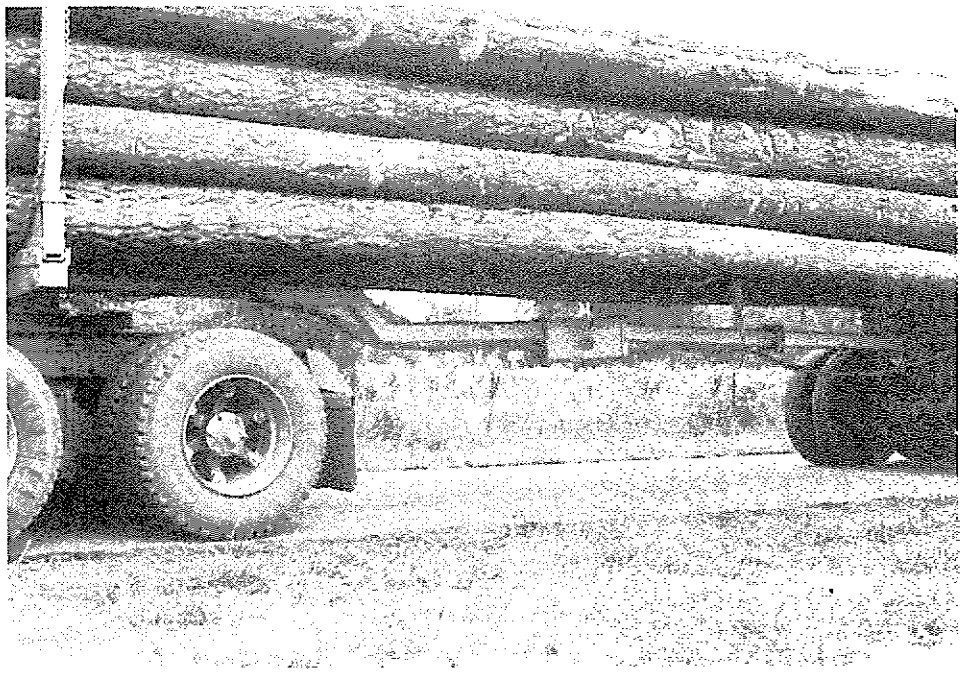
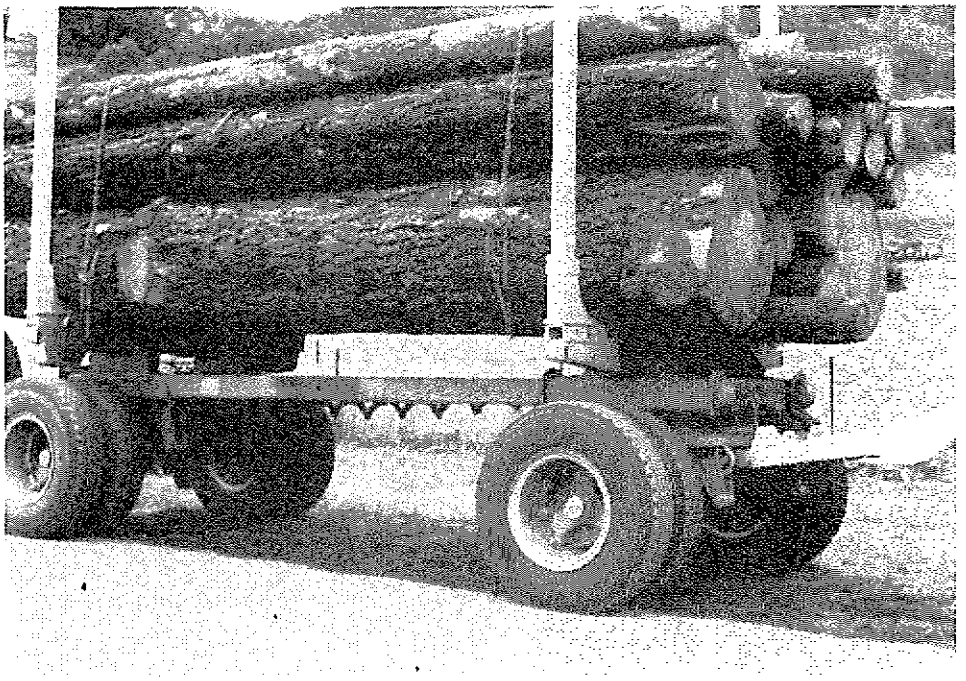


Figure 12 -Folding pole on two-axle jinker trailer

Figure 13 -A folding pole three-axle jinker in piggyback position

Exhibited for the first time was a **self-piggybacking 'shorts' trailer** (commonly referred to in Australia as a dog trailer), manufactured by Taylor Made Engineering of Tasmania. The trailer was the first of its type seen by the author. There were two versions at FIME, two and three axle, demonstrated behind an 8-wheel drive MAN truck.



Figurel4- Self piggybacking short log ('dog') trailer

The difference from the normal self-piggybacking jinker is that the dog trailer is telescoped to reduce its wheel base before the folding-pole, self-piggybacking action starts. The two trailer chassis rails slide through box sections on the trailer turntable (under the front bolster). The mark on the chassis in the photo (with the hole in the centre) shows the shortened position. The trailer is then piggybacked in the same way as a jinker, i.e. the drawbar hinges upward in the middle and, as the truck continues to reverse, lifts the front of the trailer up onto the truck. The truck bolsters fold down out of the way.

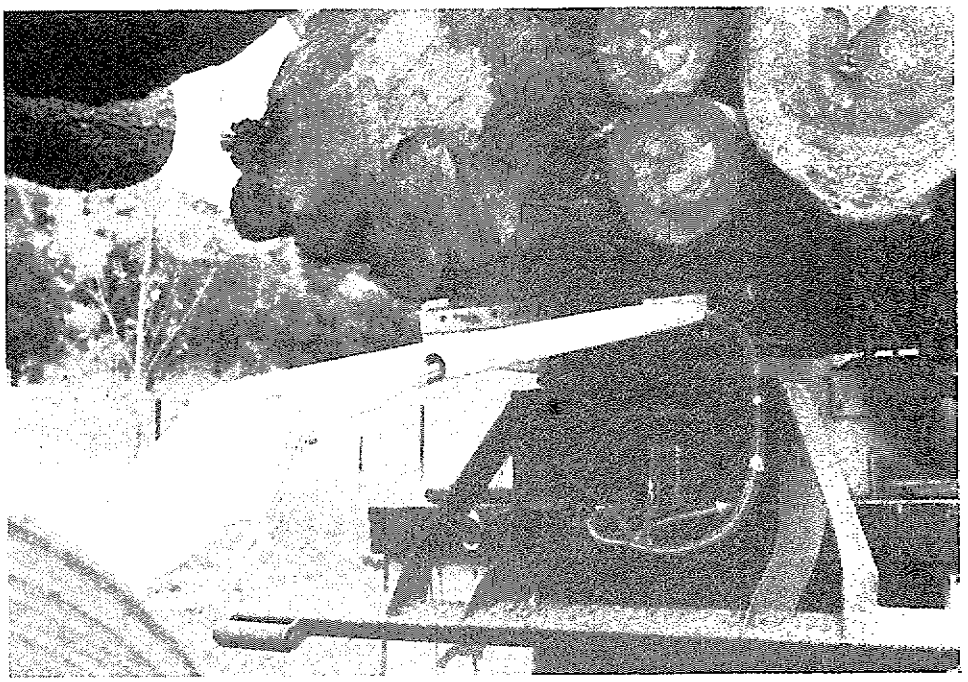


Figure15 - Hitch point for the self piggybacking dog trailer on the truck bolster turntable

A high quality video of the Taylor Made trailer is available from LIRA.

Skeletal semi-trailers are a common trailer unit for hauling short pine logs (4 to 6 m). Their popularity is somewhat surprising as, like the New Zealand "bailey-bridge trailer, they have a significantly higher tare weight than say a double unit truck and dog trailer.

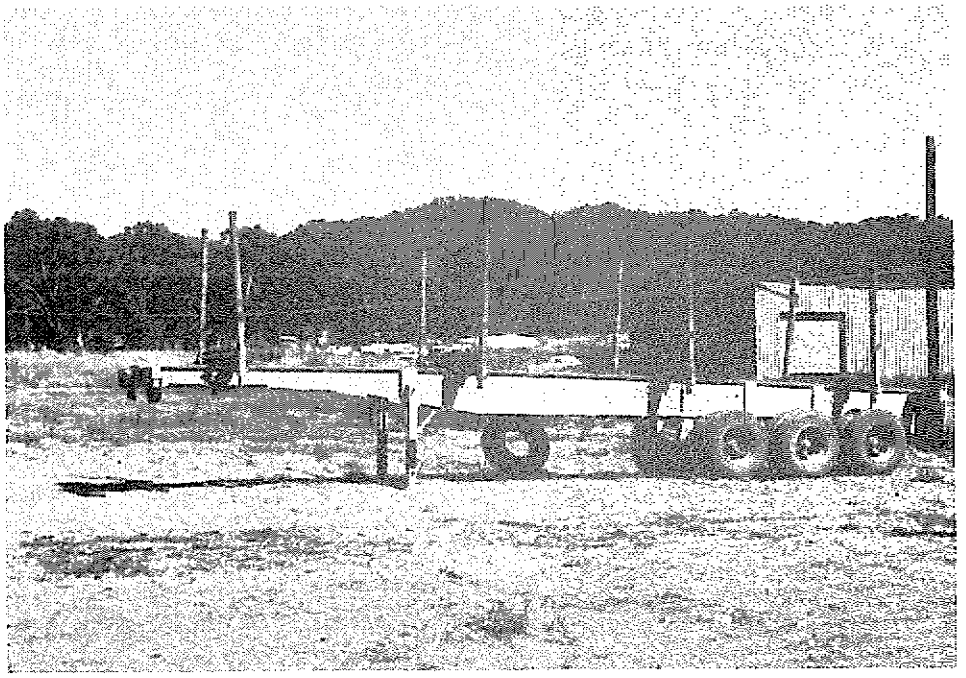


Figure 16- Typical skeletal semi-trailer

It was somewhat surprising to see skeletal semi-trailers used almost exclusively on the relatively long highway hauls into the ANM mill at Albury. The logs are mainly 4 to 6 m thinnings and could readily have been carried on double unit truck and trailers with lower tare weight and ability to piggyback on the return journey.

Super single tyres were seen on a few rigs, but discussion with operators at the exhibition suggested that this style of tyre was losing popularity in logging work.

Figure 17- Super single tyres on semi-trailer. Trailer tare weight 4.5 tonnes.

Log load securing on the semi-trailers was commonly by use of a webbing cargo winch with chain fitted. The cargo winches are designed for webbing and are quite light in construction. Some of the winches seen at FIME and in the field were cracked or distorted. Load securing chains were commonly 9/32 inch Hercalloy (6.4 tonne breaking load) or 7.3 mm Hilite 2 (6 tonne breaking load).

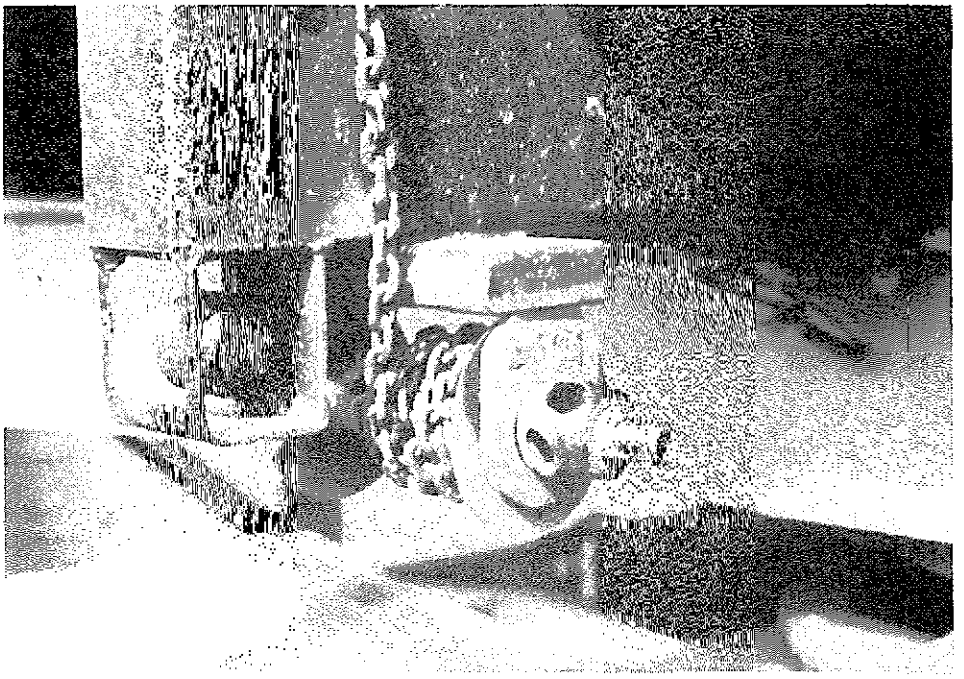


Figure 18 - Webbing-type cargo winch fitted with chain for log load securing

Of interest to those considering off-highway haulage on low quality roads was a Moxy civil engineering truck rigged up as a forwarder. The unit was apparently assembled for FIME and had no operational experience.

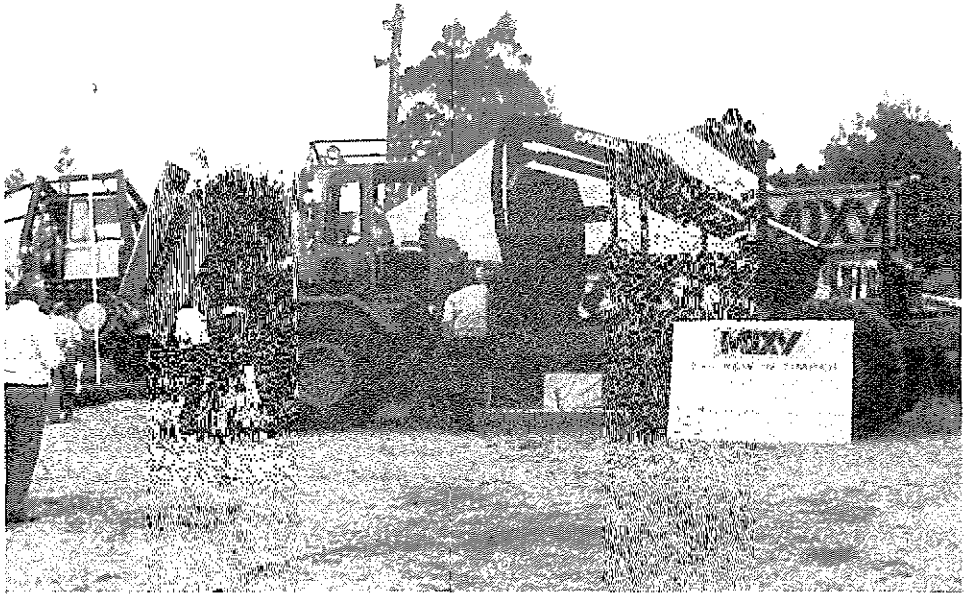


Figure 19- Moxy 5200 civil engineering truck rigged as log forwarder

Loading

A feature of Australian hydraulic log loaders is the almost exclusive use of "crab grab" type grapples. Originally credited to contractor Barry Padgett of Tasmania, the crab grab is a sturdy grapple that does not have a rotating feature. The grapple therefore has one less hydraulic control than a rotating type, and generally fits straight onto an excavator boom in place of a bucket. It also avoids the breakdown problems so frequent with rotators. The grapple is most popular in hard wood loading where it often has a dual role as a debarker as well. Of course in larger logs the lack of rotation is not so much of a problem.

Figure 20 - 'Crab Grab' loader grapple working in the mists of Mt. Ben!

Incidentally, crab grab type grapples are now manufactured by Ian Patchell in Rotorua, for sale to the Australian market. Patchell also produces a specialist outer boom for log loading, to go with the crab grab.

(To the author's knowledge only one crab grab type grapple has been used in New Zealand - fitted to a Massey Ferguson 450S excavator working in Southland.)

3 Hydraulic Weighing Devices

At the request of John Ellis of N.Z. Forest Service, the author enquired about the Indexator style of load weighing device for hydraulic knuckleboom loaders. The Indexator MV3 portable scale features a load cell, which is fitted above or below the grapple rotator on the crane, and runs a signal back to a digital display

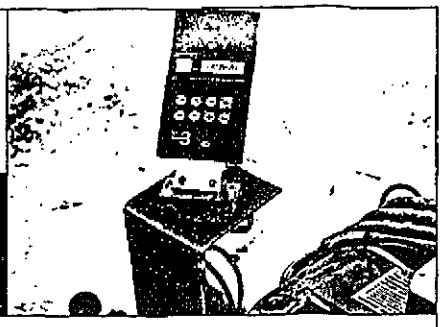
alongside the operator. Individual load weights can be accumulated into a total load weight in much the same way as the Loadrite units commonly used in New Zealand on hydraulic front end loaders.

However, after some initial mechanical problems in operation in Australia, the Indexator units have been temporarily withdrawn. The agents expected the units to be available again later in 1986. (See Pages 21-24 for the MV3 specification sheet.)

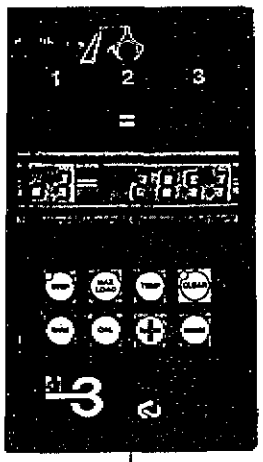
5. COMPUTER COSTING PROGRAMME

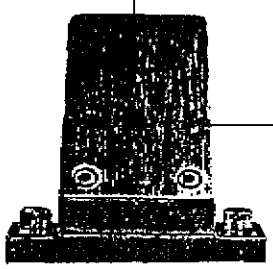
A CSIRO computer programme, "RATE-SETTER", for calculating logging contract rates was demonstrated at the FIME Conference and Exhibition. The programme was developed by CSIRO staff to assist with rate negoiation in Eden, NSW, logging operations. It appeared similar in function to LIRA's COLCO. (See Pages 21-24).

1. Instrument. Fits in your vest pocket. Numeric display presents the exact weight clearly and distinctly. Issues warning when you reach the overload point. Display is illuminated automatically as soon as daylight begins to fade.

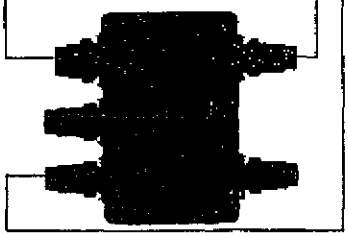


2. ENTRY button. To enter a weight, simply press this button.

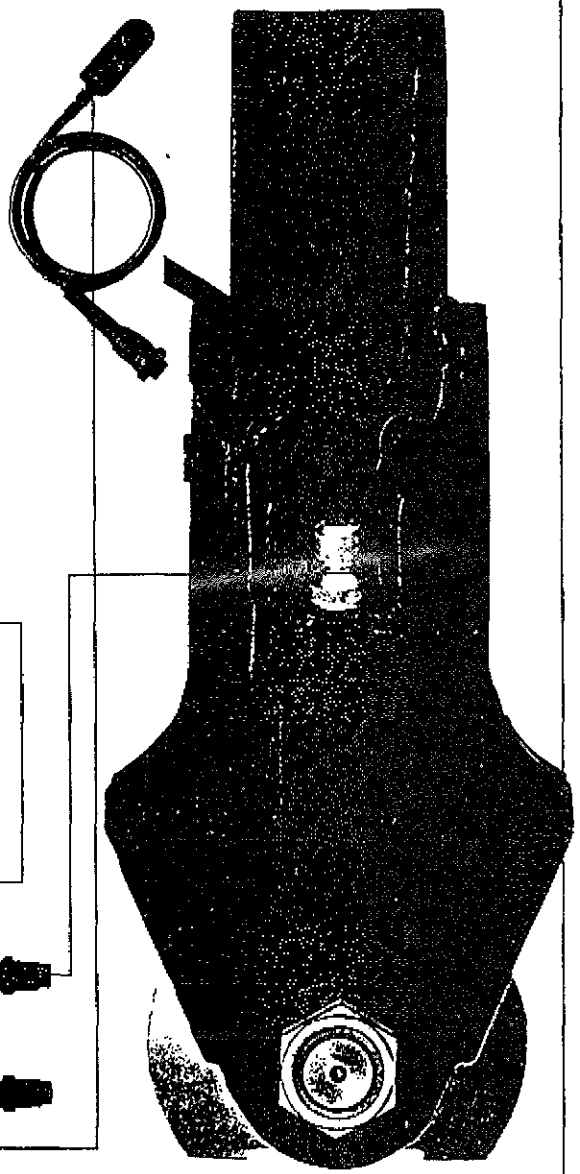




5. Weighing unit. Oscillations are damped automatically to facilitate loading.



3. Cassette-type mounting bracket (attached to boom). Unaffected by weather and wind. Instrument can be mounted easily and conveniently.



4. Junction box. Mounted externally on boom. Designed to accomodate other units such as temperature indicators and external steppers.

Simple and ingeneous

The MV3 scale system incorporates reliable, state-of-the-art technology. You can rely on it in all kinds of weather — from the tropics to the Arctic. The MV3 instrument withstands impacts, moisture, oils and dust.

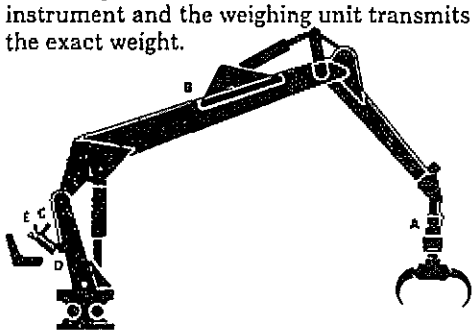
The MV3 instrument is programmable

A complete stand-alone unit, the MV3 includes the instrument itself, cassette-type mounting bracket, ENTRY button, junction box, cables and weighing unit.

Here's how it works

When not in use, you keep the instrument safely inside the cab. When you start loading, you simply insert the instrument into the convenient cassette-type mounting bracket (attached to the boom).

The signal cable that runs between the instrument and the weighing unit transmits the exact weight.

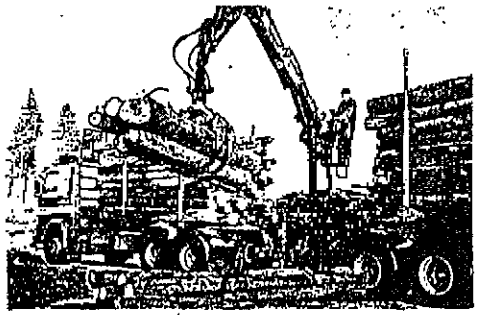


7. Example of system configuration: A) Weighing unit with oscillation damper; B) Signal cable runs along top of boom where it is well protected; C) Cassette-type mounting bracket and MV3 instrument; D) Junction box; E) ENTRY button.

While loading, all you have to do is press the ENTRY button, and the exact weight will be added to the register. You can read off the weight of each lift and also the cumulative total. And since the instrument is programmable, you can obtain truckload totals, trailer-load totals, logpile totals, etc. The instrument will warn you when you reach the overload point.

MV3 technical data

Max load per lift: 3 000 kg (6 614 lb.)
Min entry weight: 1 kg (2.2 lb.)
Accuracy: ±0.25%
Ambient temperature (in operation): −40° C to +60° C (−40° F to +140° F)
Power requirement: 24 V DC
Weight of weighing unit: 20 kg (44 lb.)



8. The MV3 calculates automatically the weight of each logpile and the cumulative total.
Simple and ingeneous. Perfect for the task at hand. Full protection against overloading (and needless fines). Also helps you exploit the full capacity of your rig.

CSIRO
Division of Chemical and Wood Technology

CSIRO
Division of Forest Research

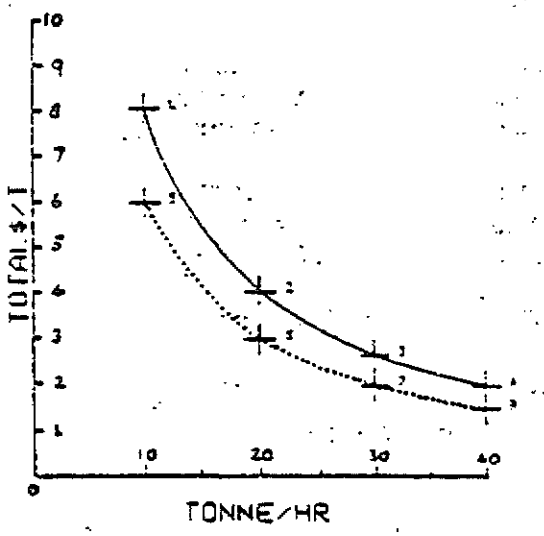
INPUT FORM

for

"RATE - SETTER"

A COMPUTER PROGRAM FOR CALCULATING CONTRACT RATES

FOR LOGGING OPERATIONS



The program was written by Bill Rawlins, CSIRO Division of Chemical and Wood Technology, Ian MacArthur, CSIRO Division of Forest Research and Denys Garden, NSW Dept. of Agriculture. It was developed with the help of the Imlay Logging Association and Harris-Daishowa Pty. Ltd., both of Eden, NSW. For further information contact Ian MacArthur (062-818238).

NOTES FOR INPUT FORM

(1) WAGE ($/WK) – The wage required is the wage including an allowance for annual leave, leave loading and sick leave but excluding overtime.

(2) OVERTIME (HRS/DAY) – This is an average rate for the whole team of workers. If only some members of the team work overtime, then this must be averaged over the whole team. All overtime is calculated to be paid at time and a half the average wage rate for the whole team.

(3) DAYS LOST YEAR – Excludes weekends. A suggested list of headings to calculate this item follows. Our value for particular items are in brackets.

Annual holidays (2)	.....
Public holidays (9)	.....
Sick leave	.....
Forest closure (Wet)	.....
Forest closure (Fire)	.....
Other	.....
Total days lost/year	.....

(4) OVERHEADS ($/YEAR) – The following items may be used in calculating overheads:

Employee transport	.....	c.f.	.....
Training contrib.	.....	Office/Workshop rental	.....
Association fees	.....	Tools and equipment	.....
Accounting fees	.....	Travel and entertainment	.....
Safety equipment	.....	Float hire	.....
Tel./electricity	.....	Managers vehicle	.....
Stat./office equipt	.....	Workshop vehicle	.....
Bank fees, taxes	.....	Payroll tax	.....
Superannuation	.....	Manager's salary	.....
Public liab. insur.	.....	Mobile radio	.....
Sundries	.....	Admin/book-keeping	.....
sub-total	.....	Total Overheads ($/year)	.....

(5) INTEREST RATE (%/YEAR) – The rate of interest that the contractor wishes to make on his investment. It should be an annual rate compounded annually (one rate we have used has been 6% above the hire purchase rate).

(6) RESALE PRICE ($) – The current price of a five year old machine. Not the price you expect to get for this machine in five years time. It should reflect hours worked by the machine.

(7) REPAIRS & MAINTENANCE (%) – The percentage of the new price you would expect to pay over the service life of the machine excluding tyres or tracks. It should reflect the nature of the task, operator care and the complexities of the particular machine. Our estimates are summarised as follows:

Operating Conditions	Easy	Average	Hard
Crawler	60%	80%	100%
Skidder	60%	80%	100%
Front-end Loader	60%	80%	100%
Excavator Loader	60%	80%	100%
Feller buncher	80%	100%	120%
Processor	80%	100%	120%

DATA INPUT FORM

CONTRACT ..... QUOTA (T/D) .....

WAGE DATA	NO. OF PERSONS	WAGE ($/WEEK)
Fallers	.....	.....
Dumpmen	.....	.....
Operators	.....	.....
Supervisors	.....	.....

Workers Comp (%)	.....
Overtime (hrs/day)	.....
Days lost per year	.....

OVERHEADS/INTEREST/INFLATION

Overheads ($/yr)	.....
Interest rate (%pa)	.....
Inflation (% pa)	.....

MACHINE DATA

No. of types	.....				
Name	.....	.....	.....	.....	.....
No. of this type	.....	.....	.....	.....	.....
Purchase price ($)	.....	.....	.....	.....	.....
Resale price ($)	.....	.....	.....	.....	.....
Tyre price ($)	.....	.....	.....	.....	.....
Tyre life (hrs)	.....	.....	.....	.....	.....
Fuel use (L/hr)	.....	.....	.....	.....	.....
Oil use (L/hr)	.....	.....	.....	.....	.....
Service life (hrs)	.....	.....	.....	.....	.....
Rep. & Maint. (%)	.....	.....	.....	.....	.....
Operating (hrs/day)	.....	.....	.....	.....	.....
Days worked/year	.....	.....	.....	.....	.....

Insurance (% pa)	.....
Fuel cost ($/L)	.....
Oil cost ($/L)	.....
Falling cost ($/tonne)	.....

CONTRACTOR : EXAMPLE OUTPUT

ANNUAL INTEREST RATE = 23% ANNUAL INFLATION RATE = 6%

GENERAL COSTS ($/TONNE)

Wages	2.06
Overheads	0.90
Falling costs	2.89

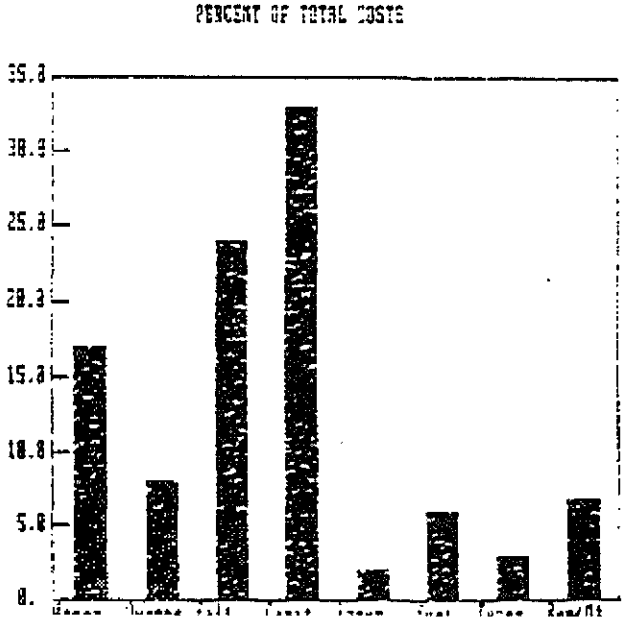
MACHINE COSTS ($/TONNE)

	CAT 520	CAT D6	CAT 950B
Capital	1.50	1.07	1.51
Insurance	0.09	0.07	0.08
Fuel & Oil	0.27	0.20	0.25
Tyres & Tracks	0.09	0.18	0.11
Repairs & Maint	0.29	0.18	0.32
Total costs	2.24	1.70	2.06

Overall Costs = $11.85/tonne

COMPONENTS OF PRICE

	$/t	%
Wages	2.06	17.39
Overheads	0.90	7.62
Falling	2.89	24.38
Capital	3.86	32.76
Insurance	0.24	2.00
Fuel & Oil	0.72	6.07
Tyres/Tracks	0.37	3.16
Repairs & Maint	0.78	6.62
Total	11.85	100.00



II - ASSOCIATED VISITS (R. PREBBLE)

ANM'S LOGGING OPERATIONS IN NEW SOUTH WALES

On 14 April 1986, immediately before FIME, a visit was made to two contract logging operations in the Tumut area. Both operations were supplying pine logs to ANM's thermo mechanical pulpmill at Albury. When the mill started in 1981 the company went for the shortwood mechanised system, mainly because there was a shortage of skilled labour available for motor-manual systems. The cost of labour was high due to workers' compensation rates. Other reasons included the Forestry Commission requirement for minimal damage to residual crop trees (tree length systems tended to cause more damage).

1. J. Crozier's Operation in Carabost Forest near Rosewood

This operation was approximately 95 km from the mill, and production thinning of 14 year old P. radiata yielding around 100 m3 per hectare. The contractor had a Kockums 880 and a Timbco 2518 feller-buncher to fell the trees and lay them out, ready for processing. The Timbco was used on the steeper slopes (up to 28°) and laid the stems out either parallel with the slope for grapple processing, or on the steeper slopes at a 45° angle uphill for whole tree extraction. The 2518 has a 46 cm shearing capacity with its felling head, and the boom can reach out 7.3 m, or up as high as 11 m if used as a delimber. For working in tight thinning situations, the boom fully retracted can rotate inside a 1.8 m radius. A 132 kW 6466T motor powers the machine.

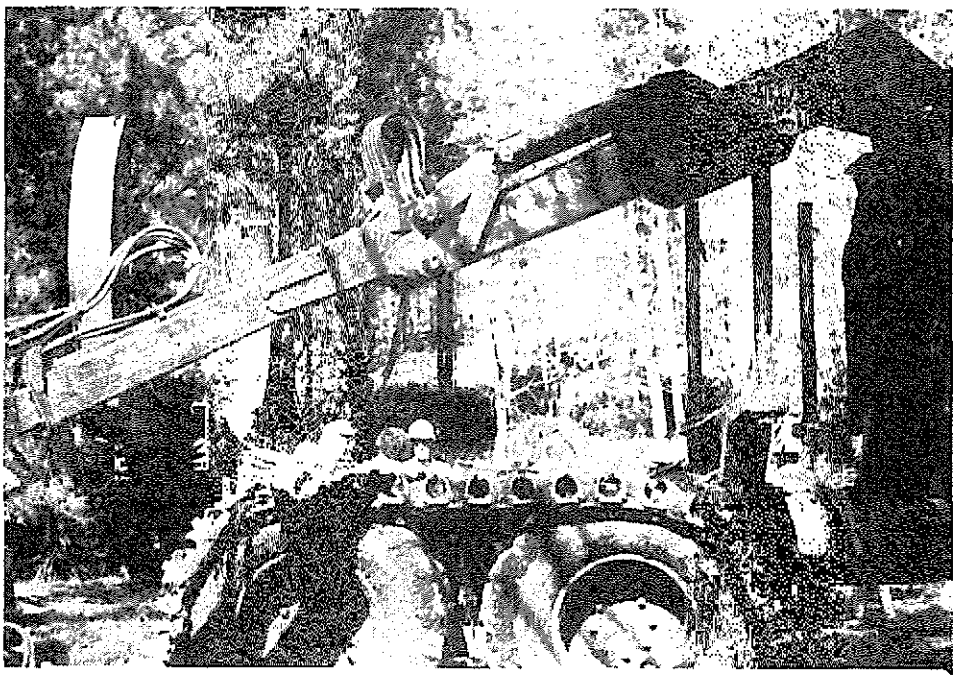
Fig 21 - The Timbco 2518 feller buncher working on a 20° slope

The Timbco (see Fig.21) was seen felling and bunching up to 7 trees at a time in the .18 m3 (est.) piece size wood. While its shearing functions and bunching capabilities were smooth and effortless (less than a minute to accumulate 6 trees), the machine seemed to lack power when driven up the slope. The 2518 was only a recent addition to Crozier's operation, and he was suitably impressed with its performance. A recent quote for a Timbco in New Zealand was $400,000.

A Valmet 920 grapple processor, mounted on a Sumitomo excavator, followed the feller-bunchers on easy to moderate slopes (up to 20°), picking up stems lying across the contour, delimbing them and cutting them to between 3.6 and 5.4 m lengths. The 920 grapple processor is a boom mounted unit that can be fitted to most excavator type bases. It relies on spiked rollers to feed the trees through the knives for delimbing. Two of the knives are incorporated in the grapple arms, and the third is a rigid mounting on the processing frame. Hydraulic motors power the spike rollers to give a speed feed of up to 4 m per second. A 50 cm chainsaw bar is fitted to the rear of the head for docking. The maximum diameter tree the head could handle was about 35 to 40 cm, and the all up weight of it is about 650 kg. The 920 grapple processor head has been superceded by the 940, which was on display at FIME and costs about $ 182,000. The processed wood was laid out perpendicular to the extraction tracks used by the Kockums 85-33 forwarders.

The 85-33 forwarder is a pivot steer six-wheel drive machine powered by a 127 kW Scania D8 motor, through a four-speed Clarke torque converter transmission. The crane on the machine is a Cranab 6010 with a 7.6 tonne/metre lift capacity and a 6.5 m reach. Crozier has four forwarders, one of which he had modified into a rigid bunk clambunk forwarder (see Fig.22).

Fig 22 - Croziers Clambunk on the rear of his 85-33 Kockums Forwarder



This clambunk forwarder was used on the steeper slopes to extract whole trees laid out at a 45° angle uphill, down to the bottom of the hill where the delimbers could get to them. The clambunk had no turntable which meant that the logs had to move within the bunk if the machine turned. However, it usually only extracted straight down the slope. As the clambunk grapple was not tilted it was often necessary for the operator to off-load with the crane instead of driving out from underneath the load. When not required in its clambunk capacity, the 85-33 reverted to a forwarder again by simply opening up the clam to form the rear bolsters. An up-to-date cost for the 85-35, without clambunk, is $350,000.(The 85-35 model supercedes the 85-33)

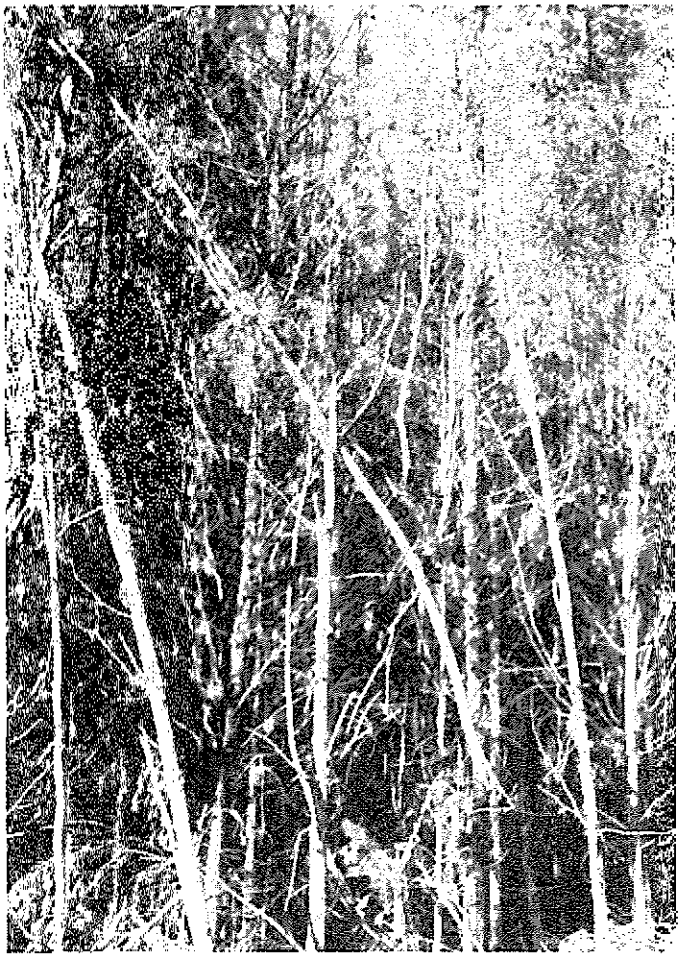
Crozier also had two Kockums 85-41 delimbers in his operation and these were generally used on the flatter terrain, i.e. at the bottom of the steep slopes which had been extracted by the clambunk, or in the easy going. The 85-41 delimbers are powered by the same 127 kW Scania motors as found in the 85-33 forwarders and the 880 feller buncher. It is a sliding boom stroke-type delimber having a set of knives (in the form of grapple arms) mounted on the main boom, and a second set in the head of the sliding boom. The sliding boom slides inside the main boom on a set of rollers, and it is pulled in and out with wire rope connected to hydraulic motors. To delimb, the operator either clamps the tree in the knives of the main boom and runs the sliding boom knives down the stem, or he clamps the tree in the sliding boom knives and draws it through the knives on the main boom. The maximum reach is 12 m and delimbing speed is between 1½ and 2½ metres/second. A hydraulically powered 50 cm long chainsaw, mounted behind the main boom knives, is used for docking the logs. The maximum diameter tree that can be handled is 75 cm, according to the specifications, and the latest price for the 85-41 is $400,000.

During extraction the forwarders usually stack the logs along narrow strip landings at the road edge. Truck load out was generally done by an independent operator out of phase with the logging operation. Crozier's daily production varied according to the stand and terrain conditions, and the machinery being used at the time, but it averaged at about 200 cubic metres per day.

2. L. McClean's Operation in Tumorrama, north of Tumut

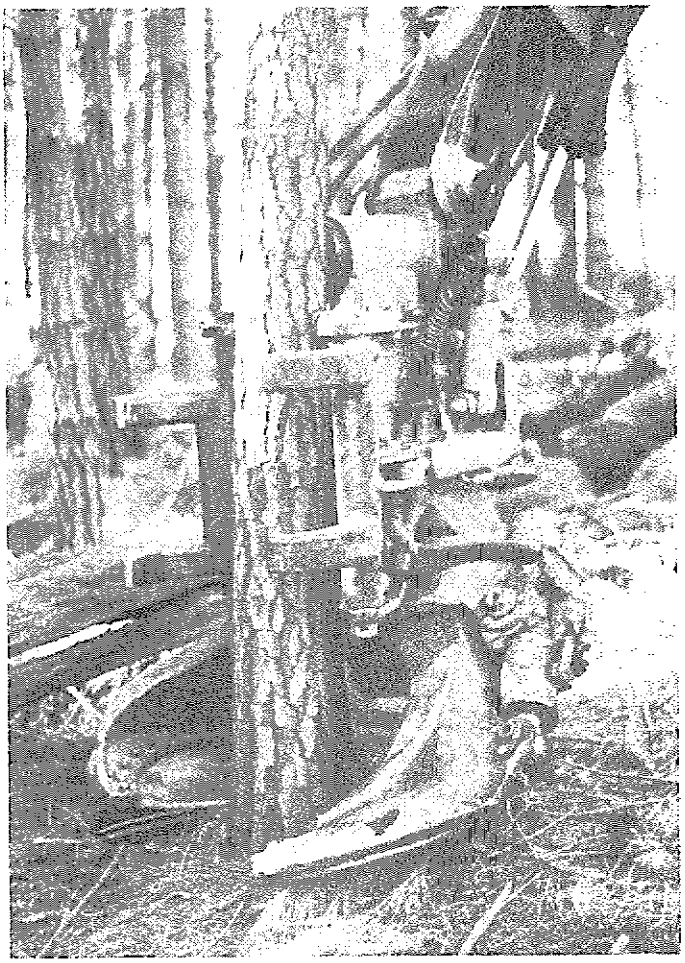
Situated over 200 km from the Albury mill, McClean was producing over 220 cubic metres/day in 25 year old P. radiata clearfell. The trees were not always good form (refer Fig. 23), and at times were on slopes of up to 30°. The average piece size of the trees was about 0.8 of a cubic metre in the good stands. Once again this operation was fully mechanised based on the original Kockums system.

Fig 23 - An example of the tree form (a younger thinning stand) in Tumorrama Forest



The felling in McClean's operation was done by either a Kockums 880 (see Fig. 24) or a Waratah head mounted on a LS2600BJ Sumitomo excavator base. On particularly steep slopes felling was done by hand. The Kockums 880 is a four-wheel drive articulated steer machine specifically designed as a feller-buncher unit. It has a 50 cm shear head mounted on a knuckleboom crane which can reach out to 6 m. Again the power unit is a Scania D8 motor through a Clark transmission.

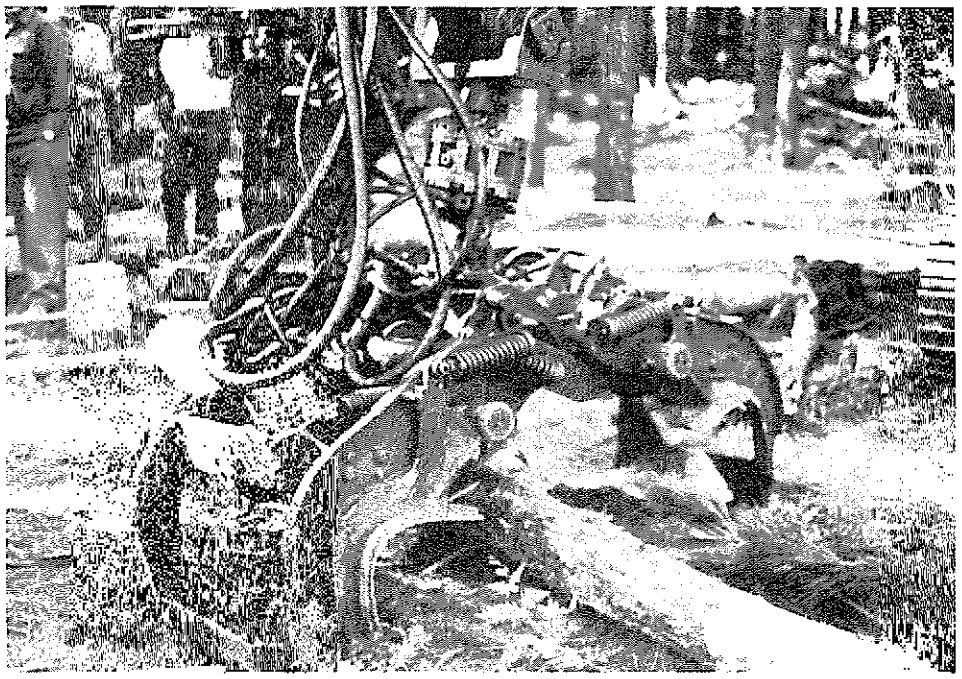
Fig 24 - The Kockums 880 Feller Buncher



The 50 cm shear on the Kockums 880 Feller Buncher

Delimbing was done either by a Kockums 85-41 or a Valmet GP Skogsjan processor head on a Sumitomo excavator (see Fig. 25). These processors delimb and cut the wood to assorted lengths for the various markets.

Fig 25 - The Valmet GP Skogsjan processor head



Extraction is done by Kockums 850 and 85-33 forwarders, and a hydrostatically driven Osa 260 forwarder. The Osa can extract on slopes of up to 28° (according to the gang foreman) by reversing up the hill and loading on its way down. Operators were reluctant to take the Kockums forwarders on similar slopes because they had torque converter transmissions.

McClean's latest acquisition was the Koehring 620DL delimber and this machine was working over rocky ground on a 20° slope. It was easily handling the malformed stems, some with diameters up to 50cm. The quality of the delimbing was quite acceptable by normal pulp mill standards, and the operator displayed considerable skill in dealing with forked trees. He would simply delimb out the dominant leader to a boom length past the crutch, then by repositioning the docking saw would cut the tree at the crutch, leaving the second leader still attached. He would then continue on and delimb and process the first leader before picking up the rest of the tree and finishing it off (see Fig. 26).

Fig 26 - The Koehring 620DL delimber

The 620DL is basically a Kockums delimbing unit mounted on a Koehring tracked undercarriage, and powered by a 3408 Cat diesel. In principle it works the same way as the 85-41 Kockums stroke-type delimber. The sliding boom has a maximum reach of 12 m and can handle stems up to 75 cm.

APM'S OPERATIONS IN GIPPSLAND, VICTORIA

Following the FIME exhibition, four of APM's logging contractors based around the Traralgon, Morwell, area were visited. The pulpmill at Merevale requires about 625,000 cubic metres of wood per year to maintain production, and just over 70% of that comes from APM's own 45,000 hectare resource. The remainder has to come from the Department of Conservation and Forestry Limited and private sources. APM work to a 27 year rotation of their radiata with up to four thinnings in between, the first taking place about age 14, then three to four yearly after that. The piece size in first thinnings can be as low as .12 m3 and will cost between $19.00 and $23.00 per cubic metre on truck. At nominal clearfell age the piece size is usually about .85 m3 and logging costs between $13.00 and $15.00 per cubic metre on truck. Almost all the pine operations at APM are fully mechanised.

1. G. Leeson's Clearfelling Operation

Situated only a matter of minutes from the mill, this contractor was working in 30 year old P. radiata with a piece size of around a cubic metre. He employs two motor-manual fallers as well as operators for his feller-buncher, delimbers and his four forwarders. Annual production is between 130,000 and 140,000 m3 and he is expected to utilise material down to 7 cm small in diameter.

In that particular piece size the manual felling was necessary and usually it was well ahead of the processing, but at the time of my visit a recent kickback accident had reduced the felling crew to one. While up to then Leeson had maintain a good accident record with his manual fallers, he preferred to use the mechanical falling because it was about the same costs but a lot safer.

The three delimbers, two Kockums 85-41's and a Koehring 266DL (similar to the 620DL described earlier) were delimbing and processing from 5.2 to 6 m in measured lengths for both sawlog and pulp wood. The machines were putting through between 25 to 30 cubic metres per machine hour with no sorting done in the process. The forwarders did that when extracting. When seen operating on 18 April, the Koehring 226DL (fig. 27) was handling the 1 m piece size with little difficulty, although it was necessary to double and even triple stroke malformed or multi-leaded stems on a number of occasions. (See Fig. 27 insets.) By reference to a helmet in the photo you can see that the branch size was about 8 to 9 cm in diameter.

Fig 27 - G. Leeson's Koehring 226DL Delimber

Insets showing the delimbing quality of the Koehring 266DL

When extracting, the forwarders normally do one pass over the cutover, picking up sawlogs, then do a second run over the same ground to collect pulpwood. The 85-33 Kockums forwarders (see Fig. 28) have a 16 tonne payload, which is about two-thirds of a truck load. (Leeson has one Volvo 860 forwarder.) The forwarder operator schedules the trucks from the bush, so when the truck arrives, it gets 60% of its load then has to wait while the forwarder returns to the bush for the remainder of his load. Little or no stocks are held at the road edge, although during my visit the forwarder was loading out of stockpiles. The average cycle time for the forwarder was between 20 and 25 minutes, but if two machines were working in the same area and picking up the same material, they could usually co-ordinate loads to minimise the delay for the trucking. The trucking is done by independent sub-contractors who are paid by Leeson, which perhaps explains how the scheduling can be controlled from the bush.

Fig 28 - The 85-33 forwarder loading out onto a truck. Note the stockpiles, an uncommon sight.

2. R. Christian's Operation in Thinning near Tyers

One of two brothers contracting to APM, Rob Christian works an Osa 260/706 harvester in conjunction with a Kockums 850 forwarder and an Osa 260. The only machine seen during this visit was the Osa harvester (fig. 29). It is a fully hydraulic, six-wheel drive, pivot-steer machine powered by a 123 kW Scania D8 motor. The 706 processing unit is mounted on the rear bogey of the machine and can rotate 125°. It has one fixed and four wrap-around knives which clasp the tree when it is placed in the processor, and then super single truck tyres fitted with chains propel the tree through the knives. Feed speeds can be up to 2.3 metres per second. The 706 has computer controlled length measurement and automatic docking and topping functions that work to preset dimensions, so log selection and measurement can be done automatically. The chainsaw felling head has a 56 cm diameter capacity and is mounted on an Osa 395 boom which has an 11 m reach. Christian's machine was only 2,000 hours old and had cost $635,000 when purchased about a year ago.

Fig 29 - R. Christians Osa 260/706 Harvester working on a 28° slope

The Osa 260/706 was working in 24 year old radiata when visited, on slopes up to 23°. The operator observed was highly skilled and could process up to three trees per minute. He frequently had one tree in the processing unit on automatic pilot while felling the next one, and often had to wait for the processor to finish. It was not uncommon for this operator to do over 35 cubic metres per machine hour in the right conditions. Larger branches of up to 7 cm in diameter presented no problem to the 706 delimber.

3. I. & R. Crawford's Radiata Clearfelling Operation

Unfortunately, only the felling machine was working when this operation was visited on 19 April. Usually a 227 Cat excavator, fitted with a 50 cm Harricana felling shear, fells for a Harricana stroke-type delimber and a Logma 85-41 processor. Extraction is done by two of the five forwarders the Crawfords own. The 101 kW 227 Cat excavator working in 35 year old P. radiata clearfell could fell up to 110 m3 per hour, but logging development officer, O. Raymond, considered its purchase price of $449,000 was too high and made the operation expensive.

The Harricana delimber (fig. 30) is mounted on a 67 kW Cat 215 excavator base with modified track grousers to make it suitable for bush travel. It works on the same principle as the Kockums and Koehring delimbers, except that the

sliding boom is driven by chains instead of wire rope. The boom has a 12 m reach and similar delimbing capacity to the Kockums. In APM's experience the Harricana is about 17% more productive than the Kockums, being capable of about 30 m3 per hour. One of the big advantages seen with the Harricana is its simplicity and the ease of getting parts for it. The only major repairs required in 7,000 odd hours of operation has been the sliding boom which needed replacing at 5,500 hours.

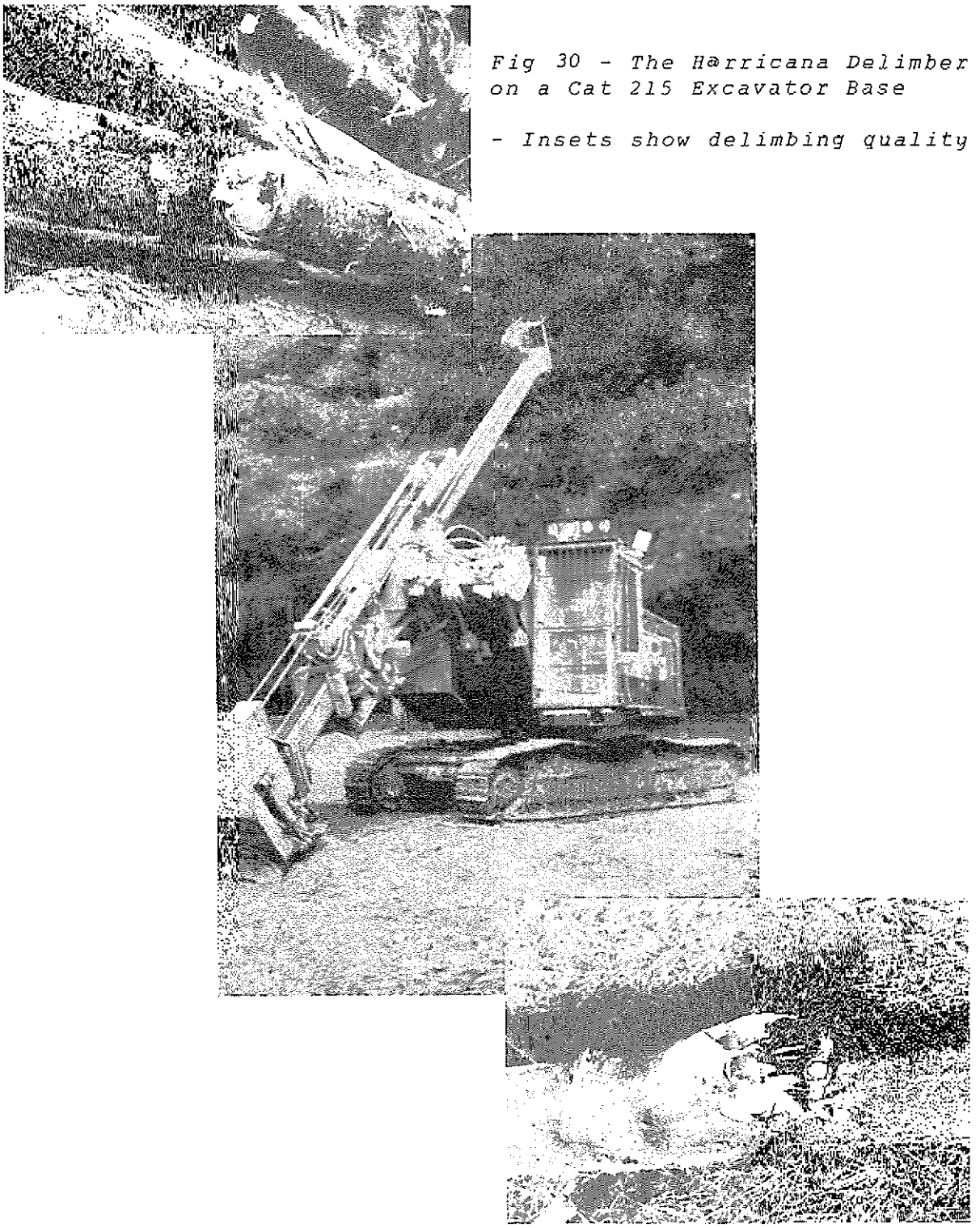


Fig 30 - The Harricana Delimber on a Cat 215 Excavator Base

- Insets show delimbing quality

Delimbing quality with the Harricana once again seemed adequate for pulp mill requirements. In some cases branches of 10 cm and up to 12 cm had been sheared off (see insets to fig. 30). The quality of the delimbing, however, is directly influenced by the sharpness of the knives. Production with the one feller-buncher, two delimbers and two forwards is up to 140,000 m3/annum.

4. G. Carstein's First Thinning Operation

This operation in 14 year old first thinnings has three Waratah harvesters felling and delimbing material for one Osa 260 forwarder and two 520 Timberjacks. Carstein's newest machine is the Waratah DFB MK IV mounted on a Kato 550 excavator (see Fig. 31). The DFB can fell, delimb and bunch trees up to 28 m high with butt diameters of 38 cm. The head has two sets of fixed knives mounted in the mainframe and two sets of wrap-around knives for clasping the trees and delimbing. It has both a felling shear and a built-in topping shear. The new Mk V model now available from Waratah has a 45 cm felling capacity and electric over hydraulic controls which eliminates all the untidy hydraulic plumbing around the head. Latest price for the Mk V boom and head is $145,000 excluding the excavator.

The operator seen working the machine on 19 April was particularly skilled and capable of felling, delimbing and processing between 10 and 12 m3/hour. He would start the felling cycle by clasping the standing tree about 3 m up the stem then stroke down to the base to grip it, and shear it off. The whole tree would then be lifted up in the head to about 6 m above the ground and the felling shears opened to allow the tree to slide through the knives. The whole tree would then be positioned above the pile of logs and the delimbed butt snipped off. With a bit of skill the operator could flick the boom sideways at the appropriate time to lay the logs down parallel in the stack. The rest of the tree is then delimbed in a similar fashion, except the top which is cut to length with the topping shears, not the felling shears (see Fig. 31).

Double leaders were no problem to the Waratah and could be handled as one log in most cases. On particularly big trees the operator would delimb the first 6 or 7 m of the stem standing, then snip it off at the 5 to 5.5 m log length so that he wasn't trying to lift the weight of the whole tree. Big branches up to 7 cm were sheared off clean and flush (see Fig. 31 insert). APM considered the Waratah to be the most successful thinning harvester in their first and second thinnings.

Fig 31 - The Waratah DFB Mk IV Harvester

VISIT TO MT GAMBIER REGION

On 21 and 22 April a number of logging operations around the Mt Gambier region were visited. Mt Gambier, situated on the South Australian/Victorian border, is basically flat coastal land with the occasional inactive volcano scattered throughout the area. The bulk of the forest resource in the region is Government owned and administered by the Woods and Forest Department. Other companies with significant holdings are :

(i) Softwood Holdings with forests around Nelson, Dartmoor and Lake Bonney.

(ii) Sapfor with reserves in the Mangwarry Penola area and east of there.

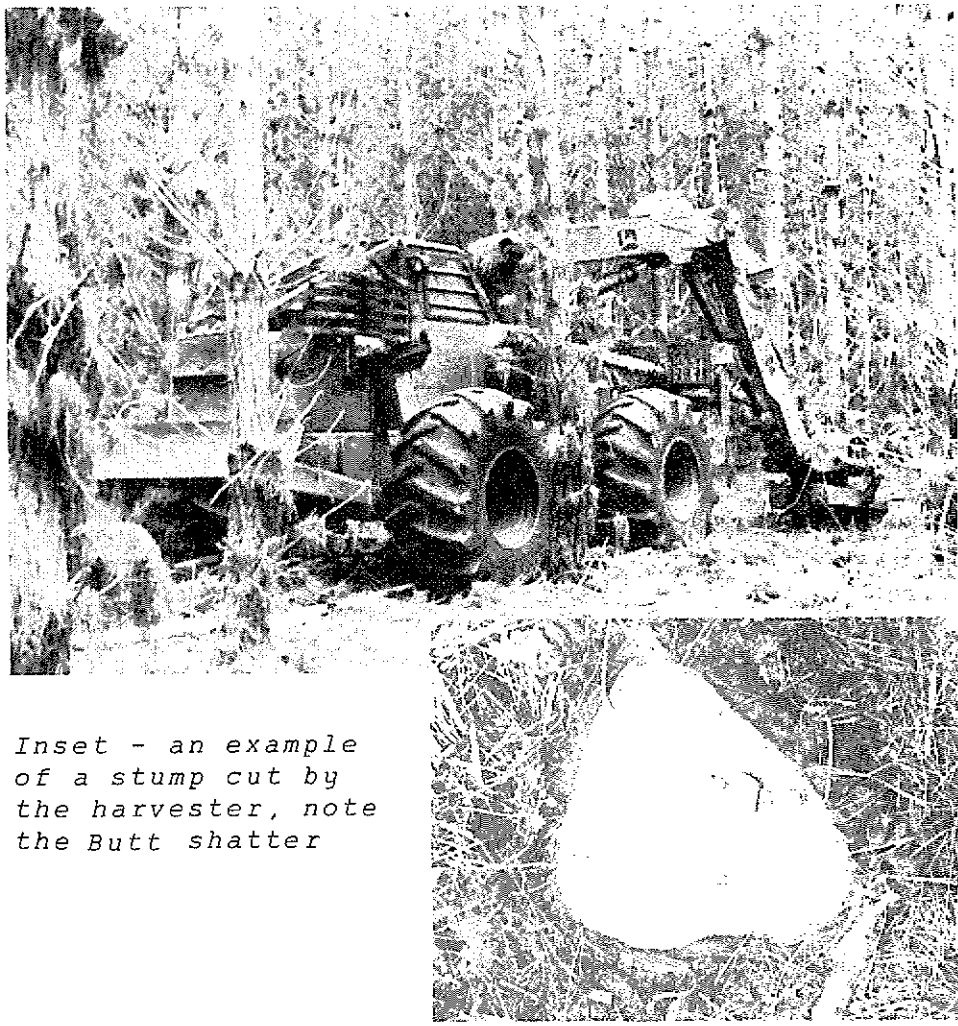
(iii) South East Afforestation Services Pty Ltd with forests north of Penola.

While there are still some motor-manual systems in operation in Mt Gambier, the bulk of the logging is now mechanised. As it was not always possible to identify operations by the contractor's name, some are labelled according to the forest they were working in.

1. First Thinning in Woods & Forests' Rennick Forest

This operation was a very late thinning of 22 year old P. radiata (the normal age for first thinning is 10 to 14 years). A John Deere 743 Tree Harvester was being used in a 5th row outrow and selection system to thin the stand from 1800 stems/ha down to 700. All crop trees had been marked by the Woods & Forests personnel and the machine was producing between 9 and 10 m3 per hour. (In second thinning the 743 can do as much as 14 m3 per hour.) The John Deere 743 is an 8 year old machine and was probably one of the first harvesters to work in the Mt Gambier region (see fig. 32). It is based on a 123 kW 740 John Deere skidder and has a 46 cm felling head mounted on a 5.3 m reach boom. The processor is located on the back of the machine and spiked rollers feed the logs through two wrap-around knives at approximately 2 m per second. An automatic length measuring device had been added to this machine to facilitate docking. The 743 harvesters are no longer sold in Australia.

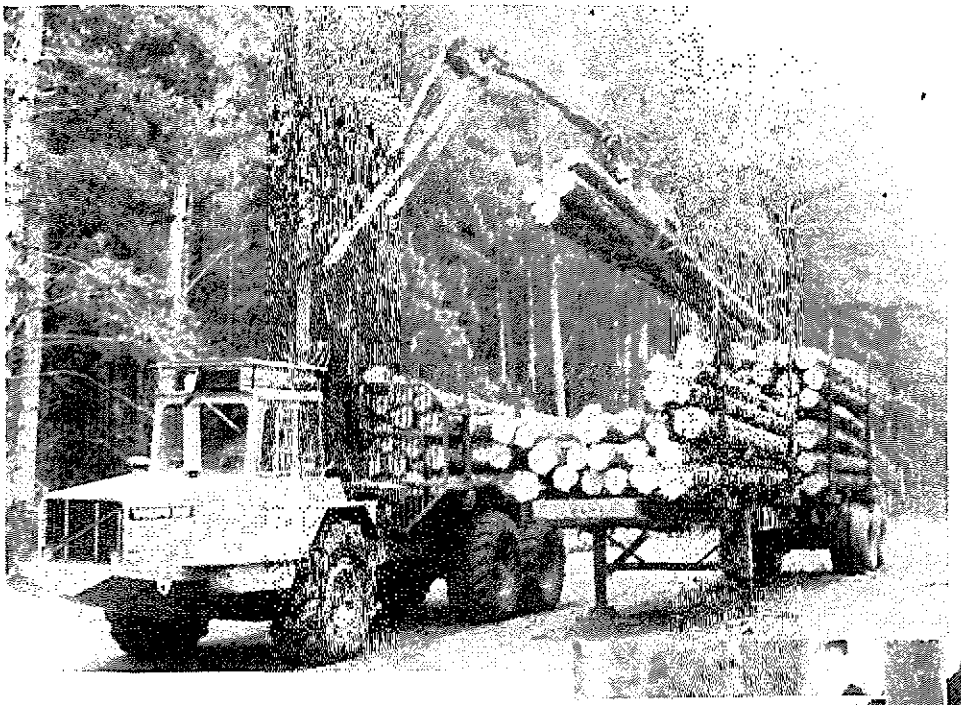
Fig 32 - The John Deere 743 Harvester in Rennick Forest

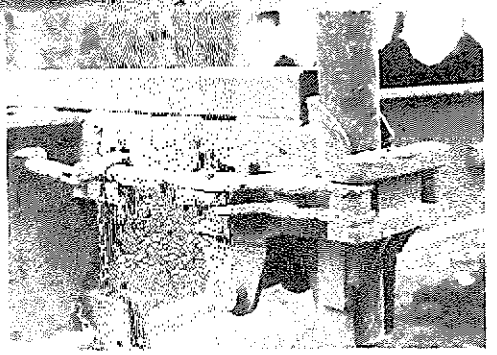


Inset - an example of a stump cut by the harvester, note the Butt shatter

Extraction in this operation is done with two Volvo forwarders - one an old 4 x 4 machine, and the other an 861 6 x 6 unit with a payload of 13 tonnes. These machines were loading directly onto staked out trailers (see fig. 33). The trailers had drop arm staunchions which fell out of the bolster frame when released (see fig. 33 insert). Apparently the logs were dropped onto bunks on the infeed to the sawmill, so the truck driver could retrieve his bolsters from under these bunks after he had released his load.

Fig 33 - The Volvo 861 forwarder extracting from the 743 harvester





Inset - A drop arm stanchion on the staked out trailers

2. Fire Salvage Spot Mills in Tantanoola Forest

Burnt pine trees left standing after the fires of Ash Wednesday (16 February 1983) are still being sawn by small, low capital "spot mills" usually consisting of an old loader, a tractor mounted circular breakdown saw and a hand feed bench saw (circular). The operation starts with the motor manual felling, delimbing and cross cutting of standing burnt trees close to the road edge. The loader then picks up the logs and lays them out on bed logs for the breakdown saw. This breakdown saw is a 105 cm circular saw mounted on a boom on the front of an old tractor (see fig. 34 (a)). Initially the log is halved with the single pass of the breakdown saw, but if the log is over about 45 cm in diameter, two passes are necessary and quite often the job has to be finished with a chainsaw cut (see figs 34(b) and (c)).

These spot mills produce 1.3 m3 packets of 150 x 100 mm x 2040 mm timber which have found a market in the mining and construction industry. Each mill produces between 25 and 35 m3 of sawn timber per week, with on average a three-man gang.

Fig 34 (a) - A breakdown saw for one of the Woods & Forests spot mills

Fig 34(b) - Finishing off the two cuts with a chainsaw

Fig 34 (c) - The halved log ready for further processing

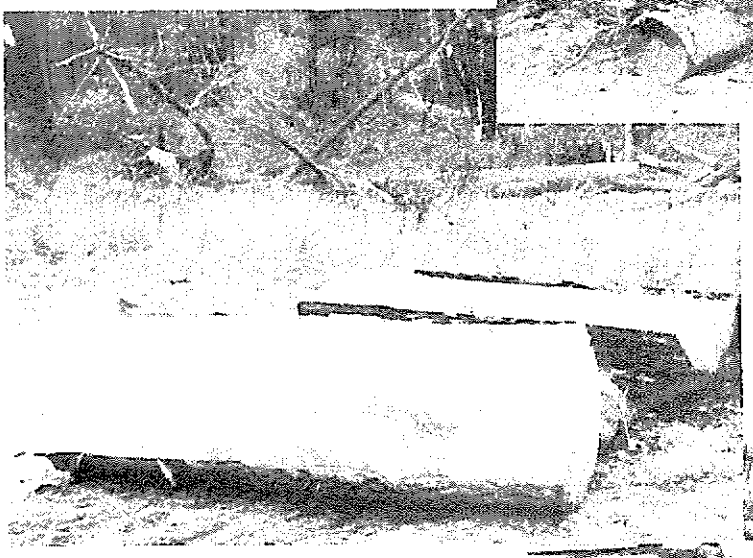


Fig 34(d) - A sawn packet of wood from the burnt trees.

3. Motor-manual Forwarder Thinning, Mt Burr Forest

Based on a five year old Timberjack 520 forwarder, this operation was a fourth thinning of 46 year old P. radiata. The crew consisted of three fallers and the machine operator and they worked to a quota of 750 m3 per week. They could usually achieve this target in four days. The Timberjack forwarder is a six-wheel drive machine powered by a 138 kW motor. It has done 10,000 hours in its five years of service and still has the original tyres on the front. The 7025 Cranab crane has a maximum reach of 6.3 m. Machine payload is around 14 tonne, and the average cycle takes about 30 minutes.

Fig 35 - A 5 year old 520 Timberjack Forwarder in Mt Burr Forest

Inset - An original tyre on the 520 Timberjack after 10,000 hrs

The felling was always done with the lean of the trees and where possible bench logs were used to elevate the stem for delimbing. The fallers tended to bring their backcuts right through to the scarf cut to minimise butt damage. A good 50 mm step was kept between the scarf and the backcut

to prevent tree kickback. The butt shown in Fig. 36 has not had its sloven cut off.

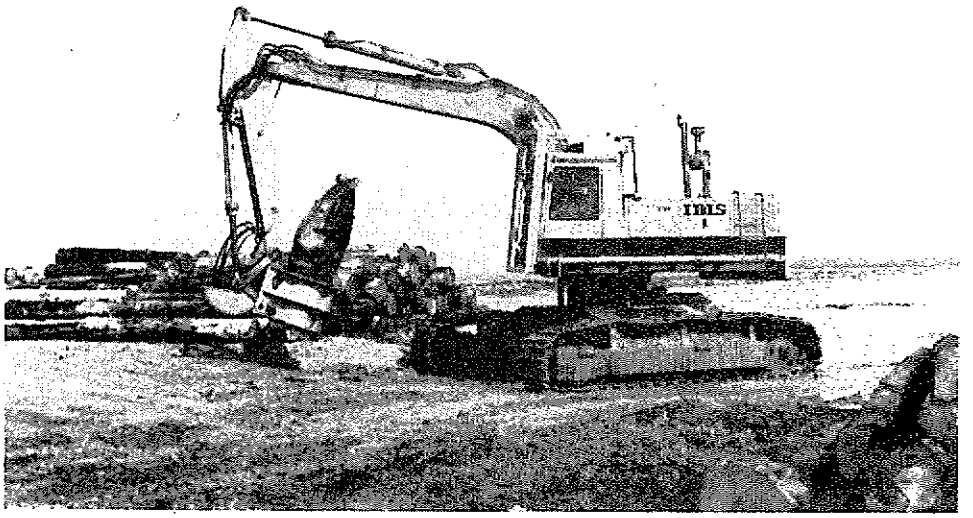
Fig 36 - An example of the felling for forwarder extraction

4. Recovery of Fire Burnt Logs Stored in Lake Bonney

On 22 April 1986 a visit was made to the recovery operation of logs stored in Lake Bonney. During the massive salvage operations after the fires on Ash Wednesday, over 500,000 m3 of logs were stored in Lake Bonney. These logs are now being utilised and a Cat 235 excavator (see Fig. 37) fitted to a D9 undercarriage is being used to locate the logs in the Lake and stack them ready for grapple skidder extraction.

About 1,000 tonnes/day is removed from the lake, but not all of that is usable. Every log has to be laid out on the skids and scanned with a metal detector before it can be dispatched to the mill. Woods and Forests believe that in retrospect aerial sprinkler systems would have been a better storage facility than Lake Bonney.

Fig 37 - IBIS, the Cat 235 loader used to find logs in Lake Bonney



5. Steyr Grapple Processor Working in Penola Forest

Originally this machine, a Kato 500 excavator based, was set up to fell and process the 15 year old second thinnings using two separate heads - a Waratah felling head and a Steyr KP40 processor. The system was designed so that the machine could fell for three or four hours and then change heads (a one hour operation, even with the quick release connections) and delimb what had been felled. This idea had proved to be inefficient in terms of machine utilisation (three to four hours a week lost in head changes), so the contractor changed to motor-manual felling and kept the Kato operating the Steyr processor full time. Two fallers, doing approximately 100 trees per hour, simply fell the trees perpendicular to the outrow and then the processor walks up and down the outrows processing the trees into log lengths for forwarder extraction (see Fig. 38). All hung up trees are left for the machine to handle.

The Steyr KP40 processor is a boom-mounted, grapple processor which has a 90 cm hydraulically powered circular saw for crosscutting. During operation four wrap-around knives grab the stem and perform the delimbing as a spiked roller chain feeds the tree through the knives. Delimbing speed is 1.5 m/second and the head can handle trees up to 40 cm. It weighs 810 kgs (including the rotator) and has a light barrier control for automatic length measuring and

computer control of the functions. The head alone costs about $102,500 and required an 88 to 100 kW base machine. Production was around 10 m3 per hour.

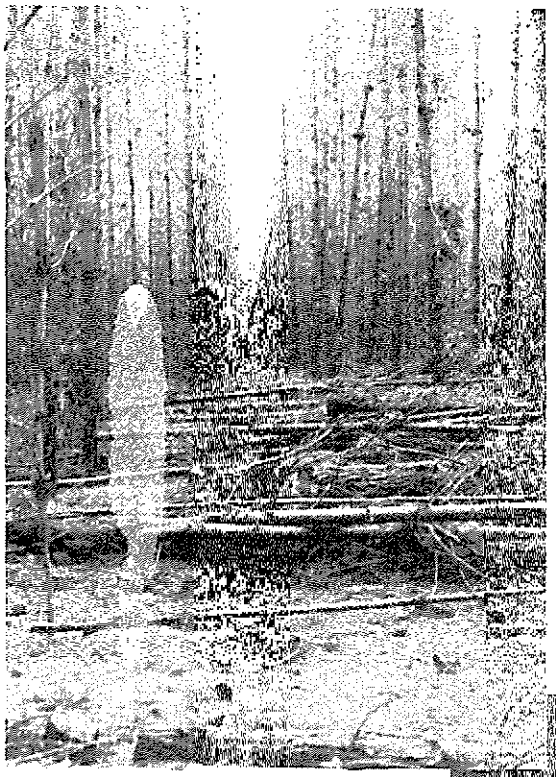
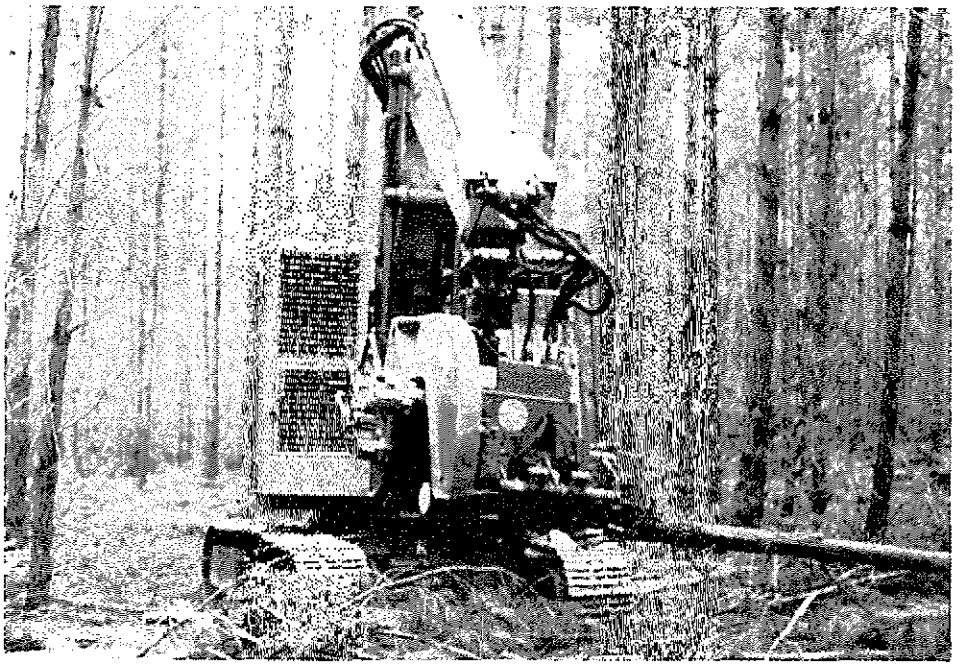


Fig 38(a) - An example of the manual felling for the Steyr KP40 processor

Fig 38(b) - The processed wood delimbed and crosscut by the Steyr

The Kato 500 in Penola Forest had an additional 68 kW Deutz motor powering the Steyr head, so that the machine had the capacity to swing and carry out boom movements while the processor was working. A second machine visited at a later stop did not have this auxillary motor and it had definite operating limits in that it couldn't successfully delimb and swing without a rapid loss of engine revs, and consequently delimbing force. Average production was around 8 m3 per hour in similar sized wood.

Fig 39 - The Steyr KP40 processing head on a Kato 500 excavator base. Note the auxiliary Deutz motor mounted behind the screen on the left hand side.



6. I. Dohnt's Clearfelling Operation, Casterton

This contractor was clearfelling 34 year old P. radiata for sawlog material only as there was no market for the pulp. He had a Koehring 620FB rotary disc feller-buncher, a Koehring 620DL delimber and two Kockums 835 forwarders producing between 300 and 360 m3 in a 10 hour shift (about 36 m3/hour). The tree size was 1 to 1.2 m3 and in good going the setup could produce 48 to 50 m3 per hour. The feller-buncher could fell sufficient wood in ten hours to keep the delimber going for 26.

The rotary disc felling head (see Fig. 40) has the capacity to cut 56 cm trees. It relies on the inertia of the rotating disc to perform the cut, and takes out a kerf of about 50 mm (see inset Fig. 40). The disc is powered by a hydraulic motor and turns at up to 1,100 rpm. The cutting speed is very quick but it has to sever the tree in one movement, otherwise the disc will stall in the cut. The felling head alone weighs about 1,300 kgs and all-up cost fitted to the 620KB Koehring base carrier is $487,000.

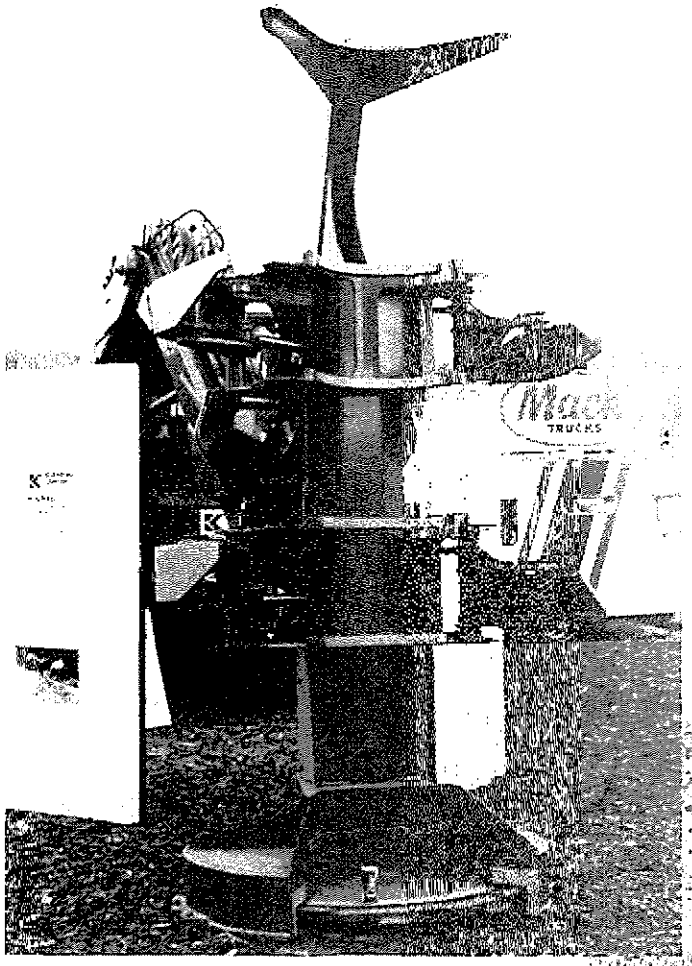
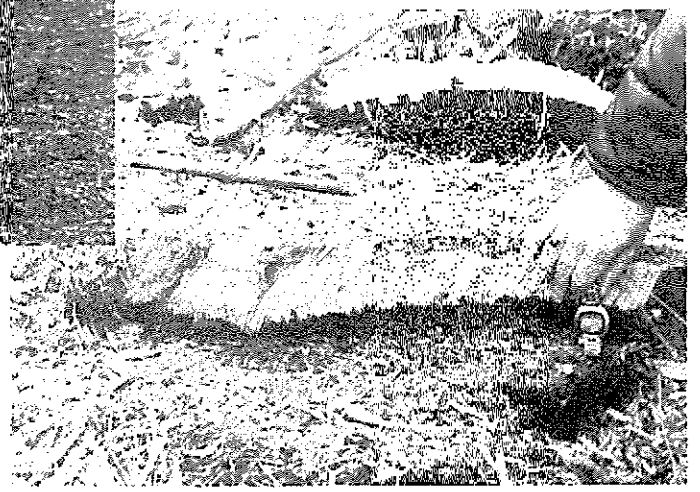


Fig 40 - The Koehring rotary disc felling head



Inset - An example of the kerf taken out with the rotary disc felling head

When observed working on 23 April, the 620FB was felling rough edge trees and having some difficulty with them. Because it relies on the inertia of the disc, the cutting is done while the head is moving in towards the tree, so the clasping arms cannot be wrapped around the stem before it has cut. A bent or malformed tree, or even a tree with a heavy lean, can therefore be a problem because it may start to fall before it has been clasped, as was seen on a number of occasions. Operator skill plays a big part in the efficiency of this machine.

The delimber is the limiting factor in Dohnt's operation and he has found that the weakest link is the chainsaw docking system. Big trees of up to 60 cm in diameter have been handled in this operation (see Fig. 41).

Fig 41 - The Koehring 620DL handling a large 55 cm tree

Inset - shows the tree size and the nature of the cut from the rotary disc felling head

DISCUSSION

Although severely disrupted by adverse weather during the latter stages, FIME was successful and appeared to reach the objectives it set out to achieve. The emphasis in 1986 was heavily on the mechanised systems, and most of the static displays were dominated by this type of machinery. New developments in log skidding equipment still have significance for Australian hardwood loggers and many New Zealand loggers, so items such as the Johnson skidding grapple and the D6 custom skidder drew considerable interest.

From what was observed in the various operations throughout New South Wales, Victoria and South Australia, the mechanised systems worked well in the Australian situation. The author's impressions were that generally radiata in Australia has smaller, flatter angled branches than in New Zealand. However, there is no reason to believe that most of the systems described in this report couldn't handle our wood. Obviously there will be some trees such as edge trees, heavily thinned stands or shelter belts that can't be logged with mechanical systems, and this is the same in Australia. However, provided the system is put into the right application they should work. It is expected that difficult trees and steeper country would still have to be done with motor-manual systems.

The problems with implementing mechanisation into New Zealand will be :

- the availability and reliability of servicing facilities to keep the machines working;
- the nature and term of the contracts under which prospective mechanised loggers will have to work; and
- the high cost of the machinery.

It should be noted that some of the machines described in this report have been working safely on fairly steep (up to 26°) terrain, which strongly disputes the argument that mechanised systems are confined to flat ground.

For mechanisation to be introduced on a large scale in New Zealand it will require a greater shortage of skilled labour, combined with poor safety records and higher labour costs than we have at present. Companies will have to allow longer terms in their contracts and give written assurances of work to enable contracts to generate sufficient capital, and the success of the whole operation will ride on the co-operation of the contractor, company supervisor and company management. The equipment suppliers are going to have to research their products carefully and include machinery that is virtually guaranteed to work, and it can be readily fixed with common componentry available in local workshops. The contractors themselves will probably be the best people to choose the right machinery. Generally the "package systems deals" with one particular brand of machine did not always find favour with the Australian contractors once they were established.

FIME 86 was an interesting and informative exhibition, although fairly expensive for both exhibitor and participant. It is hoped that this report will give some insight into the exhibition and the general logging environment in New South Wales, Victoria and South Australia.

III - THE FIME CONFERENCES

Logging and sawmilling conferences were held on the Saturday and Sunday preceding the FIME exhibition. The conferences were held in the Civic Centre in Albury, N.S.W. Each conference featured two parallel programmes, so there were in fact four parallel programmes going on most of the time.

The Chairman of each of the conference sessions were given strict instructions regarding time keeping and the procedure and timing for questions. This was necessary to allow delegates to move between different sessions of the conference as they desired. Overall the approach worked quite well, the only problems arising when some sessions ran over time, or questions were taken at the wrong time.

Another innovation was the requirement for the delegates to present written questions to the Chairman. Despite initial scepticism, this system worked surprisingly well.

Approximately 480 delegates attended the conferences.

Two keynote addresses were presented to the joint opening ceremony of the logging and sawmilling conferences on Saturday 12 April. The two addresses;

- "Resources Availability During the Next Ten Years", Dr Wal Gentle, Commissioner for Forests, N.S.W.
- "Utilising the Resource Profitably", Mr Brian Gibson, Managing Director, Australian Newsprint Mills

have been summarised in the May issue of the Australian Forest Industry Journal.

LOGGING CONFERENCE

J. Galbraith and R. Prebble, between them, attended most sessions of the logging conference. The following are brief summaries or excerpts from papers thought to be of interest to the New Zealand industry. Full copies of the Conference Proceedings are available from LIRA.

"CURRENT HARVESTING METHODS IN AUSTRALASIA AND THE ROLE OF FOREST OPERATIONS RESEARCH IN AUSTRALIA AND NEW ZEALAND" (A.W. Grayburn, N.Z.F.P. and LIRA Chairman)

This was an introductory paper to one of the first business sessions which dealt with harvesting and forest operations research and development. Tony Grayburn looked at the subject under three successive headings :

- Why certain practises are currently performed.
- What changes might take place in the future.
- The part that research might play in making these changes more effective.

A summary of the latter, i.e. research opportunities :

The industry in Australasia is not big enough to mount a massive

equipment and method R. & D. programme, but on average this industry spends less than most on research so it can afford more. It is ironic that local developments such as the Windsor and Waratah find favour in countries outside their origin. The most urgent areas of need are :

(i) To achieve greater co-ordination of research and adaption of results by;

- encouraging national trade association and co-ordinated research;
- continuing effort in technology transfer;
- involvement of research organisations in training and training co-ordination;
- while, say, 80% of time may be spent on applied research and technology transfer for immediate results and gains, we must also put effort into new ideas of hypothesis testing to make progress.

(ii) Further work in the human area to attract and retain workforce, including;

- knowing more about the workforce and their needs;
- improved safety;
- business training for contractors;
- are there enough qualified people working in the industry for healthy, vigorous management?

(iii) More testing of new equipment in industry co-operatives. Australia has had good experience in this area in the past.

(iv) More effort in forest management to produce lower logging costs.

(v) More research effort in the log landing phase of the total system. It is becoming the critical area between log extraction and more sophisticated log preparation. Is the landing the right place to be doing the log preparation and sorting?

(vi) The increased use of cable haulers in the future requires research work to improve this generally costly extraction method.

"SITE PREPARATION TECHNIQUES FOR SOFTWOOD IN AUSTRALIA" (Dick McCarthy, APM Forests)

Site preparation must be seen as providing biological requirements for seedling survival and maximum growth. It takes time for the biological/economical results of planting operations and these should not be compromised unnecessarily by short-term economic constraints. "Five years from now would the results of your efforts be a healthy, vigorously growing stand, or an unacceptable forest slum?"

The four basic types of site preparation techniques used in Australia were described, i.e. manual, mechanical, chemical and controlled natural processes. The methods and their results were well illustrated by slides.

A recent introduction to South Australia is the Bracke scarifier which scarifies intermittent patches of soil.

A table compares the different site preparation methods under different headings, such as production rate, micro-site quality, effect on growth rate etc.

Due regard for proper treatment of forest soils in Australia is overlooked. "Many people think that our yields are retarded due to rainfall, but this is not true." Organic matter content is one of the most important characteristics of forest soils for plantation establishment. Techniques which remove organic matter, such as wind-rowing, scalping and burning, have a marked effect on subsequent tree growth. Harvesting machinery must be designed to allow the best site preparation, i.e. working along the contour, mulching the slash on site and cutting the stumps level with the ground surface.

"FORESTRY PLANNING AND LOGGING" (Bill Briggs, APM Forests)

Matching Production and Demand - The key is to build flexibility into the system to allow the operation time to adjust up or down as required. While obviously harvesting systems should be planned to produce at their optimum levels, maximum and minimum levels should be calculated. Mechanised operations show greater economies of scale at up to, say, 20% above quota than conventional snig and load systems.

"The payment system should be entirely on contract piece work rates, a system that is highly productive, highly rewarding and highly desirable for the timber industry, and any suggestions to change it must be opposed."

Industrial Relations - In recent years in Australia the Union movement has become more active in logging work, and has had a part in improving training, motivation, reward, job satisfaction and security. Regular meetings with all the groups concerned with harvesting is important, and it was suggested that this concept and practise of industrial relations consultation is further advanced in some parts of Australia than it is in New Zealand.

The importance of training and safety is stressed, preferably progressing through basic instruction to a licensing system conducted by qualified instructors. New Zealand has a well organised and comprehensive range of training from operator through to logging specialist courses.

Equipment Selection - Knowledge of the relative costs of different logging systems is important in equipment selection, and a table of relative logging costs in APM Forests was

published.

	Index
Mechanical pine CF, undulating slope	100
Motor-manual pine CF, undulating slope	120
Conventional regrowth ash	140
Conventional old growth mixed species	160
Mechanical pine T1, undulating slope	170
Motor-manual pine T1, undulating slope	190
Mechanised pine T1/T2, steep slope	200
Motor-manual pine T1, steep slope	230
Skyline pine T1	270

In assessing the optimum system to grow and harvest the forest, there is often a necessity to trade off and compromise between growing and harvesting phases.

Environment and Community Issues - Jointly formulated and observed prescriptions and Codes of Practice are important to achieving harvesting with minimum impact and without unreasonable restrictions.

"FACTORS AFFECTING THE INTRODUCTION OF FULLY MECHANISED SYSTEMS INPLANTATION THINNINGS AND HARVESTING SYSTEMS" (S. Vine, Pyneboard, N.S.W.)

This paper is of interest to the New Zealand industry because it describes the reasoning of a Company in changing from almost totally motor-manual logging systems to almost totally mechanised within two years. Prior to 1984 the mill input system required 2.4 m lengths of pulp wood. This was satisfied by motor-manual production of 2.4 m billets at the stump. In 1984 a log deck capable of handling 4.8 m wood was installed at the mill. In deciding to move from motor-manual to mechanical operations, the main factors considered by the Company for the harvesting of first thinnings in Pinus Radiata were :

(i) **The Motor-manual Operation** - "I like to think of manual cutters as an endangered species, with motor-manual pulp wood cutters in particular as an anachronism, a legacy of an age where social conscience and workers compensation had not been invented". The hazardous and heavy nature of the manual harvesting work was of concern to the Company. A graph presented showed that the accident frequency (per 1000 tonnes of wood produced) had declined over the previous 17 years to roughly .3 of an accident per 1000 tonnes. Accident severity was highly variable and appeared to average around 5 work days lost per 1000 tonnes over the same period.

(ii) **The Alternatives** - a wide range of alternatives existed between total manual and total harvesting systems. The Company decided not to look at integrated systems of both manual and mechanical, but to go for a fully mechanised operation.

(iii) **Workers Compensation** - "... if we look at the matter honestly we can see we are mainly paying for past sins." "In dollar terms, Workers Compensation premiums cost approximately 3½ times more for motor-manual operations than for our mechanical operations."

(iv) **Forest Survey** - Four harvesting areas were surveyed. Topography and ground conditions were generally favourable to either system, but these were often heavily branched and more risky for manual cutting.

(v) **Activity Level** (author's note : has generally been considered that motor-manual systems offer more flexibility to changing production levels according to mill demand. Conversely, heavy investment in mechanised harvesting would make fluctuations in mill demand more costly to cope with) - The Company's experience in the past had been that wide fluctuations in market, and therefore mill, demand had caused widespread laying off and then rehiring of cutters. With all the attendant problems of recruitment, training and so on, considering the hazardous and heavy nature of cutting work, it was considered unacceptable to expect higher production by increased effort or working long hours. On the other hand mechanisation was seen to offer overtime or double-shifting readily to achieve increased production with minimal increase in danger and very short response time.

(vi) **Climatic Factors** - Winter rain and snow and summer high temperatures experienced in the Oberon region affect manual cutters adversely, but had little effect on the mechanical system.

(vii) **Technology** - Although a wide range of harvesting equipment was available, the Company chose a system that had been well proven in Australia. They were conscious of the initial struggle that suppliers and purchasers had experienced in the introduction of new equipment.

(viii) **Contractor Applicants** - "We were most surprised and indeed impressed with the standard and experience of many of the people who registered an interest in becoming involved in our harvesting operations. Clearly this is indicative of the new professionalism that is now established within the harvesting industry, and augers well for the future."

(ix) **Company Image** - "Clearly, as we rush towards the Twenty-First Century, hoards of manual pulp wood cutters were not going to win us too many accolades, and the time had come for a change."

(Author's note : This paper was interesting in that in considering whether or not to mechanise, the comparative direct harvesting costs in dollars/tonne are not mentioned.)

"PROCESSING OPERATIONS : IN THE BUSH OR AT THE ROADSIDE? (Ivan Dohnt, Contractor, South Australia; and John Galbraith, LIRA, N.Z.)

Ivan Dohnt described the factors he had assessed in deciding whether to operate his processor (a Koehring 620DL - see R. Prebble's notes on the operation) in the bush or at the roadside. He considered; the log assortments required, the de-phasing of the various operations of felling, processing and forwarding to produce a more even flow of wood, roadside area, truck loadout and volume per hectare. Roadside processing would have a higher capital cost, but a higher productivity to offset it.

He chose processing in the bush.

Galbraith's paper looked at the New Zealand harvesting scene in general, and homed in on cable logging. The conclusion is that in cable logging in particular, the decision to haul tree length and process on the landing has brought N.Z. cable operations into a dead-end in productivity. Research is needed to establish the productivity and cost of doing more processing in the bush. Faster, more productive cable haulers and bunching systems for ground based machines could mean that the old rule-of-thumb, i.e. to keep the extracted piece in as large a size as possible, may not be the right answer.

"THE NEW ZEALAND WIDE TYRED SKIDDER TRIALS" (Rob Prebble, LIRA)

The paper described the wide tyred skidder trials being run in New Zealand by LIRA. Overseas experience with wide tyres had indicated; productivity increases, fuel savings, reductions in ground disturbance and compaction, improved operator comfort. The machine and trial procedures were described.

Early indications of results were :

- On moderate terrain (up to 18°) under dry conditions the wide tyres offer no significant benefit over the narrow tyres.

- On steeper terrain (up to 25°) the wide tyres have displayed considerable advantages in stability.

- Ability to work on very poor landing surfaces.

The early indications are that the wide tyres do have the potential to extend the range of skidders into marginal areas.

"THE EXCAVATOR AS A CARRIER FOR LOGGING EQUIPMENT" (Lex McLean, Contractor and Machinery Supplier, Tumut, N.S.W.)

This was a very practical and well received discussion on experience in converting hydraulic excavators to logging work.

A basic choice in logging equipment was to go for either; high-cost specialised equipment, or low-cost excavator carrier with

simple attachments. McLean's company had chosen the latter. However, considerable modification and strengthening was required on the basic excavator machine to make it an acceptable bush carrier. This work included :

- canopy
- underguarding
- hydraulic circuits
- controls
- boom and outer boom
- low oil devices
- cooling

"Various modifications took around 1200 to 1500 machine hours (or 9 to 12 months) to get them right. During this period it required substantial costs, machine transport to town, cost of modification and loss of production. After this period we could say that we are now only involved with what we would now consider normal R. & M. ... ". Valuable experience was gained, much of it the hard way.

(Author's note : New Zealand operators considering conversion of excavators to logging work would be well advised to read the full paper and then to possibly communicate with Lex McLean.)

There were three papers on a road transport theme :

"IMPROVING ROAD TRANSPORT EFFICIENCY" (Terry Henderson, Consultant, Melbourne)

This was a rather general paper which covered transport efficiency under two headings - Capital Efficiency and Operational Efficiency.

The estimated cost of road cartage to the timber industry in Australia is over $300 million per annum. The three major cost groups are :

- capital costs, approximately 30%
- labour, approximately 40%
- fuel, tyres, repairs, insurance etc, the other 30%

Based on this breakdown, for instance, "... a 2% reduction in labour costs will be far more advantageous to a company than a 5% reduction in fuel. (Fuel would normally contribute between 10 to 15% of "other costs".)"

Some tips on financing equipment purchased are given in the paper.

Henderson noted that the most significant area for efficiency gains was in the use of labour - proper scheduling of drivers and driver training and the relationship between owner drivers and employed drivers . "In general terms the industry

sees owner drivers as being more productive to the industry. .... However, a combination of the favourable Union attitude towards employed drivers and the taxing imposts of Governments will reduce this benefit (of owner drivers), and there is no doubt that more and more timber cartage will be carried out by drivers employed under the TWU awards."

Tyre technology - Henderson's company had been testing super single tyres for the forestry industry. "While the tyres assist fuel consumption and improve the stability of the trailer, I am not convinced that they are suitable for long hauls over rough forestry roads. On the other hand, in well loaded plantations and operations which load from the edge of forests, I believe that these tyres have considerable economic advantages. The survey carried out from pine plantations in Gippsland showed an improved fuel consumption of about 4% and a consensus amongst drivers that the wide profile tyre trailer was more stable than the conventional tyred units."

Vehicle maintenance is not as important as it was ten years ago. Better designed vehicles,more frequent changeover of trucks etc has meant that most of the maintenance required during the vehicle's life is preventative maintenance.

"ROADTRAINS : WHAT IS THEIR PLACE IN LOGGING OPERATIONS?" (Bob Pearson, Victorian Road Construction Authority; and Roy Palmer, Contractor, W.A.)

Australia's roadtrains are amongst the longest and heaviest in the world (up to 50 m long and over 100 tonnes gross). These vehicles have contributed significant economic benefits to outback and Western Australia. Application in other parts of Australia is limited by problems of compatability with other road users and restrictions on gross vehicle weights. Additional mechanical requirements - covering brakes, couplings, fifth wheels, performance levels,spray suppression,etc, and route selection, are factors in extending the use of combination vehicles.

Recently a new vehicle concept, the "B" double (in New Zealand called a B-train) is becoming popular, and appears to be looked on favourably by the authorities.

Existing and proposed axle loadings were illustrated (note that there are some differences between eastern and western states in Australia).

AXLE TYPE	PRESENT		PROPOSED	
	EASTERN	WESTERN	EASTERN	WESTERN
		AXLE LOADINGS		
Steering	5.4	5.4	6.0	6.0
Tandem Axle	15.0	16.5	15.0	16.5
Tri-axle	18.0	20.0	20.0	20.0
		GROSS VEHICLE WEIGHT		
"B" double	53.4	57.0	56.0	59.0
Roadtrain double	72.0	77.0	76.0	79.0

Roy Palmer, a contractor from West Australia, gave his usual entertaining talk from the contractors' viewpoint. Palmer gave some figures to illustrate the fuel efficiency of roadtrains versus conventional truck units. In his example a roadtrain with a payload of 50 tonnes showed a 52% fuel saving over a 25 tonne payload vehicle over a 100 kilometer lead.

The major consideration with roadtrains is traction. This is particularly the case with an unladen vehicle travelling the last few kilometers to the bush loading point. To overcome the problem in his particular case he moved to an 8-wheel drive truck.

Safety is another factor in using roadtrains. Theoretically half the vehicles means half the probability of an accident occurring. In his particular case his trucks had logged between 8 and 10 million kilometers without one incidence, much less an accident.

Palmer concluded with a plea that where more efficient vehicles could be introduced, there should be something in it for the contractor. This would negate the need to speed or overload the vehicle to remain viable. "Leave something for somebody else."

SAFETY

Three papers were presented to the conference on the subject of logging safety.

"A LOOK AT FOREST ACCIDENT STATISTICS FOR AUSTRALIA AND NEW ZEALAND" (Mick Crowe, CSIRO)

The paper surveyed accident statistics available in Australia and New Zealand, and found that accurate countrywide information on the frequency, nature and severity of logging accidents does not exist in either Australia or New Zealand. Some Australian states have logging accident data (notably Western Australia), but it is either not published or mixed in other industry information. The Accident Reporting Scheme run by LIRA for the N.Z. industry reports only a portion of the accidents occurring, but the reports do allow conclusions about the nature of accidents

occurring. This information has been used, for instance, to support the introduction of cut resistant legwear for chainsaw operators.

In Australia, some companies have collected accident information on their operations, and also regional training teams have collected information from their region of operation.

A study by Crowe of hardwood logging accidents in Australia estimated that "each year hardwood loggers had a 1 in 560 chance of being killed, a 1 in 160 chance of suffering an injury which would take more than 100 days recovery, and a 1 in 9 chance of a lost time injury which would take 27 days recovery". The study provided a lot of information to indicate where the problems were and where to direct effort to improve the record.

The experience of ANM at Albury over the past 4½ years illustrated the potential effect of mechanisation on accident rate. In that time the ANM logging operations had 17 lost time accidents, resulting in 259 days lost. Although chainsaw operators comprised only 20% of the workforce, they accounted for 16 of the 17 accidents.

In conclusion; "... both Australia and New Zealand need a continuing factual collection of logging accident data from which the problems of the industry can be analysed and solutions monitored. New Zealand has already gone some way in establishing this, however there is the problem of unknown bias in incomplete collections of non-random samples. In Australia the most realistic solution is for the regional areas to combine their information."

"HOW THE LOGGING ACCIDENT PROBLEM IS BEING TACKLED" (Andy Cusack, LITA, S.A.)

The paper described strategies which have been used in Australia to gain a positive effect on accident rates.

(i) **Managerial attitude** - the manager and his supervisors must take a role of total responsibility to the workforce, and be fully aware of what their responsibilities in accident prevention are.

(ii) **Accident Records and Statistics** - Cusack echoed the concerns of the previous paper in noting the lack of comprehensive accident data being collected. The requirements are :

"- accurate and objective investigation and reporting
- analysis and implementation of positive action taken by the management and workforce to prevent similar accidents"

(iii) **Development of Work Systems** - the work system being used has high relevance to implementing an accident prevention programme. "Investigation and development of systems

must go hand in hand with any training programme. This point should be stressed when it is considered that much of the training is actually promoting unsafe systems which are causing the accidents."

(iv) **Protective Equipment**

(v) **Work Techniques**

(vi) **Training**

(vii) **New Developments** - a new development in South Australia is a "back education programme".

"LIMITS ON FURTHER PROGRESS : THE SELECTION AND TRAINING OF FOREST WORKERS TO AVOID RISK TAKING" (Mel Henderson, National Occupational Health and Safety Commission)

No written paper was presented in this session. The main thesis of the presentation was that it is not realistic to prepare workers to completely avoid risk taking - it is necessary to properly prepare them for it. "So called risk taking is a basic fact of life." The paper considered how the skill of being a sensible risk taker could be developed.

FIME CONFERENCES LOGGING PROGRAMME

Conference Theme:
"Management of People and Machines in Logging Operations"

SATURDAY LOGGING

Saturday April 12, 1986

ogging Theatre 1

irman: D W Frankcombe
nager Forests & Wood Products,
stralian Newsprint Mills Ltd, Hobart, Tasmania

Hardwood Experience: Managing the Forest for ximum Dollar Return

EAKER: Prof I S Ferguson, Professor of Forest Science Head of Forestry Section, University of Melbourne

11.00-11.20

vesting Strategies for Improved Productivity from ive Hardwoods

EAKER: C M Kerruish, Senior Research Scientist, IRO Division of Forest Research, Canberra, ACT.

11.20-11.40

sury Planning & Logging

EAKER: W Briggs, Harvesting Superintendent, APM sts Pty Ltd, Morwell, Victoria.

11.40-12.00

QUESTION TIME

Logging Theatre 2

Chairman: J Galbraith, Director, LIRA, New Zealand

Current Harvesting Methods in Australia, & the Role of Forest Operations Research in Australia & New Zealand

SPEAKER: A W Grayburn, Divisional Manager Forest Resources, NZ Forest Products & Chairman, LIRA, New Zealand

Site Preparation Techniques for Softwoods in Australia

SPEAKER: R B McCarthy, Operations Superintendent, APM Forests Pty Ltd, Morwell, Victoria,

New Developments in Machinery for Site Preparation & Planting of Softwood Forests; A Practical Viewpoint

SPEAKER: L Parsons, Senior Forester, Logging SE, SA Woods & Forests Dept., Mount Gambier, South Australia

QUESTION TIME

ogging Theatre 1

irman: O Raymond, Harvesting Development nager, APM Forests Ltd, Morwell, Victoria

s its impact, and the Methods & Equipment Used in Control

EAKER: P Cheney,Senior Research Scientist, RO Division of Forest Research, Canberra, ACT.

2.00-2.20

QUESTION TIME

vesting & Storage of Fire-killed timber

EAKER: T G H Bankes, Harvesting & Marketing nager, SA Woods & Forests Dept., Mount Gambier, th Australia

2.20-2.30

QUESTION TIME

ook at Forest Accident Statistics for tralia & New Zealand:

Magnitude of the Problem

EAKER: M Crowe, Specialist Service Officer, CSIRO ision of Forest Research, Canberra, ACT.

3.00-3.20

QUESTION TIME

Logging Theatre 2

Chairman: G Griffin, Deputy Director General, Department of Conservation, Forests & Lands, Melbourne, Victoria

Specialisation of Equipment for Hardwood Logging: Do Attitudes of Companies & Foresters Prevent it Happening — What are the Benefits?

SPEAKER: J Whitehead, Logging Contractor, Eden, NSW.

QUESTION TIME

Planning Operation & Control of Logging Contracts

SPEAKER: R McCormack, Experimental Scientist, CSIRO Division of Forest Research, Canberra, ACT.

QUESTION TIME

Factors Affecting the Introduction of Fully Mechanised Systems in Plantation Thinnings & Harvesting Systems

SPEAKER: S Vine, Logging Manager, CSR Pyneboard Group, Oberon, NSW.

QUESTION TIME

Afternoon Tea 3.30-4.00

gging Theatre 1

irman: D E Huett, Principal Executive Officer, rmanian Logging Association Ltd, Launceston, rmania.

lopments in Wire Rope forCable Logging hidding Operations

AKER: B Tuor, Forest Engineer, APPM Ltd, nceston, Tasmania.

4.00-4.20

QUESTION TIME

Proper Care & Attention of Hydraulics & Hydrostatics imum Efficiency

AKER: K Bradley, Phillips Hydraulic Services Pty Albury, NSW

4.20-4.50

QUESTION TIME

Logging Theatre 2

Chairman: F Whitelaw, Forestry Manager, Harris-Daishowa Australia Pty Ltd, Eden NSW

Small Wood Harvesting & Collection in Hardwood Forests

SPEAKER: D Grant, Forest Manager, North & East, APPM Ltd, Launceston, Tasmania

QUESTION TIME

Steep Country Logging

SPEAKER: J Ward, B Sc (Forestry), Grad Dip Sc, Logging Manager, Hyne & Sons Pty Ltd Maryborough, Queensland

QUESTION TIME

SATURDAY LOGGING CONFERENCE FINISH

SUNDAY LOGGING

Sunday April 13, 1986

Logging Theatre 1

Chairman: N Humphreys, Wood Procurement Superintendent, Australian Newsprint Mills Ltd, Lavington, NSW.

Processing Operations: In the Bush or at the Roadside?

SPEAKER: I Dobat, Director, L V Dobat & Co Pty Ltd, Mount Gambier, South Australia

9.00-9.20

QUESTION TIME

Processing Operations: In the Bush or at the Roadside?

SPEAKER: J Galbraith, Director, LIRA, New Zealand.

9.30-9.50

QUESTION TIME

How the Logging Accident Problem is Being Tackled

SPEAKER: A J Cusick, Officer in Charge, LITA Inc, Mount Gambier, South Australia

10.00-10.20

QUESTION TIME

Logging Theatre 2

Chairman: A H Cole, Assistant Director, Forest Operations, SA Woods & Forest Dept., Adelaide, South Australia

Harvesting Operations: New Zealand Tyrad Skidder Trials

SPEAKER: R Preble, Research Officer, LIRA, New Zealand

QUESTION TIME

Harvesting Operations: The Excavator as a Carrier for Logging Equipment; Experience and Future

SPEAKER: L McLean, Ryans Pty Ltd, Taree, NSW

QUESTION TIME

Harvesting Operations: Three-in-One Harvesters versus Feller/Buncher &Processor Combinations

SPEAKER: R Korn, Logging Contractor, Tumbarumba, NSW

QUESTION TIME

Logging Theatre 1

Chairman: D Wilkinson, Consultant, Brisbane, Queensland

JOINT CONFERENCE SESSION: LOGGING AND SAWMILLING

Workers Compensation & the Forest Industries
SPEAKER: N Gibson, Director & Victorian Manager Steeves-Lumley (Aust) Pty Ltd, Melbourne, Victoria

11.00-11.20

QUESTION TIME

Logging Theatre 1

Chairman: T G H Bankes, Harvesting & Marketing Manager, SA Woods & Forests Dept., Mount Gambier, South Australia

Limits on Further Progress: The Selection and Training of Forest Workers to Avoid Risk Taking

SPEAKER: M E Henderson, Ergonomist, National Occupational Health & Safety Commission, Canberra, ACT.

11.30-11.50

QUESTION TIME

Is there Really a Place for Log Merchandising in the Bush, or at the Mill

SPEAKER: R L Hyne, Director, Hyne & Sons Pty Ltd, Maryborough, Queensland

12.00-12.20

QUESTION TIME

Logging Theatre 2

Chairman: G Green, Forest Manager, Greenfright Pty Ltd, Myrtleford, Victoria

Improving Road Transport Efficiency

SPEAKER: T Henderson, Principal Consultant, Henderson Consultants, Melbourne, Victoria

QUESTION TIME

Roadtrains: What is Their Place in Logging Operations

SPEAKER: R Pearson, Engineer, Victorian Road Construction Authority, Melbourne, Victoria

QUESTION TIME

Roadtrains: What is Their Place in Logging Operations, continued

SPEAKER: R Palmer, Contractor, Bunbury, West Australia

QUESTION TIME

Logging Theatre 1

Chairman: I McArthur, Technical Officer, CSIRO Division of Forest Research, Canberra, ACT.
JOINT SESSION FOR LOGGING CONFERENCE DELEGATES

What's New in Logging at FIME'86 International
SPEAKERS: Mike Bannister, Editor, Logger Magazine; I McLeod, Instructor, Eden Logging Investigation & Training Team, Eden,NSW; D Kuehner, Manager, Saplor Timber Mills, Tarpeena, SA; K Morgan, Contractor, Launceston, Tasmania; O Raymond, Harvesting Development Manager, APM Forests, Morwell, Vic; N Humphreys, Wood Procurement Superintendent, Lavington, NSW; W Rawlins, Senior Research Scientist, CSIRO Division of Chemical & Wood Technology, Canberra, ACT.

2.00-3.30

Afternoon Tea 3.30-4.00

Logging Theatre 1

Chairman: C A Lembke, Managing Director, Australian Forest Industries Journal & Logger Magazine

JOINT SESSION LOGGING & SAWMILLING CONFERENCE DELEGATES

Forest Industries & the Public

SPEAKER: T H Cameron, Managing Director, Marbut-Cameron Pty Ltd, Melbourne, Victoria

4.00-4.20

QUESTION TIME

Summing Up: Where are we now — Where do We go from Here?

SPEAKERS: G Bennett, OAM, Chairman, Australian Timber Producers Council; and A G Padgett, representing, Australian Logging Council.

4.30-5.00

CONFERENCE FINISH