

The Problems and Philosophy of State Forest Management by George Dey 1968

Document No 4

Recording and Progressing of Timber Stacks

So far the ground covered in the measurement of timber has been restricted to the physical means of quantifying it - whether as individual logs, loads of logs or complete sub. compartments. These measurements would be recorded in a range of documents. Log measurements for example would be noted in a tally book (such as the Form 27 offered a few chapters back). Such compartment measurements would in all probability be recorded in a Tariff Tally Sheet - - - the official form currently in use being the 'S.15'. Outgoing loads may be on log tallies, or weigh tickets, and summarised on Conveyance Notes which serve as an invoice to the customer. There are other types of timber movement which are the subject of measure and record, namely:-

- (1) transfer of produce e.g. from one Forest to another; and
- (2) reconversion of one commodity to another,

The problem now confronting the forester is one of the major problems of Forest Management - how best to build up these measurements day by day, week by week, over the scope of a complete Forest Year to provide information which not only summarises the achievement, but presents a regular balance of stocks. What mandate is to be accepted - bearing in mind the definitive needs of the Mature Forest conception of the Philosophy and. the provision of allowance for the Impact of the Unexpected?

The Forester will, of course, have responsibilities accruing from measurement towards paying men, completing records, progressing plans, securing costings and supplying information to higher levels of management. It is to be hoped that in the last case, higher levels would not ask for information which is not made intrinsically available in the routine of the system.

On top of this, for the efficient current running of his charge the Forester would surely wish to know the following :-

- (1) The stock of timber lying felled in every sub, compartment and remaining unextracted.
- (2) The stock of timber extracted from every sub. compartment and still lying at roadside, classified into a range covering that which remains unmanufactured into something saleable, and that which has been converted into saleable commodities, but which still remains undispached.

The past, amounts which have already been dispatched towards a sale commitment and thus, the balance still outstanding.

Weekly Tally Summaries - Forms 28a and b

The next link in the chain from log Tallies etc. is a weekly summary prepared by field staff - quite possibly in a field office - of all timber activity, including fellings, extractions, reconversions, transfers and dispatches.

The design of such summaries presents a little difficulty at this stage in that generally speaking they should present a pattern to conform with the documents they must feed. And to some extent these, the main timber controlling documents, may be of a design specific to certain modes of Timber Production varying between Forests.

Specimens of such summaries as proved appropriate to Inverliever are included as Forms 28a and 28b. It was found expedient to evolve the two, one serving for the felling extraction, dispatch of primary or basically converted commodities, and the other for reconversions.

The author's inspiration in presenting this work embracing Forest Management in all its aspects, first saw the light of day in 1956 when he sketched a Working Plan for Inverliever, and when, after finding a harassed Head Forester (the late Bob Crozier) in his office one Sunday working on his Stock Recording ledgers, he resolved to try and crack this nut too, once and for all, and evolve a system which was not only definitive, but capable of being maintained by a Forest Clerk. By 1960 the problem was largely solved and from Forest Years 61 to 64 (at least), the system was manifest in a large form, which not only produced the information everyone needed, but satisfied the Forester and was kept by his clerkess.

It should first be explained that the pattern of timber production at Inverliever during these years was pretty straightforward - sawlogs (in two grades) and long pitwood. Very little reconversion was undertaken beyond these stages.

It should also be pointed out that the production of timber produced by a plantation during its lifetime is divided roughly in the ratio of 60% sawlogs, 40% pitwood/pulpwood. It would therefore seem expedient to assume that this state of affairs is represented in the Mature Forest and should be the sort of model on which a truly definitive system would be designed. It may be all very well designing a system to work for the pitwood stage, but it may well fall short when the Forest grows into sawlogs. However, a system which is designed to cope with the later phase will cope admirably with the early stage as well.

There are alternative approaches to Timber Recording. For example the long pitwood element if extracted to roadside in long length can be looked on as "unconverted" - - - something raw or nebulous, still waiting conversion into something finite. This raises problems at sawlog status, however, which would infer a split approach to the logs vis a vis pitwood.

The approach finally used sought to be more definitive and is fundamental to the understanding and working of the system.

In effect, any timber on being felled is classified into something finite, and this stage is known as the Primary or Basic Conversion stage. If sawlogs and long pitwood (or pulpwood) are produced, then they are given the dignity of being called, or classified just that - "Sawlogs" and "Long Pitwood".

If subsequent extraction takes place as whole trees, without any basic cross-cutting in the wood, then a name or classification would have to be coined for them (e.g. "whole trees"), and the operation of felling looked upon as coincident with Primary or Basic conversion.

Anything which subsequently happens to the timber to alter its status while still remaining on the Forest stocks - e.g. crosscutting of long Pitwood into pit-props, or reclassifying of one grade of sawlog to another, or of a sawlog to a strainer - - - is regarded as "Reconversion".

Everything, then, has a name and the need for a form or document on which to record produce hitherto regarded as unconverted is obviated.

Coming to the Formula itself, it may help towards the better understanding of the whole procedure if the matter is dealt with in some detail.

The Formula can be divided into sections, the first of which might be said to isolate the stock remaining in the wood, felled but unextracted. This is a simple case to cover. Concluding Stock in the Wood is the difference between Total Felling and Total Extraction. - .

Now even here there are one or two methods of securing this information, one being to deal with current data, i.e. everything felled, minus everything extracted each week - - - but plus any stock left lying from the previous week.

The approach opted for in the Formula offered here (as, indeed, that which, characterises most of the other aspects of Management throughout this Philosophy), is to use accumulated Totals to date for finding balances. - 81 -

So Concluding Stock in the Wood now becomes Total Fellings to Date minus Total Extractions to Date.

The next step is to secure Concluding Stocks at Roadside. To achieve this the Formula first channels the basic information into two sections:-

- (1) Movements of Timber to Roadside, and
- (2) Movement of Timber away from Roadside.

The Concluding stock at Roadside-again basing it on accumulated Totals to date - will be the difference between the two - i.e. movements TO Roadside minus movements FROM Roadside.

This simple expression is, however, rather more complicated because several factors contribute towards such movements in each case.

For example, Movements to Roadside are not only the result of Extraction, but of "Transfer in (from a different part of the home Forest or from a neighbouring Forest), and of Reconversion of one commodity to another. Thus provision must be made for not only accumulating these factors individually, but for totalling these to give a Total Movement to Roadside figure.

Movements from Roadside also include Transfer and Reconversion as well as the obvious Sales; and more subtle factors can also intrude, such as theft and losses from shrinkage, drying out and conversion.

Thus the final Formula (but omitting these last named "subtle" factors) can be expressed as follows:-

Total Fellings A	Movements to Roadside				Movements from Roadside				Concluding Stocks	
	Extr- tion B	Reconv- ersion C	Trans- fer In D	Total E (B+C+D)	Sales F	Recon- Version G	Transf er Out H	Total I (F+G+H)	IN Wood A-B	AT Roadside E-I

Before incorporation in a Form, the Formula can be embellished - even rearranged, and some of the possibilities will be illustrated in a series of Sample Forms to follow. Nevertheless, the basic conception remains exactly the same throughout.

The format shown above is on a horizontal basis - i.e. the weekly current figures for movements etc, are added vertically, while the balancing or subtraction to find concluding stocks is done horizontally. However this can be reversed; the formula can be designed vertically so that the additions are done horizontally and the subtractions carried out vertically. Which is preferred may well be a matter of personal preference, but would also depend on how frequently the "books" were balanced.

The Timber felling and Movement Record - Form 29

Despite the rejection of an "unconverted" state or category it is nevertheless acknowledged that there is a difference between timber which is produced from Basic conversion as bulk raw material, though nevertheless a saleable commodity, and timber which has been manufactured into a usable article, albeit from conversion or later reconversion.

It is visualised that-the first of these groups should be recorded and progressed on a basic Timber Record Form, comprehensive enough to cover these staple commodities. To return to the example of Inverliever, already quoted, these were Long Random Length tops ("Long Pitwood") and Sawlogs - in fact Sawlogs of 2 grades. Each of these would require to be tracked separately. If the Basic Formula can be thought of as a unit or a module, as in a prefabricated building, then one unit or module would be required per commodity.

This in effect is how the first form is built together into one of some 30 inches long. It contains three units of Formula to cover Long Pitwood, Sawlogs Grade 1 and Sawlogs grade 2.

In addition, these units are prefixed by a section which serves the purpose of a simple Running Record of Total Fellings, in which provision is made for date, location and category of Thinning (or Felling) plus columns for numbers of Trees and Total Volume. The Total Volume is then allocated into constituent commodities in the appropriate unit, all for one series of entries in the Running Record section of date, sub. compartment number etc.

It is conceivable that manufactured articles may be produced at this conversion stage. But it becomes less practicable to add further units to the form to cope with these. Accordingly, the system provides a ledger in which these items can be covered. Because of this, and for completeness, a modified abbreviated unit is added to the form in which these 'Other Items' can be entered. Note, however, that no balancing of stocks is undertaken - the entries being purely transitory before being entered into the ledgers, wherein the Concluding Stock Balances are struck. It is visualised at this stage that such commodities may lose compartment identity for a more general Forest or Depot identity.

Mention of compartment identity poses one of the big bones of contention with this or any other Timber Recording System. Namely, must the Timber being handled and Tracked be kept on a compartment, and sub. compartment basis?

If not, then items can be entered on one form and the resulting data thus accumulates as the Total figures for the Forest. One would visualise this taking place under an extensive system of management.

Under more intensive systems, however, the entries would have to be made under sub. compartment - i.e. with a sheet per sub. compartment. This makes easier the task of auditing, or of isolating trouble fairly quickly should deficiencies occur, and enables the routine of completing records, plans etc. to follow very readily indeed, particularly at the end of a Forest Year.

It would follow however that by keeping the Timber Record in this manner - i.e. a page or form per sub. compartment - a summary form would also be required, on which stocks per sub. compartment are accumulated to give Total Forest figures.

In practice at Inverliever, two summary sheets were provided which split the function - one keeping track weekly of Concluding Stocks only; the other summarising totals of Fellings, Extractions, reconversions, transfers - - - i.e. movements generally to provide data as and when required for Progress Reports and Quarterly summaries.

Under this system, which does not deal in currents, but only accumulated totals to date, another solution would be to add extra long sheets on which to obtain these Forest Totals to date. This admittedly involves some duplication of effort but may be easier than the summarising in sub. compartment detail. Occasional cross checking would have to be done however. Ideally, of course, one would hope that submissions of current figures would cease to be called for.

The summaries are shown reproduced in foolscap size as Forms 29a and 29b.

Before using Form 23, the Forester must make one further decision. Should he initiate a set to serve only one Forest Year, or should his forms run independently of Forest Year? The former will in all probability prove the widely accepted choice, but the Forms can be run independent of Forest Year.

On the Form 29 here presented, it will be noted that twin columns are provided under each activity or operation. This allows a column for current figures only, and a parallel column for the accumulated total to date. Naturally this means more horizontal space and goes some way to explaining the exceptional width of the Form. It was felt that it would make the task of subtraction and of aggregating "interim currents" like monthly Progress Report submissions, slightly easier.

If the Forms are run independently of Forest Year there is much to be said for adding a third column - a "periodic" column - between weekly current and accumulated Total to Date columns.

Note the Concluding Stock columns are not duplicated - being merely non historical subtractions of the various historic accumulatory figures.

It is possible, of course, to dispense with these double columns and enter total to date vertically under the currents, i.e. in a single shared column. This would use less horizontal space, but more vertical space, and would call for using a different colour e.g. red, for the accumulative Total to Date. To save space on this long form, the activities Transfer and Reconversion have been set together i.e. sharing columns. This was felt reasonable at Inverliever in view of the fairly infrequent use made of these. But each could be differentiated by a symbol of initials and totalled separately if need be.

What follows next is a series of working notes specific to the Forms **29** and containing an outline of the procedure which should be adopted for carrying forward Stocks from previous Forest Years.

1. Start a new sheet for each Compartment under the species concerned, creating separate sections for Spruces, D.F., Larches etc.

2. The first seven columns serve as a running record - but on a compartment basis. From these columns information can be more readily sifted into Thinning Plans, Compt. Records, etc.

3. Although the sheets could be kept continuous, regardless of Forest Year, it is recommended that new sheets be started for each Forest Year.

4. All balancing is done with accumulative "to date" totals. These are marked A, B, D & G in red, D being the sum of Cols. B & C, and G, the sum of Cols. E & F. From these four columns, by subtraction, can be found the concluding stocks for the compartment either unextracted ("in wood") or at Roadside.

5. If stock has to be brought forward, a rather complicated procedure has to be followed. Stock brought forward will be of two categories - either unextracted, or at roadside.

(a) Unextracted Stock - Any stock shown as unextracted or "in wood" (column A - B) which has to be carried forward will also have to be shown in column A (Fellings to Date).

(b) Roadside Stock - Any stock at roadside (col. D - G) will have to be entered up under the following columns:- A's (Fellings to date), B' s (Extraction to date), D' s (Total movements to Roadside to date).

Perhaps the worked example attached will explain more clearly, but in summary, any stock brought forward "at Roadside" goes into columns A, B & D; any stock "in wood" is added to column A.

Stock brought forward can be expressed in another way - Unextracted "in wood" stock represents the total fellings for previous year less total dispatches; "at Roadside" stock represents the previous year's total extraction plus reconversion, transfer in etc. less total dispatches etc. up to the end of the year.

Note that it is important to bring forward stock only in "to date" columns, and must never be included in "Current" columns.

6. Once existing stocks are brought forward the sheets can be entered up daily or weekly or as convenient.

7. Recovering and Transfer in or out. To save space these have been lumped in the same column. They can be kept fairly separate if one is perhaps entered in a different colour of pencil or ink, or a suffix or prefix added e.g. (RC) or (TR). Where Reconversion is from one basic classification to another e.g. from Sawlogs to Long Pitwood, it is recommended that the "reconversion out" be entered into same horizontal line as the "reconversion in".

8. If a totalling of fellings or movements is required periodically e.g. for monthly Progress Reports, it is recommended that this be done by simply adding the appropriate weeks under the current columns and this total perhaps entered in a different colour on an otherwise blank horizontal column. If document numbers are required, these can be entered underneath the appropriate figures in the current and to date columns.

9. Where the sheets are kept on a page per compartment basis, summaries will have to be employed to provide the "Forest total" picture. Two summaries are provided -one for Roadside and Unextracted stock only - and the other for fellings and Timber Movements. Whilst the former is of more use for local week to week management, the latter is intended as an aid to filling in Progress Reports, S.6's etc. It is recommended that where figures are entered up under one compartment that the balancing and entering up of summaries (when required) is done concurrently. e.g. after "fellings to date" and "Extractions to date" - the A^s and B^s - have been filled in - subtract to find concluding stock in wood before filling in cols. C, D, etc. Thus enter up the summaries before proceeding to another compartment and page.))

((10. Special Items for transfer to Ledger. This is a "space saver" and is intended as a transitory category for those items of a specialised nature which can lose compartment identity and become entered up into the ledger. Pitprops prepared in the wood can be shown as fellings, then extractions, but props prepared from Long Pitwood at Roadside, or prepared in dump, will appear under Reconversion and then immediately move to a Ledger. "Transfers in" of Special Items, it is visualised will go straight into a Ledger and not into any Compartment. But their movement will have to be kept track of when completing S.6's.

11. Masking - A system of masks can be devised to assist the matter of subtracting to find Concluding Stocks, "in wood" or "at Roadside". One such mask is attached.))

Timber Stock Ledger - Form 30

The second Form based on the Formula (No. 30), is a variant from Form 29 in a number of respects.

- (1) It adopts a vertical format as opposed to the horizontal. This makes the task of subtraction to find concluding stocks somewhat easier. The additions of the weekly current figures to bring the accumulative figure up to date, however, will have to be done horizontally i.e. across the page, although even this can be eased by the effort of repeating the previous total to date at the head of the next week's column in pencil.
- (2) It contains only one unit of the formula and is thus somewhat more specialised than Form 29. (Generally speaking if a basic form is required to cover more than one commodity, the horizontal format, as in Form 29, should prove more apt.) It is designed, therefore, to serve as a ledger for 'Other' Item or manufactured commodity purposes, or for making bulk checks on a Forest basis on items sold on continuing sale basis such as Long Pitwood, or pulpwood all under a regime which seeks to strike balances weekly.

Nevertheless, provision is made on the form so that it can serve on a compartment basis if need be.

- (3) It has built into it, the refinement of extra lines with which the Forester can progress a sale, albeit only one sale at a time.

A set of working notes now follows.

Notes on Use of Timber Stock Ledger - Form 30

The ledger is intended, for accounting of stocks in bulk of timber which is the products of Primary Conversion. Provision has been made to allow progressing of a continuing sale to a Merchant, i.e. a sale in which a certain volume of timber is promised over a specified period of time and the Forester commences to fell to meet this commitment. The limitations of foolscap permit the progressing of sales to only one Merchant. Two might be squeezed in if colour was used to differentiate between entries but would not be easy.

The Ledger can be used to account for stocks of converted produce of an elementary nature. It is not intended to serve the needs of a saw mill operating on a large scale.

Although the contingency has been allowed for, it is not really intended for use on a Compartment basis. Compartment accounting should be carried out on the comprehensive sheets able to cover the range of classes of timber from Primary Conversion. If used on a Compartment basis, sheets must be opened for each class e.g. sawlogs, long pitwood, etc.

The use of the "mask" and a scrutiny of a worked sample should go a long way towards explaining the use of the ledger.

The first step is to bring forward stock from previous Forest Year.

1. Bringing Forward Stock from Previous Forest Year

Stock will be of two classes - "at stump" (i.e. unextracted) and "at roadside". In the first instance any "at stump" stock must be included in the "Fellings" column; "Roadside" stock must be entered in both the "Fellings" and "Extraction" columns. Thereafter, two systems may be employed, (a) by balancing with "weekly current" figures to which has been added the concluding stocks from the previous week. (in this case, the procedure outlined above, for bringing forward stock from previous Forest Year must be followed every week), or (b) (what is recommended and followed in example) by balancing with accumulated totals to date. Here stock from previous Forest Year is brought forward as above only once. For ease in adding, totals to date can be repeated at the head of lines B, C, D, E, G, H, or I during the following week, before the latest "weekly current" is added to give a revised "Total to Date".

e.g. Week Ending	4.1.64	11.1.64	18.1.64
	500	500	930
Current	500	430	1200
Total todate	500	930	2130

(Note that in these methods if stock has had to be brought forward from previous Forest Year, figures for Felling and Extraction cannot be quoted in Progress Reports etc. without first deducting these Carry Forwards).

Once the matter of bring Forward Stock has been settled the system is ready to account for subsequent progressing.

2. The Weekly Routine

Current figures should be entered - preferably in black - under appropriate week and against appropriate operation or category. To these have been added the totals to date of proceeding week. To facilitate adding, these can be repeated (in pencil, say) immediately above the 'current'. The new 'total to date' (under the broken line) is then determined and entered in red.

The mask can then be used to isolate the "Totals to date" of Movements to and from Roadside and their respective sums entered into Columns F and J.

Still using the mask (and remembering to move it along so that the appropriate week under review appears in the top most "window") the concluding stocks (a) at stump and (b) at roadside can be determined by subtraction.

If a sale is being progressed, the mask may again be used to facilitate subtraction of Line & from A. Incidentally, the total to date (line g) also gives an indication of the sale progress, particularly if compared with the "commitment - weekly Accumulative" line.

3. Converting of Produce

The sheets do not cater for saw-milling in as much as timber is not entered in the round and converted into commodity on one and the same sheet. The difficulty furthermore, is increased by waste, both actual physical waste and that caused by differing units. If it is possible to isolate waste so that it can be attributed to a certain parcel on a weekly basis, both "commodity volume" and "waste" can be entered into the line "H" current. If waste cannot be isolated in this way, an estimate can be made e.g. quarterly, and entered as a bulk entry in the "H" current line. It may also be possible to open an intermediate sheet of "Timber for Saw-milling" into which the basic Sawlog or Pitwood is brought under "Reconversion".

One further difficulty with converted material is that accounting is frequently necessary both in cubic feet and number of pieces. If there is insufficient room in one column - two can be used for one week - one for pieces and the other for cubic feet.

Each sheet of the ledger provides for 13 columns, so that in a full year up to four sheets may be needed for any one commodity, i.e. one per quarter.

Bringing Forward Stock from Previous Forest Year

WORKED EXAMPLE
"LONG PITWOOD"

Last entry during previous Forest Year:-	Movements to Roadside			TOTAL	Movements from Roadside		TOTAL	Concluding Stock	
	Fellings To date A	Extraction To date B	Reconversion Transfer in To date C	TO DATE D (=B + C)	Sales To date E	Reconversion Transfer out To date F	TO DATE G (=E + F)	In Wood A - B	At Roadside D - G
	4,760	4,700	80	4,780	3,100	1,000	4,100	60	680
Detailed working of bringing forward Concluding Stock:-									
Stock brought forward entry on first line of new Forest Year:-	B/F 740	B/F 680		B/F 680				60	680

It will be seen that A - B (740 - 680) = 60 and that D - G (680 - nil) = 680, which tallies with Concluding Stock figures.

Timber Stock Ledgers: Alternative Designs Forms 31, 32 and 33

Forms 31 and 32 are both designed around the definitive Formula, and return to the horizontal format of Form 29. But, like Form 30, both incorporate only one unit. So once again their functions are more those of ledgers for manufactured articles.

Form 31 - This is essentially the same design as Form 29, despite its restriction to one commodity. It incorporates the Running Record section, so can be used on a compartment basis. But it does contain one or two refinements.

For example a rearrangement of the movements from Roadside section puts the 'Total' column in closer juxtaposition with that of Movements "in".

Then its design has been slightly extended to cover two concurrent sales of the same commodity.

Lastly, the columns for each activity are split to allow for the use of two units. Alternatively these duplicate columns can be used for the "current" and "Total to Date" entries if only one unit is used - just as with Form 29, the long form. Otherwise the routine intended for Form 31 visualises the "current" and "Total to Date" entries coming underneath each other in the same column. Use of black for current and red for Total to date should make for plain differentiation.

Form 32 - The Running Record section has been dropped here so that this form serves only as a bulk ledger. The Movements from Roadside "Sales" sections have now been increased, so that three sales of the same commodity can be covered at one time.

Again the columns have been split, so that two units can be included, or the 'Current'/'Total' entries kept level with each other. But, as with Form 31, it is visualised that these entries should be piled vertically, and in fact the form is especially useful for accumulating data for balancing less frequently than weekly, or for "catching up" retrospectively.

Commodities such as pitprops were very much in mind during the conception of this form.

Form 33 - This form is complementary to 31 and 32 (and possibly 29) and serves the express function of progressing sales - particularly continuing sales of considerable duration - i.e. 6 or 12 months. A wide range of significant statistic is included, which should enable the Forester as a routine to gauge how his sales are proceeding and, if necessary, to make adjustments.

((Controlling Stocks at District Level

The foregoing technique outlined how Timber Stocks can be controlled on paper at Forest level. What of the District Officer? How can he check stocks of commodities, and the progress of sales, in which he is particularly interested?

He can, of course, telephone and ask in the hope that balances have been struck. He can also maintain records of his own - effecting a sort of "long distance" control.

The two Forms 32 and 33 will serve admirably for this task. But he will require routine, periodical statements from the Forester - summarised extracts, of all movements relating to the commodities in which he is interested - i.e. the preparation of new stocks either by Felling, Extraction, Reconversion, Transfer etc., and the disposal of stocks by sale, Reconversion, Transfer out, etc.

The attached form shows a fairly straightforward Format on which to record such summary statements, which can be completed and submitted weekly or fortnightly by the Forester or his clerk.

The District Manager, (or his clerk if he has one) can then enter the relevant details onto the appropriate forms, bring them up to date and strike the balance required. The exercise will not only provide information, but give the District Officer a much clearer and integrated picture of the progress of the Forest's timber activities, smoothly, and inexorably.

This constant monitoring will give, by routine, timeous warning of when a field visit may become necessary. It will also save time on what otherwise would have been a field visit, and save uncomfortable embarrassment all round.))

Forest:		Progress of Thinning and Felling										Week(s) Ending 18/2/68			
Totals	Thinning									Clear Fellings					
	Area (acs)			Tot.	Volume (H. ft.)				Total	Area(acs)		Tot.	Volume (H. ft.)		Total
	CP	NS	DF		Pine	Spruce	DF	Hardwood		CP	NS		JL		
	Previous	29	26	3	58	8,922	7,195	1,007	667	14,711			150	36	51
Current	3			3	840				840	<i>Windsor only</i>					
To Date	32	26	3	61	9,762	7,195	1,007	667	18,611			150	36	51	237
Programme	42	70	10	122	13,000	25,000	2,000		40,000						

Forest:	Summary of Timber Stock Movements - IN/OUT					...Week(s) Ending 18-2-68	
Movement Categories:- CONversion: REConversion: TRansfer: Sale: Loss:							
Item	Size	Species	Unit(s)	Quantity	Category	Order No., Buyer's Name, etc.	
Pit props	6 1/2' x 4-8" TO	MC	pieces	683	Con.		
Stakes	5 1/2' x 2-4' "	"	ea.	158	con		
Round Sawlogs (various)		"	H. Ft.	47	con		
OUT							
Stakes	5 1/2' x 3-4"	MC	ea	50	S	A35 175221 F. Reynolds & Son	
Round Timber		Beech	piece Ton	36 ST.18c	S	A39 298393 I. Williams	
"	"	"	"	33 4T.16c	S	" " " 4	
Stakes	6 1/2' x 2-3"	MC	ea	60	S	" " " 5 Glamorgan Fine Service	
Boxwood	6 1/2' x 4-8"	MC	pieces	45	Tr.	Tair Owen Forest	

Forest:		Progress of Planting and Beating Up										...Week(s) Ending			
Totals	Areas in Acres			Analysis of Principle Species (Thousands)											
	Affor- ested	Replanted		Afforest and Replant							Beating Up				
		Burnt	Felled	SS	NS	NF	JL						SS	JL	HL
Previous	30			30	4	7	8						6	14	
Current	1			3			9						2		2
To Date	31			33	4	7	9						8	14	20
Programme	74			56	17	11	28						10	2	2

((Incidentally, the stencilled "Statement" or "Summary of Movements" form also has on it two additional "statement" sections, one to provide amplification of Thinning and Felling Progress, the other to supply extra details on Planting and Beating Up programmes, i.e. information not readily available on Progress Reports.

Timber Production in General

A good deal of ground has now been covered in the management of Timber Production from the very long range forecasts necessary for the policy makers right down to the exactitudes of measuring a single log.

It would take up too much space to write up in detail the many investigations the author undertook at Inverliever. However, a little space can perhaps be found to mention one or two.

(1) Sawlog Estimation - One or two studies were made to check that a fairly accurate guide of Sawlog/Pitwood ratio could be obtained from average B.H.Q.G. of the thinnings before felling. Generally speaking confirmation was forthcoming especially in bigger trees which have moved away from the critical girths above which the discipline of a minimum 10 foot log asserted themselves, i.e. 5½ inches. From these investigations were produced two items which proved most useful:-

- (a) A series of assortment curves on which the Log/Pit or Pulp percentages were plotted against B.H.Q.G. to cover a range of Top Diameter regimes, and;
- (b) A series of tree profiles, virtually stem analysis which have still not ceased to offer the writer some degree of usefulness.))

(((2) Increment - In a quest for a quick method of discovering average increment recently accrued, the author measured 4 trees in detail. The increment in each case for the preceding 3 years was measured on exposed cross sections by a conventional diameter method and compared with a short cut method based on girth, in which measuring up the tree, half the distance equal to the three years Top Height Increment, a figure of M.Q.G. as it might have been three years ago was obtained.

The results in all 4 cases came out virtually "spot on" (the averages of the four trees compared 5% with 5.1%), so much so that the author dared not repeat it in case the illusions of accuracy became shattered!

However any claim to fame the author may have hoped for from this little study disappeared several years later when he discovered much the same conclusions written up in an article in the Forestry Commission Journal of 1958 (P.129), by R. J. G. Horne, by coincidence himself a one time associate of Inverliever.

As was hinted at in the chapter on "Timber Production Estimation", (page 55), such routine checks could prove most useful in adjusting Growing Stock volumes should a volume control approach be desired in Estimation of Thinning Allowable Gut.))

(((3) Windblow - While serving in East Scotland, the author endured his first tastes of windblow in December 1962 and then in the Great Gale of January 1963. (1953?) His share of this was 310,000 H. ft. and the disruption of a brand new set of thinning plans for the Forests of his District.

During his 10 years at Inverliever, he accumulated a further 622,000 H. ft. of windblow (and another series of shattered, shining new plans). Thus, his total experience of windblow must by now total about 1 million Hoppus feet, and he is left in no delusions about its impact.

In fact, the Forestry "industry in general need not labour under any delusions; as the Plantation Stock of this country grows taller, so will the incidence of windblow increase. It is a factor all must live and come to terms with.

Much has been written about the silvicultural aspects of windblow, and all must be read by the manager.))

((A bibliography can be found in the same Forestry Commission Journal as just mentioned above (1958 - page 132), to which can at least be added articles, more recent including bibliographies, by D. G. Pyatt (Royal Scottish Forestry Journal July 1966) and J. A. Busby (Royal Scottish Forestry Society Journal of April 1965* page 86).

Proper siting of species - attention to drainage and its regular maintenance -all these things are so true and important.

The lessons of Inverliever confirmed all these and probably more besides. Due to lack of access, many first thinnings had to be delayed until top heights of 50 and even 60 feet had accrued. Many of these stands suffered severely from subsequent windblow.

The moral in fact seemed to be, if a stand has been allowed to grow too tall, without thinning, forget it - leave it to grow on for as long as one dare, then clear fell.

Many cases were observed of large trees growing together in undisturbed groups of 2, 3, even 4-, which survived the gales. No doubt this was by virtue of good deep crowns and exposed positions but it was also conceivable that they offered each other some element of mutual support by an intermingling of roots - - standing on each other's toes, so to speak.

Because of this, the author became attracted to a form of thinning in which single trees were not chosen as the Final Crop Unit, but three - i.e. a Final Crop "Trio", growing together at planting distance, and relieved at fairly early stages by thinning.

It was an obvious corollary to this which led to a wider use of double furrow ploughing, as was evidenced in the fine, shallow broad slice of the Clarke (Parkgate) plough. Clearly tree roots of two adjacent rows, especially if planting was staggered in triangular pattern, would have more scope to offer mutual support than on deep single furrow ploughing.

Furthermore, there seemed more urgency to practice deep cultivation on the hard mineral sites - particularly shallow peaty podsols with pan - with ploughs like the Tine, and in particular the Clarke Twin Tine which combined the elements of deep cultivation directly under a humified turf medium in which to secure more assured establishment.

Easy sites and probably peat bogs should not call for plough treatment in the second generation even if it were possible to do it. On hard mineral sites, therefore, it is all the more important to make the investment while the ground is free from roads etc., because the effect will surely benefit more than one generation.

Incidentally it makes an interesting and sobering diversion to reflect that windblow at Inverliever may well have been mitigated by the fact that roots were able to penetrate the steeply tilted beds of the Dalradian Grits. Then one thinks of tree roots sitting for example, on flat plates of Pennant Sandstone in the South Wales Coalfield, and almost winces with apprehension.

If much has been written about the silvicultural aspects of windblow, not a great deal has been said about the management of it.))

Windblow and Management

Windblow comes as an interruption to the smooth progress of a manager's plans. Once a clear felling regime has been initiated, any windblow which occurs will probably be made to fit into the clear felling pattern and will not prove too serious a handicap, especially if some sort of average Rotation is being employed, and if the age class distribution is broad - the nearer normal, of course, the better.

Windblow is most troublesome in adolescent afforestation projects before the mature forest phase has been reached, i.e. when production activity is confined to Thinning. Should a sizeable parcel of windblow suddenly appear on the Forest Manager's lap he will be faced with no mean dilemma. Should the windblow volume be made to form part of his annual cut? Or, as it simulates clear felling, can it be looked upon as supplementary to the Thinning which should be carried on as usual?

It will depend a great deal on the size and extent of the catastrophe, whether or not the shaping of a policy will fall on the local Manager's shoulders.

However there are certain routine steps, he can initiate right away.

(1) Put men to clear roads, commencing with Public roads if any of these cross the Forest.

(2) Clear fences or enclosures to keep out invasion by vermin, sheep etc.

In both these cases crosscutting should follow the pattern currently in force at the Forest, unless an emergency arises when the cutting of a "channel" by cross-cutting haphazard and relative to the tree may have to be resorted to. What sort of emergency? Well, as happened once at Inverliever, an ambulance carrying a maternity case may happen along - - -

(3) Initiate the preparation of an estimate of the extent of the windblow. This should be done per sub. compartment and species. Although detailed measurement is out of the question, every dodge known to human ingenuity should be taken to make the estimate as accurate as possible,. For example, make a count of trees and try to assess average girth; estimate the area of larger pockets as a cross check. Needless to say, if the Forest has good and up to date records of stocking, Top Height, Volume etc., this should come easy.

If for some reason a detailed measurement has been made, for Pete's sake mark the trees. There may well be more windblow to follow, particularly if the gale has struck during October to December.

If an estimate only has been made, and more windblow follows, subsequently, it is frequently possible to make an estimate of the new disaster if, for example, orientation is different. If not, it is far better to make a completely new estimate superseding the old and embracing everything.

While waiting the results of this survey, the Manager may obtain news that the catastrophe is on a nation-wide scale. If so, all thinning operations should be forthwith suspended, and assistance offered to local authorities to extend road clearing beyond the Forest.

What happens next depends on scale - whether the windblow covers a widespread area, or is localised to the Forest under consideration - and, if the latter, how it compares in volume to the annual thinning cut.

All that can really be done here is to list and try to bring out the significance of several of the factors which the Forest Manager would have to consider in formulating his plan.

1. Species - Obviously if a light demanding species like Pine predominated, there will be greater urgency in clearing up, particularly if the windblow is scattered under surviving canopy.

2. Damage - The damage be characterised as genuine windblow (i.e. with trees still on root) or wind break (i.e. trees have snapped, leaving shattered stumps on root). It is more urgent to salvage windbreak, of course, as deterioration quickly sets in. It is worthwhile considering the ordering of supplies of Insecticide (e.g. Hexaplus) in case a buildup of wood-boring beetle follows in April/May.

3. Pattern - The pattern of the windblow may be of a scattered nature throughout the surviving crop, or it may be in extensive, complete pockets. Other factors having been considered (e.g. Species), and the windblow occurring early in the season, there will be less interruptions, less need to cover the same ground twice, because of further windblow, if the clear patches are attended to first.

4. Scope - If the estimate reveals a very extensive volume blown, i.e. over a year's thinning, then serious consideration must be given to:

- (a) concentrating on windblow alone and suspending thinning; and
- (b) introducing timber merchants to undertake a proportion of the work.

If the estimate shows a manageable size - i.e. perhaps under one year's thinning, the manager may decide the task of clearing up not only lies within his own resources, but is not urgent enough to justify suspending thinning. Thus he will seek to formulate a plan in which thinning and the clearance of the windblow will be carried on concurrently.

5. Markets - A windblow "sets" the pattern of the produce in that the trees are "marked" for you,, Generally the average tree from windblow exceeds that from Thinning (at Inverliever approximately 19.0 cf. 7 H. ft.) If the Forest has existing commitments to markets, these must be carefully studied in relation to the expected outturn from the windblow. For example, whilst the sawlog element is not likely to prove an embarrassment other than specieswise, the ratio of pitwood or pulpwood might do so- in as much as the incidence of the small wood from windblow may drop to well below the planned weekly dispatch figure of the commitment. The merchant may be favourably disposed towards easing, even waiving the commitment. If not, due consideration must be given to continuing thinning to produce the desired element of smaller-material, or seeking to meet the commitment elsewhere, e.g. from a kind neighbor.

In the event of there being no existing, tailormade market to absorb the windblow, one must be sought as soon as the Plan is formulated and preferably on a continuing sale basis.

The important point is that the timber is technically "felled" and now very vulnerable to possible deterioration. If quantities are extensive, then the merchant must be invited to play a role of more significance than just a customer. His integrity and goodwill become vital.

If some of the windblow is to be sold "standing", the contract terms must include careful allowance for an agreed method of measurement, bearing in mind that further windblow may well confuse the issue before completion. Suitable methods of measurement under the circumstances might be by tape and measuring rod on felling and crosscutting (costs shared?), or by weight on dispatch. Agreement must be reached on allowance procedure if shattered sections of stem are prevalent.

6. The Plan - The manager must now decide on his plan, and once he has struck on what seems a reasonable solution, he should put this as a written instruction to the Forester, setting target dates.

(Herewith follows an example of an outline plan prepared for the big September 1961 windblow at Inverliever - some 234,000 Hoppus feet, just about one year's cut, and largely Spruces. Subsequent windblow escalated the total to nearly 340,000 Hoppus feet).

Thinning was to be stopped for 1 year. It was decreed that all sawlogs accruing from the windblow had to be reserved for an existing commitment, but that the merchants concerned would themselves undertake a proportion on a Standing Sale basis, which eventually accounted for some 30%. The clearing up, then, would follow a longish term pattern and it was decided to aim at clearance over a period of 16 to 18 months, which allowed for a recommencement of thinning after about 12 months.

The Forest was at that time following a 3 year Thinning cycle.

The following order of clearance was found to be compatible with other considerations.

Clear first, compartments in Thinning areas currently just completed, secondly, compartments in previous year's thinning; finally, compartments in thinning area which would now have been due, (this taking place concurrent with recommencement of thinning).

7. Equipment - Having prepared the plan, review equipment held on stock and decide on additions or replacements required. If the windblow has precipitated unfamiliar classes of produce, appropriate technical training of staff must be considered too.

8. Roads - If some of the windblow still remains inaccessible because of lack of roads, consider revising roads plan, or seeking a supplementary, ad hoc emergency crash programme.

9. Finance - Review the current approved Budget and if the measures outlined in the Plan call for it, seek supplementary funds to cover.

10. Recording - Once the clearance is underway, it will no doubt occur to the reader, that entries in the Produce Records are going to cover a good many more compartments than was anticipated under the Thinning Regime. It must therefore be decided whether the intensive sub-compartment approach must continue or whether it can be suspended for the time being in favour of an 'ad hoc' Forest-wide sheet. Windblow, however, should be clearly marked as such - for it can become a quite revealing statistic.

All clear windblown patches of an agreed minimum area (1 acre?) must be surveyed and recorded. Where this is adjacent to a previous windblow, it is better to check by surveying the whole, and subtracting from the previous record, to find the new area.

11. Lastly, study the impact on Thinning Plans and be prepared to revise if necessary. Here, the Manager on a 'Free Block' Principle can really feel smug.

Subsequently, when thinning recommences, do not attempt to catch up, just start in where the programme left off. If thinning had been suspended for over a year, there may be a case for acceleration, but this may be more aptly achieved by somewhat lighter thinning. However this sort of decision must be made in relation to the nominal cycle. Obviously longer cycles will suffer less than short ones.

Section 9 Working Plans

Once settled in an area for a number of years, the Forest Manager needs little more than the abstracted or appendiced Plans and schedules to conduct his day to day planning and running of his charge. He certainly will not need to recourse to the comprehensive, cumbersome, encyclopaedia, modern Working Plans have tended to become.

But with change of staff, a Working Plan really comes into its own, as a force for bridging the gap and providing background and continuity. Hence the need for regular maintenance, if one is to have a Working Plan at all.

The Philosophy, in its quest for what is Basic and Definitive, will quickly link a Working Plan to a Forest. Anything larger, e.g. a Working Plan area, embracing two or more Forests is, however economical may seem its preparation, far too vulnerable and inflexible. Changes in one of the constituent Forests affect the whole, and the Manager will assuredly find himself continually having to break down comprehensive information into the Forest units.

Nevertheless, where management puts high store on normality, or at least improving age class structure, there is a very valid case for taking a close look at one or two neighbouring Forests, to see if by a bit of grafting here and there, one can mould at least one better balanced unit from the aggregate. Who knows, by casting such wider nets, unnecessary sacrifices and dilemmas may be avoided.

The text of a Working Plan should follow a straightforward format which aims at concentration, without repetition. It should be conceived as a whole - - at one sitting, as it were.

Its chapters can be broadly grouped as follows:-

1st Group: Factual resumes covering factors such as Location, Geology, Meteorology, Local History, Civil Administration - all having some bearing in the shaping of a basic policy for the Forest.

2nd Group: These should deal specifically with the History of the Forest, its acquisitions and its staff administratively speaking; completing with a brief statement describing the technical status of the Forest at time of writing - age class structure, species ratio, productivity level etc.

3rd Group: A statement of Objects of Management, which form a mandate from Headquarters or Conservator and with which the Forest might be expected to conform, How far the Forest can conform - or how far it is unique enough to deviate in certain aspects - these should be indicated at this stage.

4th Group: (if applicable) - An outline of the Afforestation Plan covering past, present and future. This should be followed by sub. chapters dealing functionally with the technical aspects of the relevant operations, preferably in the sequence they occur in the practical course of Forestry.

The need for housing, roads and other ancillary requirements should be covered too.

5th Group: A Plan dealing with the Maintenance/Protection/Thinning phases, also including sub. chapters on the same lines as the preceding group.

6th Group: A Regeneration Plan, outlining aspects of Rotation (as can be deduced from Mandatory Objects of Management and peculiar local conditions), subsequent clear felling and replanting - again including attendant sub. chapters amplifying the technical considerations embodied in the range of appropriate operations likely to be needed in implementing the Plan.

All these, as has been stated, should cover past history (but briefly), current situation, and future trend in so far as this can be prescribed or predicted. In other words facts are stated, inferences discussed and continuing policies outlined, all in one deep breath, while the Manager's mind and attentions are already focused on the subject.

The text of the plan should be loose leaf, held in a simple file folder on a hinged split ring, and contained in a shallow box file (similar in design to those produced for L.P., record albums).

The Forms and Documents which comprise the day to day, month to month, year to year, working machinery should be abstracted - double foolscap held between hardboard covers, and foolscap in simple file covers in an annual box file.

Any attempt should be avoided to contain Working Plans in stiff covered, wedge shaped, metal clasped, trophies, because these will gradually but inevitably drive any manager to the limits of frustration, rage and despair.

No Plan is likely to succeed for long on shuttle copy maintenance. What then is the Philosopher's dream for a suitable alternative system of maintenance which will ensure an ever up to date Plan?

As far as the Forms and Documents are concerned, their annual treatment has already been covered. What of the text?

What really stirs the imagination now, is to conceive another "double". First, why should annual maintenance not take place coincident with the preparation of the Annual Report? If the layout of the Annual Report - done on a Forest basis - closely follows the format of the Working Plan, then changes of technique and policy can be written up as amendment slips or sheets with copies distributed to the various holders of a plan, ready for insertion under appropriate function or chapter.

Secondly, it would be most gratifying, if the same format, or sequence of Plans, functions and operations etc., were to serve also as the basis of a truly definitive Forest filing system, one in which the technical considerations of management and silviculture form the central core - and on to which the other functions embellishing the Forestry profile, can fit as ancillary. Only in this way will co-ordination be secure, and ambiguity avoided.

((Office Procedure

A lot of time can be wasted just looking for "stuff", so it is right that the question of filing should receive a fair measure of attention.

Reference has already been made to the need for a technically based filing system. Ideally this should be alphabetical, even to the extent of coining new words to help the functions fit into a rational chronological order. Failing this, of course, the next best solution is to have a really good comprehensive alphabetical file index card system, suitably cross referenced, and then it does not much matter under what heading one files the bulk paper.

The ideal method of holding files is in boxes. The two sizes currently available are adequate but whereas the 15" x 11" x 5" size has a collapsible end, the 15" x 11" x 3" has not; would that it had. And would that the range be extended to include a 15¹" x 11" x 1" size.

These can be stored upright on shelves, or cupboards, of which there is now an admirable type with an automatic roll up front to protect the contents from dust.

The practice of using 6 inch map titles as the basis for indexing items of a private woodland, or even an estate wayleave nature is a good one, but those old timers already set up in this way will be a trifle apprehensive at the issue of a new series of sheets.

Where a manager lacks typing facilities, a triplicate manifold book is useful. The copy retained in the book remains as a chronological cross reference.

If typing facilities are available, plus a typist, and the manager drafts his letters by hand, he should consider retaining his draft to form the basis of a chronological cross reference.

With items of some importance at least, always have an extra copy prepared for the files.

The best place on a letter for quick scrutiny of date and file reference for someone who is right handed, is on the top right hand corner of the first page.

Information and Instruction

It is easy for a manager to find himself over-endowed with guidance and still be uncertain of where it is and what it is.

Forest specialists have been extremely active in committing their conclusions to paper and the manager of the late 1960's has this certainly at his disposal, but broadcast in a host of pigeonholes - as Headquarters memoranda, conservancy instructions, Forestry Commission publications (e.g. Leaflets, Bulletins, Booklets, Research Records and Journals, Entopath, Work Study Reports), and various Forestry Journals such as "Forestry" and those of the Royal Scottish and England and Wales Societies and the Universities.

One can of course refer queries to the Forestry Commission Central Library and its comprehensive Oxford classification reference system. But this takes time.

Over the years, the author built up a miniature alphabetical cross reference index to the numerous F.C. publications, with hopes of extending it to official Instructions and Memoranda, and the Society Journals as well. This is on stencil copy paper cut to a 2 inches x 2.2 inches size.

But it would be a simple task to type this on a stencil and run off sufficient copies to serve the needs of every District - even Forest office in the country.

The sheet marked 'I' shows how this initial investment might be made, with the typist starting at the letter "A" and continuing through to "Z". A size of 4 inches by 2.6 inches was chosen because it seemed a reasonable compromise to get 10 'cards' from one sheet of foolscap.))

AARON, J. R.
"Survey of Management Literature" F.C. Res. Pap. 28
"Guide to Homegrown Timbers" F.C. Jnl. 63/P128

ABIES (SILVER FIR)
- - adelges insects on - - F.C. Bultn. 26

ACORNS F.C. Leaflet 28
"Collection and Storage"

ADELGES
- Cooleyi F.C. Lflt. No 2
- on J.L. & H.L. F.C. Rec. 17
- on Silver Firs (Varty) F.C. Bultn. 26
- on Spruce etc. F.C. Lflt. 7

AFFORESTATION
- of Chalk Downland F.C. Bultn. 34
(R.F. Wood & M. Nimmo)
- of Chalk Wolds of E. Riding
(I. R. Marshall) F.C. Jnl. '59/P.65

AFFORESTATION
- of Former Opencast F.C. Jnl. '59/P.69
Coal site in Coed see also:-
Morgannwg (J. White) F.C. Jnl. '58/P.31

AFFORESTATION
- a review of Research F.C. Jnl. '57/113
Branch
Trial Plantations (Edwards
and Wood)

AFFORESTATION
- of Upland Heaths F.C. Bultn. 32
(Zehetmayr)
- Calluna Heathland, F.C. Bultn. 36
Mycorrhizal Associations
(Handley)
"Trials of Disc Plough on F.C. Jnl.
Upland Heaths" (G. Stewart) '57/118

AIDS ---
to Working Conifer Thinnings
(S. Forrester) F.C. Bklt. 8

AIR POLLUTION -
- in Forestry (Lines F.C. Jnl. 63/97
& Phillips)

PLANTING METHODS

- on S/Mouldboard Cuthbertson
ploughing (Neustein) F.C. Res. 30

CUTHBERTSON PLOUGHING

- S/Mouldboard, Methods of
planting on - (Neustein) F.C. Res.30

PLOUGHING, CUTHBERTSON F.C. Res. 30
S/Mouldboard
- Methods of Planting on
(Neustein)

NEUSTEIN, S.A., B.Sc. F.C.Res.30
"Methods of Planting on Single
Mouldboard Cuthbertson Ploughing"

BRUNCHORSTIA DIE-BACK F.C. Rec.61
- of Corsican Pine (Read)

DIE-BACK F.C. Rec.61
- Brunchorstia, of Corsican
Pine (Read)

CORSICAN PINE F.C. Rec.61
- Brunchorstia Die-Back of
(Read)

PINE, CORSICAN F.C. Rec.61
- Brunchorstia Die-Back of
(Read)

READ, D. J., B.Sc., P.h.d. F.C. Rec.61
"Brunchorstia Die-Back
of Corsican Pine"

CONIFERS F.C. Bklt.15
"Know your - - -"

((Thereafter, the maintenance and additions can be catered for in two ways. The task can fall on the resources of each and every local Forester and District Officer. They can prepare new cards, or add to old ones as and when new publications are issued. Or the task can be left to one central source, in which case entirely new cards would have to be prepared - as is shown on Sheet II. The issue can be delayed until at least 10 items, i.e. one whole foolscap sheet can be completed. If done in this way a smaller format could be accepted, as no additions to existing cards would be contemplated. But a more definitive solution - short of issuing the guidance in fewer channels - is to persuade the producers of publications to include ready made file index pages, which can then be cut by the recipient and inserted into his own card index box.))

((Work Load and Compartmenting

The ideal way of illustrating the work load assessment exercise is to use the Normal Forest state as a basis. The following chart shows the work load in terms of annual Felling cum Planting programme in acres, plus Thinning/Felling Timber Volumes in Hoppus Feet for a range of Yield Classes.

Examples of Financial notations of Different Species & Yield Classes		SS Y.C. 280	SS Y.C. 180	SP Y.C. 160	SS Y.C.120	SP Y.C.80
Rotation Years		50	55	60	60	70
Area in acres to be Felled & Re planted Annually, coupled with Annual Increment Removed (100%), in Hoppus Feet.	per 1,000 acs.	<div>20 280,000</div>	<div>18 180,000</div>	<div>17 162,000</div>	<div>17 122,000</div>	14 acres 77,000 H.ft
	per 2,000 acs.	<div>40 560,000</div>	<div>36 360,000</div>	<div>33 310,000</div>	<div>33 235,000</div>	28 acres 152,000 H. ft
	per 3,000 acs.	<div>60 840,000</div>	<div>54 540,000</div>	<div>50 475,000</div>	<div>50 360,000</div>	43 acs. 235, 000 H.ft
	per 5,000 acs.	<div>100 1,400,000</div>	<div>90 900,000</div>	<div>83 800,000</div>	<div>83 600,000</div>	70 acs. 385,000 H.ft

Two points are stressed from the above chart :-

- (1) Although we are busy now with afforestation, it is obvious that acre for acre, the real load, of work lies in the field of Production.
- (2) A Forester or District Officer with a charge of predominantly Y.C.180 S.S. say, in West Scotland has a much bigger- task compared with those in the East of the country dealing with Y.C.80 S.P. - almost 2½ times as much - simply by virtue of the difference in Productivity,

Concentrating now on two of these Yield Classes - Y.C. 180 S.S. and 80 S.P., a fuller picture can be built up of the operations necessary to support units of each of 1,000 acres which are now subject to a Normal Forest sustained Yield regime, These operations can, from current costs etc., be translated in turn into terms of the Labour Man Years required to run them.

In the chart which follows, the list of operations is not necessarily intended to be comprehensive, nor the implied costs definitive.))

List of Routine Annual Operations			
Sitka Spruce Y.C. 180 Rotation 50 years		Scots Pine Y.C. 80 Rotation 70 years	
per 1,000 acres	Labour Man Years	per 1,000 acres	Labour Man Years
Fell 18 acres Thin 150acs. app.) 180,000 (on 4 yr.cycle) H. ft.	18.0	Fell 14 acres Thin 97 acs, app.) 77,000 (on 6 yr. cycle) H. ft.	8.0
Replant 18 acs, Weed (say 3 per crop) 60 acs. Brash 18 acs. Maintain Drains, 3,000 chns,, (@ 12 chns. per acre) Ancillary (e.g. Protection)	0.2 0.5 0.5 3.5 4.0	Replant 14 acs. Weed (say 5 per crop) 65 acs. Brash 14 acs. Maintain Drains, 830 chns. (@ 5 chns, per acre) Ancillary	0.1 0.5 0.3 1.0 3.0
	26.7		13.0

It will be further apparent that other variable factors will have a bearing on work load, including:

- (a) local labour quality or productivity;
- (b) incidence of wet time, sickness, house subsidy etc.; and
- (c) the extent to which mechanisation can be used.

But on the face of it, a Forester with 1,000 acres Y.C. 180 S.S. has as much to look after as the chap with 2,000 acres Y.G. 80 S.P.

Forester Complementing

It is from fundamental calculations like these that long term Forester work loads can be predicted. Of course it is by no means the whole story. Increasing use of mechanisation may bring a drop in labour, but may well increase the element of supervision required by virtue of its expensive nature and accelerated productivity.

Apart from this inherent characteristic of deciding the basic level of the work load, productivity does not play much of a part in influencing the Forester's job, unless to some extent in record keeping. Thus the choice between an intensive and an extensive regime should not to any large extent bring a marked differential in Forester complement - unless the move from intensive to extensive brings with it an acceptable drop in the quality and standards of the work to be supervised, (it is assumed that the Forester is not basically involved in planning, other than in discussion with the District Officer).

District Officer Complementing

There are many routine tasks forming part of the D.F.O. mandate which are a function of a Forest. Thus the fewer Forests forming his District charge, the fewer will be those routine tasks, and the fewer the personalities involved in absorbing the pattern of his technical and silvicultural instruction and recommendation.

Again productivity plays a part in deciding the size of the D.F.O's task.

A large element of the job is of course, planning.

What really makes the impact on planning is spread of productivity, and this generally tends to become all the greater with higher productivity.))

((As has already been seen in the sections on Long Term Forecasting, productivity takes its place as a significant factor along with species and "P" Year. The more there are of each of these, the more the work of estimation increases.

It was seen that Inverliever's average sub. compartment area was 3 acres; in the South Wales Coalfield, this average seems to be in the order of 9 acres, but here mixtures tend to complicate matters and the assessment upon which this evidence was based averaged productivity for each sub. compartment. For timber estimation purposes a mixture of two species is virtually two sub. compartments involving two separate calculations.

But it should be feasible when attempting to assess a District work load, to find the gross number of sub. compartments and multiply this by a figure representing the average time spent in making the estimation calculations for one basic unit. In point of fact it is just as quick to estimate for 10,000 H. ft. if it is all in one sub. compartment,, as it is for 1,000.

A reasonable estimate of District Officer Man days can result.

The Short term and Annual Thinning Plans depend on productivity more because of its effect on cycle (the higher the productivity, the shorter the cycle, the more units for which to estimate).

Work on Land Utilisation documents depends on sheer activity - acquisition, disposition, afforestation, etc., and particularly on the number of acquisitions aggregating the constituent forests of the District. (There can be a wide disparity between Districts here; the Mid Glamorgan District of 20,000 acres in the South Wales Coalfield, aggregated, by 1968, some 93 acquisitions, involving 159 distinct pieces of ground, although these condensed into 97 separate blocks by reasons of contiguity),

The Afforestation phase brings a multiplicity of problems, not the least being the influx of new acquisitions and their teething troubles with boundaries, leases, wayleaves, public footpaths, etc. Afforestation generally proceeds at a much greater rate than the anticipated replanting rate corresponding to the Normal for the equivalent Forest Total area, and calls for an initial, extraordinary investment in effort, embracing fencing, compartmenting, reading, surveying, planimetry, ploughing, treating scrub, protecting from fire etc. It all adds up to a case which may deviate drastically from the Norm. Nevertheless, most of the factors can, and should be given full weight in terms of man days work per acre - adjusted for complexity of topography, proximity to industrial areas etc.

So much for the planning side.

But the District Officer may also have a supervisory mandate, too, with responsibilities vis-a-vis the quality and timeliness of the work executed in the field by the Forester and his squad. If this is so - and it should be made clear to him that it is - due allowance must be made to allocate him ample time to perform this function.

It may take a computer to do it, but it would be by no means impossible to build up a fair expression of a District Work load in terms of man days, by analysis of all these foregoing basic facts.

There are a finite number of working days per annum - some 260, unless for those unlucky enough in the draw to be in a Fire problem area. Deducting for leave, the total drops to around 225, Telephone calls can easily prune away the equivalent of 5 of these.

Management by telephone is a jerky, haphazard thing. The telephone drives a spike through the arrangements and intentions of others. It disturbs concentration. When someone telephones, he is under pressure - - - he has misplaced a fact - - - he seeks comfort - - - he jumps the queue. The telephone comes as a ripple on the calm surface of smooth planning and organisation. All too often it can finish by washing away a whole day like a high sea. Its contents pass unrecorded; all too often one call leads to another. No, it is an instrument of emergency. A 5 day deduction is conservative.))

((Then allowance must be made for a host of other matters in addition to basic planning - Private Woodlands, scrutinising reports and records, digesting instructions, acquisition work, confidential reporting, dealing with ad hoc special reports and exercises (those whims from outer space), courses, visits by senior staff, arranging and conducting outings by students and societies, shows, lectures, etc. etc.

A really careful study of many Districts' hidden burdens can readily be made by analysing the chronological letter book, and the result might well surprise many a complementing officer.

Environment plays a part, too. High rainfall areas dissolve away productivity; industrial, urbanised areas increase travel time with traffic competition and road repair holdups.

It will not be difficult to wipe off the 225- - -))

((Inducing the Extensive

The intensity of management can to some extent be controlled during afforestation and guided towards the extensive by planting the Forest in shorter periods than usual, and with as few species as possible. If skill and luck are on the positive side, a narrowing of the spread of productivity can result.

But this is long term. Ironically, such a bid for an extensive foundation can only be made by a concentration and telescoping of programmes, unbalancing more than ever the short term work load. It is hard not to look upon this "blitz" as anything but intensive.

What the extensive manager seeks to do is to aim at establishing an increased basic unit size, an investment for an easier future, probably not his own. This may require a shift of focus all along the line especially if Normal Age Class distribution is felt desirable, and this may have to be found over a larger area than the Forest of hitherto - perhaps even greater than a Districts

Naturally all this brings corresponding uneven and unstable labour conditions, though some mitigation may be offered by transporting labour in, or using contractors. Naturally, too, larger areas will be exposed to the risk of windblow, at any one place and time.

Other measures to which Foresters can resort in the move towards extensive management - in the belief that saving in expenditure leads in the end to more profit - include sub. standard fencing, doing without preplanting-cum-fire protection roads- wider planting distances; no beating up, light weeding, no brashing, line thinning, etc.,. These compromise measures are in fact little more than a lowering of the quality and standard of the job.

However it is the prerogative of the State Forest Employer to opt for this choice between intensive and extensive, and the District Officer can only hope that the decision has been manifest in a matching of District size.

Nevertheless, it will be difficult to justify an extensive choice in the Highland Forest, where range of P. Year, species and productivity already set the stage for intensive management. All that is needed, is a request for timber production to be qualified by species, and already the pattern becomes inevitably intensive.

When a work load has been underestimated, it is inevitable that something must "go". All too often, it will be the conscientious District Officer's private time which is ploughed in - a subsidy, it might be called, for the State's effort.

But next in line to suffer will be the supervisory aspect,,

The basic planning, the routine tasks, the ad hoc tasks - - - all are too exposed an official document and letter to dodge. No, it is the checking of the quality of the job in the field that must be risked. And, of course, the District Officer's own reputation, if any lapses come to light.))

((No District Officer willingly loses the chance to inspect. Ten to one the attractions which led him to Forestry include its element of outdoor activity. It is thus a loss to him to sacrifice a day in the sun and instead bury his nose in unsavoury paperwork, or in matters of tenuous and incidental relevance to Forestry. Too much diversion of effort into work which is intrinsically unproductive and distasteful can only lead to undue pressures^ carelessness, boredom, waning morale and even loss of standard and efficiency.

And yet it is hard to escape the fact that the real responsibility for such a predicament - however well intentioned the motives of economy had been - rests with the complementing authorities. It behoves them, therefore to make a thorough analysis of facts before fitting together the "cloth" and the "model". And having decided that an extensive complement is all they can afford, they must not seek information and not expect standards which only intensive management can supply.))

((Choosing the Right Man

Gauging the work load is one thing, selecting the right man is another. An eminent man of Forestry, addressing an excursion to a complex, industrialised area, said that the place would " make or break an officer". He said so with some pride, having been "made" there himself. His pride would have been more justified if he could have said that, in matters of complementing, a careful analysis of each District and its work load was made in conjunction with an equally searching assessment of the men under consideration - covering their technical abilities and experience, domestic and family background, personality and temperament, financial resources, nationalistic feelings, hobbies, sports, aptitudes etc. - before a final match was made of Officer to District.

In this way there could be more certainty of "make", and less chance of "break".

A contented officer freed from anomalous pressures makes for efficient management and good value.

In point of fact there is a justifiable case for a complementing or personnel officer, ideally a technical man of considerable experience who can by personal contact build up a fairly shrewd knowledge of the District Officer complement, and who can advise on transfers, etc.

Forestry, it has been said, is not a job but a way of life.

It is true that the Forester is a countryman by birth or by adoption. It is also true that in coming to Forestry, the Forester (and this term is taken to include the District Officer) is generally resolved to come in for his working lifetime.

This involves sacrifice; country living is expensive, not always convenient, by dint of remoteness, relatively hazardous (e.g. illness, winter), and lacking in the amenities and recreations of the city. There is not a wide range of alternative, similar work for him to turn to, should some sort of break-down occur between him and employer. Somehow, in the country, he is more liable to be at the beck and call of interested professionals and members of the public, twelve hours a day, seven days a week. He is unlikely to finish with a fortune off his salary at the end of the day.

Nevertheless, he accepts these risks and anomalies in all good faith, and can only hope, in return, that his employer will reciprocate by the humanities of sensitive postings and long employment.))

((The Ideal District

What follows now may not be to everyone's liking. But it is hard to escape the fact that a fair District size, given average productivity, would be about 15,000 acres. - - -

that it would be aggregated in about three Forests - - -

that it should have a central office complex on which Foresters in charge would also be based - - -))

((that it should have a graduate Officer in charge, responsible for all filing and record keeping, relying on basic information being supplied by the Foresters, who - - - would now be offered great relief to concentrate on their jobs as field executors, administrators and supervisors.

Such a set up would have the merit of vesting the District Officer with a real measure of authority which at present he only tenuously enjoys.

It brings his control virtually to field level and ad hoc checking now eliminated. It avoids duplication in filing and record keeping.

The Forester, can fit well into the picture as a deputy, in the District Office's absence.

Furthermore there is every chance that the need for an elaborate monitoring organisation, such is now manifest, e.g. in Conservancies, could decline, thus lowering overheads at such levels,

Alternatively, large and complex districts, especially those in industrial areas so vulnerable to impact from so many outside agencies, could be inflated to perhaps twice the size and staffed by a team of two - D.F.O. plus assistant. This assistant could well be a trainee graduate, but there is scope for creating the post as one in its own right. This would satisfy the provision of a deputy - that insurance of continuity which can bring added efficiency and comfort. The essential planning - the core of the job - can proceed timeously and smoothly, now insulated to a fair degree from the interruptions and diversions from outside,

A skilful blend of aptitudes may well produce an ideal team.

The cost of a graduate D.F.O. is one of the cheapest in the whole of the overhead chain; a few more of them may lead to much less of the others.

Many District Officers prefer to live well clear of their office. Others (the more dedicated?) prefer to live on the spot. The latter certainly gives a break from driving, if the trip between house and office can be accomplished in a short walk, and another merit of this - from the State Employers point of view at least - is that there is more likelihood of the D.F.O. working extra time in times of pressure,

It has already been claimed that country living can be more expensive than city living. One aspect of this which passes unnoticed as an anomaly, is that the city dweller does escape from identifying himself with the country communities of the Forests.

Many Forests have artificially established villages - others have extended on existing villages. Both are communities in which Forester and District Officer may be expected to display leadership - at least interest - either in time or money or both. This can be expensive - - - especially if the community is one of a few in the District, or neighbourhood. A bottle for a raffle here, a box of chocolates there etc., soon mounts up.

The worst contingency, of course, that can happen to a District Officer is that his area is so "decentralised" that he finds himself living in the communities of other Districts and having to contribute to these too!))

((Promotion

Promotion prospects may not be one of the problems of Forest Management, but it would be invidious to deny that it is a vital problem to the Forest Manager.

Let us face it, some are marked and favoured for promotion, others are not.

When loyal and conscientious service have not proved sufficient to attract favour, if leadership is indifferent, confidence and inspiration can flounder on the rocks of disenchantment and. the District can be a lonely place.))

((For such Officers, some consolation, some measure of contentment will tend to buttress better and efficient service if they can be steered towards the jobs in which they show aptitude, and towards that part of the world they prefer. Being near kith, kin and friends etc. will, furthermore, tend to make for cheaper domestic living and offer more scope for enjoying leisure time.

It will raise less problems with strange dialects, place names, and will probably make the officer - as a native himself - more acceptable with neighbours, etc. with whom he conducts business.

Mention has already been made to a Complementing/Personnel Officer who would, by dint of becoming intimately familiar with all aspects of the Officers' professional and domestic circumstances, be able to advise on transfers etc. He could equally well serve as a countersigning officer on confidential reports, acting as a leveller- to possible anomalous intrusions of personality.

Personality has a mutual feeling for personality and it is easy to appreciate how bias can creep in because of an exaggeration of this facet. Extrovert personality has come to be regarded synonymous with drive and leadership. But true leadership requires more qualities than this - it requires single mindedness, dedication, shrewdness, tact, patience, genuine technical experience and example - all tempered with good humour and humanity.

All these are not the exclusive prerequisite of the extrovert, they are found in the introvert too. The difference is that the latter prefers to keep all these weapons of his armoury sheathed until called upon to use them.

It would be interesting to learn how much personality it is reckoned to take, to raise the Yield Class of a plantation by 20 feet. It is true that scientific know how can affect this with applications of fertiliser, but generally speaking, once trees are planted, they set their own pace. If the manager can even keep abreast of them he is going a long way towards solving the problems of management.

The real and tangible contribution which a manager can make towards Forestry will be in terms of his appreciation of fundamental problems, technical know how in coping with them, the accuracy and honesty of his working (e.g. surveying, mapping, estimating) the shrewdness and long sightedness he displays in deploying all these facts and figures into effective plans.

The only place where this will really be assessed properly will be within the contexts of his own District and Office.

The Philosophy would suggest that in the long term, the specialist will gradually become obsolete, leaving in the majority the comprehensive man in the District,

Yet the specialist, in matters of promotion, is uniquely placed. First, he is generally reported on by similar specialist and sympathetic seniors; he may be questioned during boards, within the close field of his work, and possibly even then by folk not specifically qualified to test him; his work is generally on a narrower front with fewer personalities on which to rely for success; lastly, he may be well positioned to be seen by and become familiar with people who matter.))

((Functionalism

Specialists are generally officers deployed to make ad hoc research into one or other relevant aspects of Forestry, having to report back as advisors - not line managers - in the hope that what they bring to light can improve understanding, techniques and ultimately margins of profit.

However, the range of Forestry operations can be grouped functionally and brought under the direct influence of a specialist line manager.

The foregoing Philosophy saw little room for such functional management, conceiving a completely tied up, co-ordinated system of management, at Forest level but in the District Office.))

((To then disentangle the neat, sown up information and rechannel it functionally, is virtually to open up a second front at the D.F.O's back, and divert his attentions from his real front, the Forest.

In this delicate, complex business, team work is very essential and in functionally controlled forestry it is too easy for too many hands not only to pull on the rope in diverse directions - but to pull on a different rope entirely.

If functionalism is considered, the first obvious case for surgery is Private and Advisory work.

Thereafter, there is a case of sorts (providing the necessary co-ordination is ensured on documents such as have already been presented), for making an incision between Afforestation (including Fire Protection and Nursery work), and Maintenance/Thinning/Clear Felling phases, But even this is as temporary as the Afforestation Programme prescribed by Government.

The co-ordination between functionaries in any other split up of the complex and integrated Forestry block, will depend largely on the personalities involved. Personality can be a very variable, somewhat nebulous, certainly not definitive cement indeed, and in event of breakdown, the blame may be rather sadly placed on the weaker party, irrespective of the other qualities involved.))

((Training

The question of training a graduate District Officer to the task of managing a District is a vexed one. The first question posed is whether the bridging of the gap should be done in the University precinct - as well it could - or in an actual District (as a temporary assistant to an experienced District Officer).

There is yet a further alternative. This is to create a training District. In such a carefully selected District, its intrinsic problems in an authentic environment can be supplemented by artificial, but relevant, stock situations to provide a full year's calendar of management procedure under the guidance of experienced men with training aptitude.

The curriculum could be ambitious enough to be supplemented by the following:-

1. Courses in the use of up to date tools and equipment - sort of private tuition, where the trainees actually handle items for themselves.
2. Extensive tours of important Forests, Nurseries, Arboreta, ^search stations, etc.
3. Training in Work Study procedures.
4. Further academic study in Legal and Case work matters, Economics, Civil Administration, etc.
5. Preparing a Forest Pay sheet - - - and so on.

Naturally a venture of this sort would, be costly, and would only be really productive with annual intakes of 6 to 8 minimum. But if more use were to be made of graduates - - - who knows, there may be scope for one Training District, in all three Nations!))

((Refresher Courses

From time to time refresher courses can keep the old hands in touch. The scope of these should keep pace with improvements and developments in techniques.

As most of these are of a technical nature, emphasis should be placed on technical men to run them. One of the valuable aspects of such courses is the interchange of ideas which can pass between the lecturer and "lecturee." Provided the former "knows his stuff", the latter will soon cope with any shortcomings of delivery and draw forth the "real gen" that lies beneath the surfaces))

((Labour Complementing

Inevitably the Forestry Manager will be involved in recruitment of Labour.

One aspect may well be the choice of engaging contractors instead of Direct Labour. Their attractiveness lies in cheapness - they generally show high productivity without a very high oncost.

Many Foresters prefer contractors because they find them more pleasant to deal with. There is no doubt that their main security lies in giving good service.

Use of contractors fits nicely when the scope of a job lasts less than a year, and there is no ulterior need to maintain a resident squad. They are also reasonably expendible if management runs into a period of financial stringency.

However, it may well behove the manager to consider encouraging F.C. workers possibly domiciled in F.C. houses - to become contractors in their own right. To the man concerned, it is a big step not to be taken lightly, but if alternative work is abundantly available, the risk may be small and readily taken.

If the main source of work, however, is confined to the F.C., as, for example it may be in West Scotland, the situation becomes a good deal more delicate. Apart from the fact that techniques change (often towards mechanisation), the crux of the problem is this. If the Forester and contractor could be left to come together and decide a price which is mutually fair, things would be fine. But frequently, the very nature of Forestry Commission's finances may decree that some of these contracts should be publicly advertised for offer. The local man may well find himself out of work if his well tried prices are undercut by an outsider.

The ex F.C. worker turned contractor, however desirable he may be in other directions, may well turn out to be a somewhat embarrassing moral responsibility.

Incidentally, it is far more expedient for the signatory to a contract on the State Forest side to be the Forester in charge.))

((Financial Cuts

Much has been made of the impact of the unexpected.

One of the most frustrating contingencies which may come virtually at any time is the Financial Cut, the F.C. - as a Government Department - share of a general pruning back of Public Spending.

Less money, alas, means more work for the Hapless Manager, faced with having to squeeze in an untimely revision of plans.

Generally the almost traditional answer is to implement the cut by pushing overboard items such as roads, hired plant, etc.

But if the impact of the cut breaks through to the principal Forestry operations, it is most likely to be concentrated on maintenance operations such as drains upkeep.

In the long term, Forestry should help to improve the balance of imports and exports, and one could plead on that account that Forestry should be exempt from the Treasury axe. In fact, the compromise which emerges is that new planting programmes remain inviolate. "We did not cut afforestation", the Government can claim, yet the axe has fallen nevertheless«

Once trees are planted, there follows a series of protection and maintenance expenses to ensure their successful well being which should be mandatory. Therefore a much more rational solution would seem to be to cut back on the impending planting programme, to ensure that no risks are taken with those already completed -with the proviso that suitable arrangements can be made to sell or delay the use of the Nursery stocks)) -106-

((Apart from emergency political cuts, and from the constant quest for efficiency, one of the chief factors which brings pressure to tighten the strings of the Forestry Purse, is the huge, growing, cankerous ogre, Compound Interest. It has been accepted as part of the Mandate in this Philosophy, but nevertheless it remains a somewhat unrealistic factor. Few people doubt the long term utility of the Forest as a natural resource, counter balancing our dependence on imports.

Perhaps the more appropriate time for Profit and Loss Accounts should come later - with the next generation.

The British Public have become stolidly indifferent to seeing huge amounts of money expended on items like Defence with little hope of regaining any obvious monetary return. If they were asked for a referendum, it is ten to one they would vote in favour of Forestry, being content to feel their £1 or so per head, at least, was still in circulation 40 to 50 years from now, and, in particular, they would vote for the job of consolidating the first generation to be expedited as surely and as completely as possible.

Few would not acknowledge that the quest for efficient and economical working should be unrelenting. But the Manager must think and plan in terms of a datum which ensures a good job uncompromisingly well and safely done, without erring on the side of extravagance. Anything less, should not be left to his choosing, but that of the policy maker. Naturally, the responsibility for deleterious consequences should go with it.

It is far too easy for the mere intrusion of ill chance to turn what seemed to be a justifiable, calculated risk, into a miscalculated one. With plantations costing up to £100 per acre, Forest Manager's salaries are not as high as to expect them to shoulder much of this sort of burden.))

A Summing Up

The first part of this work enunciating a Forestry Philosophy has already been summarised (Page 12) and must suffice.

To attempt a summary of the second part - a Management System compatible with the Philosophy - is a much less straightforward task. In fact, all that will be done here is to repeat, in bolder type, as it were, the salient features of its underlying policy and manifest shape.

1. The Scope of Forest Management has been defined.
2. As wide a range as possible of the comprehensible factors impinging on Forest Management has been examined to evaluate their influence and significance.
3. A system has been evolved embracing most of these factors, seeking to legislate for the worst and most complex contingency. Thus the system is characterised as being comprehensive and co-ordinating.
4. An essentially intensive approach has been made in the belief that this is virtually mandatory, but nevertheless the System will readily suit extensive management.
5. The System seeks to embody the elements of economic Forestry such as are prescribed by the Faustman Formula - or at least by the derived Net Discounted Revenue approach.
6. In consequence of this, a clear distinction is made between matters, facts and figures which essentially relate to Afforestation, and those to the consolidated Maintain/Thin/Fell/Replant state of the Sustained Yield Forest.
7. The whole System visualises a completeness and integrity at Forest level which belies functional line management at District level.
8. In matters of collecting and keeping up to date the information upon which record keeping and estimation depends, this should be done as a matter of routine by local Forest staff, thus rendering each Forest self-sufficient.

9. It is further visualised that the basic information, e.g. that on productivity assessment of crop, should be revised or checked at least once per thinning cycle, making the Forest virtually up to date with overhauled, viable data every year.

10. The System from start to finish visualises manual maintenance but the search for the fundamental and definitive would also serve to programme a computer to undertake some of the steps, particularly long term production forecasting.

11. The System is such that weekly balances can be struck with little extra effort.

12. A distinction is made between historic and non historic data. Balancing is generally achieved between historic figures accumulated to date.

13. The System has been devised to be as complete as possible in the matter of collecting statistics. For example nearly every basic step is recorded at some level, and this record is maintained at no extra cost - being available for statistical analysis or audit later on.

Thus ad hoc exercises should be unnecessary; everything in the way of costing etc. is "built" in, ready to receive and record data in as intensive a stratum as required.

14. The System anticipates certain mandates to provide information and statistics for passage back to higher echelons, and seeks to design the system so that it provides this service as a routine, and in a way of most intrinsic use to the Manager himself.

15« The System is embodied in a set of forms which serves as a guide to nearly every step in the Management Routine, and yet does so without being so rigid as to deny flexibility.

16. Finally, advice and observations, in terms of the Philosophy, have been offered in a variety of facets which go to embellish management - e.g. mapping, complementing, timber measurement, handling of windblow, etc.

