Capital expenditure evaluation

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CAPITAL EXPENDITURE EVALUATION

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INTRODUCTION AND SYNOPSIS

The need for Capital Expenditure decisions is basic not only to individual organisations but also to everyday life. In a personal sphere one cannot be certain that a decision is right but at least the decision maker is making a judgement in accordance with his own desires and on a basis of information obtained personally. This is seldom the case in business decisions. Though it will be maintained later that the business objectives are an extension or projection of a businessman's personal desires, these are modified in the industrial context by external factors, and the information on which the judgement is based is seldom first hand. This latter implies that there must be some means, or preferably method, of collecting, collating and transmitting the required information. Such a method could be an informal communication in a small community, but in an industrial organisation of any size a more formalised method or system is essential for the benefit of both the decision maker and the supplier of information. The information supplied must be documented for immediate use and subsequent reference.

A formal system was and is in operation at Brush Electrical Engineering Company, but its validity was questioned. This thesis arose as the result of a request for revision of the system and an incorporation of more modern techniques of evaluation.

Such a managerial problem is endemic to any organisation and the discussion is directed to the factors affecting such a system in an industrial organisation. Specifically, because of the author's background and the purpose of the thesis the reference to persons and appointments have a bias towards an engineering organisation.

No system can exist effectively out of its overall context. This context is drawn from the wider area of general industrial organisations using the Brush situation only as an example.

The system is discussed from the startpoint of a documented proposal to the release of funds and the "go ahead" for work to commence, in an organisation with an annual budgeting system. The ability and knowledge of people available to operate the system is of prime importance in its design. The personnel primarily involved are visualised as having a fair degree of technical knowledge but only a limited knowledge of appraisal methods involving financial considerations.

Consideration of the constituents of a proposal leads to the conclusion that the information should consist principally of a statement of requirement and the reason or justification for it being implemented. In the context of a business proposal one should add the cost, time and resources involved. These, then are the main items of information

required to be transmitted in a system of communication, submitted by one person, whom we will call the sponsor, for consideration and decision by another. To have the greatest chance of success the sponsor must attempt to satisfy the decision maker's desires or objectives, and can only do so if he is aware of them and the criteria for satisfaction.

The requirement is largely a statement of technical fact, the acceptance of which will depend either on knowledge common to both parties or on the decision maker's recognition of the sponsor's technical competence. It is in the justification for the proposal that the greatest controversy will arise. Scott & Williams (11), distinguish between judgements based on quantitative information and judgements based on qualitative information.

The area of qualitative judgement and the appropriate non-economic justification have been least investigated in subject literature, although it is becoming increasingly clear to modern management that a considerable number of decisions lie in this area. A measure of acceptability must be established and the justification rated on this comparative or ordinal scale. Since, in the business context, there is no common unit for such a scale, subsequent discussion classifies proposals by motivation in an attempt to achieve harmony of thought between the sponsor and decision maker and

establish the criteria for justification of proposals.

Quantitative judgement has received the most attention in the literature of business decisions and provided one can agree a valid yardstick of acceptability a criteria for consistent decision can be established. This is the basis of economic justification and the later discussion is concerned largely with the method to be adopted and the considerations involved.

Cost and time are factual, subject of course to the validity of the estimate and the competence of the estimator. In the main discussion it is emphasised that costs are a constituent of the proposal whilst the appraisal of costs is part of the justification. Time and resources are considered together because of their inter-dependence and a network method of demonstrating this is advocated.

The discussion concludes with a brief consideration of proceedure, by which the information is transmitted, and post audit as a check of the system. These are both, by necessity, related to the context of a particular organisation and only the under-lying principles of these are reviewed.

After consideration of the factors applicable in general, the later sections are developed as required by the particular situation at Brush and their organisation sets the context within which a proposed system is drawn up. The final section is the proposed system incorporating draft standing instructions for use by the Company.

One final definition of terminology must be made before commencing the general discussion. We are dealing with Capital Expenditures and not Capital Investments. The former are understood to include a larger proportion of low value items of a localised nature than the latter. The terms expenditure and investment are used, to some degree in this paper, as inter-changable, but mainly in their normally accepted interpretations of the outlay and the employment of monies and resources.

SECTION A

A DISCUSSION OF CAPITAL EXPENDITURE EVALUATION

A. A DISCUSSION OF A CAPITAL EXPENDITURE EVALUATION

1. Definition of Capital Expenditure

Taylor (1) sub-divides spending decisions into two categories, those which are expenditures for long lived items, namely fixed assets such as machinery and real property, and those which are entirely in the present. Capital Expenditures are, of course, the former but this definition is probably too imprecise for practical use and by stating limits a more practicable definition can be achieved.

It has been suggested that the limits imposed for the award of Investment Grants for Capital Expenditure are acceptable and also have an added relevance in the later consideration of taxation effects.

A Capital Expenditure can thus, for our purpose, be defined as an expenditure which is (a) £25 or more on a single project, including any necessary revenue expenditure such as installation costs associated with it, and (b), for the purchase of an identifiable tangible asset with an anticipated life of three years or more.

For the purposes of Investment Grants, certain categories of goods, i.e. buildings, furniture and vehicles are excluded; such an exception is not applicable to our definition but the exemption must be noted for later consideration.

2. General Requirements

The purpose of the system and its associated forms is the presentation to Management, in as concise a manner as possible, of information necessary to reach a decision to proceed with a proposed expenditure and subsequently to control the expenditure authorised. The forms used should therefore be a two way channel of communication conveying to the sponsor, management criteria for decision making and when completed, detailed information to the decision maker to meet those criteria.

It is anticipated that proposals and applications will be sponsored at works engineer/planning engineer level and in the main forms will be prepared by them with additional assistance where required. Any system evolved will therefore be operated mainly by people with a technical background and only a limited knowledge and familiarity with economic analysis and accounting techniques.

The cost of obtaining and processing information can be expensive in terms of time and labour of skilled personnel. The information required should therefore be restricted to that which is relevant and a reasonable estimate, rather than precise in detail where such precision is excessively time and/or cost consuming. The calculations must of course be accurate within the limits of realistic approximation. Information given may form the basis for further evaluation by

persons skilled in more advanced techniques.

The type of proposals and range of values are such that a varying amount of detail is necessary in preparation. The proposal forms should therefore be the summary of information required, supported as necessary by working papers carrying more detailed information and calculations.

3. Decision Making

In the early stages of this project the emphasis was, as initially requested, on economic appraisal and only after fuller consideration of the information needed for decision making could the importance of other factors affecting the decision be appreciated. One of the requirements of the proposed system, mentioned earlier, is to convey to a sponsor the criteria by which a decision is made by the management. This can only be done if the decision process is understood and the factors to be considered specified for the sponsor's information.

Unlike many writers who tend to pass quickly over these aspects, Wright (10), investigates the decision process and explains business decisions as satisfying an "effective sub-set of business objectives" which he divides generally into three categories of motivation by objective, for Profit, for Expansion and for Reputation. It is further qualified that the objectives must be unsatisfied and appear to be

capable of satisfaction in the situation under review by the solution presented.

The variation of requirements for the satisfaction of objectives and their inter-play in particular situations is the cause of differences in the diverse decisions made. Since the objectives are projections of a businessman's own desires, unfulfilled desires at a particular time will considerably affect a particular decision.

The variation of desires cannot be met by the sponsor as this is both subjective and liable to changes of which he cannot be aware. The extent to which his proposal can be justified to meet stated objectives will, however, determine within the limits of a particular situation, its acceptability. This pre-supposes a measure of acceptability and it must be realised that this may be finite or comparative, dependant on whether quantitative or qualitative judgement is involved.

Particularly in qualitative judgement the decision taken will depend not only on the justification put forward but also on the validity of the assumptions on which it is based. It is, therefore, important that any justification clearly states such assumptions even when they are thought to be common knowledge.

4. Classification of Investments

In line with this theory of decision making, it is suggested that all proposals be divided by criteria of

acceptability into four main categories which are detailed below. The purpose of so categorising is to provide clearly defined general criteria, to which the sponsor must match his justification for expenditure. Proposals failing to satisfy any one criterion may be considered if there are additional, but lesser, justifications which fall into other categories. The four categories are two requiring principally qualitative judgement and two quantitative judgement.

i. Social

Corresponding to Wright's objective of reputation, these proposals can be described as being legal or moral in origin.

Little can be said about legal requirements other than to stress that failure to comply with statutory regulations often carries its own penalty. Legal requirements are often only an expression of social and moral obligations to which few managerial personnel would not conform. Social considerations such as are involved in medical and welfare proposals or similar schemes for the well being of employees are far more a matter of moral judgement and it is only by considering possible outcomes that a valid judgement may be made. The task of the sponsor is to define the probable outcome of lack of action and the results of his recommendation.

ii. Intuitional

Drucker (9) stresses the importance of opportunity

in modern business and it may well be that the investments categorised under this head, essentially those having potential rather than definable results, could have the most far reaching effect on future activities. Such effects may not only be for gain but also for avoidance of loss, as when one is anticipating competitor developments such as quality improvement which could outmode one's own company products and practice. Similarly, in the purchase of more sophisticated machines the possible gains in advanced technology are visionary rather then quantifiable. The range of this category may well be said to include the proposals of inspiration and despair. The case of a "follower" company is cited by Wright (10) where failure to take action is so clear that detailed investigation of return is superfluous and the true determinant is the effectiveness of the action proposed. This class of investments will involve, to a greater or lesser degree, the assessment of risk and uncertainty. It is not the province of the sponsor of a proposal to decide such questions but it is essential that he states clearly the assumptions on which his proposal is based for the benefit of those making the decision.

iii. Economic

Essentially these are quantifiable decisions of which the outcome of a given expenditure can be estimated. Wright's profit motivation is here paramount. The need for realistic

appraisal cannot be stressed enough as it is on the validity of the estimate that the decision to proceed with the expenditure will depend and lead to ultimate success or failure. Appraisal techniques as relevant to this paper are discussed later and the choice of Discounted Cash Flow Net Present Worth method is advocated. This, together with a presentation of costs and anticipated revenue, form the sponsor's main justification under this category.

iv. Replacement

Replacement proposals could be treated as economic proposals but also involve questions of possible discontinuance of a process or product and consideration of salvage. They are therefore excepted as a separate category requiring differing treatment but must, in general conform to the criterion of other economic proposals. Involving more detailed investigation in terms of alternative courses and comparisons, replacement proposals of any magnitude call for far more expertise in appraisal techniques than will be possessed by the average sponsor. The proposals should therefore be treated rather differently. The information given should be sufficient to enable management to assess whether the expenditure is justified on the sponsor's knowledge alone or whether the implications are such that further investigation should be made to evaluate policy considerations of which the sponsor has little, if any, knowledge. Such an investigation calls

for the necessary authority to evaluate and resolve the clash of inter-departmental policies which is often involved, as well as the expertise in appraisal techniques necessary to carry out replacement analysis with its complications of timing, future policy and assessment of trends.

5. Alternatives

It is as well to stress one point of general application before moving from general to specific consideration of techniques. Koontz & O'Donnel (8), in writing on Decision Making say "it is perhaps a sound adage for a manager that, if there seems to be only one way of doing a thing, that way is probably wrong". Equally, it may be said that one of the greatest advantages of "Value Analysis" in its process of listing and evaluating alternatives. It is not suggested that alternatives on this scale need to be included in a proposal but it would certainly be of advantage if it were known that a sponsor had given consideration to a number of alternatives and in putting forward his proposal, listed the more feasible with sound reasons for rejection. The alternatives cited must also be true alternatives in that they are mutually exclusive and capable of similar performance to the standards required. The policy of "No Action" is, of course, always an alternative, if only a passive one.

6. Appraisal

The factors affecting a decision can be classified within general limits as qualitative or quantitative. The former call essentially for value judgement whilst the latter are a matter for economic appraisal. A similarity of treatment can, however, be made. The division may not be clear cut and a proposal may involve both, but even in the area of qualitative judgement it is essential in a business to assess the extent of possible outlay of funds and the cost of decisions. In any proposal there will be an element of assumption and for both decision and subsequent appraisal it is essential that such assumptions are recorded and validated.

Some areas in which qualitative judgement is applicable were mentioned earlier, but only a few. Proposals of this nature, particularly those classed as intuitional, are largely dependent on the initiative and foresight of the sponsor or other originators of fruitful ideas. It was mentioned in the description of intuitional decisions that qualitative judgements of potential involve an assessment of risk often on a basis of incomplete information. Williams & Scott stress the need to document the information available in such a manner that it can be appreciated and due emphasis given, possibly by those not entirely familar with what is often thought to be common knowledge.

Economic appraisal, discussed in the following

paragraphs is of prime consideration in quantitative judgements. It is important, however, to remember that the object of such appraisal may be not only the maximisation of gain but alternatively the minimisation of loss. Thus, in considering basically qualitative judgements, an economic appraisal may be relevant in deciding between alternatives as well as in assessing costs.

7. Economic Appraisal

Economic appraisal of an investment is fundamentally a comparison of costs attributable to and revenue anticipated from the investment. The fundamental problem of costing thus rears its head from the outset and the appraisal can only be as good as the expenditures and receipts or the estimates thereof. The care with which this information is collected will largely determine the validity or otherwise of the appraisal.

The second fundamental to be grasped is the nature of expenditures and receipts to be included. An appraisal of this kind differs from price costing in that no attempt is made to cover all expenses attributable to a project. No such problem as the allocation of a share of fixed costs arises as the only expenditure included is that which is directly attributable to the investment. Fixed costs, for example supervision, may of course increase as a result of the investment if more supervisory personnel are required

but only in such an instance should such a cost be taken into account and then only the increment. In practice it may well occur that an investment will result in no such increase and the proceeds of the investment will provide added revenue to meet the burden of overheads. To attempt to estimate in such a case is both difficult and liable to error and should therefore be accepted as a non-quantifiable bonus of increased productivity. In dealing with other costs of a more variable nature it is essential to take a realistic attitude to what will in fact happen. A replacement machine requiring only the same operator gives rise to no increase in labour cost and none should therefore be included in the appraisal. Replacement machines requiring fewer operators would show a reduction in labour costs; care should be taken that the surplus capacity can be absorbed elsewhere and the saving not be illusory.

8. Ranking by Inspection

This form of appraisal is a common feature of everyday life and will invariably be used where there are clear and simple advantages of one alternative over another. An investment having a substantially higher total return for the same outlay over the same period is preferable to one with a lower return; for varying outlays a simple calculation of return per unit of outlay will give an

equally satisfactory ranking. When however the timing and duration of the proceeds vary the decision becomes less clear cut and more sophisticated appraisal techniques must be used.

9. Older Techniques of Appraisal

Appraisal techniques of investment worth vary principally due to the criteria of acceptance. Modern thought favours the use of Discounted Cash Flow but before discussing this more sophisticated method it is advantageous to comment briefly on older conventional methods and note their disadvantages, which are to some measure overcome by Discounted Cash Flow.

Appraisal techniques are in essence methods of ranking investments either against each other or against a pre-determined criterion of acceptance and it is these criteria which give rise to the various named techniques.

Pay back period ranks investments by the period over which the initial outlay is recovered, thus favouring short lived investments. The major faults of this method are the failure to take account of proceeds earned after the payback period and the failure to take account of the differing timing of proceeds earned during the payback period.

Proceeds per unit outlay are the total proceeds from an investment divided by the outlay and ranked

accordingly. This method again ignores the timing of the proceeds and thus fails to take account of the time value of money.

The average annual proceeds per unit of outlay is a highly fallacious method which favours short lived investments with high cash proceeds. The use of average annual proceeds, whilst appearing to take account of the timing of proceeds, actually gives no weight to the duration of the investment.

Average income on book value or cost. These two ratios of relating income to book value or cost will vary considerably in their ranking if depreciation (in itself a debatable subject) is taken into account. The method without any depreciation still fails to take account of the timing of proceeds.

10. Discounted Cash Flow

The main criticism of the older conventional methods is the failure to take into account the timing of proceeds or what has more aptly been described as the time value of money. The old adage of the bird in the hand is never so applicable as when considering money. A pound now can give value either in immediate consumer satisfaction or in the earning of investment interest. This capacity to earn interest and relevant lower present or discounted value of future money is the basis of Discounted Cash Flow Appraisal.

Another advantage of these techniques is the relating of proceeds to expenditures on a directly attributable basis. Thus increased costs are measured against increments in receipts.

There are three accepted Discounted Cash Flow techniques, of which only Net Present Worth and Rate of Return are appropriate to a project of this nature. The third technique of Net Terminal Value is far more sophisticated and probably a better determinant in certain instances, but it requires a knowledge of financing sources and an ability to make assumptions concerning re-investment rates and future capital costs that are expected to prevail in the period in question. Such knowledge and ability are beyond the average sponsor envisaged, and the method is rejected on these grounds.

The other two methods, Net Present Worth and Rate of Return differ mainly in their criterion and the latter involves a longer but not otherwise more difficult calculation. In Net Present Worth, cash receipts from investment less cash expenditure over time intervals of usually a year are calculated and the net sums discounted to present value at a pre-determined rate of interest. The summation of the discounted annual sums is the figure of Net Present Worth. The criterion for acceptance of an economic proposal is therefore the attainment of a positive

Net Present Worth at the pre-determined rate of interest. Ranking is in order of Net Present Worth with the largest sum being most acceptable. A probably better method of ranking is to divide the Net Present Worth by the capital outlay, discounted where appropriate and thus the criterion becomes Net Present Worth per unit of outlay at present value.

Rate of Return or Yield requires a similar matching of receipts and expenditures but the calculation made determines what discounting rate or rate of return makes the present value of the proceeds sum to zero, i.e., the present value of receipts and outlays are equal. The criterion of acceptance in this method is again a pre-determined rate which the rate of return must exceed. Ranking is in the order of rates of return for the various investments under consideration. The determination of the rate of return is by trial and error using differing discounting rates until the zero present value is calculated or can be interpolated hence the longer calculation involved.

Both methods have their advocates and both need a pre-determined rate either for discounting or acceptance of the rate of return. The determination of this rate is discussed later but as a matter of company policy must be related to the cost of financing investment. It is also noteworthy that a variation in this rate can change the order

of ranking where the Net Present Worth method is applied to a number of investments due to the relative lower present worth of proceeds in later years compared with those of earlier years. In the majority of cases the acceptance/ rejection signal given by either method will be the same. It is therefore in the area of ranking, relevant when capital available is restricted, that we are concerned. The contention is that the differences in ranking are caused by the implicit assumptions concerning the re-investment of cash flows received during the period of the investment. In rate of return it is implicitly assumed that these are re-invested at a minimum rate of interest equivalent to that of the original investment. In Net Present Worth however, the assumption is of re-investment at a minimum interest rate equivalent to the original discount rate. Since this latter is related to the cost of financing and will invariably be less than the rate of return of selected investments, it must be accepted that the latter assumption is more valid. Net Present Worth is therefore considered the more realistic method. The case of a loan re-payable during the period does not upset this assumption since where such re-payments are a proviso of the investment the re-payments can and should be brought into account as a cash outlay at the appropriate time and the present value is the return on remaining capital invested.

The Net Present Worth method also obviates the problem of multiple yield which can occur in the non-conventional type of investment where a large outlay occurs late in the investment period. Such an investment is unlikely in the company for whom this project is being completed but a typical example is where a large sum in reparation or re-instatement is required at the end of the investment.

One drawback to using the Net Present Worth method is that it is not applicable directly to investments having differing lives. This can however, be overcome by progressing further where necessary and either calculating the Equivalent Annual Value or by considering alternatives over a set study period. The latter involves a considerable amount of calculation and the longer the period considered the more speculative the estimates involved must be. In part of course, errors due to this are lessened by the effect of the discounting process whereby equal proceeds received later have a lower present value than earlier proceeds. The calculation of Equivalent Annual Value on the other hand is very simple and is obtained by dividing the Net Present Worth by the Cumulative Present Worth Factor, i.e., the sum of the Present Worth Factors used in discounting.

Use of Rate of Return is not precluded by the system proposed but is left as an alternative calculation based on

the information given by the sponsor to be carried out in such cases where a rate of return is required as a supplementary measure for acceptance of proposals involving unusual risk.

11. Outline of Net Present Worth

The basic proceedure for Net Present Worth commences with the collection of all relevant costs and receipts or estimates associated with the investment. A tabular form of presentation is used and items are collated by time period, usually of one year. Thus, all expenditures and receipts occuring in a year are deemed to take place at the end of the year. This period of a year is an arbitary choice and if required a shorter period may be chosen but calculations are considerably simplified by the use of the basic year. Large discrete payments occuring at the start of a year are conventionally ascribed to the end of the previous year. It is essential to differentiate between capital expenditures and running costs and receipts to enable the calculations to be made. Account is then taken of investment grants and taxation allowances and deductions in respect of corporation tax are made, allowing for the time lag involved. A summation of annual net proceeds is now made which, multiplied by the relevant discount factors, gives the present value for each year. The sum of these present values is the Net Present Worth of the investment which may, if required, be converted

to the Equivalent Annual Value, as described earlier.

The Net Present Worth is defined as that amount expressed in terms of present values which an investment will earn over and above recovery of outlay and interest at a pre-determined rate. Its value as an investment criterion can be clearly seen especially when the specified rate of interest is a basic requirement for all ranking investments on economic grounds.

Where restriction of funds imposes a more rigorous criterion, Equivalent Annual Value per unit of Outlay should be made using the Equivalent Annual Value and dividing by the Outlay, discounted as appropriate. All necessary information for this further calculation must be contained on a completed proposal form.

12. Discounting Rate

The importance of the level of discounting rate is apparent from the foregoing and cannot be over emphasised. Too low a rate can result in the acceptance of unprofitable investments, too high a rate can exclude consideration of investments which are basically profitable and starve the company of investment opportunities. The obvious choice is to relate the discount or earning rate to the real cost of capital required to finance investments. Such a rate, taken as a minimum criterion of acceptance/rejection in economic expenditures, will result in a recovery of outlay

and interest paid plus a clear but undefined amount of profit on all capital so invested.

Commenting on this the National Economic Development Council (7), whilst admitting the complexity of the decisions as to the real cost of finance, assess the figure for companies whose earnings are not particularly risky or uncertain, to be less than 10%. Such companies should not require to set an acceptance level above 10% in real terms after corporation tax.

In arriving at a projected discount rate, a company must consider its major sources of finance and making allowance for the amounts of each type arrive at an estimate of the weighted average. Alternatively, it may of course be considered that with increases in total investment the need will arise to use the higher interest bearing sources ultimately and therefore set the rate so that all investments earn this as a minimum.

R. Bower, in his article in the Engineering Economist 1962, maintains that linking the investment to its financing source and their joint consideration and appraisal, is essential and that the average value of cost of capital should not be used. His contention that this is the better method is agreed but is considered unrealistic in this situation where the sponsor is remote from the financing arrangements.

It is unlikely that any one expenditure could be

linked with a specific financing source and it is relevant to our argument to note that we are dealing with proposals for expenditure and considering their feasibility before the allocation of funds. A general criterion of acceptability is therefore essential and only an average cost of finance can be taken in these circumstances.

The main sources of finance in business are share capital, loan capital, retained earnings and bank loans. Bank overdrafts are not normally considered long term finance but account should be taken of these if they are long standing and a real part of a firm's long term finance. We are dealing here firstly with what Porterfield (12) refers to as explicit cost of capital, the actual interest or interest equivalent payable on the sum obtained and must also take into account the effect of taxation on such interest. In Discounted Cash Flow techniques, discounting is after corporation tax and therefore we should consider interest charges at this stage and make adjustments for such interest as is payable before tax.

The rate for share capital can be taken as the dividends paid before deducting income tax. For preference shares this rate is obvious but for ordinary shares, unless a dividend policy is followed, only an approximate value can be taken based on a pattern of satisfying payments to shareholders in previous years. Modern thought on share

value however, stresses that dividends are only part of the cost of the share and allowance should be made for growth value. Merret & Sykes (3), explain the relevant calculation and have tabulated the results in a graphical form (Annex A.1), from which, for a given equity dividend net of tax, a minimum earning rate net of corporation tax can be read off. The graph also makes allowance for retained earnings and this enables a single figure to be taken for the cost of capital in respect of these two financing sources.

Loans, Debentures and Bank Loans, or Overdrafts, having specified interest rates are again obvious as to necessary earnings but such interest is payable before corporation tax and the rate must be adjusted accordingly. Thus, a loan with an interest rate of 15% before tax can be serviced by an investment calculated to yield a minimum return of 8.625% after corporation tax.

We have considered what Porterfield describes as the explicit cost of capital. The obvious principle involved is that the borrowing of money at a higher rate than that earned as normal practice is a certain road to bankruptcy. A second cardinal principle in investment is the selection of the best opportunity for investment. This principle leads to the defining by Porterfield of the implicit cost of capital, otherwise known as opportunity cost, as the best company project or investment opportunity that would be foregone if

the current investment were made. The opportunity cost is the basis for ranking investments and to particularise and arrive at a minimum acceptance rate one must consider the level at which economic investments can currently or normally be made outside the firm. Since one cannot envisage unlimited funds available and some degree of capital restriction must be presumed, we are dealing in the main with relatively short term investment which does not preclude future changes. Postulating a 10% return on such investment this would again be subject to corporation tax giving a nett 5.75% rate.

Where retained earnings are a sole financing source this implicit cost must be considered as a governing factor. Advocates of the presumption of zero cost for retained earnings ignore this factor and by doing so contravene the principle of best opportunity which must be considered in arriving at the minimum rate that we require.

13. Investment Grants

An apparently simple concession to encourage industrial development is complicated both for the items on which it is given and by insufficient knowledge of its effects due to lack of experience in use. Currently, for a manufacturing company in a non-development area, a grant of 25% of the full cost is given for purchase of new plant and machinery. The full cost must not be less than £25, including installation charges. In Discounted Cash Flow calculations this is a

cash inflow, but the time lag of payment, from twelve to eighteen months after the expenditure, must be taken into account.

14. Tax Allowances and Considerations

Corporation tax is a charge against profits arising at a current rate of 42½%. Capital expenditures are not set against profits direct but capital allowances are applied having the net effect of reducing the amount of profit before depreciation subject to tax. The rates of allowances differ according to the item concerned and should be confirmed with a local Tax Office where an appreciable amount is involved.

Capital Allowances are of three kinds, Initial Allowances, Annual or Wear and Tear Allowances and the Balancing Charge or Allowance. Discounted Cash Flow takes account of all three and in order to do this it is necessary to understand their application.

Initial Allowance is given in the first year only, in addition to the annual allowance at a prescribed percentage of the cost on specified expenditures which do not qualify for the investment grant. The rates vary from 15% for buildings, works and structures classed as industrial buildings (excluding retail shops, offices, dwelling houses and hotels) to 30% for plant, machinery and vehicles (excluding passenger cars). Certain investments in scientific research assets merit a 100% writing off allowance against the profits in the year in which

the expenditure occurs. Initial allowances, in varying the pattern of tax allowance and hence tax payments, become highly significant in Discounted Cash Flow appraisal, due to the consequent change in the timing of net receipts.

Annual Allowance, again at a percentage according to item, is calculated on the written down value of the item. The written down value is the initial cost (full cost of the item less investment grant, if applicable), minus the sum of initial and annual allowances given in previous years.

It can be seen that the effect of grants and allowances is to offset against tax an amount approaching 100% of full cost. The balancing allowance or charge makes an adjustment of the difference between the final written down value and the disposal value. A sum equal to the difference is allowed where the written down value is greater and charged where the disposal or salvage value is greater.

15. Duration and Scope of Project

So far we have dealt essentially with the justification for a proposed expenditure and in the process have also examined the costs involved. The appraisal of costs being part of the justification and the costs themselves a constituent part of the proposal. The emphasis on the time value of money was the main reason for adopting Discounted Cash Flow methods of appraisal, but time and timing are also important considerations in arriving at a decision as are the resources

to be employed during the time period.

The major time elements to be considered can be labeled project time and anticipated life. The former is the period required for implementing the proposal and will therefore be the period when the bulk of resources will be employed and the major expenditure, particularly capital expenditure, will be committed if not indeed expended. The project time may well extend or be extended over a period of years, particularly where the project is phased for reasons of finance or development.

The anticipated life of the investment is that period over which the investment and its results are considered. It will include the project time and the additional period during which the receipts from the investment are considered as accruing. This must be differentiated from the economic life as applied to plant and machinery. The anticipated life may only be part of the economic life or alternatively extend over the economic lives of generations of equipment. The anticipated life is therefore logically the period over which the economic appraisal is made by the Discounted Cash Flow technique previously advocated.

The employment of resources will be the final, but not the least, of the decision maker's considerations. The "what" and the "when" may be deciding factors as to whether a project can proceed. The sponsor is only able

to state the requirement and it is a managerial function to allocate in general the resources of the organisation to specific tasks dependent on availability and relative importance of the possible commitments considered. The resources to be employed can be sub-divided into those of the organisation and those external to the organisation. The former can be further divided into those of the sponsor department and those of other departments which may be involved to a greater or lesser degree in any particular project.

The technique of Critical Path Network has been developed as a method of demonstrating the logical sequence of the activities of a process and deriving from it certain information of fundamental importance. There are many who consider such a network does not justify its preparation in projects of minor value. In so doing, they ignore the fact that a network is only as complex as the detail inserted and the complexity is the deciding factor in the time and effort involved in producing the network. An authority on critical path methods, K.G. Lockyer (13) advocates the use of networks even on fairly simple processes as he maintains that the clarity and logical development demonstrated more than justifies the effort involved in preparation.

A modified form of network is advocated as part of the system to show the general activities of a project,

their timing and the contribution of resources. From the sub-division of resources, mentioned previously, it is also suggested that the network layout should be stratified to differentiate between the sponsor and other departments of the organisation and external services or suppliers.

16.

Proceedure

In addition to the information transmitted, the system includes the method or proceedure of transmission which must also be considered. Any proceedure must fit the organisation in which it is intended to operate and certain general principles can be identified but it will invariably be found that the general proceedure must be tailored to the organisation.

To construct the framework one must first identify the particular system within the context of the organisation. Most systems of this nature are sub-systems of a larger structure and the points of contact with other systems must be identified. Our Capital Expenditure system may well be part of an overall Budgetary Control System with which it must conform in certain aspects. The second identification can be expressed as the "need to know". We have postulated so far a sponsor and a decision maker. In most industrial organisations these two will seldom be in direct communication and other persons with varying degrees of authority and

responsibility will, of necessity, have to be aware of and sanction or agree with all or part of any proposal. The proceedure must be such that this is done automatically.

Having established this framework of context and persons, proceedure design then becomes a method study of which the cardinal motto should be economy of effort on the part of all concerned.

Information to be presented must be relevant and as factual as possible. The use of a summary supported by detailed working papers which can be consulted when and where necessary is preferable to a mass of paper. The channels of communication must be clear and the limits of authority and responsibilities clearly defined for all those necessarily involved.

17. Post Audit

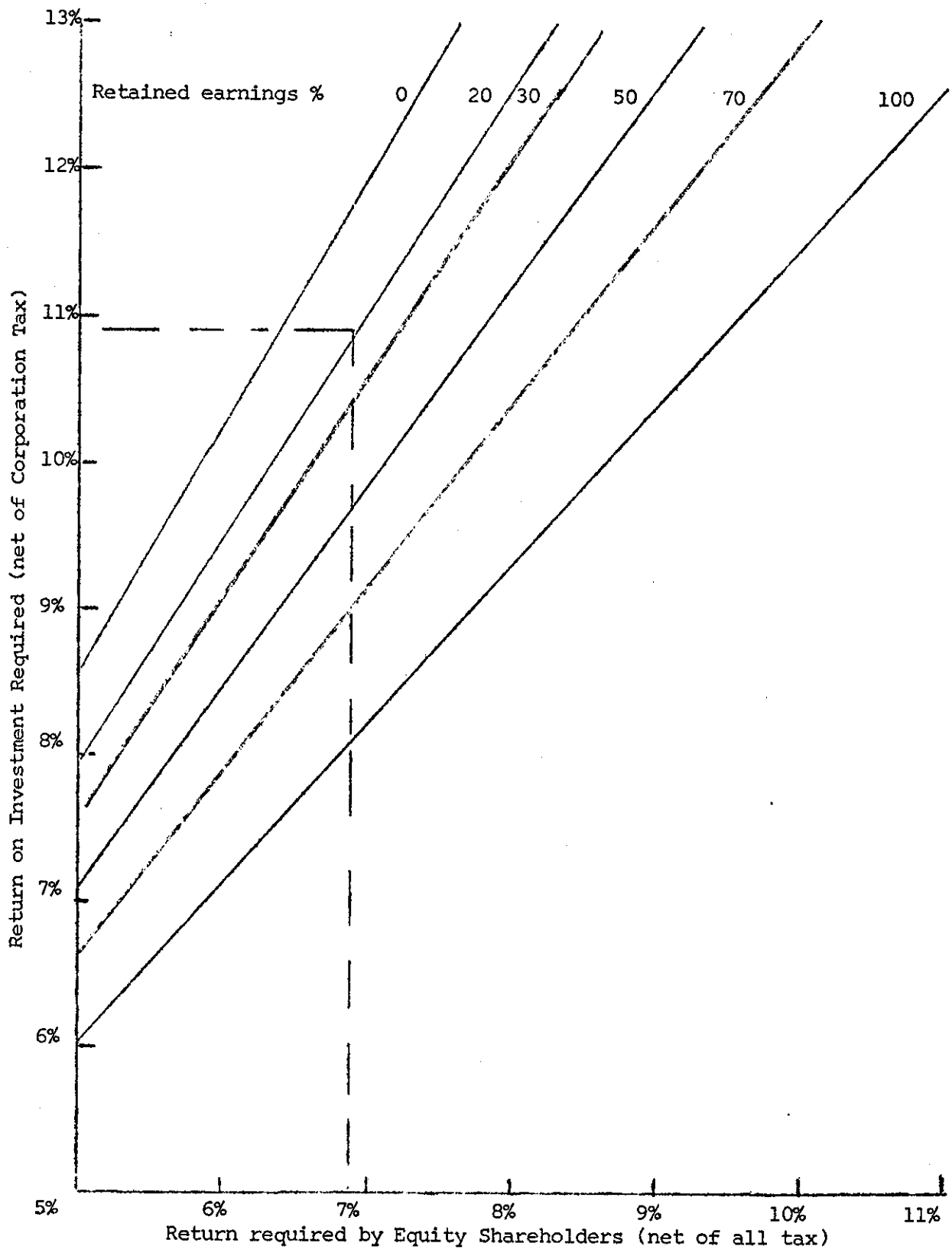
Any system which does not incorporate some degree of check and proof of validity will, in time, become suspect. Post audit, in so far as it can be carried out, is a check on Capital Expenditure. To try to discuss it as a proceedure out of context with an organisation is virtually impossible, but certain aims can be specified.

The purpose is to confirm the validity of estimating and appraisal, largely as a guidance to the future. A minimum requirement should be that actual expenditure is compared with estimated costs. A similar comparison of receipts and savings

raises major difficulties and normally, for reasons of economy, only an ad hoc check can be made. Where the expenditure is in respect of items for a specific use, such a check is far more feasible but for general purpose items reliance must be placed on partial checking to confirm that receipts or savings are being made, although the extent of them cannot be determined.

ANNEX A.1

COST OF EXTERNAL EQUITY AND RETAINED EARNINGS



from Capital Budgeting & Company Finance, A.J.Merrett & Allen Sykes.

SECTION B

THE BRUSH ELECTRICAL ENGINEERING COMPANY

ANNEXURES

B. THE BRUSH ELECTRICAL ENGINEERING COMPANY

1. General Situation

The Brush Company, a subsidiary of the Hawker Siddeley Group, has its main location on the outskirts of Loughborough. It is engaged on the manufacture of heavy electrical products and employs some 4,500 persons.

Financial control is vested in the local Executive Board, subject to a bulk allocation of funds on an annual budget system by the Group.

A system for the proposal and authorisation of Capital Expenditure is in operation. This was queried as to whether the best information was available to Management so that consideration could be given to proposals. In the initial request, it was anticipated that a review of the existing proceedure would involve the adoption of appraisal techniques and should result in a revision of the standing instructions for the company and the paperwork involved.

2. Company Organisation

During the early part of 1968 the company was de-centralised into four Product Divisions. These divisions are Rotating Machines, Switchgear, Transformer and Traction. There is, in addition, a Financial Division and certain central services which include the Manager Works Services, Chief Maintenance Engineer and the Chief Jig and Tool

Engineer; these latter are under the direct control of the Managing Director. The effect of these changes is to make the divisions more self-contained, particularly in accounting and other commercial functions. The skeleton organisation tree (Annex B.1) illustrates the Switchgear division and other departments concerned with Capital Expenditure Proceedure.

Because of the re-organisation this investigation was limited to the Switchgear division with the intent that the proposed system should be implemented for a trial period in this division. The post of divisional accountant is included in each Product Division and in the case of the Switchgear division, the Director has stated that he will be responsible for budget control within the division.

3. Outline of Present System

In essence, the system is a two stage budget control, the proceedure for which is laid down in a Standing Instruction issued in 1965. To this instruction there have been various amendments culminating in a proceedure implemented in 1965 but not, as yet, published as a standing instruction.

A proposal for expenditure will start with a Proposal Form (P.12015) which originates usually at works or planning engineer level and passes up to the Divisional Manager where, if supported by him and agreed by the Divisional Director is then included in the proposed divisional budget. Budget proposals are consolidated by the Manager Works Services

considered by the local Executive Board and agreed or amended in the November preceeding the year under review; if ratified by the Group, a total sum to cover the proposal is allotted but discretion is given to divisions to submit other proposals during the year, either as alternatives within the amount allotted or, if essential, as additions to this sum. The proceedure in such cases is similar to the routine proposals.

The second stage of the system is the release of funds when the proposed expenditure is to be incurred. An Application for Authorisation (2c/4/68) is prepared, again at works or planning engineer level and is submitted by the divisional manager through the Manager Works Services to the Divisional Director for approval and considerationby the local Executive Board, who then release the funds.

It is important to note that there is a time gap between the two stages which can be as much as fifteen months or even more in the event of an expenditure carrying over into successive years.

Subsequent to the expenditure a record of expenditures and commitments is entered, as incurred, on the back of the Application for Authorisation; it is also notified to the Manager Works Services and the departments concerned. The expenditure to date is totalled and entered on the monthly summary prepared by the Manager Works Services. The record

of expenditures and commitments forms the basis for post audit purposes.

4. Proposal Form (P.12015)

The present proposal form (Annex B.2), records a Justification, Description of Requirement, Departments Affected and an Estimated Cost, sub-divided under Capital and Revenue. No provision is made to record savings or gains nor is there provision for economic evaluation. The progress of the proposal through the routine is recorded on the form by signatures of the relevant authorities.

On the back of the form is a Reminder List which is basically an Aide-Memoir of possible requirements, including some statutory considerations.

5. Application for Expenditure Authority (2C/4/68)

The present application form (Annex B.3) provides information as to the work requested together with an estimate of the cost. No separate justification of the proposal is specified but this may be added in preparing a particular form. The Works Services department add details of associated Revenue Expenditure and allocate Plant Numbers.

A similar proceedure of submission, support, approval and authorisation to that for proposal forms is substantiated by the signatures of persons concerned.

On the back of the form are details of Expenditure and Commitment recorded after authorisation by the accounts

department against the Budget Reference Number allotted. Completion of this section is, in fact, a third stage in the overall proceedure.

6. Control

Control of Capital Expenditure lies with the Managing Director and the local Board within the total approved by the Group. The Manager Works Services processes the proposal and expenditure authorisation documents and allots budget serial numbers to those expenditures authorised. He maintains the records of proposals accepted, the release of funds and also circulates details, as required, to the division. The records are such that it can easily be ascertained what projects have been authorised and what funds have been released and expended. This actual expenditure is recorded on notification from the accounts department and all information is summarised monthly.

7. Details of Expenditure

A survey of expenditures authorised in 1966 and 1967 was carried out (Annex C.4 & C.5), at the start of this project. In the department now comprising the Switchgear division, one hundred and twenty expenditures were authorised totalling £41,223, in addition to which there were a further six projects carried over from 1965 totalling £3,725.

Of the new expenditures, ten were under £25; the remaining one hundred and ten ranged up to £6,850 with a

median of £163 and lower and upper quartiles of £72 and £323.

8. Critique of Present System

Having outlined the proceedure and forms in use at present it is relevant to comment briefly on these before proceeding to design a future system.

i. The system is workable and the main criticism raised is its validity as a method of assessment. At no stage is an economic appraisal specifically prescribed and although in practice estimates of probable savings may be given, this is not always done.

ii. No provision is made for other than quantifiable economic considerations.

iii. Although there is a definite association between the proposal and authorisation these are not specifically linked and due to the time lag involved they may well not be associated by those dealing with them at various stages.

iv. The application for authorisation, as designed, appears to be purely a formal application and tends to ignore a secondary but most important function of reviewing the proposal after a period of time in which conditions may well have changed.

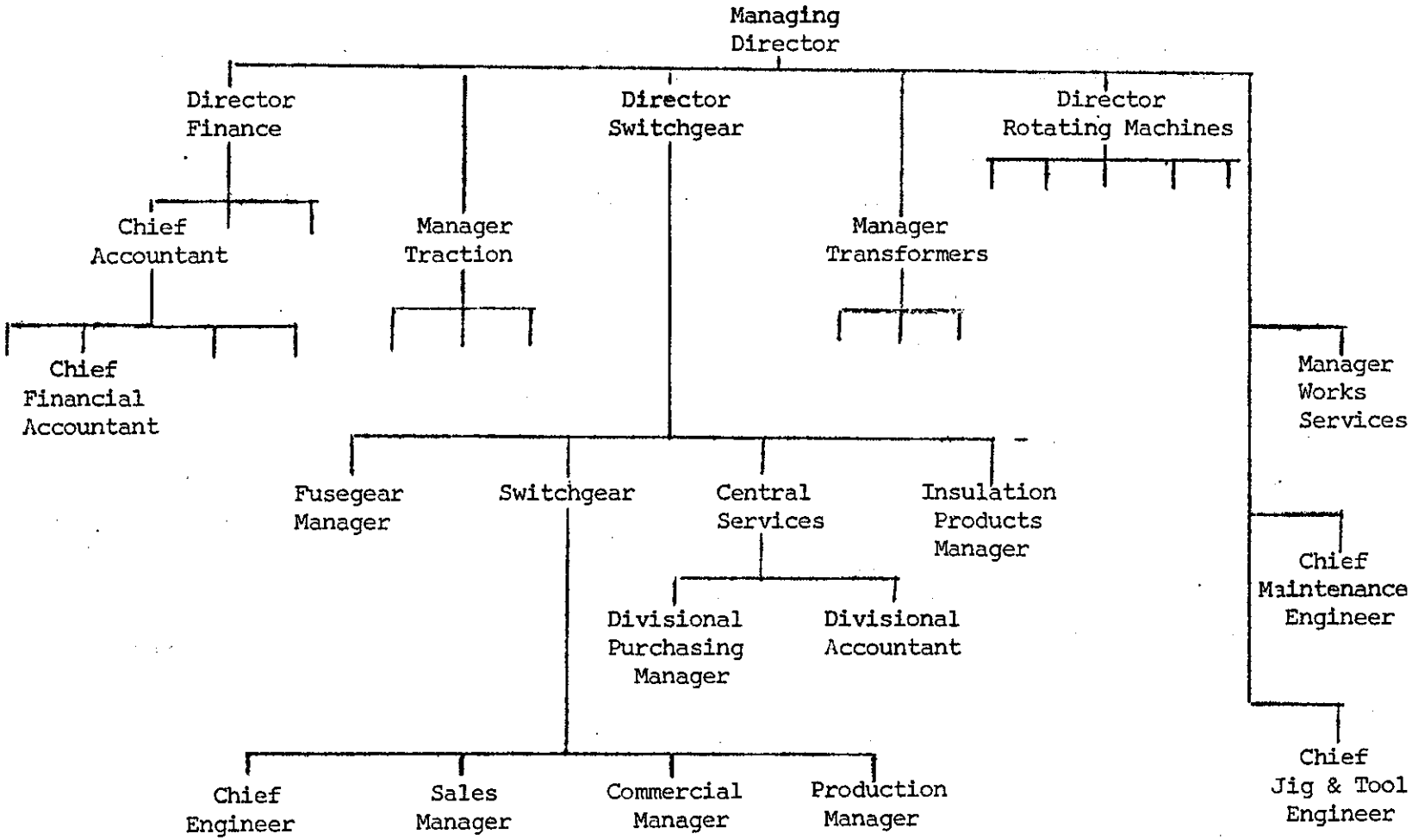
v. The information recorded on the back of both forms, the reminder list and the record of expenditure and commitments, although related to a project, are not particularly relevant to the decision to proceed with a project.

vi. The scope and duration of the project proposed is not well defined. Provision is made for noting what other departments are affected and use of the aide-memoir will ensure that other specific points are covered. No estimate of duration of a project is made nor of the anticipated life of the investment. No reference is made to any external services or suppliers.

vii. The control system as exercised by the Manager Works Services appears to be simple in operation and adequate for the information required. Some clarification on carry over projects may be relevant and no details of previous years' authorisations and expenditure is shown on the monthly statement, which would appear to be the master control document circulated to those concerned. In view of the company re-organisation it is anticipated that similar records to those maintained by the Manager Works Services will need to be kept by the division.

ANNEX B.1

SKELETON ORGANISATION TREE



ANNEX B.2

P 12015 FORM 1

CAPITAL & REVENUE	PROPOSAL	YEAR	REF. NO.

DIVISION

TITLE

JUSTIFICATION

Nº	DESCRIPTION OF REQUIREMENT	DEPARTMENTS AFFECTED: DIVISION	PLANT D.O.	PLANT OFFICE	BUILDERS	CARPENTERS	PLUMBERS	MILLWRIGHTS	ELECTRICIANS	CONTRACTORS	ESTIMATED COST: CAPITAL £	REVENUE £
	TOTALS											

DATE		REMARKS
	SUBMITTED BY	
	ESTIMATE CHECKED BY	
	SUPPORTED BY MANAGER DIVISION	INCLUDED IN BUDGET MANAGER WORKS SERVICES
	APPROVED BY DIRECTOR DIVISION	

REMINDER LIST	PROPOSAL	REF: NO.
DESCRIPTION OF REQUIREMENT.	REQ'D YES or NO.	STATE ADDITIONAL LOAD ON ANY SERVICE REQ'D. REMARKS.
Access during building alterations		
Access to new and existing buildings		
Boundary Restrictions		
Buildings New		
Buildings Resite		
Buildings Alterations		
Check Locations and Advise		
Cables. Power from Sub Station		
Cables and Distribution Boxes		
Compressed Air		
Clocks (Wall)		
Drains Process		
Drains Storm		
Drains Foul		
Drawing Office		
Doors. Sizes affecting New & Existing Shops		
Electrical Installations		
Enclosures Plant & Test		
Floors		
Foundations		
Fire Extinguishers		
Gas Installations		
Industrial Development Certificate		
Lighting General		
Lighting Individual		
Lifting Equipment General		
Lifting Equipment Cranes		
Material Handling		
Notice Boards		
Offices. Partition Type		
Offices. Brick Built		
Planning Permit		
Plant New		
Plant Removal		
Plant Disposal (Quote No.)		
Plant New Installation		
Plant Re-Install Existing		
Pipework Process Steam or H.P. Hot Water		
Process Heating		
Public Address System		
Personnel Amenities		
Roads		
Repair Floors		
Space Heating		
Shop Floor Layout		
Surveying Site New Buildings		
Site Preparation		
Stores		
Safety Precautions		
Trent Water Board Permit		
Toilets Male		
Toilets Female		
Telephones Internal		
Telephones G.P.O.		
Transformer Limitations. Internal		
Transport External		
Time Recording Clocks		
Time Recording Racks		
Ventilation		
Water Hot		
Water Cold		
Water Process		

ANNEX B.3 Form 2A/4/68

APPLICATION FOR CAPITAL/SPECIAL REVENUE EXPENDITURE AUTHORITY

Division	Dept.	C.C.	Year	Budget Reference Number /

Details of work for which release is requested	£	s.	d.
Request covers All / Part / Complete Budget Item £			

To be completed by Works Services Dept.

Associated Revenue Expenditure Cost .....£

Expenditure No. .....

Plant Number .....

Inland Revenue Class

Budget Allocation £

Released to Date £

Balance

Date / / .....
Manager
Works Services

Date

Submitted by

Applicant

Supported by

Departmental Head

Approved by

Director

Authorised by

Managing Director

EXPENDITURE

Reference	P/No.	Details	Amount	Reference	P/No.	Details	Amount

COMMITMENTS

Order No.	Supplier	Value of Order	Amount Invoiced	Order No.	Supplier	Value of Order	Amount Invoiced

ANNEX B.4/1

EXPENDITURE AUTHORISED 1966

Budget Serial	Item	Amount Released
52/419/	Extn to Fuse Gear Production	£'s
01	Croform Vibrators, 4 Nos	60
02	Racking, shelving & containers	550
03	Benches & assy equipment	475
04	Spacesaver storage rack	400
05	Steel cupboards	144
06	Supp to 52/41267	400
08	Punch feed unit	350
09	Trays & spacesaver trays	110
10	ICC metal degreasing plant	64
11	Cable for fusegear m/c	482
12	Bowl feeders (printing)	310
13	Arbor press	103
14	Ozaminor III	500
15	Arbor press, 2 Nos	60
16	Fire cupboards	150
52/420/	Test Equipment	
01	High speed oscillograph	6850
52/421/	Extn to facilities (m/c tools)	
01	Desouter air spanners, 2 Nos	93
02	Benches etc., Delle	315
03	Rotor spanners etc.,	127
04	Spacesaver rack	572
05	Rack & benches	300
06	Barrel pump	64
07	Trailers	201
08	Metal treatment basket	89
09	Conveyancer truck	2063
10	Standard pallets, 50 Nos	715
11	Brush platform trucks, 3 Nos	154

Budget Serial	Item	Amount Released
52/421/	Extn to facilities (M/C tools) cont'd	£'s
12	Limitose bandsaw	210
13	Build frames	323
14	Hydraulic strip bending m/c	283
15	Toroidal taping m/c	261
16	Spreader lifting beam	34
17	Pollard drill	203
18	Hydraulic lift jack	71
19	Vacuum cleaners	403
20	Barrel pump	63
21	Barlow Whitney oven	826
22	Barrel pumps	232
23	2 ton crane	1440
24	Spindle drill m/c, 2 Nos	270
25	Circular saw	322
26	Conversion of crane	390
52/423/	Extn to facilities (sundries)	
01	Extention equipment VSI Car section	163
02	Stud welding unit	132
03	3rd channel to semi-automatic Fuse Test	325
04	Furniture	54
05	Desk	40
06	Addition to 52/41327	17
07	Addition to 52/41238	16
52/439/	Re-newal of facilities (test equipment)	
01	Measuring Shunts & extra	1937
02	Patch Elliot CT test set & extra	295
03	Stalfile microfilm viewer	165
04	Kelvin double bridge	182
05	Hall effect equipment	182

ANNEX B.4/1

Budget Serial		Amount Released
52/440/	Re-newal of existing facilities (Small tools bench equipment etc.)	£'s
01	Barrel pump	62
02	Trucks, 2 Nos, trolleys, 2 Nos	140
03	Trucks, 2 Nos	37
04	Hydraulic hand lift truck	65
05	Mobile safety steps, 6 Nos	87
06	Hicycle drills, 3 Nos	101
07	Step ladder	36
08	4 drawer filing cabinet	19
09	Counting scales	310
10	Card index	83
11	Trucks for compressor plant	120
12	Storage racking	1024
13	Push pull tapping m/c	109
14	DeSoutter spanner	49
15	6" bench grinder	22
16	Rack with rollers	46
17	2 Pollard drill	182
18	Draughting machine	159
19	Trucks, 2 Nos	83
20	Paint spray racks	70
21	Spray guns	72
22	Wrenches, drill etc.,	410
23	Platform truck	41
24	Platform truck	23
25	Platform truck	18
26	Adding machine	40
27	Assembly frame	206
28	OBA sockets and extension	20
29	Airtools	222
30	Air drill	37
31	Hicycle drill	63
32	Racking	193

ANNEX B.4/1

CARRY OVER 1965 - 1966

Budget Serial	Item	Amount Released £'s
52/914	Modification to Capping m/c (balance)	43
52/920	Replacement Camera (balance)	3
52/924	Sand & capping machine	3608
52/926	Regulators (balance)	39
52/928	Wiring Trolleys (balance)	3
52/930	Furniture	29

ANNEX B.4/2

EXPENDITURE AUTHORISED 1967

Budget Serial	Item	Amount Released
52/483/		£'s
01	Floodlights, 7 Nos	104
02	Data lagging	3592
03	Ammeters/Voltmeters	190
04	3 phase Variac	297
05	Meters	81
06	Transducers	300
07	Ohmeters	222
52/533/		
01	2 spindle Elliot drill	270
02	Auto capping machine	1750
03	Morris triple block	56
04	Respray trolleys, 4 Nos	151
05	Oil drainage rack	8
06	Build frames	24
07	Tools	37
08	Interlocking unit	290
09	75/300 KVA Fed welder	1210
10	Spacesaver racking	478
11	Spray guns, 2 Nos	29
12	Spacesaver trays, 100 Nos	108
13	Frame extension for solder pot	344
14	Pneumatic nibbler	120
15	Berlett saw rack	12
16	Screens etc	132
17	Baskets	58
18	Dipping unit	25
19	Barrel pumps, 2 Nos	133
20	Air container & hydraulic equipment	180
21	Semi-mobile oil filter	861

EXPENDITURE AUTHORISED 1967 (cont'd)

Budget Serial 52/533/	Item	Amount Released £'s
22	Additions to crane	404
23	Wood battens, 380 Nos	59
24	Comparison scales	100
25	Fettering equipment	237
26	Equipment for Mitchell pump	138
27	Reffman tools	140

ANNEX B.5

SURVEY OF EXPENDITURE AUTHORISED IN 1966/67

Budget Serial	Amount Released	Budget Serial	Amount Released	Budget Serial	Amount Released	Budget Serial	Amount Released
533/05	8	421/20	63	419/16	150	421/02	315
533/12	12	419/10	64	533/04	151	421/25	322
423/09	16	421/06	64	421/11	154	421/13	323 Q
423/06	17	440/04	65	440/18	159	423/03	325
440/25	18	440/20	70	423/01	163 M	533/13	344
440/08	19	421/18	71	439/03	165	419/08	350
440/28	20	440/21	72 Q	533/20	180	421/26	390
440/15	22	483/05	81	440/17	182	419/04	400
440/24	23	440/10	83	483/03	190	419/06	400
522/06	24	440/19	83	440/32	193	439/05	400
533/18	25	440/05	87	421/07	201	421/19	403
533/11	29	421/01	93	421/17	203	533/22	404
421/16	34	533/24	100	440/27	206	440/22	410
440/07	36	440/06	101	421/12	210	419/03	475
440/03	37	419/13	103	439/04	220	533/10	478
440/30	37	483/01	104	440/29	222	419/11	482
533/07	37	421/08	107	483/07	222	419/14	500
440/26	40	533/12	108	421/22	232	419/02	550
423/05	40	440/13	109	533/25	237	421/04	572
440/23	41	419/09	110	421/15	261	421/10	715
440/16	46	440/11	120	421/24	270	421/21	826
440/14	49	533/14	120	533/01	270	533/21	861
423/04	54	421/03	127	421/14	283	440/12	1024
533/03	56	423/02	132	533/08	290	533/09	1210
533/17	58	533/16	132	439/04	295	421/23	1440
533/23	59	533/19	133	483/04	297	533/02	1750
419/01	60	533/26	138	421/05	300	439/01	1937
419/15	60	533/27	140	483/06	300	421/09	2183
440/01	62	440/02	140	440/09	310	483/02	3592
440/31	63	419/05	144	419/12	310	420/01	6850

M = Median

Q = Upper & Lower Quartiles

SECTION C

STANDING INSTRUCTIONS FOR CAPITAL EXPENDITURE

C. A PROPOSED SYSTEM FOR BRUSH ELECTRICAL ENGINEERING

Part I - Summary of Changes Advocated

1. General

Prior to drawing up the detail of a revised system it is necessary to consider the present organisation and system at Brush, in the light of the Main Discussion, and decide what amendments or innovations need to be made. The main changes affect the proceedure, forms and supporting papers and post audit.

2. Proposed Proceedure

The existing two stage budgetary system forms the context into which the proposed system must fit. The control proceedure at present operated by the Manager Works Services, within this budgetary system, is effective and simple and only a minor amendment is necessary. This amendment consists of allotting the budget serial number during the proposal stage instead of on the release of funds.

Due to the changes brought about by the 1968 de-centralisation, it is considered necessary to nominate a budget controller in each division whose task would be to consolidate and administer budget proceedure on behalf of the division. This is, to some extent, a duplication of the work of the Manager Works Services (Company budget controller) but it is considered essential if the Divisional

Directors are to be fully advised concerning their divisional responsibility.

3. The forms and supporting papers

The existing budget system requires two separate actions, the submission of a proposal for approval in principle and inclusion in the budget allocation, and subsequently, the application for authorisation and release of funds. These two actions are mandatory to the proposed system and are referred to as the Proposal and the Request.

The inter-relation of the two actions is important. At the stage of budget preparation all projects are considered for inclusion and a proposal must be accepted or rejcted, both on its merit and in comparison with others. The need is therefore for all decision making information to be incorporated in the proposal. By contrast, the request deals with a particular project and is only relevant to other projects in the final decision to commit allocated funds. This is the time for review of both the project intent and the use of funds.

The information required at both stages is largely similar in content and the proposal form contains the greater detail; the request form is intended to be used in conjunction with a previously approved proposal.

The Proposal Form (Annex C.1) and its supporting Project Costing and Network (Annex C.2) are designed to be

used as a summary of the project. When completed they contain all essential information for a decision to be made together with supporting detail of the economic appraisal, timing and scope of the project. In the majority of proposals this will be sufficient. Provision is made in the instructions for additional information where necessary to be contained in working papers which support the proposal.

Use of the Request Form (Annex C.3) in conjunction with an approved proposal facilitates its use for review and release proceedure. The main features of the requirement justification and total cost are repeated; the other information given concerns the funds required and the review of the project. It has been anticipated that in a project of some duration, funds may be apportioned and released at intervals and provision for this "part release" is made on the form.

4. Post Audit

The whole question of post audit is fraught with complications due to the varying circumstances in which assets purchased are used. The minimum requirement should be that actual expenditures are compared with estimates given in proposals. The record of expenditures on the back of the present application form is now on a separate form to be used by the accounts department and/or controllers as required (Annex C.4).

Comparison of receipts or savings is the major

difficulty in post audit and where required, an ad hoc check of these should be made. In normal circumstances this will only be economically feasible where the expenditure is in respect of equipment for a specific use.

5. Cost of Capital

In order that economic appraisal proposals can be carried out in the proposed system, a Discounting Rate, related to the Cost of Capital must be specified. The basis for calculating this was discussed in Section A under Discounting Rate.

The Cost of Capital for Brush, based on the published accounts of the Hawker Siddeley Group, has been calculated (Annex C.5). This shows an average acceptable rate to be 8.7% with a maximum of 10.9% for the greater cost of equity and retained earnings.

In view of this and the Company target of 15% for earnings in investments before tax, it is recommended that a discount rate of 9% be adopted.

6. Standing Instructions

To implement the proposed system and incorporate the resultant changes new Standing Instructions are required. These follow as Parts II and III of this Section, the former detailing the new proceedure and the latter a guide to completion of forms, parts of which may be new to those concerned.

Part II - Standing Instructions - Proceedure

1. General

Capital Expenditures requiring Executive Board approval will be submitted in accordance with the proceedure outlined below. The preceedure involves a two stage submission. Firstly, a proposal for Approval in Principle is prepared and such proposals will normally be submitted to the Executive Board in September/October of the year preceeding the expenditure, for inclusion in the capital expenditure budget of the year. Secondly, a Request for Release of Funds will be submitted prior to the commencement of the project.

The Executive Board will allocate funds for the year to cover proposals accepted. Exceptionally, a proposal may be submitted in the current year, either as an amendment to, or in addition to, the allocated budget. Proceedure for these is as for normal proposals but acceptance and allocation is at the discretion of the Executive Board.

For an interim period this instruction and proceedure is limited to the Switchgear division.

2. Capital Expenditure

To be classed as capital expenditure an asset, or set of related assets, purchased must (a) cost £25 or over including installation charges, (b) be identifiable and (c) have an anticipated life of 3 years or more.

3. Terminology

Throughout this instruction the following exceptional terms are used to refer to persons designated to carry out the following functions:

i. Company Budget Controller - consolidates and acts for the Executive Board on all matters relating to the preparation and control of the capital expenditure budget. This function is carried out by the Manager Works Services.

ii. Divisional Budget Controller - consolidates and acts for the Divisional Director on all matters relating to the preparation and control of the Capital Expenditure Budget in the division. The Divisional Accountant (Switchgear) has been so designated.

iii. Sponsor - the originator or person designated by head of department to prepare the proposal.

4. Proposal

The sponsor will complete the detail of the Proposal Form (Annex C.1) and a supporting Project Costing and Network (Annex C.2) which is part of the proposal; the latter part of this instruction is for guidance in this.

A minimum of original and three copies of the proposal and network are required with additional copies for any other department concerned with the project. Where another department is involved they will sign all copies as agreeing the relevant subsidiary costs. The sponsor will

submit all copies signed to his head of department. Where a project requires supporting information the proposal form should show consolidated figures only and a fair copy of other working papers should accompany the proposal.

The head of department, if approving and supporting the proposal, will sign all copies and pass them to the Divisional Controller.

The Divisional Controller, after checking the individual proposals will obtain the approval of the Divisional Director and then consolidate all proposals approved into the division proposed budget and pass them to the Company Controller for submission to the Executive Board, retaining one copy of each proposal together with any working papers for reference.

The Company Controller consolidates all proposals for Board approval and on approval, allots a budget serial number. He then retains two copies of the proposal for reference and distributes the remaining copies to the Divisional Controller and any other department concerned.

The other departments will retain approved copies for reference.

The Divisional Controller notes on his previously retained copy the budget serial number and passes the other copy to the sponsor department for their information and retention.

The foregoing is illustrated on a proceedural diagram (Annex C.6).

5. Request

This form, (Annex C.3), reviewing a proposal already approved and requesting release of funds, is prepared by the department prior to the commencement of work or placing of orders. The same number of copies will be required as for the original proposal and it is transmitted as indicated in the proceedural diagram (Annex C.7).

After signature by the head of department and any other signatures in respect of subsidiary costs the completed copies are passed to the Divisional Controller who, after checking, will obtain the approval of the Divisional Director and retaining one copy, will submit the remainder to the Company Controller for Executive Board action.

After approval and release of funds by the Executive Board the Company Controller will endorse all copies of the request and distribute as for the original proposal to the departments interested and to the accounts department with the second copy of the proposal form previously retained.

The Divisional Controller will note the release and inform the Sponsor Department that work may commence by passing on an endorsed copy of the request.

Part III - Standing Instructions - Documentation

1. General

This standing instruction introduces a new Capital Expenditure Project Vetting proceedure into the company. It incorporates more modern methods of appraisal with which sponsors of projects may not be familiar and this part of the standing instruction is to explain and assist in completing the necessary Proposal and Request forms.

2. Description of Project

This is common to both forms and consists of the division departmental details, the title of the project and the budget year. Details of the Requirement and Justification are also common to both forms and are described under the proposal form.

3. Proposal Form

Requirement - shows the main details of the work to be carried out or the installation to be made. Where the project includes the purchase of a number of items, particularly if they can be used independently they should be listed separately with approximate costs on the back of the forms. It is essential that all proposals are complete in all respects. They may be linked with other proposals as part of an overall programme but no project should be dependent for its success on others.

Justification - the reason why the company should

implement the project. Such reasons can be categorised under the four motives of Social, Intuitional, Economic and Replacement. The Statement of Justification should be framed to show how the project meets one or more of these motives.

Social - includes projects which are intended to satisfy legal or social obligations such as statutory regulations, medical and welfare needs.

Intuitional - this type of project will include such divers objectives as innovations of new techniques, improvement of quality, increased overall productivity and the anticipation or matching of competitive developments. Whilst the reason may be obvious, proof of potential achievement is not quantifiable with any degree of accuracy.

Economic - a proposal where an appraisal can be made based on reliable estimates of potential outcome. The introduction of new machines on full production is typical of this category.

Replacement - proposals where a similar appraisal to the previous category may be made but in addition the outcome of non-replacement should be considered.

Alternatives - briefly show the most relevant alternatives considered and reasons for rejection. This may simply be a question of cost or performance but could involve more detailed appraisal and comparison of alternatives

in the supporting working papers.

Project Duration - is an indication for planning purposes of when the project will be carried out and over what period the effect of the installation is considered; it is supported by the Project Costing and Network sheet.

Project Costing - is a summary of the information on the attached Costing and Network sheet divided into Cash Outlay, Operating Costs and D.C.F. Appraisal.

4. Project Costing and Network

The proposal form is supported by a Costing and Network sheet which is designed to give the calculations required for economic appraisal of the project. This sheet is a summary of essential information and may be supported by working papers in the case of larger projects or where there is insufficient space for a particular item this may be shown on an attached sheet. Where working papers are used the project costing and network sheet must be the summary as normally working papers will not be referred to the Executive Board unless specially requested by them.

The appraisal is by the Discounted Cash Flow Technique of Net Present Worth, a preparatory table for which is given on the sheet. Net Present Worth is defined as the worth of a project at present value after recovery of capital invested and interest calculated at a stated discounting rate. A positive Net Present Worth is the criterion for acceptance

of economic proposals and a least negative Net Present Worth a consideration for other non-economic proposals. A further criterion used in ranking projects of varying lives is the Equivalent Annual Value derived from the Present Net Worth as explained later and defined as its annual uniform equivalent over the life of the investment. The discounting rate applicable in the company is given (Annex C.8).

The project costing deals with cash flows, i.e., outlays or receipts or estimates thereof and an algebraic convention is adopted. Cash inflows (receipts) are treated as positive and cash outflows (outlays) as negative. To avoid ambiguity and possible error, negative amounts are shown in brackets thus (1234).

The years are counted numerically and conventionally all cash flows during the year are considered to occur at the end of the year with the exception of large outlays or receipts which, if occuring at the beginning of a year are deemed to occur at the end of the previous year. Normally therefore, Capital outlay at the start of the project is shown as occuring at the end of year 0 and all other cash flows at the end of the year in which they physically occur. It is important to note that all costs and receipts taken are attributable, i.e. they arise solely as a result of the project and are the increases or decreases in costs and receipts due to the project. No question of the allocation of costs arise and overheads as

such are not considered unless there is a change resulting from the project, for example an increase in supervisory personnel. Receipts arising in the form of savings should also be scrutinised carefully to ensure that a projected economy is a real saving. A proposed reduction in labour results in no saving unless the surplus labour can be dispensed with or used in other gainful employment.

(i) Detail of Costs

The detail of costs classifies all cash flows into Capital Outlay and Operating Costs/Receipts. Recoveries such as salvage are noted separately under Capital Outlay.

Capital Outlay includes all those items which occur as one off cash flows usually but not always at the start or during the setting up of the project. Capital Outlay is further sub-divided into Capital Costs and Installation Costs. The former are those outlays in respect of items which, during the life of the project, have some recovery or salvage value and the latter those outlays which are non-recoverable.

Recoveries during or at the end of the anticipated life and noted separately may include the disposable value of any equipment replaced as a result of the project. Grants and Tax Allowances are not considered at this stage as a recovery.

To complete the Capital Outlay section enter against the year(usually starting with year 0) in column (a) the item

and costs or, where space is insufficient, the total of costs under the respective columns (b) (c) or (d). The Total Outlay for the year column (e) is obtained by adding all costs incurred during the year (c) + (d) and will be negative. Repeat for each year in which costs occur in sequence.

The addition of columns (c) and (d) give the respective totals of Capital Costs and Installation Costs required on the proposal form. In a similar manner enter the Recoveries in the lower part of the section and calculate the total for each year. The total recoveries to be carried forward to the proposal form is the sum of the lower part of columns (c) and (d).

The Operating Costs/Receipts are those items which are recurrent, such as labour costs, and arise from the routine operation of the project to which they are directly related. They are an increment of cost or saving directly resulting from the project.

Again in this section enter the cost or receipt under the appropriate column against the year in which it occurs in sequential order. This will normally start from year 1 as operating costs/receipts cannot occur before the start of the project which is the end of year 0. It is as well to enter all years in turn, as a check, even though the cost/receipt may be nil.

The Total Cost for the year is obtained by adding the appropriate items in columns (g) (h) and (i), which will again be negative. Addition of the receipts for the year, column (k),(a positive amount) gives the annual total income in column (l).

The sum of column (j) gives the Total Operating Cost required for the proposal form.

(ii) Grants and Allowances

Before the DCF calculation is it necessary to calculate the Investment Grant and Tax Allowances.

Investment Grants are currently payable on all items of new plant and machinery (excluding vehicles) the full cost of which, including installation, is £25 or over. No grant is receivable in respect of items under £25 unless they are part of a set or group of items and cannot be used other than as part of the set or group. The current rate for Investment Grants in the Loughborough area is given, (Annex C.8).

Tax Allowances are of three types, current rates for which are given (Annex C.8). Tax allowances are the official method of allowance for depreciation and no other depreciation calculation is required in DCF calculation. The allowances receivable are deducted from income to calculate taxable income.

Initial allowances are granted in cases where no

investment grant is made and may be claimed on all industrial buildings (which excludes retail shops, offices, dwelling houses and hotels), machinery, plant and motor vehicles (excluding passenger carrying vehicles). There is a special 100% writing off allowance for certain investments in scientific research. Initial Allowance is in addition to the annual or wear and tear allowance for the first year and is calculated as a percentage of full cost.

Annual Allowances are calculated as a percentage of the written down value which is defined as the full cost less any investment grant receivable, minus the sum of initial and annual allowances receivable in previous years. It should be noted that where an initial allowance is receivable the written down value for the first year only is equal to the full cost and only thereafter does the initial allowance and previous annual allowances reduce the written down value.

The Balancing Charge or Allowance is the final allowance made and may be regarded as completing the process of 100% depreciation. The Balancing Charge/Allowance is the full cost less the sum of grant and allowances received, minus the disposal or salvage value. Where this is positive a charge is made and where negative, an allowance.

Both Grants and Tax Allowances are received some time after the expenditure in respect of which they are claimed. In the case of allowances this will be in the

financial year following the expenditure and in the case of grants, some fifteen to eighteen months after claiming, which means in calculation the second year after the expenditure.

(iii) D.C.F. Calculation

The tabular form of DCF Calculation is fairly straight forward, especially if certain conventional methods are used. It must first be repeated that the calculations are in terms of cash outflows and inflows and these are shown as negative and positive respectively. To avoid any ambiguity it is normal practice to bracket thus (1234), negative amounts. Secondly, with the exception of the final two columns the computation is in respect of individual years and all addition or subtraction is horizontal and algebraical, taking due note of positive and negative signs.

Column (a) - enter the year end starting with year 0, the commencement of the project. All other entries and computations will be by their respective year.

Columns (b) and (c) - from the Detail of Costs, columns (e) and (l), enter the Capital Outlay and Total Income by years; Outlay being negative and Income positive or negative.

Column (d) - from the allowances previously calculated in (ii) enter the total allowances due against the year in which they will be received. This may include an Initial Allowance, an Annual Allowance or a Balancing Allowance

or charge.

Column (e) - taxable income is Total Income minus Tax Allowances (c) - (d). Note that this can be positive or negative.

Column (f) - Corporation Tax Deduction is calculated as a percentage of taxable income, the current rate for which is given (Annex C.8). Where the taxable income is negative, the tax deduction will also be negative. This is permissable by assuming a credit which is theoretically set off against other company tax deductions or by considering that the negative taxable income is a loss which will reduce the total company profit liable for tax.

Column (g) - Net Income is the total income minus the tax deduction (c) - (f).

Column (h) - Miscellaneous receipts are such items as Investment Grants and Recoveries from (i) and (ii) above, i.e., items which are not re-current and are, in effect, capital receipts.

Column (i) - Annual Proceeds is the sum of Capital Outlay (which is negative), Net Income and Miscellaneous Receipts (b) + (g) + (h).

Column (j) - the Present Worth Factor is based on the discounting rate to be applied in accordance with company policy. The Present Worth Factor is shown in Present Value Tables and a relevant extract for 0-11 years is given (Annex c.8).

The addition of this column gives the Cumulative Present Worth Factor (CPWF) used in the final calculation of Equivalent Annual Value.

Column (k) - Net Present Worth is the Annual Proceeds discounted, i.e., multiplied by the relevant year's Present Worth Factor and the summation of this final column is the total Net Present Worth (NPW) of the project.

The final calculation of Equivalent Annual Value is made by dividing the Net Present Worth by the Cumulative Present Worth Factor.

Both the Net Present Worth and the Equivalent Annual Value are carried forward to the proposal form.

(iv) Project Network

The network given on the back of the Project Costing is intended to show the scope and duration of the project. Activities should be limited to general descriptions of stages in the development of the project. The layout sheet is divided horizontally so that a sub-division can be made of activities by contractors and services external to the company, by the sponsor department and by other company departments. The project time calculated from the network is entered on the proposal form.

5. Request Form

The Request Form (Annex C.3) has a dual purpose in requesting the release of funds and in reviewing the

proposal immediately before work is ordered or commenced.

The Description of the Project, Requirement and Justification, should be the same as for the proposal. The budget serial number previously allotted to.the proposal is entered on the release form.

A release may be for the whole or part of the funds required for a project and the release number and detail of Funds Requested is entered accordingly.

Review of the proposal will show either no change, a change in project and/or a change in costing. The Review details must be completed accordingly and the necessary changes detailed as shown.

6. Record of Expenditure and Commitment

This form (Annex C.4) formerly part of the Application for Expenditure Authority, is now a separate form for attachment when required by the accounts department and any others required to maintain such a record.

7. Aide - Memoir

The following requirements, formerly part of the proposal, are listed as an aide-memoir of special requirements which should be considered by the sponsor.

Access during building alterations
Access to new and existing buildings
Boundary Restrictions
Buildings new
Buildings Resite
Buildings Alterations
Check Locations and Advise
Cables, Power from Sub-Station
Cables and Distribution Boxes
Compressed Air
Clocks (Wall)
Drains Process
Drains Storm
Drains Foul
Drawing Office
Doors, Sizes affecting New & Existing Shops
Electrical Installations
Enclosures Plant and Test
Floors
Foundations
Fire Extinguishers
Gas Installations
Industrial Development Certificate
Lighting General
Lighting Individual
Lifting Equipment General
Lifting Equipment Cranes

Material Handling
Notice Boards
Offices, Partition Type
Offices, Brick Built
Planning Permit
Plant, New
Plant Removal
Plant Disposal (Quote No.)
Plant New Installation
Plant Re-Install Existing
Pipework Process Steam or H.P. Hot Water
Process Heating
Public Address System
Personnel Amenities
Road
Repair Floors
Space Heating
Shop Floor Layout
Surveying Site New Buildings
Site Preparation
Stores
Safety Precautions
Trent Water Board Permit
Toilets Male
Toilets Female
Telephones Internal
Telephones G.P.O.
Transformer Limitations, Internal
Transport External
Time Recording Clocks
Time Recording Racks
Ventilation
Water Hot
Water Cold
Water Process

ANNEX C.1

PROPOSAL FOR CAPITAL EXPENDITURE - APPROVAL IN PRINCIPLE

Division | Year

Department

Title | *Original/Revised

Requirement

*This proposal is complete in all respects/Is linked with .....

Justification - *Social/Intuitional/Economic/Replacement

Alternatives - considered & rejected for the reasons shown

Project Duration

Start date..... Project time..... Anticipated life.....

Project Costing

Capital Outlay		Total Operating Costs
Capital Costs	£	
Installation Costs	£	
Total B/d	£	£.....
Less Recoveries	£	
Grand Total	£	

D.C.F. Appraisal

Net Present Worth £..... Equivalent Annual Value £.....

Submitted Date Sponsor:	Approved Date Divisional Director:
Subsidiary Costs Agreed	Included in Proposed Budget Company Controller:
Supported Head of Department:	Accepted/Rejected/Amended Executive Board:
Budget Action Divisional Controller:	Budget Serial Number Company Controller:

*Delete as necessary

PROPOSAL FOR CAPITAL EXPENDITURE - PROJECT COSTING & NETWORK

(i) DETAIL OF COSTS

Capital Outlay					Operating Costs/Receipts						
Year End (a)	Item (b)	Capital Costs (c)	Install Costs (d)	Total Outlay (e)	Year End (f)	Mat. (g)	Lab. (h)	Misc (i)	Total Cost (j)	Receipt (k)	Total Income (l)
Totals:											
Recoveries:											
Totals:									Totals:		

(ii) GRANT AND TAXES

*Investment Grant ....% = £

or

*Initial Allowance ...% = £

Balancing *Charge/Allowance = £

Annual Allowances @.....%

Years: (1)£ (2)£ (3)£ (4)£

(5)£ (6)£ (7)£ (8)£

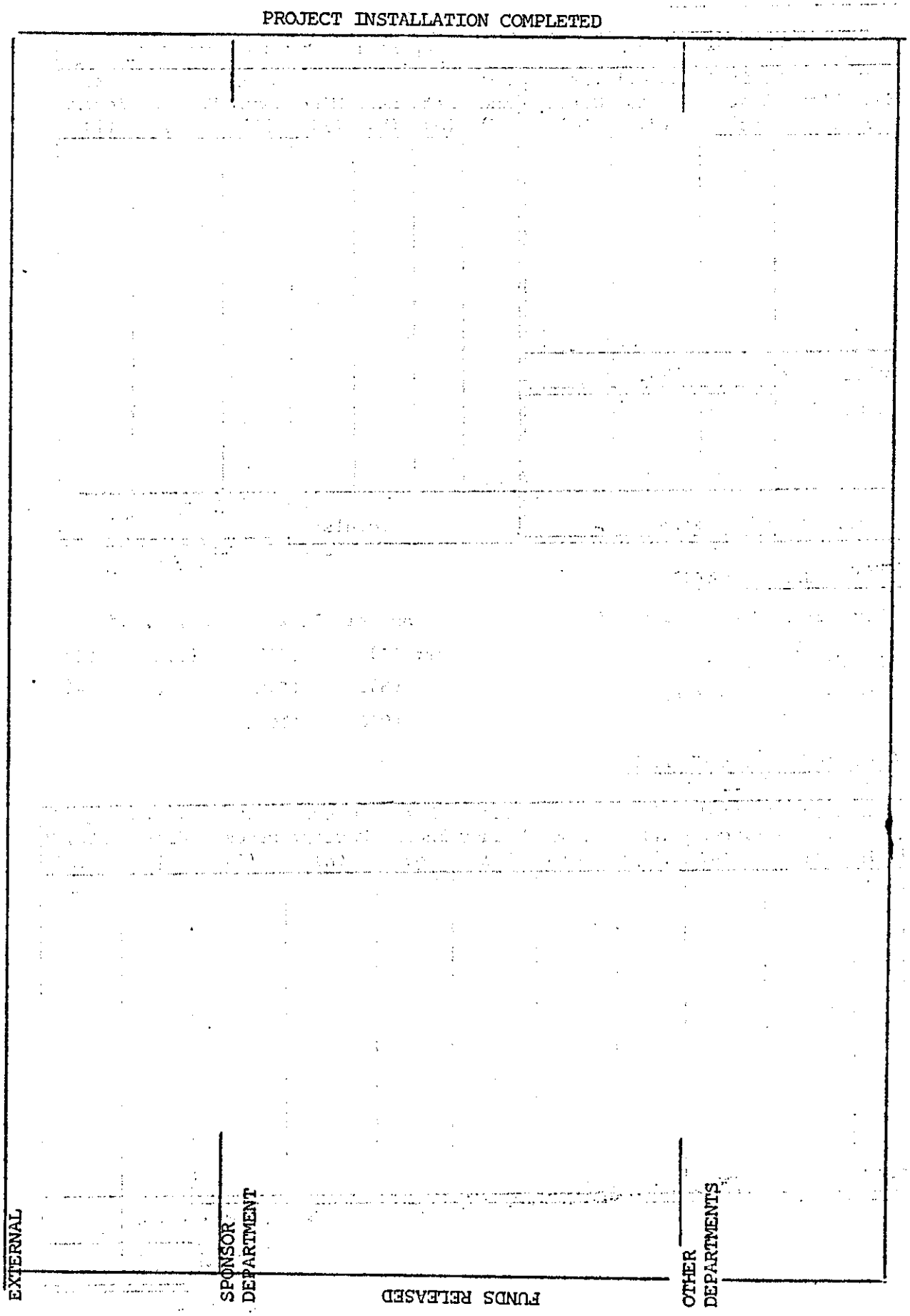
(9)£ (10)£

(iii) D.C.F. CALCULATION

Year End (a)	Capital Outlay (b)	Total Income (c)	Tax Allce (d)	Tax Income (e)	Tax Deduct (f)	Net Income (g)	Misc. Receipt (h)	Net Proceed (i)	PW Factor (j)	NPW at...% (k)
									CPWF =	
									NPW =	

Equivalent Annual Value = $\frac{NPW}{CPWF}$ = £.....

(iv) PROJECT NETWORK



ANNEX C.3

REQUEST FOR CAPITAL EXPENDITURE - RELEASE OF FUNDS

Division | Year

Department | Budget Serial No.

Title | Release No.....of.....

Requirement

Justification - *Social/Intuitional/Economic/Replacement

Funds Requested

This release is for *all/part of the funds required for the project

Total funds required £..... Released to Date £.....

Release now requested £..... Expenditure and commitments to date £.....

Review

*The project does not vary significantly from the original proposal

*There is a significant variation in the project, detailed overleaf

*There is a significant change in the costing of the project. The reason for this change is detailed overleaf. A revised proposal form is attached.

Subsidiary Costs Agreed: Date	Approved Divisional Director: Date
Request Submitted Sponsor Department:	Funds Released Executive Board:
Checked Divisional Controller:	Departments Informed Company Controller:

*Delete as necessary

ANNEX C.4

RECORD OF EXPENDITURES & COMMITMENTS

Division Year

Department Budget Serial:

Project Title

EXPENDITURE

Ref	P/No	Details	Amount	Ref	P/No	Details	Amount

COMMITMENTS

Order No.	Supplier	Order Value	Amount Invoiced	Order No.	Supplier	Order Value	Amount Invoiced

CALCULATION OF COST OF CAPITAL

SHARE CAPITAL AND STOCKS	£000	DIVIDEND/INTEREST
Ordinary Shares (Issued)	47,678	12% less Income Tax 6.9%
Preference Shares	5,960	5½%
Debenture Stocks	1,983	4% Net Tax Equivalent 2.3%
	15,000	7% Net Tax Equivalent 4.3%

% RETAINED EARNINGS

Profit after Taxation		7315
Preference Dividend	328	
		6987
Ordinary Dividend	5721	
		1266

$$\frac{\text{Retained Earnings}}{\text{Profit - Pref.Dividend}} = 18\%$$

COST OF CAPITAL

Equity and Retained Earnings (From Annex A.1) = 10.9% (Equity earning 6.9% net of all tax)

WEIGHTED AVERAGE

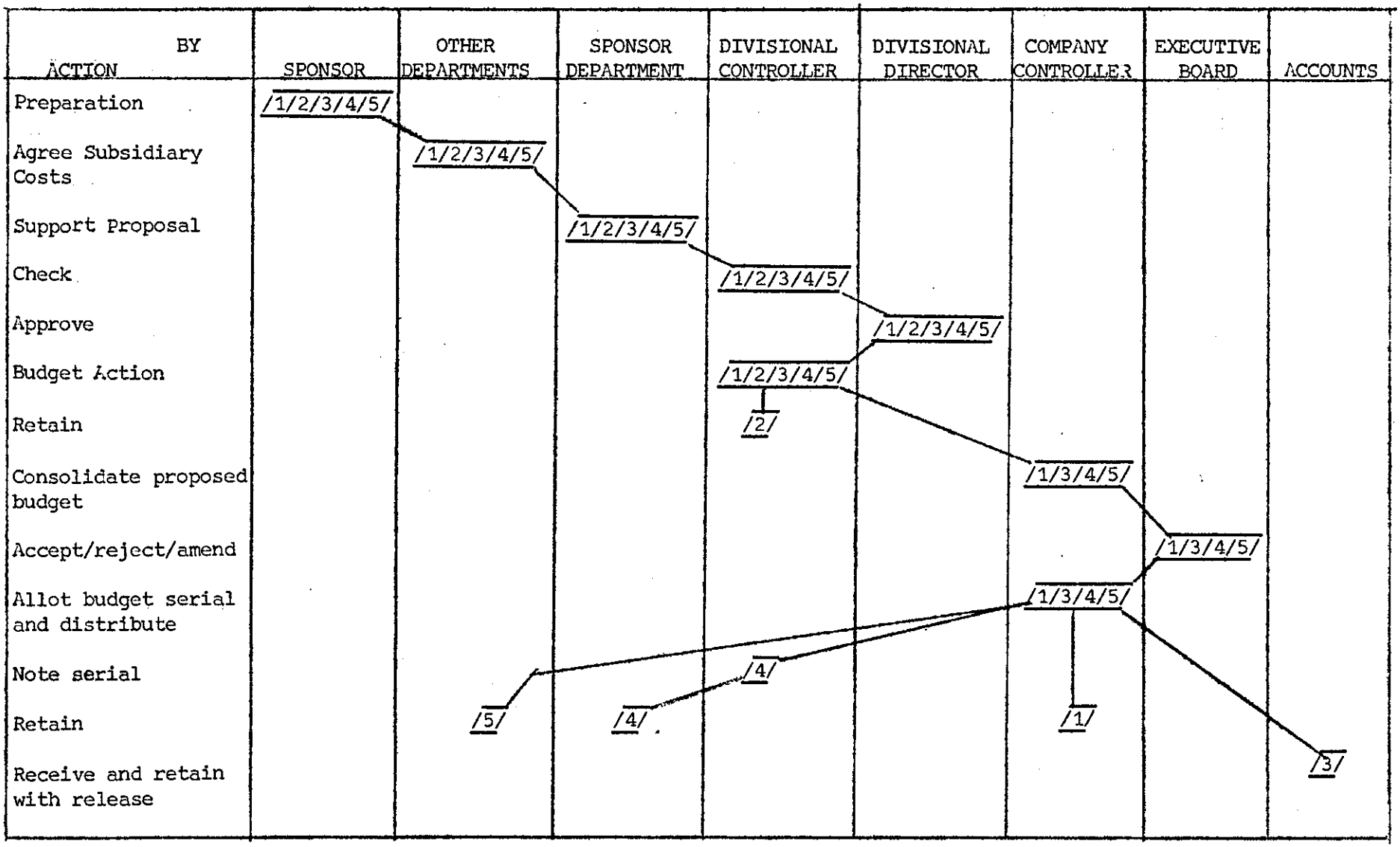
$$\text{Average} = \frac{(10.9 \times 477) + (5.5 \times 60) + (2.3 \times 19) + (4.3 \times 150)}{706}$$

$$= \frac{6218}{706}$$

$$= 8.7\%$$

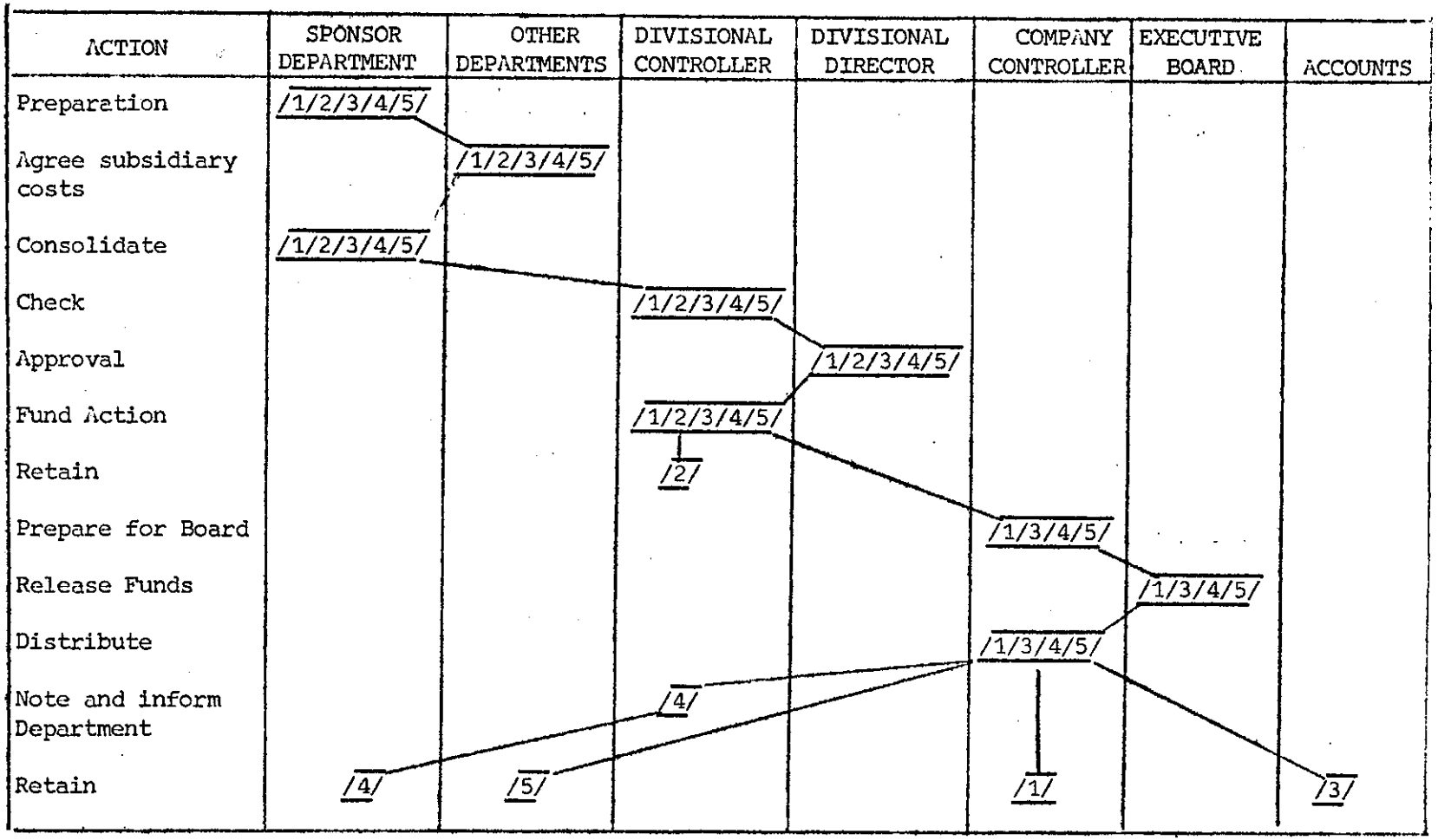
ANNEX C.6

PROCEEDURAL DIAGRAM - (PROPOSAL)



/?/ = Copy Number

PROCEEDURAL DIAGRAM - (REQUEST)



/?/ = Copy Number

CURRENT INFORMATION FOR PREPARATION OF PROPOSAL

Company Discount Rate as at 1st October 1968 - 9%

Present Worth Factors (Present Value of £1) for 9%

Year	PW Factor	Year	PW Factor	Year	PW Factor
0	1.000	4	0.708	8	0.502
1	0.917	5	0.650	9	0.460
2	0.842	6	0.596	10	0.422
3	0.772	7	0.547	11	0.387

Corporation Tax as at 1st October 1968 - 42½%

Investment Grant as at 1st October 1968 - 25%
(Non-development area)

Tax Allowance Rates as at 1st October 1968

Item	Initial Allowance % of Full Cost	(a) Annual Allowance % of Written Down Value
Plant & Machinery	30 (secondhand)	15 - 30
Vehicles	30 (excl. passenger cars)	25
Furnishing Industrial	30	5
Furniture	30	10
Office Equipment	30	15
Certain Scientific Research Assets	100% (writing off allowance)	-
Industrial Buildings	15	4% of full cost p.a.
Patents	-	See footnote (b)

(a) Annual Allowance rates vary with the life and type of the assets. The rates quoted are minimum and current and should be used for general guidance only.

(b) Annual Allowances for Patents are calculated as a uniform annual amount to be allowed over the remaining life of the patent, during which the full cost may be written off. The remianing life is seventeen years less the time the patent has existed.

CONCLUSION

The method of approach to this project, as is common in studies with a practical application, was to examine relevant literature and other sources of information dealing with similar problems. From the background knowledge so acquired a general solution was obtained and this was then adapted to meet the particular needs of the Brush Company. This scientific study approach ensures that the solution put forward takes account of all factors that need to be considered and that the basic system produced is not distorted by the idiosyncrasies of a particular situation. Thereby any adaptation to fit the system to a specific situation becomes a matter of choice and not accident.

The proposed Brush system required little adaption from a basic structure and is therefore suitable for use in any industrial organisation with only minor changes to suit the particular organisation.

Further reiteration of principles and factors considered would only be repetition of the main discussion and in concluding it is proposed to look briefly at wider issues outside the text but still part of the purpose of completing the thesis.

Comment must be made on the literature on Capital Expenditure Evaluation and related subjects. Much has been written but it would appear that two areas have not been

examined in any great detail. Most literature is on the subject of Capital Investment where writers tend to consider large single amounts for which the more sophisticated methods of investigation and appraisal can be justified. The distinction between Capital Investment and Capital Expenditure was made in the Introduction.

The latter tends to consist of a host of smaller amounts which totalled together form an appreciable part of a firm's capital investment. This is the first area where the businessman needs guidance to a workable method of evaluating the individual expenditures. The other area of scarcity, also mentioned in the Introduction, is that of non-quantitative judgement. Wright's book on Investment Decision in Industry was the only one read which really tried to examine and explain this problem which others tended to ignore or move quickly over. It may be that, as the answers are to some extent psychological, the fundamental survey has not, or cannot, be made at present but it is a developing trend of management today that economic considerations are not the only criterion for business judgements.

If Management can be said to be a science it is a science in which people are involved to a greater or lesser degree in all its problems. This was stressed earlier in the context of people operating a system but even more

pertinent is that throughout the whole discussion we are seeking to establish and define for a proposed channel of communication between people. One specific item which the writer has learned from completing this project is the difficulty, but real need in managerial problems, of ensuring that the system fits the people and not the reverse. This is not to deny that by training, people can be extended but such a training must be a progression and not a distortion. The happiest solution is probably exemplified by the method adopted in introducing Discounted Cash Flow Calculations on a step by step approach so that the system itself extends the operator and without undue strain, increases his knowledge and ability.

A second point learned from this project is the scope of information and information sources associated with this relatively simple managerial problem. In the course of preparing the work, the writer has discussed the problem and points arising with people of varying disciplines and experience. Much of the information gathered was subsequently discarded as not being relevant to the immediate problem but remains with the writer and is indicative of the breadth and interplay of knowledge required by Management in industry today.

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