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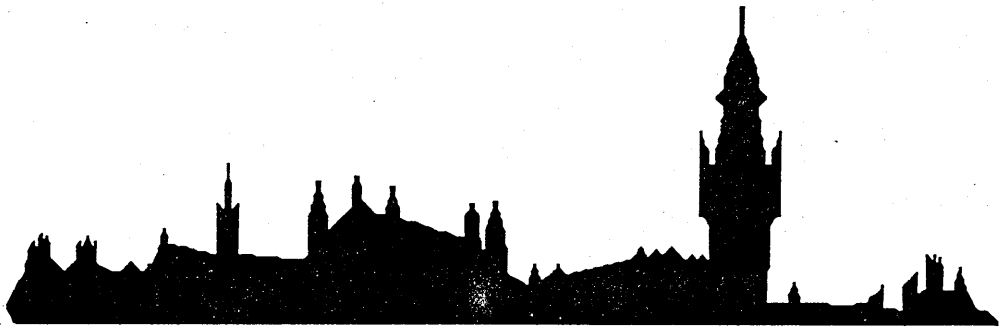

An Integrated computing System For Local

Housing Management

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To

my parents and family

Aknowlegement.

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Abstract.

Scottish Local Authority Housing Management Departments receive large numbers of requests for rehousing from both existing tenants and would-be tenants, claims for rent & rate rebates from both local authority tenants and private occupants, and requests for housing repairs from both tenants and maintenance inspectors. As a result they face substantial workloads both in their clerical and administrative procedures. An integrated housing management system, using a multi-access computer, can be a means of easing many of these difficulties.

After reviewing the nature and extent of the use of computers in Scottish housing management a detailed description is given of a computerised housing management system which was developed for Scottish Local Authority Housing Management departments. The system is designed to be adequate for use by Glasgow District Council, the largest housing management organisation in Scotland. The techniques used include interactive multi-access to the computer held data, on-line entry with validation and real-time updating of files.

Results are given from which the conclusion is drawn that an integrated housing management system using a multi-access computer can help significantly in the work of a Local Housing Management Department.

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The Role and Function of Local Housing Management.

1.1. Introduction.

Local authority housing management is concerned with a broad range of issues ranging from strategic to "day-to-day" tasks. The main tasks can be summarised under the broad headings allocation & waiting list, repair & maintenance rent accounting, the collection of rent arrears, and the administration of housing benefits. Before considering such issues, which relate to housing both built and acquired by local authorities, it is important to stress that housing management, in this century, has undergone fundamental changes. New approaches continue to develop although the Council house sector has begun to contract since 1980. This chapter will examine the particular problems and policies of local authority housing management as defined and highlighted by housing authority managers and reformers.

One of the major developments since the beginning of this century has been the expanding role and functions of local housing authorities, in that what was initially a policy of modest supplementary provision has been replaced by one where by local authorities are major providers of rented housing. In Britain as a whole, such authorities own 28% of the country's total housing stock, while in Scotland this proportion increases to almost a half[1]. In addition to this extensive scale of operation, the functions of local housing management have also expanded from merely overseeing sanitary and hygiene conditions to being now

responsible for the entire character of public and private housing stock within their jurisdiction. This entails responsibility for the provision and improvement of housing, the demolition of stock designated as seriously sub-standard, and both estimation and satisfaction the future needs of the private and public housing sectors. Thus, one of the major tasks is the augmentation of housing supply to meet potential demand and, in this, a consideration of alternative forms of tenure is an important issue in the balancing mechanism.

Macey and Baker[2] consider housing management to be the application of those skills that care not only for properties but also their amenities and surroundings. In order to achieve this they stress the importance of constructive co-operation between landlord and tenant. Consensus of opinion holds that efficient management lies at the heart of progressive and socially constructive housing policy, yet as Merrett[3] points out, this is an aspect that, until recently, has received very little attention. Council house letting, repairing, modernisation and the attendant rent and other policies have been largely matters for local discretion, and the general effects of such administrative decisions have been but superficially studied. Although 'paternalism' appears to govern management policies, the wide operational differences between authorities and their often divisive and individualistic approaches have led to fundamental dichotomies between districts. Whereas it is possible to cite individual authorities which operate efficient and far-sighted policies, there are others, bureaucratically constrained, that fail to meet their statutory obligations. Here it

might be noted that some authorities, while purporting to assist the majority, favour certain socio-economic groups to the detriment of those with the greatest housing needs. Throughout Britain the image of Council Housing is now one of a residual, even anachronistic 'welfare' sector, one of under-privileged residents who are unable to compete in the general environment of housing provision, and one which is now increasingly related to the forces of supply and demand that operate in the private market.

In short, this chapter summarises the history of Local Authority Housing, and relates it to present attituates and practices. In turn the possible effects of current developments in computer technology are considered, with particular reference to the field of Local Housing Management. Current practices, where different districts make greater, or less use of computers are considered. Subsequent chapters describe a fully integrated computerised housing management system capable of being tailored to suit the needs of any existing Local Housing Authority.

1.2. The Background to Local Housing Management

In order to justify the contention that major policy changes, both generally and specifically, have occurred, this section summarises the historical evolution of local housing management. Its foundation stems from nineteenth century philanthropic ideals which initially came to prominence in relation to the provision and control of working class education, although there was considerable debate and conflicting opinion as to its implementation[4]. By the second half of the century, great concern was also expressed over the quality of working class housing, housing movements initially stemming from what was a reaction to overcrowding, the prevalence of disease and, equally significant, the fears of insurrection amongst the lower classes. Such concerns were responsible for the philanthropic application of capitalist principles to the issues involving the underprivileged.

One of the most influential supporters of a housing management system was Octavia Hill. She advocated a graduated attack on the current problems of the time, beginning with the lowest stratum of society and, subsequently, moving on to including the skilled classes some of whom were then being housed by philanthropic societies. Her emphasis was on the improvement of all aspects of working-class life-style and her passion for change and assistance extended to such areas as financial advice, the organisation of social activities and assistance in homes, including advice on decoration and furnishing. But what really established a basis for housing management was the introduction of a system involving the systematic training of 'model' tenants for 'model' dwellings.

Hill's 'philanthropy', however, also had a harsher side to it, for those who failed to meet her ideals and expectations were evicted.

In essence, Octavia Hill had set out to demonstrate that through a sound policy of education and training, landlords could be guaranteed 'good' tenants. Many of her social experiments consisted of improving nineteenth century slum properties and renting them to selected tenants, her argument being that upgraded property would be appreciated and well-maintained provided those needing re-housing were carefully selected. Supervision was seen as being vital to the sucess of any scheme, particularly in terms of the collection of rent, the amount of which covered improvement and administration costs as well as ensuring a financial return for the enlightened landlord[5]. Significantly, rent arrears were not allowed.

Octavia Hill's system of housing management was based on the direct control of tenants and their re-education away from the ingrained habits and attitudes of slum existence. Inherent in its ideals was a social filtering process which effectively weeded out these elements deemed unsatisfactory for her experimental purposes[6]. According to Wohl, "Her system, so endearingly personal, was hopelessly insular. Her activities, so sound, so altruistic, and godly, tended to push in to the background the real crises which had to be met..Her contribution was after all a negative one"[7]. She saw the practice of housing management as one whose function was integrated. In the properties she managed herself, and in others overseen by trained volunteer women, the idea of property management, as providing a positive attack on housing problems,

gained wider recognition. In all her managed concerns, the supervisor was responsible for the collection of rent, for all matters affecting tenants (allocation, transfer and disputes) and for the routine maintenance of properties[8].

In addition to Hill's experiments many enlightened nineteenth century industrialists and charitable institutions were also concerned with the provision of improved working class housing. Such societies offered investors a 5% return on their capital outlay and further ensured that not only the most deserving but also the most 'respectable' of the lower classes were given tenancy[9]. Strict occupancy regulations were enforced for these model communities which, in effect, made the trusts discriminatory and oppressive. Such characteristics, many have argued, survive in contemporary housing management. One society, the Metropolitan Association, had strict rules governing rent payment and it also carefully screened its applicants, allowing sub-letting only to relatives. As a high proportion of the working class needed to sub-let in order to pay what were substantial and ever-increasing rents, this limitation was particularly severe. The Peabody Trust was also highly selective in choosing its tenants and was apathetic to all who (by its self-imposed standards) were considered unsuitable. Here, too, its regulations might be seen as a model that is still followed (as noted below) by some local authorities in their conditions of tenancy.

Some of the main rules and regulations of housing management systems included the following:

1. No rent arrears were allowed.

2. Passages, steps, closets and lavatory windows were required to be washed or swept every Saturday before 10.00 a.m. This was to be organised in terms of a tenant rota.

3. Washing was to be confined to the laundry, which could not be used by non-tenants, and no clothes were to be hung outside.

4. The beating of mats, carpets, etc., was not permissible after 10.00 pm and it was deemed a breech of regulations to throw rubbish out of windows or doors.

5. Tenants were required to pay the cost of all breakages and repairs in their rooms.

6. Children were not allowed to play on the stairs, in passages, or in the laundries.

7. No dogs were to be kept on the premises.

8. Tenants were not allowed to paint, paper or drive nails into the walls.

9. Disorderly and intemperate tenants would be issued with immediate eviction notices[10].

Tenants of charity-provided housing and, subsequently, Council Authority housing thus found themselves subjected to strict behavioural codes which the 'respectable' element readily accepted and to which the 'disreputables' were obliged to conform or suffer eviction. In fact, the sifting of tenancy applicants attempted to exclude those unlikely to prove 'good' dwellers. Consequently, the poorest stratum and also those in irregular or transient

occupations were considered unsuitable tenants of the new improved houses. Most of those accommodated by the housing trust movement in the latter part of the nineteenth century were, in fact, the permanently employed working class households or the more 'affluent' of the casual workers. Significantly, the values of the philanthropic societies were supported by Victorian capitalist ideologies, not least the principles of laissez-faire.

1.3. The Post Victorian Era

Prior to the First World War, there were little more than 25,000 publicly owned dwelling units[11], and those authorities with tenanted accommodation usually employed agents or solicitors as middle-men whose main purpose was rent collection. After 1918, this system was strongly challenged by the new Ministry of Health which, by 1920, supported the role of public housing management working under the aegis of the Housing Department. Significantly, this system was based on the experience gained from the Octavia Hill and other housing societies. Collectively, these provided important guidelines for local authorities who faced, for the first time, the problems and general issues of housing management. The Ministry of Health advised that whatever system was adopted in terms of housing provision and management" arrangements (would) have to be made for carrying out the following objects:

1. The careful selection of tenants.

2. The elimination of unsatisfactory tenants.

3. The constant supervision of the property, and its occupants, by officials directly employed and paid by the owners.

4. The systematic and punctual collection of rents"[12].

The 1920's, however, witnessed the development of a variety of managerial organisations, the most common theme being that the different aspects of housing management were placed in the hands of the most appropriate departments: the selection of tenants was the

work of councillors, rent was collected by treasurers, and housing maintenance become the concern of engineers and architects[13]. Damer[14] has demonstrated that the council estates of the 1920's, on account of high rents and rigorous selection policies, were largely let to the highest paid workers. Such estates were of a higher social status compared to those which resulted from slum clearance schemes, slum dwellers (stigmatised as 'rough') being relegated to more basic housing where space was restricted and house designs less attractive.

The 1930's were marked by Government intervention in the form of the 1930 and 1935 Housing Acts. These initiated a period of local authority slum clearance and housing replacement. In 1938, the Central Housing Advisory Committee report[15] described it as an "entirely fresh principle...a principle designed in a short time to create great social change...This was the central fact and it was a new faced to housing."

Prior to the Cullingworth Report of 1969[16], the 1938 Report of the Central Housing Advisory Committee was the most influential report on housing management, for it set important standards. Its committee specified the roles and practices they considered as bases for such aspects as the allocation of housing, the vetting of would-be tenants prior to re-housing, the grading of applicants, and the furnishing and hygiene arrangements of dwellings. Included in their provisions were the development of community services and 'after care' facilities for both dwelling and tenant.

The appearance of the 1930's estates largely reflected contemporary economic and political attitudes, but the letting policies and council attitudes to the re-housing problem still parodied nineteenth century methods and treatment. The divisive and individualistic approach of housing management is fully expressed in the 1938[17] report dealing with 'problem families'. The 'bad habits' of the slum dwellers, it was stated, "are not easily broken and when these habits govern the behaviour of a small community, such as sometimes exits in a slum street, they persist for want of better alternatives. The bad tenant will learn more readily by eye than by ear. We therefore favour the principle of separating unsatisfactory tenants from one another."

This report, however, did much to improve the status and efficiency of housing management, for it supported and strengthened the overseer role of housing managers and also involved management in new housing designs and town planning. Prior to the report, the tenancy section of most authorities was usually only an adjunct of the town clerk's department. Hence the comprehensive attempt to increase control throughout the whole housing field was firmly underway. Unfortunately, the gathering momentum of slum clearance and of rebuilding programmes was cut short by World War II.

Although the developments in housing management during the inter-war period cannot be precisely outlined, one of its dominant characteristics was the increasing degree of local housing management of new buildings and newly-acquired properties. The social character of those accommodated varied greatly (particularly

between the wars) and housing management was forced to work with sub-standard dwellings and difficult tenants. Yet it is important to stress that these problems composed no more than a minor proportion of its tasks.

1.4. The Post-War Period

1.4.1. The 1940's

During the 1940's, the shortfall of dwellings, exacerbated by little new building and extensive war damage, led to the construction of non-traditional, temporary housing[18] including the 'pre-fabs'.

The 1938 Central Housing Advisory Committee report was accepted as a kind of 'theoretical philosophy' put into practice by the enormous post-1945 housing expansion which accommodated predominantly working class families with stable and growing incomes. The other major cause of housing change stemmed from the Ministry of Health's confirmation of local autonomy in terms of management. Both these influences are apparent in the 1946 Scottish Housing Advisory Committee Report on 'Housing Management in Scotland'[19] which stressed that the primary duty of the housing manager is the collection of rent, though under the Octavia Hill system this was seen as much more than a mere business transaction. The Housing Manager was one who sought to create a sense of responsibility in tenants and a feeling that their tenancy obligations were in their own communal and personal interest. Throughout the 1940's the relationship between central and local government is pertinent to the understanding of the changing practices and policies of housing management. Importantly, the granting of local autonomy allowed authorities either to ignore or side-step central government advice and recommendations, the latter becoming increasingly more liberal. Residential qualifications are

a case in point: in 1949 the Ministry of Health urged local authorities to consider that: "whatever system of selection is adopted, care should be taken that factors not relevant to housing need, such as length of residence in the area or the date of application, are allowed to weigh only in deciding between applicants whose claims on grounds of need are equal"[20].

1.4.2. The 1950's

The distinguishing feature of post-war conditions was the great expansion in the local sector, particularly throughout the Fifties. This brought great changes in the role and methods of housing management. The institution of individual housing departments became commonplace and functions which were formerly administered separately by different departments were increasingly brought together under the umbrella of a housing manager. This applied particularly to rent collection and accounting, allocation, and the general administration of the housing department. Throughout the 1950's, however, such ideas, though suitable to tackle the social problems of pre-war slum clearance, recived less attention at what was a time of new purpose and hope in council accommodation. Central Housing Advisory Committee in its report on 'Unsatisfactory Tenants'[21], continued to offer advice on housing management. The philosophy of housing management in the 1950's was that of maintaining the operations then instituted to deal with the massive increase in the number of applicants for tenancies. An important move during this period stemmed from the 8th Report (1957) of the Housing Management Sub-Committee of CHAC[22], which advocated that all functions relating to the landlord and tenant should be the

responsibility of one committee and department, although it made provision for management variations with respect to "small housing authorities owning a few hundred houses."

1.4.3. The 1960's

The 1960's saw further movement in government policy away from its emphasis on 'greenfield' sites for new building to that of inner city replacement and slum clearance. Those sections of the communities then being housed by local authorities were increasingly those who had been displaced by the urban 'bull-dozer'. This meant that a large percentage of new council tenants were the displaced populations from renewal and replacement schemes. Many were housed in the new high-rise blocks which often quickly became, for social and physical reasons, unpopular and unacceptable.

The 1960's also witnessed the continuing decline in privately rented stock which, together with the consequent problems of slum clearance (not least homelessness), created the need for increasing co-ordination of local government services and additional changes in allocation priorities. The Seebohm Committee[23] advised housing authorities that they "should be able to give early and effective help to vulnerable people", and it also called for greater co-operation between housing departments and the social services. This 'comprehensive' approach was seen as a major solution to the problems[24]. The Cullingworth Report of 1969[25] drew attention to the social groups who faced particular difficulties in finding accommodation (single people, students, young mobile workers and

unmarried professionals). It also highlighted the special needs of low income families, large families, the elderly, and the homeless groups which local authorities still tended either to ignore or to give low rehousing priorities. Gradually 'Housing Need' was given more consideration as an allocation criterion, and since it was related to social and economic needs, provided another indication of the way in which the role of local authorities had changed to meet the specific circumstances of its tenants - potential and actual.

In summary, therefore, housing management in the 1960's began to recognise those in need as being the victims of, rather than the culprits of, the housing system. Towards the end of the period, and into the early 1970's the move was from the high-rise development and back to low-rise high density construction. In many areas, espcially city authorities door-to-door rent collection ceased, yet this consequent lack of contact with tenants meant that housing management was faced with other problems.

1.4.4. The 1970's onwards

From the 1970's onwards the concept of the linkages between housing needs and social and economic needs gained further support from the Finer Report[26] and the particular issues involving single parent families and ethnic minorities were fully outlined in the PEP Survey[27]. Both publications confirmed that changes were to taking place in the way local authorities were dealing with tenants.

This concept was confirmed by the Homelessness Circular (18/74) of

considerable increase in the housing authorities' work-load.

This change in local authority attitude throughout the 1970's was physically mirrored in the move away from extensive slum clearance schemes and new building to the modernisation of existing stock. This was introduced in addition to programmes of general maintenance, which included external painting and repairs. Hence, the task of dealing with an aging housing stock was a new departure for housing management, but one that brought with it many acute problems. Many of the latter were obscured during the early 1970's on account of the reorganisation of local government. From 1975 onwards, however, the difficulties of coping with increasing maintenance demands, together with tighter management, became all too apparent, especially in the face of resource cuts. Old properties were deteriorating more rapidly, while the number of tenants requiring local authority action was increasing, especially in view of the current governmental commitment to owner-occupation. This, together with attempts to resuscitate the private rented sector, as well as changes in allocation policies, have all been greatly constrained by the current economic climate. Hence, it can be said that the current problems facing local housing management will continue into the foreseeable future.

1.5 The Influence of the Past on Present Day Policies

While the above synopsis of Local Authority Housing policies may appear, at first sight, to be of little more than historical interest, this is not the case. As in any other organisation, the decisions reached by local housing authorities are not determined entirely as a result of rational discussion. It is inevitable that, to a greater or lesser extent, personal prejudices among those who determine policy and make decisions will have a significant influence. In many cases the most influential individuals are those most experienced in local government affairs, and who, therefore, have been influenced by their personal experiences of forty, or even fifty, years ago. In addition, prejudices acquired from parents may well be based on conditions as they were as long ago as the late 19th century. Thus, some knowledge of the history of public sector housing can often provide an explanation of apparently irrational opinions expressed by members of Local Housing Authorities, and of decisions reached by authorities.

1.6. Potential changes and Developments in Local Housing Management

The many changes and developments in government policies throughout the last 15 years have attempted to dictate management policies and practices to local authorities. Formerly, much had been left to their discretionary judgement, so it is important to examine these changes and to comment on their potential effect. It is necessary therefore, to discuss first of all, policy changes and then the methods and organisation of housing management, together with the policies affecting residents' rights.

1.6.1. Policy Changes

The most important alterations in housing policy have affected the areas of tenancy and tenancy conditions. One of the main changes relating to allocation policies has been the move away from the more obvious 'grading schemes'. The requirement for more information to be supplied to applicants was also acknowledged in the 1980 Housing Act, which required councils to publish their allocation and transfer systems.

Recent suggestions for alterations in tenancy policy have been concerned with the problems of special groups, and a number of reports have urged that local authorities should focus on the needs of such groups. These include the handicapped, the disabled, battered wives, single parent families and ethnic minorities[33]. This has led to the situation where the district council must give priority to the above-mentioned groups.

Another area in which important changes have taken place is in the administrative work and procedures concerning housing beneift. This has largely resulted from the Social Security and Housing Benefits Act (1982), which formulated important rules applicable to all statutory and non-statutory tenants. It contains clear statements which define distinct tenant responsibilities. At the same time it urges local authorities to amalgamate their machinery involving rent rebates, allowances, rate, and supplementary benefit into a collective Housing Benefit system administered by the local authorities[34]. Such changes in national policy have resulted in local authorities becoming increasingly involved in social matters rather than just administration.

1.6.2. Administrative Changes

They involve such developments as the comprehensive approach, tenant participation and neighbourhood management. Hence it is pertinent to examine these developments in order to ascertain the degree to which they are likely to achieve their objective of real improvement in housing management, and their effect on the proposed Local Housing Management system.

1. The Comprehensive Approach

This attempt to integrate all housing functions, both public and private sectors collectively relates to the image of corporate management which local authorities are attempting to create. To date, however, corporate management has been hindered by developments external to itself, not least, grant cuts. Hence comprehensive housing services have been largely impotent in

influencing ancillary actions[35].

Whereas the provision of comprehensive services was seen as a method of implementing better authority-tenant contact and communication[36], it is important to note that it can have little effect on the quality of housing management simply by amalgamating its various facets and areas of concern under one 'umbrella'. Even the communication elements of the policy have hardly changed; in fact, many would argue that the expanding range of departments has created more communication difficulties: a concomitant of the centralised approach. This is one of the reasons for many local urban authorities having instituted decentralisation policies for housing administration based on area offices. In actual fact, however, in large local authorities many area offices in the larger authorities deal with dwellings whose numbers are equivalent to that of a small local council.

2. Tenant Participation

One important response to new housing management relates to tenant participation, which occurs at a variety of levels and includes services, allocations, capital programmes, repairs and estate management. It is envisaged that tenant participation in capital programmes will operate at the development planning level[37]. The Housing Act (1980) advises local authorities on tenant participation and, since that date, tenant associations have begun to play an active role in housing management. Important advice and guidance comes from a supra-body, the National Tenant Organisation.

The Tenant-Management Co-operatives, formed under the Housing Rent and Subsidies Act 1975, are perhaps of greatest importance within the field of tenant participation. In addition, management co-operatives in Scotland are encouraged by the Scottish Development Department Circular(14/17,1977)[38]. Based on the evidence to date, Tenants' Management Co-operatives seem to provide a successful way of involving, directly, tenants in housing management[39].

The range of questions which may be discussed by housing authorities is defined in the Housing Act (1980), but debates concerning rents are excluded. Yet tenant-authority meetings, advisory services and the co-option of tenants to serve on committees could be seen, if fully implemented, as a major advance in occupier-management relationships.

3. Neighbourhood Management

Neighbourhood Management more recent innovation and it plays an important role, particularly in difficult-to-let estates and high-density housing schemes. It stems basically from decentralisation policies and the move by authorities to open area offices, the latter having a senior officer and a small maintenance and advisory team. It has been noted that such offices immediately improve relationships and general morale amongst both tenants and officials[40]. Such offices, however, in spite of their advantages are not always easy to establish, and resource and staffing problems are usually the main constraints. In the case of the more difficult estates, especially those with problems concerning such as heating system problems, damp and condensation, etc., local

offices rarely have the funds to deal with the problems[41]. Also, the housing management profession has expressed concern at the increased work load, and hence additional staff required, which it considers will result from the adoption of such a system. The availability of financial resources, therefore, is obviously the major factor behind the success, or otherwise, of Neighbourhood Management.

1.7. The Policies, Practices and Problems of Local Housing Management

Through legislation and monetary control, central government has set broad limits on the management task of local authorities, although the latter still largely specify their own policies.

It is important, therefore, to consider the various policies that apply to housing authority management. Many the statutes governing such rights and obligations do not differentiate between the public and private sectors. However, a body of legislation, laid down in Section I of the Housing Act (1980), deals only with the public sector and gives tenants certain rights, including the right to purchase their dwellings.

Parts of this legislation are so specific that councils are given little discretionary power in certain areas. For instance, the sections of the Housing Finance Act (1972) provides the details of the National Rent Rebates and Allowance Scheme, whereas other sections are general in the extreme. Sections of the Social Security and Housing Act (1982) specify mechanisms for the amalgamation of rebates, allowances, and supplementary benefits into a general Housing Benefit to be administered by local authorities. Under Section 32 of the Housing Act (1961) considerable discretion is left in the hands of councils, particularly as regards the obligations of landlords and tenants concerning the repair and maintenance of properties.

Although extensive legal requirements apply to allocation, central

government has been prepared to leave the finer details of selection to the discretion of local authorities, who best know their own problems. Yet guidelines on selection and allocations priorities reach local authorities as advice circulars from Scottish Development Department[42]. Such advice has largely concentrated on primary rationing, in other words the various schemes that can be applied in a realistic way to select tenants.

Until such advice was made available, many district councils greatly restricted access to council housing waiting lists by placing such restrictions as age qualifications and length of residence within the authority's area of jurisdiction. District councils throughout Scotland, are now obliged to open their waiting lists to all persons living within their administered areas. Yet despite such improvements, the system is one that still demands the skilful manipulation of waiting lists[43]. Some local authorities also operate exchange schemes which attempt to match applicants and suitable dwelling units.

The problem of rent arrears is one of the most obvious concerns of local authorities and, commenting on policies concerning arrears, Macey and Baker[44] conclude that: "It is not in the best interests of the tenants that too lenient or complacent an attitude should be adopted by the housing authority. Such an attitude brings two results in its train. The bad payer is not checked until he has a millstone round his neck, while the general body of tenants gradually adopts a negligent attitude and the number of arrears cases increases quite unnecessarily."

In 1980, a study by the Scottish office[45] examined the problems and reported that tenants require some personal contact with council staff, who can then, if necessary, advise them on welfare benefits and rebates. In addition, it argued that procedures necessary for the recovery of arrears needed to be improved. In 1981, the Housing Research Group of City University also examined the problems facing local authorities and stated[46] that there are distinct limits to dealing in a uniform way with all cases of rent arrears. Tenants must, and want, to be treated in a personal manner, they want their own personal problems and conditions to be taken into account when faced with growing rent arrears. Equally, staff whose job involves repeating identical procedures for all cases can often lose a sense of social purpose in what they are doing, particularly in terms of those people and those estates that most need to benefit from their work. In 1984 the DoE studied the problems facing both tenants and local authorities and suggested ways of preventing rent arrears[47]. The survey stressed that "there are two philosophies on rent arrears: Firstly, that they are dealing with debtors and not debts, and, therefore, must vary procedures and practice according to the need of the individual debtor rather than have prescribed regulations for debts of certain levels. Secondly, the emphasis from start to finish should be on the prevention of homelessness and eviction and not on the promotion of it."

Many publications have stressed that the problems found on many estates have a direct correlation with poor maintenance. In particular, the seminar reports of the Housing Review, not least

study by the Ash[48], comment that certain key problems can be identified. These include the high cost of maintenance, bad services, poor communication between housing departments, lack of tenant participation, and lack of information provided by the authority. Ash's study stressed that more changes in the structure of council housing departments are needed, and, furthermore, it recommends the need for occupants' participation and for self-help schemes in terms of property improvement. It further suggested that with the aid of computerisation, a more efficient organisation and control of issues would result.

1.8. The Organisation and Local Staffing of Local Housing Management

When considering local housing management, it is important to discuss both the structure of its various departments and their staffs. The various aspects of the organisation will now be discussed.

1.8.1. Comprehensive Housing Approach

The advice given to local authorities in the 1920's borrowed many ideas from the earlier housing management societies of the 19th century. Housing functions were allocated among various departments, repairs to the maintenance department, rent collection to the treasurer, new housing provision to the architects, etc. The idea that housing management operates more efficiently when co-ordinated into one comprehensive department was not accepted until the restructuring of local authorities in 1970[49], and an additional contribution in this area was the expansion of housing authority activities into the private sector.

The objective of such comprehensive housing services must be to provide an efficient service to the occupier as well as attempt to cover all aspects of private and public sector management[50]. The move away from what has been termed the 'waiting list mentality' coincided with the institution of joint management authorities. The Maud Report[51], commenting on this arrangement, emphasised the need for local authorities to re-structure their management policies, thus providing the opportunity for a more efficient service in which a management-orientated system works in close co-operation

with government authority. The Housing Service Advisory Group[52] put forward the criteria whereby authorities could select tenants and it stressed the importance of a comprehensive approach and integrated system.

1.8.2. Decentralised Housing Approach

The decentralisation of local authorities has as its main objective the provision of more local levels of provision assistance by housing authorities. In pre-war times a number of local authorities realised the disadvantages of operating from one centralised office. The decisions in favour of decentralisation were largely governed in terms of travelling costs. The Bulter report[53] was explicit in explaining the bases of such an approach: "The role of area housing management organised on a decentralised basis, is to take the service as close to people as possible. Following the traumas of local government reorganisation, it was essential to try to established close contact with tenants of the new authorities. The establishment of local area housing offices to deal with day to day management was an attempt to meet this need. It was also a method of enabling staff to become aware of local circumstances to a degree that would not have been possible in a large centralised organisation..."

Maclennan[54] also commented that "Not only will it reduce the repeated travel costs, particularly for peripheral area residents, but locally-oriented management may be able to respond in a rapid and integrated fashion to local problems and opportunities." The size and nature of the district council has an important bearing on

the scale of decentralisation. 'Rural' authorities (those with only small towns) are usually decentralised, but in many cases of small urban authorities transport services to one main housing office are better than to less central sub-offices. In addition, the small size of many housing departments may not warrant decentralisation especially where an efficient level of communication operates, through door-to-door rent collecting, between dwellers and management staff. On the other hand, some large urban local authorities (for instance, Glasgow, Manchester, and Birmingham) increased the number of their area offices in order to improve contact between occupants and authority staff.

Another factor relevant to the level of decentralisation is the degree to which computerised systems operate at the housing management level. The more computer techniques are used, the less the degree, generally speaking, of decentralisation. This seems to suggest that it is administrative convenience rather than closer occupier-staff relationships that characterises housing management. Manchester, however, has devolved some of its fundamental decision making, especially rehousing decisions, by using its central computer and local visual display units to aid more rapid communication between local staff and headquarters[55]. The implementation of this type of computer facility, it must be noted, has led to additional problems concerning decentralisation. In particular duplicate records are necessary, one set in the main office and sub-sets at the appropriate area offices.

1.8.3. Staff Training

The importance of adequate staff training has long been stressed as a prerequisite to the new approach in local authority housing management. The lack of qualified personnel was highlighted in the City University's findings of 1977[56] and subsequently, numerous reports and articles have further stressed the need for expert training. Not least of these is the DoE Report[57] which concludes that "there is pressing need for more training in housing management." There is no doubt, therefore, that efficient training will significantly improve the quality of housing management. Training is needed for councillors and senior staff as well as for those in the non-executive posts. The importance of training in computerised systems has already been discussed and priority must also be given to training those staff having personal contact with tenants, e.g., housing visitors and advisers. In 1978, Scottish Local Authority Special Housing Group[58] suggested that staff members most likely to visit or meet members of the public should be trained in providing comprehensive and meaningful advice. Such staff include those dealing with allocation, letting and waiting list clients, and also those who either visit potential occupiers or work from area offices. This group argued that some of the major deficiencies currently affecting housing management relate to the lack of basic communicative skills and knowledge among important sections of the staff. A major fear is that staff attitudes will disrupt efficient management and, consequently, create more problems. An additional concern stems from the conflict between the public and the private sectors.

1.8.4. Computers

The use of computer techniques in housing management is currently of major importance, especially as regards how it aids efficiency. Since the early 1970's they have become increasingly common. In area offices computer services are especially useful in allowing the immediate retrieval from central storage of up-to-date information on all aspects of housing functions. Computers can greatly improve the service given to tenants, particularly in providing speedy answers to queries, providing the housing department has ensured that its staff have received adequate education and training in computer operation.

According to Scarrett[59], at least part of the training should be undertaken on the particular system to be used. It is usual to operate the old and new systems alongside one another for a period long enough to ensure that the new system is fully understood and is being operated correctly. It is, of course, important to ensure that the system itself operates as intended. Computerisation does not reduce the need for skilled staff, but it places different responsibilities on them, and allows a better service to be provided both to tenants and to the authority.

As Hirsch states[60], "many housing managers have been living with their computers for nearly a decade now, and though their relationships are often stormy, few would contemplate divorce". Most urban authority housing departments now have computer facilities and, according to the Scottish Local Authorities Special Housing Group Survey of 1982[61] five (i.e.50%) of those with a

decentralised organisation were computerised. Conversely, only 50% of those with a centralised organisation had computer facilities. Initially, computers were used for the administration of housing benefits and other routine clerical work. However, over the last decade or so, they have been profitably applied not only to the financial side of housing management, particularly rent accounting, but also to lettings, waiting list allocations and general maintenance and repairs. Yet the use of computers is still relatively little developed in this country[62]. The computerisation of housing benefits (Rebates and Allowances) was largely the result of the Social Security and Housing Benefits Act (1982), which requires authorities to amalgamate their machinery involving rebates, allowances, and supplementary benefits into a collective Housing Benefit. In view of the falling costs of computerised hardware and software, it seems highly likely that most local housing authorities will change to such a system, thereby leading to a major reduction in administrative time spent on housing management.

1.9. Organisation of Local Housing Management

Authorities differ considerably in the particular responsibilities given to staff who deal with existing occupiers. Responsibilities of staff who have dealings with occupiers include the visiting of transfer applicants, rent arrears recoveries, the maintenance of properties, tenancy conditions, the organisation of repair work, the inspection of vacant properties, and the provision of advice and information. This makes the division between local and other housing management responsibilities a particularly blurred one.

The major functions, such as allocation & waiting list, repair & maintenance, rent accounting, rent collection and arrears control, and housing benefits are described in more detail in later chapters. Much of the local management work of large urban authorities is organised from area offices, e.g. jobbing repair are often undertaken by a local depot-based force. Conversely, many authorities with smaller housing stocks, but an extensive geographical area, manage their commitments from one head office, with a substantial amount of repair and maintenance work being placed in the hands of private contractors. In both cases most contact with tenants is made by the local housing management staff, including those in charge of repair requests. It is important, therefore, to discuss their work and also the occupier experience of it.

Although much of the work of housing management departments is primarily concerned with providing services to tenants, they are

also concerned with the operation of what are essentially landlord functions, such as accounting for rent collected, keeping tenancy records and organising the re-letting of empty properties. Certain management functions, however, relate more specifically to joint tenant-landlord interests. These include such things as transfers and the carrying out of repairs. No hard and fast distinction can be made between what can be termed landlord activities and services to tenants, but an attempt to differentiate does help in an assessment of local housing management.

In summary, local authority housing management departments are faced with both organisational and clerical problems. Some have argued that the use of an integrated computer system would solve many of these current difficulties, while, at the same time, it would allow the implementation of more efficient methods of housing management. The computer processing of housing management information is discussed in more detail in the next chapters, and it would appear that greater efficiency and general benefit would come from such an integrated approach.

2. The Nature, Characteristics & Experience of Computer Systems Used in Local Housing Management in Scotland

2.1. Introduction

As noted in chapter 1, housing functions and the processing information relating to these functions has greatly changed from the days when master file records were maintained and checked manually. The adoption of housing management computer systems, hereafter referred to as 'systems', has meant that most functions are now handled by machines capable of the fast and accurate processing of transactions, the maintenance of invisible records, and more frequent reporting.

The main function of such systems is to process transactions efficiently and accurately, to maintain permanent and up-to-date reference files, to deal with internal and external reporting, and to produce routine reports and documents for managerial and financial purposes. These functions, in system terms, are referred to as data capture, data input, data processing and data storage. Further information on these stages and operations can be obtained from a number of sources[63,64].

Computers are used to operate these functions and most local Scottish housing authorities have had some experience with the use of computers in different areas of housing management. This means that staff have some idea of what computers can do, although they might not be knowledgeable as regards the ways in which computers really work. It will be useful, therefore, to consider, initially,

computer types before discussing how computers operate and the components which make up the systems used in Scottish Local Authorities' Housing Management Department.

As part of this research a questionnaire (see Appendix 1) was sent in April, 1985, to all Directors of Housing in Scottish District, Islands and New Town authorities. The questionnaire was followed by three reminders in June, July and August, respectively, and telephone calls were made in September and October to check or seek further information. During this period, i.e. from April to December 1985, regular visits were arranged to 10 Scottish authorities with multiple visits to a selection of these authorities (see Appendix 2). This included 10 visits to Stirling District Council and 26 visits to Glasgow District Council.

Although it proved impossible to obtain answers from all the Scottish authorities or complete answers to a number of questions, the purpose of the investigation was to gauge the extent and nature of the main problems facing Scottish housing authorities. The findings provide a major information source for this study which seeks to examine how computers can be more effectively used, particularly as part of an integrated system.

Survey forms were distributed to 61 housing authorities made up of 53 District Councils, 3 Island Councils and 5 New Towns (see Appendix 3). Replies were received from 53, that is, an 87% response rate. This number was made up of 46 District Councils, 2 Island Councils and 5 New Towns. The statistics quoted and

discussed in the following pages, unless otherwise stated, relate to the questionnaire findings.

The main objective of this chapter is to consider briefly the main computer types. This is followed by a discussion of the types of computer in use and their manufacturers. Also, computer systems used by Scottish local authorities are described, followed by a description of the management of the systems and the staff who operate them. Finally, current problems and future developments are discussed.

2.2. The Main Computer Types

In order to simplify what can appear as a confusing array of different types of computer, it is important to note that there are basically three main types that are currently used. These can be labelled as mainframe, mini, and micro have some idea of their broad characteristics, uses and limitations. Currently, Scottish local authorities use all three types of computer noted above.

1. Mainframe Computers

These were, until a few years ago that is prior to the introduction of the 'mini-computer, the only type of business computer available. Not only were they large, but they were also expensive and demanded a closely controlled environment in which to operate. Rooms needed a major electrical supply and there were problems associated with heat dissipation. The major disadvantage of these early computers was their lack of backing store facilities, other than punched cards or punched paper[65]. Consequently they had limited use in terms of their business application. New models were subsequently introduced and major advances came with the IBM range such as the 360 and ICL 1900 series[66]. Their magnetic storage facilities and easier programming procedures (using high level languages) were major improvements. In addition integrated circuits gave cheaper and faster processing power, and modular construction gave greater flexibility and economy. Above all, multi-programming resulted in more rapid and efficient operations.

2. Minicomputers

By the 1970's there was a major swing away from the large mainframe hardware to the use of the smaller minicomputers[67]. These compact and less costly machines are capable of meeting the processing needs of most small local authorities.They, too, have seen many technical advancements and most approach the power and capacity of mainframe models and compete satisfactorily in terms of operating speed and storage.

3. Microcomputers

Developed in the later 1970's[68], these machines were introduced to satisfy the small office demand, especially those requiring small storage capacity. Originally developed as machines for the technical enthusiast, their value for serious business has since been recognised and in the last few years commercial users have realised their potential. As a result they have developed in power and storage capacity to provide fast and now complex processing. These so-called 'personal' computers are now capable of storing some millions of characters. Their capacity and, however, is limited, in the context of a major local housing management system.

In the context of the above, it is important to note that as computer technology has developed the distinctions between the three main computer types have rapidly become blurred, especially as many small computers are now more powerful than the large mainframe varieties of some year ago.

The survey showed that many of the Scottish local authorities used

more than one type of computer. Caithness and Glasgow District Councils, for example, used all three types and there were many authorities that used two. In addition, some authorities were using more than one computer of the same type, for example, Edinburgh and Monklands (which each had two mainframes), Glasgow (which had 18 mini and 26 micro computers) and Glenrothes which had 2 micro-computers.Table 2.1 illustrates local authority computer usage.

Table 2.1

Number of Housing Authorities by Type of Computer.

Type of Computer	Number of Local Authorities
Mainframes	3
Mini	18
Micro	15

Mainframe computers are typically used by many people simultaneously. This usage is characteristic whether the processing is centralised in one large data centre, or is widely spread with decentralised terminals. Hence, while several programmers might be carrying out on-line programming through terminals, an allocation clerk might be entering items of information pertaining to applications or storing housing data. This might be proceeding on while rent and rebate clerks in a number of area offices are entering tenant demands and while, in addition, computer operators are running a large Direct Labour Organisation stock control report. Such multi-demands on the system will in no way hinder the

Housing Director from displaying housing management statistics on his office screen.

The largest number of applications that are run on local authority mainframe computers are programs developed specifically for particular councils and their users. But of the 67% of authorities using mainframe computers, only 29% had written and developed their own housing programs. The remainder relied on standard packages or a combination of packages and programs written in-house.

Minicomputers are suitable for small local authorities, especially those that have no area offices. Of their 6-12 screen terminals, these are usually divided between allocation and waiting list information, rent and rate rebates, general office management, maintenance and repair work, and rent accounts. The survey indicated that 26% of the authorities relied on mini-computers, though some 58% of these also had area offices. Table 2.2 illustrates the distribution of terminals and area offices among authorities.

Table 2.2

Number of Local Authorities Using Minicomputer by Area Offices and Number of Terminals

Name of Local Authority using Minicomputers	No. of Area Offices	No. of Terminals
Roxburgh	2	6
Tweeddale	3	2
Stirling	2	12
Annandale & Eskdale	6	4

Nithsdale	none	9
Argyle & Bute	9	5
Bearsden & Milngavie	0	2
Strathkelvin	2	15
Clydesdale	none	6
Cumbernauld & Kilsyth	3	2
Cumnock & Doune	none	6
Cunningham	4	6
Glenrothes	none	2

Minicomputers can use packages for their housing management work and functions, allocation and waiting list, maintenance and repair, rent accounts and housing benefits. An extensive range of housing management packages is available at the cost of a few thousand pounds each[69]. Interestingly, Cunninghame District Council reported that it had written and developed its own programs, though for more details see Table 2.3.

Table 2.3

Housing Authorities Using Minicomputer by Type of Soft Application Programs

Local Authority Using Mini	In-House Developed Programme	Use Packages	Use Both
Roxburgh			*
Tweeddale		*	
Stirling		*	
Annandale		*	
Nithsdale		*	

Argyll & Bute			*
Bearsden & Milngavie		*	
Strathkelvin		*	
Clydesale		*	
Cumbernauld & Kilsyth		*	
Cumnock & Doune		*	
Cunningham	*		
Glenrothes NT			*

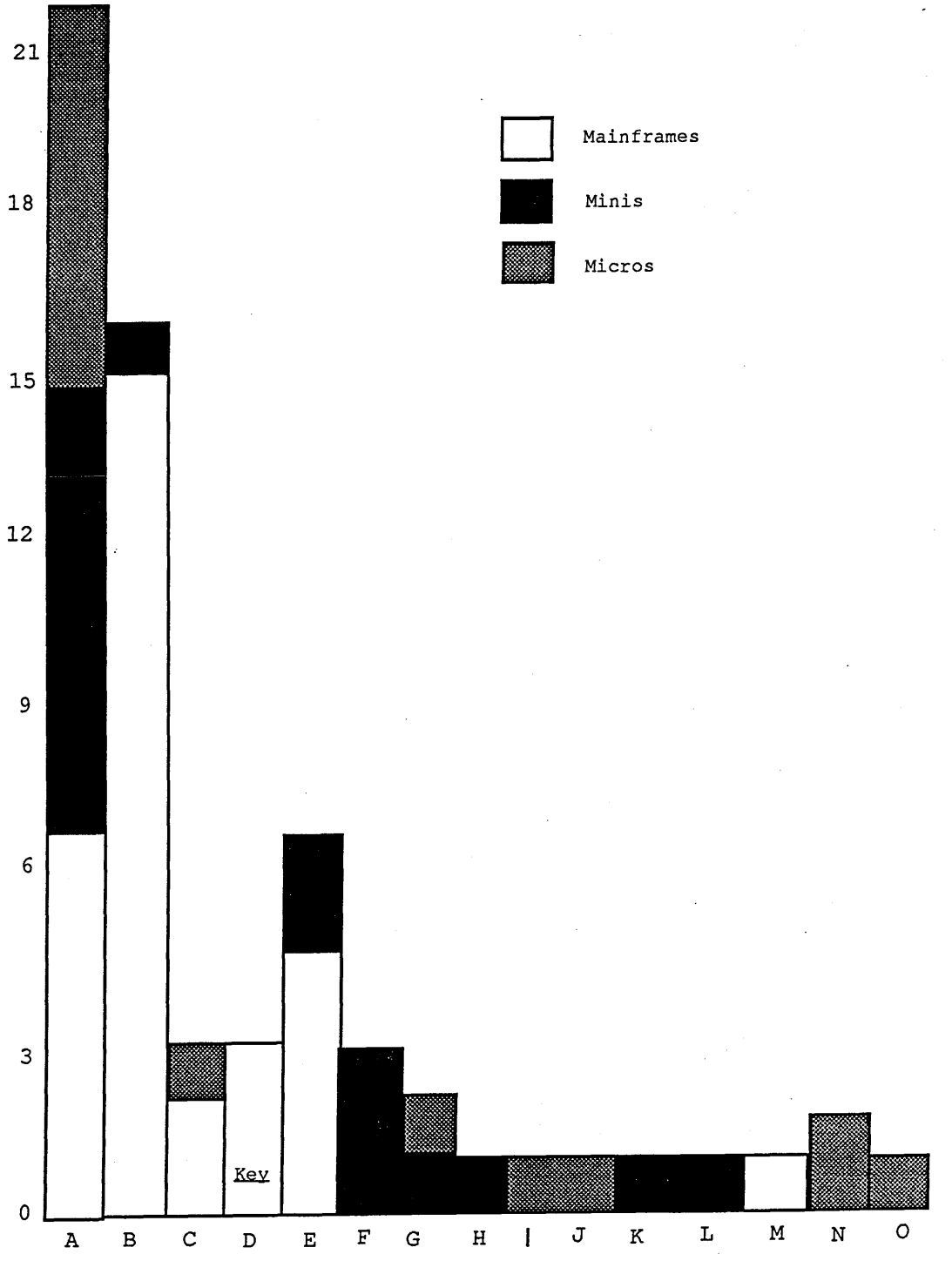
Many of the smaller councils with microcomputers lack in house expertise and rely on the dealer or supplier for 'turnkey' (i.e. read to use) systems and for assistance in programming and operating equipment.

As micro-computers are usually single-user machines they are designed for solving one task or program at a time. Though programs can be developed and run on them, microcomputers are not really as suitable for local authorities as are mainframe computers. It might be noted, however, that Badenoch & Strathspey, Kincardine, and Skye and Lochalsh rely on microcomputers and that the majority of housing management applications use expensive pre-programmed packages.

2.3. The Types of Computers in Use and their Manufacturers

2.1a-d illustrate the breakdown of the types of computers and their components classified according to manufacturer or brand name. These show a very wide range, though the dominant makes used by the authorities are NCR and ICL. Such a variety of manufactured equipment precludes the easy and efficient sharing of software packages and can often cause problems of staff mobility since the latter are often adept at handling only one type or make of computer. Mainframes are generally sold by the international computer manufacturers (IBM, HONEYWELL, ICL, etc) and their selection and purchase is an expert task which often requires a long period of analysis and sometimes a trial run to test efficiency and capabilities. As Hirsch writes[70] "many housing departments have experienced difficulties with the computer system manufacturers, who in most cases operate the mainframe". Installation, undertaken by the supplier, is also an elaborate procedure, and demands a special room, usually air conditioned, and with false flooring to take the necessary cables. Consequently, mainframe computers are supplied with a comprehensive support service which usually includes education and application assistance in addition to maintenance.

Mini-computers are sold direct from the manufacturers (NCR, IBM, ICL, etc.) or by independent dealers who are also software dealers offering their own packaged programs for the hardware equipment they supply. Choice and purchase again requires careful consideration and usually also involves obtaining and evaluating a



Key

A = NCR
B = ICL
C = IBM
D = BURROUGHS
E = HONEYWELL
F = SEQUOIA
G = ZILOG
H = OLIVETTI
I = APPLE
J = COMMODORE
K = KALAMAZOO
L = NIXDORF
M = MICRODATA
N = SIRLUS
O = INTERBEC

Figure 2.1A

Computer Type by Manufacturer

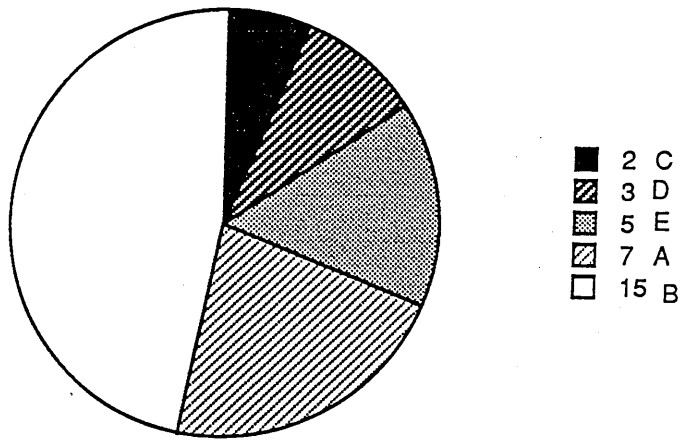


Figure 2.1B

Distribution of Mainframes by Manufacturer

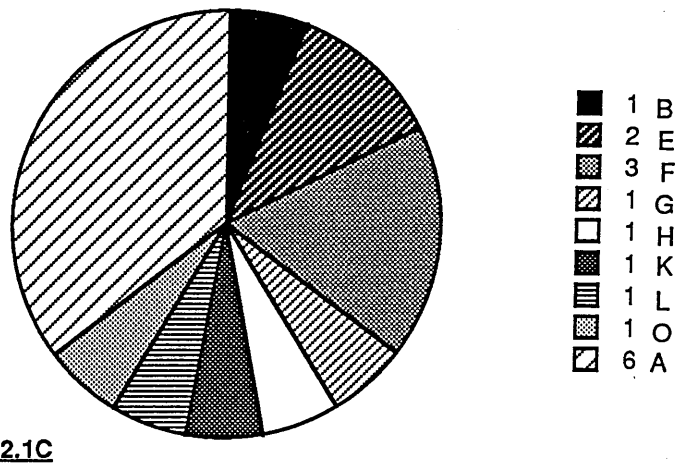


Figure 2.1C

Distribution of Minicomputers by Manufacturer

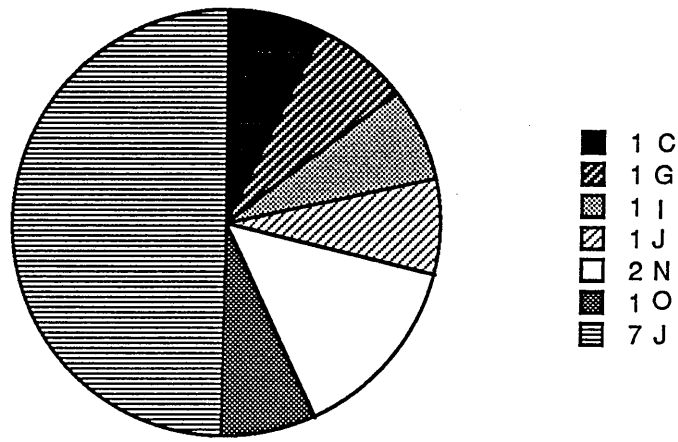


Figure 2.1D

Distribution of Microcomputers by Manufactrer

number of competitive systems. Largely on account of their considerably lower price, microcomputers are usually sold by retail firms which are either independent or operate as direct outlets for the manufacturers. Almost without exception they are purchased, rather than rented or leased, and are readily available for the individual (often private) user. They have the advantage of working off regular mains electricity supplies and demand little more than a desk-top in terms of installation space.

2.4. How Computers Operate

It will be useful to explain briefly how computers work and the stages necessary for their efficient use.

A computer is an electronic machine capable of obeying a series of instructions stored in the machine. Importantly, before a computer can carry out a task (such as recording a tenant's arrears or a tenant's total points in the allocation system) it has to be given the necessary instructions. These have to be precise and unambiguous and written, or coded, in a language that the computer understands. Any set of instructions which informs a computer on how to carry out a task is referred to as a program. A computer language, therefore, consists of a series of codes, that is, sequences of instructions, communicated to the machine.

The machine itself, being a piece of office equipment, is known as the 'hard-ware', whereas the programs used to instruct the computer in its respective tasks are referred to as 'software'. Despite the fact that, in terms of size, capacity, and cost, computers vary from relatively uncomplicated home models to those capable of dealing with the processing functions of a large local authority, they consist of the same basic components.

2.4.1. The hardware in Use

This refers to all the equipment used for data processing.Such housing data might include information on stock, housing attributes and information on a prospective tenant, etc. All data is numerically stored, i.e. alphabetic texts are coded as numbers.

Such data arrive at the central processing unit (CPU) as a stream of electronic impulses along wires and cables. The CPU, together with the backing store and the input and output devices are collectively known as the hardware. Further information on these hardware devices can be obtained from a number of references[71,72,73].

1. The Central Processing Unit (CUP)

This comprises the main memory, a control unit, and an arithmetic unit. The main memory is where both the program instructions and the data to be processed by these instructions are held. Obviously, before instructions can be obeyed, they have to be loaded into the system's main store and the jargon for obeying instructions is a 'program run' or 'program execution'. The internal store of a computer is measured in terms of the number of bytes. The symbol K is used to represent 1,024 bytes. Mainframes, in practice, have virtually no storage limitation and, as noted, 67% of Scottish authorities operated mainframe systems. Hence, these authorities are not limited in the volume of material they can handle. Mini-computers are also general purpose computers and have the same capabilities as mainframes, except for their smaller capacity. Thus, there is a limit both to the volume of work and the number of simultaneous users that mini-computers can handle. The survey indicated that 26% of Scottish authorities used this kind of computer. Of the Scottish authorities, 7% relied on mico-computers which, in practice, have a wide range of capabilities but limited storage. Hence they are less efficient in the volume of work they

can handle, the latter being related, in part, to their slow processing rate. Also they can be used only for one operation at a time.

The Control Unit

This unit supervises the execution of the programming instructions by controlling the operation of the other devices in the configuration.

The Arithmetic Unit

This unit performs the calculations and logical tests required by the program.

In general, the CPU is expensive and most of the data in the machine is normally held on backing store devices.

2. Backing Store

This is a device for permanently storing or holding programs and data which are not immediately required. This is a cheaper, but slower method of storage used to supplement, to great extent, the main memory in the CPU. Magnetic tapes and discs are most commonly used in Backing Store devices. Scottish local authorities use other types of backing store though they strongly favour discs and tapes, 90% using the former and 10% the latter. Discs allow more direct, and hence quicker, access to individually stored data items. The major disadvantage of tape storage is the delay in locating information held towards the end of the tape.

3. Input and Output Devices

These are complementary devices in that input devices are used to read information into the computer, while the result of running the program is produced on the output device. Except for those housing authorities using regional council computers, the most common input/output device used by Scottish local authorities is the interactive terminal, which is capable of acting as both an input and an output device. It usually consists of a television-type screen and a typewriter style keyboard (the VDU). Information on housing can easily be typed in and the result produced by the program is displayed on the screen. This enables the user to interact with the running of a program. Other input devices used by some Scottish authorities, for instance Stirling, Edinburgh, and Motherwell, are the card and tape systems. Magnetic discs are also commonly used, while Kirkcaldy uses both tape and disc.

The most popular input device, used by some 76% of Scottish local authorities, is key-to-disc. Its advantage is the greater control ensured over keyed input, and hence greater accuracy and security, ease of verification, and quieter monitoring. There is also a considerable cost saving compared to paper tapes and punched cards. Other input devices used by Scottish local authorities, in micro-computers in particular, are diskettes and cassettes. Three authorities were found to use diskettes as well as other devices. They have the advantage of providing a robust, easily portable form of data storage and can be passed from one department to another if further data must be added. Their main disadvantage is that the transfer of information from diskettes and cassettes to magnetic

tapes is comparatively slow. Neither can the system be transferred into a front end terminal since the data station operators are detached from the data converter. As the cassette and diskette systems do not have the backing of the large computer companies, it is unlikely that they will gain extensive acceptance. Rather, input to the modern computer will continue to come from magnetic tape and magnetic discs.

In terms of the special purpose document readers, these are attempts to reduce the amount of form filling as well as keyboard work connected with data preparation. The OMR (optical mark reader), OCR (optical character reader) and magnetic ink are the most common document reader devices. These can be used for reading renewal notices, cheques, and documentation relating to rent collection, repair and maintenance work, point scheme notification, etc. However, no Scottish authority reported that they were using this type of input device.

The survey showed that more than one type of output device was used, the most common (79% of the authorities) being the line printer, and many authorities used more than one. Printing out data has the advantage that it can be taken away for further perusal and study, but if the output data is voluminous it may be more economic and efficient to record it on microforms (microfiles, microfiche). Although useful for compacting historical data only 2 authorities, Banff & Buchan and Edinburgh district councils, reported the use of microfile. In addition, only 3 authorities (N.E.Fife, Dundee, and Perth & Kinross) mentioned the use of microfiche. A common form of output device today is the word

processor which has the advantages of speed, economy and ease of connection. Of the local authorities, 23% were found to use word processors in addition to line printers. Table 2.4 indicates the respective distribution of word processing equipment throughout the authorities. Where authorities wish to see, though not necessarily print, information and data, the screen display unit plays an important role and can also show diagrams and graphs, if necessary.

Table 2.4

Housing Authorities by Number of Word-Processors Used.

Local Authority	Number of Word processors
Tweeddale	1
Dunfermline	1
N.E.Fife	2
Banff & Buchan	1
Caithness	1
Lochaber	2
Edinburgh	4
Cunninghame	1
Glasgow	2
Dundee	6
Irvine New Town	1
Livingstone New Town	1

The above-mentioned devices that service the computer processes are all hardware devices and their usage is dependent on the type of computer in operation. In mainframe equipment the hardware is

usually reliable and offers, together with software accessories, a potentially high degree of security. The hardware components of mini-computers are also generally reliable though their security features are not as dependable. But the hardware and software operating systems of micro-computers are not as reliable, and diskettes, in particular, pose frequent equipment problems on account of their sensitive read/write head alignment. Though they add to the cost, the recent increase in the availability of hard disk drives has resulted in a great improvement in the reliability of micro-computers for regular housing management use.

The survey assessed the general tendency to deal with hardware and software problems after the setting up of the equipment rather than undertaking thorough pre-installation testing. These problems will be more fully discussed below. As a rule, however, micro-computers offer fewer security problems than do mainframes and mini-computers. One general difficulty relates to the wide range of equipment used which often makes it impossible to share software packages. This has an important effect on staff mobility.

2.4.2. Computer Software in Use

Systems software control the transfer of the computer's instructions into signals which direct the various devices to perform operations such as reading data from a magnetic disk file, the input of data through a visual display unit, the calculations to be performed on the data, the writing of processed data to the disk file, and the display of a message on the VDU screen. Computer software can be divided into two types, the programming system and

the operating system. Detailed information on this topic can be obtained from a number of references[74,75].

A. The Programming System

This includes all the application program and language compilers used in the system.

The Application Programs

When computerising all, or part, of their housing functions, directors and officers have the choice of either purchasing packages selected from a wide range of existing software or writing and developing their own programs. Both types of programs are in use among Scottish housing authorities but the trend towards the former appears to be on the increase as professionally developed packages become more readily available. Whatever type is the more suitable obviously depends on the authority's particular requirements, the type of computer hardware, and the size of the authority. The survey showed that the majority of authorities used a mixture of internally written and externally purchased packages. The percentages were as follows: 20% used programs written and developed in-house, 53% purchased program packages; and 27% used a combination of both. It was found that those authorities using a mixture of software used them for different housing functions. For example,some 33% used software written and developed in-house for waiting list work, and only 8% purchased package programs, while the rest used both. In maintenance and repair, 25% used programs written and developed in-house, and the remainder (75%) used prepared packages. In rent accounting the majority (83%) developed

programs in-house and the reminder used prepared packages. For housing benefits calculations, all authorities used prepared packages. The relative advantages of the two types of software packages can be summarised as follows:

Package Programs

1. They are less expensive on account of the economics of scale resulting from mass production and many buyers.

2. An authority can test a package before actually purchasing it.

3. They do not require in-house programming expertise, although they do require (and this is often under-estimated) a certain amount of learning and implementation skills.

Programs Written and Developed In-house

1. The computer staff of an authority can design a program that exactly meets local housing requirements.

2. Authorities can develop special programs that are often not commercially available.

3. Staff who have programming expertise must be available.

To conclude, therefore, the major consideration is that which an authority requires from its software, and its ability to produce such software in-house.

2. Programming Languages

Programs are executed only in a computer's 'machine language' which

is basically a series of "0"s and "1"s. Writing such programs is time-consuming and often not practicable. Hence 'high-level' languages have been developed such as Basic, Cobol, Fortran and Pascal. A program is coded (the source program) in one of these languages and is then translated into the machine language (the object program). The program which carries out the translation is either an interpreter (if it translates each line of the program individually during execution), or a compiler (if the entire source program is translated into machine code before execution). The survey indicated the following breakdown of programming languages used by Scottish authorities, 13% Basic, 49% Cobol, 27% Basic and Cobol, while 11% indicated that they were unaware of the language because that they used regional computers. The authorities using two languages were those that had more than one type of computer (mainframe, mini and micro) and the majority of authorities using mainframe and mini-computers reported the use of Cobol. Authorities using micro-computers reported the use of Basic. No authority reported the use of other programming languages.

Basic

This is a straightforward, high level language which is intended for use in a time-share environment. Hence, it is of particular value in eductional institutions[76]. The survey indicated the effective use of the language amongst authorities with micro-computers and also amongst the smaller authorities. This language is by far the most common since it is seen as being easy to learn and quick to write. Yet it is a free form, unstructured language

which makes it harder to document and maintain and, in addition, there is no industry standard Basic which permits a program written for one machine to be run on another without considerable conversion. Basic programs are usually run using an interpreter, though Basic compilers are available. Compiled Basic is normally executed much faster than interpreted Basic.

Cobol

This high level language is extensively used by Scottish housing authorities, particularly the larger ones using mainframe and mini-computers. The language is most commonly employed for business data processing applications, including housing management work. Though commonly the language of large machines it is now becoming available for professional micro computers, thus permitting the transfer of existing Cobol mainframe programs. As it uses English-type commands it can be self-documenting, but it takes longer to write than the other languages. Also, it uses much more memory space than other commonly used computer languages. As Hunt and Shelly write[77] "Unfortunately Cobol has not lived up to the original expectations and can not be fully understood by the uninitiated (office manager), and its propensity towards English has turned it into a verbose language from the programmers point of view."

Pascal

Described as a 'Structured Basic' this is a new language that is considerably faster than either Cobol or Basic. Pascal combines ease of programming with a disciplined format for subsequent

maintenance, though it does not take longer to write. The other major advantage is that it is economical in terms of memory space. The Pascal (Turbo) facilitates the transfer of programs from one machine to another. Hence, the language is particularly useful for processing large and complex files. Also covers useful extensions, including some functions familiar to programmers with experience in other languages. It is the language used in this research for the writing of programs relevant to housing management functions.

B. The Operation System

The computer operating system consists of an integrated set of machine language routines designed to schedule processing jobs, control the execution of particular programs, select input and output devices, and call, as required, support programs such as special sorting routines. The computer, as seen by the user, is the computer hardware plus the operation system. It is therefore convenient to consider them to function together as a single system. Hence, their combined effects and operation will be referred to as the computer system.

2.5. The Types of System in Use in Scottish Local Authorities Housing Management

The many different types of systems used by Scottish local authorities result from the equally diverse requirements and the wide range of hardware and software available to the systems designers. Classification, however, can be made according to the nature of the processing and the ownership of the system.

2.5.1. Processing Techniques

The survey highlighted three types of processing technique: Batch, On-line and Real-time, and that many local authorities used more than one in the operation of their housing management system. However, the survey also showed that no authority used all three processing techniques for all functions. The precise breakdown is identified in Table 2.5

Table 2.5

Processing Operation Techniques by Type and by Number of Authorities

Type of Operation	Housing Management Functions			
	Allocation	Repair	Rent Account	Housing Benefit
Not Specified	0	0	2	2
Batch	1	6	28	17
On-line	5	9	8	11
Real-time	0	1	1	2

Batch & On-line	3	6	4	8
Batch & Real-time	0	0	0	0
On-line & Real-time	0	0	1	1
All three	0	2	1	1

The main difference between these three types relates to the time delay between the capture of housing data and its processing. In batch processing, groups of transactions are collected and sent to the data processing centre for preparation and the eventual input and processing of the batch. The batching period, therefore, is responsible for the time delay between data capture and eventual processing. For example, if the files for arrears re-payments entries are updated each week then this will be the batch time period.

There is no data preparation prior to input with the on-line processing technique, for all transactions are directly keyed into the visual display units under program control. Instead of manual batching the software collects the batches of transactions and processes them periodically, for example, every twenty transactions, thus continually updating the file. It is possible in some on-line jobs such as repair-order entries, for the operator to control the size of the batch by the use of the 'end of batch' symbol to initiating processing.

On-line processing requires that all files are permanently connected to the central processor and are constantly accessible. This allows the data input devices to be located away from where

the central processor is housed. Batch processing may involve such serial access secondary storage devices as magnetic tape units and the sorting of transactions prior to processing. On-line processing, however, requires the use of direct access storage such as magnetic disks, as these transactions are processed in an unsorted order. The advantage is that this provides local staff with a quick and efficient response to enquiries. This technique also means that specific transaction details can be captured as they arise, thus providing up-to-date information. As Ghosh states[78], "The use of on-line computer techniques is an aid to effective management is now an accepted and essential part of the running of many business interests throughout the world".

The hardware requirements of real-time processing are the same as those of on-line processing, but although transactions are keyed as they occur, they are immediately processed, individually, by the application programs. Hence, there is no time delay between data capture and processing, and the files are continuously kept up-to-date. Hence, real-time processing is appropriate for these aspects of housing work that rely totally on currently up-to-date information, for example, cash receipts and jobbing repairs. The system is also efficient for large authorities with area offices, such as Glasgow and Edinburgh, where considerable work is involved with the rehousing of tenants and with the hundreds of applications being dealt with in their offices at any one time. Individual properties. Also, other resources such as maintenance and repair materials, are items that must not be allocated to more than one

applicant.

Authorities have many common interests in this area of operation and the techniques used must take into account the importance of a swift response to inquiries. Table 2.5 shows that councils use more than one technique, which tends to confirm that there are advantages in this. In real time processing a single message is fed into the computer from a terminal and within seconds it is processed and a reply is displayed on the terminal screen. If a hard copy facility is attached this reply can be printed.

In summary, it seems that a range of methods is the most effective approach, and it is the purpose of this study to design an integrated computerised housing management system based on the three above mentioned processing techniques.

2.5.2. Ownership of Computer Systems

According to ownership, the survey indicated five types of computer facilities currently used by Scottish local authorities. These are shown in Table 2.6.

Table 2.6.

Computer Facilities used by Scottish Local Authorities According to their Ownership

Type of System	Number of Authorities
In-house, where each department has its own computer system	1
In-house, using a central computer within the Local Authority	20
Contracted service within the Local Authority	5
Contracted service time-sharing	4
Use of the region's computer facilities	7
Use of a mixture	9

As can be seen some authorities owned a mixture of types. Of those, nine authorities own a mixture of computers, two of them (Dunfermline and Caithness District Councils) have their own computer facilities in the maintenance and repair department and, at the same time, use the region's computer facility for rent accounts and housing benefits. Kirkcaldy District Council has its own computer facility for waiting list work but uses the region's computer for rent accounts and housing benefits. Dundee District Council's maintenance and housing benefits departments each have their own computer facility, and at the same time their maintenance and repair department and their rent accounts department use a central computer within the local authority. The maintenance department of Skye and Lochalsh council has its own computer

facility, while their Housing Benefits Department used contracted services, time-sharing this with another local authority. Monklands uses two types of facility. While its Housing Benefits Department uses a centralised local authority computer, its Rent Accounting Department makes use of contracted services. Clackmannan District Council also uses two types of facility, its Maintenance Department makes use of a District Council computer, whereas its Rent Accounting and Housing Benefits divisions use the region's computer facility. Aberdeen uses a computer facility housed in the City Chamberlain's department for their housing provision. It is worth noting that the ninth of these authorities (Glasgow) uses a mixed computer facility, though Housing Benefits have their own computer. At the same time, however, its Rent Accounting Department uses the region's computer facility, whereas Allocation, Maintenance,and Housing Benefit use the District Council's central computer.

An in-house system, particularly one with a central computer within the local authority itself, is one which the council owns and is installed on the authority's premises. The survey indicates that twenty authorities, out of 46 using computers, have in-house systems. The advantages of an in-house system include convenience, control over processing schedules and priorities, suitability to the authority's requirements, and prestige. However, there are also problems of which the main ones include cost, maintenance, reliability and staffing. In addition, there are considerations of unused capacity and of the equipment becoming obsolete. Table 2.7 illustrates the problems of systems used, with particular reference

to those authorities using them.

One authority using an in-house system failed to specify problems. One of the major problems stemmed from the use of purchased package programs for in-house computer systems: "officers seem to be in general agreement that an in-house system is more likely to work well for a housing department, but the cost in time and resources can be prohibitive, especially for smaller authorities"[79]. Such factors may induce those users new to computer processing to decide on a contracted service, as Strathkelvin District Council pointed out, "there is discussion that the system should be leased".

Contracted services are businesses that provide computing services to those local authorities which are either unable or unwilling to install an in-house system. The survey showed that, of the forty six authorities using computers in their housing management functions, five used contracted services. They reported that these were leased for a five-year period with an option of renewal. Contracted services provide batch processing facilities operating to a fixed schedule, standard program packages, system development, and data preparation. The user is responsible for arranging the transportation of transaction batches to the bureau and for the collection of the programmed documents and reports. The advantage of a service bureau is that it offers access to a proven system at a cost less than that of a permanently installed in-house system. The main disadvantages relate to the transport of material between the two organisations, changes in legislation, and changes in local policy. Other disadvantages include the risk of disclosing

confidential information, the names and address of tenants, for example, and problems associated with software design. Table 2.7 summarises the main problems facing authorities using contracted services.

Table 2.7.

Problems with Computer Systems

	Number of Local Authorities			
Type of Problem	**In-house**	**Contracted Service**	**Contracted Time-sharing**	**Region's Facilities**
Speed and capacity	11	1	2	1
Size & location of equipment	3	1	2	-
Maintenance & difficulties with the system	6	1	3	3
Reliability/ efficiency	4	1	-	6
System cost	4	2	-	-
Staffing (utilisation, attitudes & specialised)	7	2	3	-
Inadequate training	5	2	1	1
Security/ confidentiality	6	3	4	4
Transportation	4	4	-	3
Software design	3	4	1	-
Changes in legislation	10	4	3	3

A time-sharing utility is another form of contracted service. It provides on-line processing facilities to authorities which have terminal and telephone connections with the central site. The survey showed that time-sharing is used jointly by four of the five Scottish New Towns, who lease the system for a six year period, and East Kilbride is also about to join the system.

As transactions are keyed in and output is printed out on the authority's own premises, this system overcomes any problems that might arise from security and disclosure. Yet, there are problems involving software, most of which stem from its implementation, design, staffing, and changes in legislation. Sharing, however, enables authorities to be serviced in a way that suggests to them that they are the only users of the system. Table 2.7 summarises the main difficulties in using such a service.

Some authorities also use the region's computer for batch processing transactions. The seven authorities using this facility are Stewartry, Wigtown, Banff & Buchan, Gordon, Inverness, Nairn, and the Orkney Islands. The major problem relates to the lack of direct connections to the regional computer. Table 2.7 summarises the main difficulties in using such a service.

Although the above provides only a brief summary of the type of systems available to Scottish authorities it is evident that system managers and designers have a wide choice from which to satisfy the requirements of a particular authority.

2.6 Computerisation and Housing Staffing in Scottish Local Housing Management

2.6.1. Staffing Specialisations

Little is known either about the number of specialists or those responsible for running computer departments, nor is a breakdown available on the duties of these staff. As noted in the previous section, seven Scottish Local Housing Management rely totally on the region's computer facility and another five rely partly on it. In these cases there is obviously no need to employ specialist staff as the programmer/analysts, etc. are employed by the region. The only local staff needed are operators to key in data to the terminals. Here it should be pointed out, however, that such authorities will hardly be those capable of developing and operating more advanced methods and procedures.

Staff can be sub-divided into three groups (system managers, programmer/analysts and operations staff). The system manager is responsible for the efficient running of the whole system, that is, the planning, co-ordination, and control of the activities of other staff. The primary role of the analyst/programmer is to design and maintain the system in such a way that it satisfies the needs of its users. This usually involves a careful study and analysis of current methods. Within the constraints that have been set, the system analyst explores the needs and design of a system[80], duties that require both considerable knowledge and experience in the procedures of housing and its administration. This, of course, is in addition to the technical knowledge of data processing

techniques and of the hardware and software. Computer and keyboard operators constitute the two main types of staff that ensure that document transactions are received from the various departments for the preparation of direct entry data. This is necessary if processing schedules are to be met and they may also be responsible for insitituing certain controls internally, prior to processing runs. Another duty involves supervision of the system whilst programs are being executed. In addition, keyboard operators may have data entry and preparation tasks. For example, they may be called upon to input data to devices such as magnetic disks, or they may input transaction data directly by using visual display units.

According to the survey, 54% of the authorities were unable to specify precisely the computer responsibilities and tasks of their staff. The other 21 authorities (46% of the total) reported specifications which differed considerably. Table 2.8 indicates the functions of the computer staff dealing with housing departments.

Table 2.8.

Scottish Housing Authorities By Number Of Computer Staff Specialisation, and of Housing Functions Computerised

Local Authority	No. of Programmer	No. of Operational	Functions Computerised*
Aberdeen	2	3	1, 2, 3, 4
Clackmannan	2	16	2, 3, 4
Clydebank	3	21	1, 2, 4
Clydesdale	Nil	5	2, 3, 4

Cumbernauld	Nil	7	3, 4
Cumnock & Doune	1	7	2, 3, 4
Cunninghame	2	5	3, 4
Dunbarton	Nil	4	2, 3, 4
Glenrothes N.T	1	7	2, 3, 4
Hamilton	2	3	2, 3, 4
Kincardine	3	3	3, 4
Lochaber	1	8	2, 3, 4
Midlothian	3	23	2, 3, 4
Monklands	5	8	3, 4
Motherwell	5	6	2, 3, 4
Nithsdale	2	5	2, 3, 4
Ross & Cromarty	3	6	3, 4
Skye & Lochalsh	Nil	2	2, 4
Stirling	4	4	1, 2, 3, 4
Strathkelvin	2	4	1, 3

Note

* functions computerised: 1 = Allocation

2 = Repair

3 = Rent

4 = Housing Benefit

Some of the larger authorities, such as Glasgow, Edinburgh and Dundee were unable to estimate correctly the tasks. Here it might be stressed that staff specifications particularly important, especially in the case of system analysts, with respect to the large housing authorities. It is necessary, firstly to derive some

indication of costs, and secondly, to discover the best way that housing staff can fit into the general system.

2.6.2. The Effect of Computerisation on Housing Staff Numbers

Many of the Scottish Local Housing Authorities did not have a detailed knowledge of the influence of computerisation on the staff employed in their various departments.

It is widely accepted that computerised processes in industry have led to significant job losses, and recent surveys have indicated that this trend is also affecting job opportunities in the public sector. Accounts clerks and secretaries seem to be at greatest risk. Yet the survey showed that, to date, there has been no significant job loss in Scottish Local Housing Authorities. In fact, as shown in Figure 2.2, the majority of authorities spoke of no change in staff employment levels. Some reported an increase, although Roxburgh, Tweeddale, Lochaber and Midlothian acknowledged job reductions. One local authority (Kirkcaldy) reported both an increase and no change, that is an increase in housing benefits and no change in the allocation and waiting list system. Five authorities were unable to estimate the direct effects of computerisation on their staffing levels.

2.6.3. Staff Training

The provision of staff training is one of the most important tasks for authorities using computerisation for through "basic education...substantial inroads (can be) made into the development

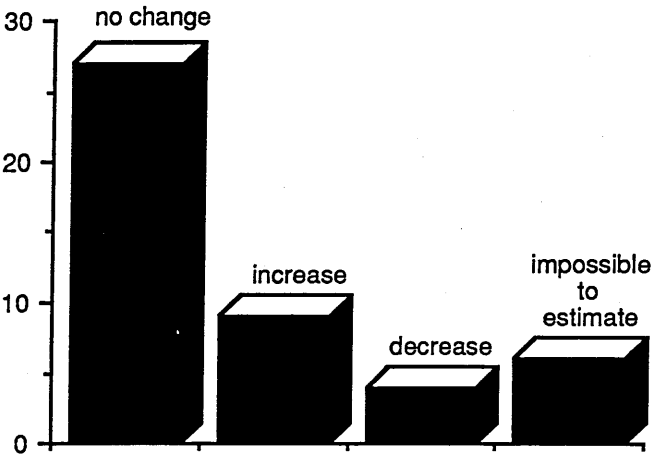


Figure 2.2

Effects of Computerisation on Housing Authorities Staffing Levels

of initial system"[81]. Local authorities must be in a position to provide adequate training for their staff if the system is to operate efficiently. As computers can still be regarded as a new technology, many local staff are unfamiliar with their operation and their capabilities. Considerable skill is needed if they are to be used and maintained to best advantage. Computerisation does not reduce the need for skilled staff, but it does place different responsibilities on them, hence training is essential for efficiency[82].

Some authorities have their own system of in-house training, while others send their staff on intensive courses, often run by the computer manufacturers. It is important that such choices are made by the computer department itself[83]. Training and instruction lasts from one or two days for the more experienced in computer operations, up to a few weeks for those seeking to understand computer technology from the basics. Training and instruction can be expensive but the benefits justify the cost involved. It is important that such courses should include all members of staff likely to be in a position to use a computer. Figure 2.3 shows that the majority of Scottish Local Housing Authorities organise some form of computer training of their staff. Only Wigtown returned a negative reply to the question, although four authorities were unable or unwilling to report on whether such training was given: Gordon, Caithness, Bearsden and Perth. Of the forty one authorities who reported their sponsoring of computer training and education, the replies to the question as to whether more was needed are illustrated in figure 2.3. Their answers to the question involving

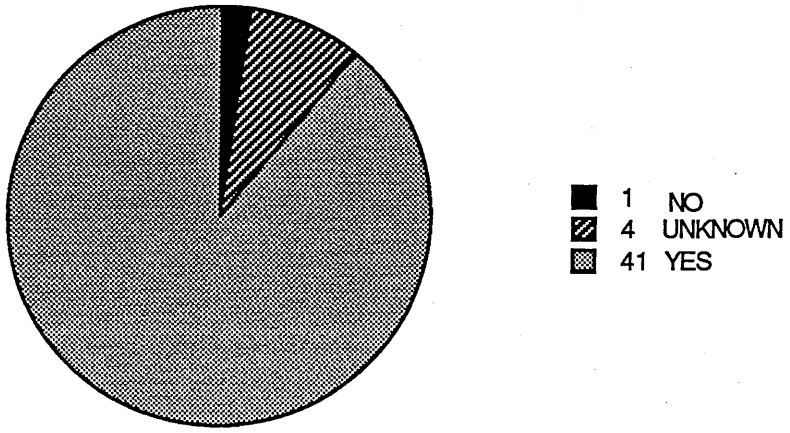


Figure 2.3

Scottish Housing Authorities Use of Computer-training of their Staff

the provision of further training is itemised in table 2.9.

Table 2.9

Housing Authorities by Number of Staff needing Training in Computerisation

Name of Authority	Number of staff needing training or further training
Skye & Lochalsh	1
Inverness	2
Annadale & Eskdale	3
Stewartry, Lochaber,	
West Lothian Argyll & Bute	4
Aberdeen	5
Nairn	6
North East Fife	9
Ross & Cromarty, Dunbarton	10
Cumbernauld & Kilsyth	14
Clydesdale, Irvine New Town	20
Clackmannan	24
Stirling, Motherwell	25
Edinburgh, Dundee	30
Livingstone Development Corporation	38
Kirkcaldy	47
Strathkelvin, Western Isles	All Staff

Roxburgh, Tweeddale, Nithsdale, Dunfermline, Banff & Buchan, Kincardine & Deeside, Midlothian, Clydebank, Cumnock & Doune, Glasgow, Hamilton, Inverclyde, Monklands, Orkney, Cumbernauld, Glenrothes	Unknown

The survey also questioned the amount of time which authorities devoted to training their staff and this is summarised in Figure 2.4. Six of the housing authorities, however, failed to provide details on this query) Stewartry, Inverness, Midlothian, and Hamilton District Councils and Irvine and Livingstone Development Corporations). Only West Lothian reported that 1-2 days were given to the training of VDU operators, and up to two weeks for other staff training.

Authorities were further questioned on the type of training courses they actively supported, i.e. whether they organised it themselves, or used outside consultants. The results of this inquiry are summarised in Figure 2.5, which shows that a number of authorities favoured (probably because of the cost factor) internal training, although the most common reply to this query was that a mixture of both internal and external training was used. Only one authority (Tweeddale District Council) indicated that all training was given externally, in this case by the NCR company.

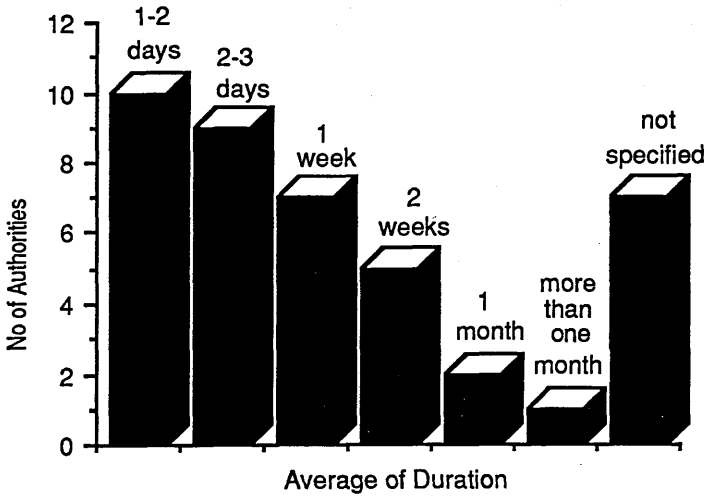


Figure 2.4

Number of Housing Authorities by Staff Training Duration

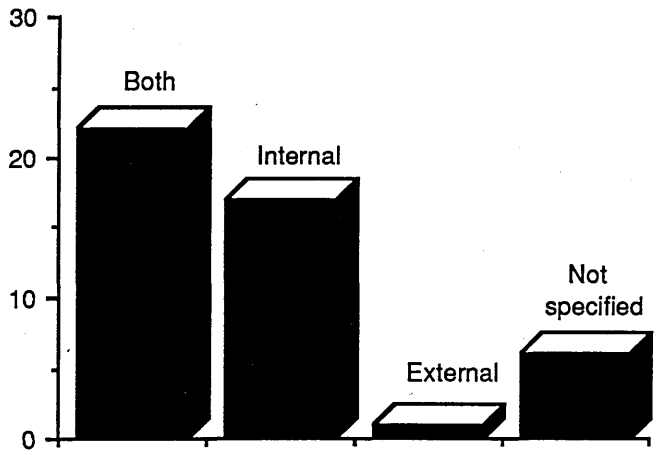


Figure 2.5
Number of Housing Authorities by Training Organisation

2.7 The Problems of Improving, and the Future Development of Computerisation in Scottish Local Housing Management

Scottish housing management directors and officials were asked to comment on problems they saw as complicating the smooth application of computerised systems to their work. Table 2.10 summarises their replies.

Table 2.10

Problems with Computer Systems

Number of Local Authority	Type of Problems
26	changes in legislation
20	capacity and speed of computer
18	security/confidentiality
14	reliability/efficiency
13	transport of data between organisation and/or area offices
13	software design
12	implementation difficulties with the system
12	inadequate training
10	maintenance and repairs
9	system cost
8	lack of specialised staff
5	staff utilisation
5	staff attitudes
4	size and location of equipment (hardware)
1	risk of unused capacity and economic obsolescence.

They indicate that the most common problem stems from changes in legislation; that is, it was extremely difficult for 'packages' to keep pace with such changes. The issue involving housing benefit was a case in point. Another common problem related to the design of the software although second to the legislation factor were the issues involving the speed and capacity of computer hardware. Many authorities voiced the opinion that the reason for the latter was related to the fact that many system analysts were unfamiliar with housing practices and, conversely, housing managers were inexperienced in their understanding of computers and their capabilities. In other words neither expert was clear in his understanding of the other's work. Hence, there is a clear case for greater computer 'know-how' amongst housing managers, and also for the computer industry to become more aware of the work undertaken by those businesses that buy and use their products. As new machines are becoming increasingly more sophisticated the problems associated with inadequate hardware capacity are likely to be eradicated, probably within the next few years. Such modernisation and improvement will obviously have considerable financial implications. Training in the use of software is particularly relevant, for whereas hardware was confidently installed by a number of Scottish authorities, much less confidence was expressed in the training and consequent understanding of the programmers. Despite the fact that some companies had produced extensive and detailed documentation and instructions, certain authorities were unconvinced that their specific requirements were being adequately met. The major problem lies in the fact that specific requirements vary between one authority and another.

Many suggestions were forwarded for improving existing computer systems. As the Director of Finance for Caithness District Council commented: the "Basket now has some large eggs" on referring to the notable development of remote control data-submission to their central computer. A consistent comment referred to the lack of control housing departments had over the general computer system, which was often located away from housing staff. As a result, difficulties were often experienced in extracting the information they needed. Difficulties in the access of information were frequently noted as a criticism of computerisation. Whereas some respondents were critical that their system was not integrated, others highlighted problems due to the absence of links between files (i.e. lack of a Data Base). Under utilisation, and slow processing, were other general criticisms. As the Housing Assistant of Skye & Lochalsh commented "now that basic systems have been in operation for a while there are major changes that could make them more efficient, but this can not be done "in-house" due to the lack of training. Programs would have to be sent back to the programmers". Conversely, many rested their case by stating it was "too early to tell" as their systems had just been installed. One of the main difficulties in hardware usage was that the system was not interactive and many reported the lack of a direct input 'on-line'. This meant that considerable time was being spent to up-date information. Other problems that were raised included the delays caused by queuing in shared systems, the time taken to complete commissioning of the entire system, lack of assistance in carrying out development work on the system, the lack of mainframe back-up

for microcomputers, problems caused by the limited capacity of existing hardware, difficulties in introducing complex programs where staff have little or no experience of computerised systems, and the lack of staff expertise to carry out further development of the system. In addition there were problems associated with software packages, for example, restricted flexibility and capacity. Also some standard packages have been found to be plagued with errors. As Hirsch pointed out[84]: "one housing benefit package designed by a well-known manufacturer has been reported to have as many as 180 errors in it".

Other weaknesses associated with the use of standard packages include inadequate documentation and inadequate staff training. Edinburgh District Council reported that one major problem was that 'Trade Unions press for higher wages to use equipment.' In general, the questionnaire evidence indicates many neglected areas of housing functions, and also others where the currently used technology has become outmoded.

At this stage it would be useful to discuss briefly the probable future developments in the computerisation of Local Housing Management. As noted, computers are used by more than 75% of Scottish authorities, i.e. 46 out of 53 respondents (8 having failed to respond). There is, therefore, room for expansion and this is likely to occur in the next few years as hardware prices fall, standards improve, and the authorities, especially the smaller ones, realise the gains that can be achieved from a computerised system. Another growth area will probably be the further application of new technology to housing functions. This

will be discussed in a subsequent chapter.

The survey asked Housing Directors for their views on future developments and how they intended to make better use of computerisation. Positive responses to this question were received from 39 authorities, 5 authorities saw little further application, and 2 authorities were unwilling to give a definite opinion. Table 2.11 illustrates the breakdown of the answers of those who responded positively.

Table 2.11

Housing Authorities Interested in Plans to Make Better Use of their Computer Systems

Area of Interest	Authorities Interested (%)
Implement a more integrated system	65
Increase the degree of decentralisation	38
Buy more software	49
Buy more equipment (hardware)	67
Other	5

As can be seen, the majority favoured buying in more hardware, including new, modern machines to replace older varieties of restricted capacity. There was also a consensus that more use should be made of integrated systems which incorporate the main functions (allocation and waiting list, maintenance & repair, rent

accounting including arrears procedures, and housing benefit). The second main area of interest was in buying additional software and the third made reference to a policy of greater decentralisation. Other replies referred to the interconnection of computers, and the conversion of all housing management functions to on-line processing. Future plans of the Scottish authorities for computerisation are given in Fig. 2.6. Although twenty-two authorities failed to comment on this issue, those who responded indicated significant plans for further computerisation of housing functions. The largest areas to be mentioned were the allocations and waiting list functions. It is of interest that this will provide the potential for improvements in the letting function. Such expansion, especially if on-line, will provide immediate and updated information on each housing application. It will also be of great benefit to tenants, applicants and housing staff, especially with increased decentralisation, where it will become a major advantage that each department knows what others are doing. Also of interest is reference to expansion in computerised property data base, which will provide more extensive information on Scottish housing. This will greatly aid the more accurate assessment and forecasting of finance, labour, materials, and general maintenance. The last of these is highlighted for further computerisation, in order to ease some of the current problems that authorities have to face in terms of carrying out repairs in a reasonable period, and to the general satisfaction of the tenant. Computers will greatly help to speed up repair work and provide a more efficient system of monitoring maintenance work. Computerising the account systems of maintenance and repair work will also make

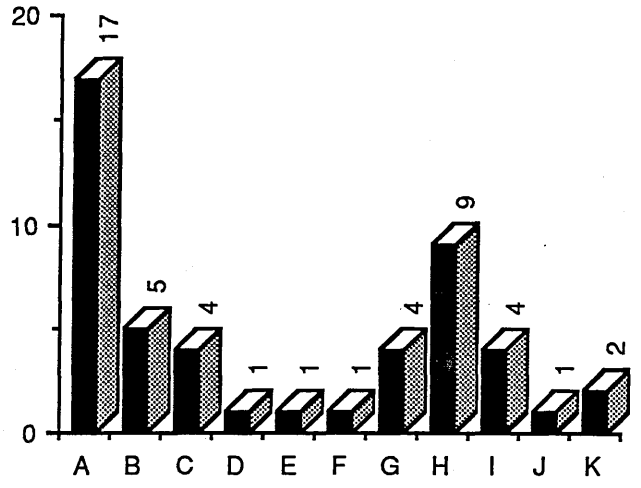


Figure 2.6

Expantion of Computer Use Future Development

Key

A. Allocation & Waiting List.

B. Repair and Maintenance.

C. Management Information System.

D. Word Processing.

E. Office Automation.

F. Tenant Information Service.

G. Statistical Analysis.

H. On-line Rent and Cash Receipt Input System.

I. Void Property.

K. Finance.

these functions more cost effective.

In summary, the high cost of labour, the need to use resources more effectively, reductions in the costs of computer equipment, and the growing experience of computer applications, will collectively encourage local authorities to extend the use of computerised systems in all aspects of housing work. To achieve this, solutions must be found to a number of problems. The first of these relates to the speed and capacity of the hardware currently used. Added to this are the difficulties imposed on software design by changes in government legislation. Such problems must be overcome if computerisation is to be fully effective. Many of the other difficulties listed can be overcome by improved training of staff in the use of computer techniques.

Training is vital, both in the working of a specific computer (which is best carried out as an in, service task) and more specialised training which would enable the authorities to respond to any new developments in computer technology. The latter is best provided by the manufacturer or by a specialised training unit. In this way, housing officers would be fully equipped to utilise a particular computer system and, in doing so, would be able to recognise the training needs of other staff members. The over-riding consideration is for the best possible use to be made of the technology that is currently available, and which will be available in the future. Professional qualifications in computer science are now called for, since only specialist training will enable housing authority staff to understand their machines fully, and to realise

their full capabilities as regards each particular housing situation.

Monitoring of the reliability and efficiency of the computerised system is essential, particularly as regards the necessity to run parallel manual systems until total confidence in the computerised system has been established. However, reliability remains one of the major problems, particularly as regards the smaller housing authorities who have very limited alternative resources available.

3. The Potential Role of Computers in Local Housing Management in Scotland

Introduction

In the light of the observations made in Chapters 1 and 2 the main problems facing local housing authority management departments are the result of both organisational and clerical factors. It was argued that the further application of computers can lead to the satisfactory solution of many of these current difficulties and, consequently, to a growing number of council-wide housing service oriented systems.

The effectiveness of computer techniques in housing management has already been asserted in large urban authorities such as Glasgow, where there has been a marked improvement in efficiency, control and the monitoring of both housing provision and the more cost-effective use of available resources. The use of computer systems is now considered by most local authorities to be economic and time-effective, particularly as regards their ability to store and handle accurately vast amounts of information. In addition, they have the ability to provide immediately up to date information on all housing functions and they also greatly improve services to tenants, since they are capable of providing speedy answers to queries.

Further, a computerised system may easily be decentralised to provide on-line terminals in area offices. Although most urban authority housing departments in Scotland have been using computerised systems for at least a decade, little information has

been available as to the nature and extent of their use in handling housing management functions and, in particular, the various methods used in dealing with these functions.

The main objective of this chapter is to review briefly the development of computer usage in Local Housing Management. This is followed by a discussion of the computer and the applicability of its methods as an aid to housing functions. It also considers the problems of the recording mechanism.

3.2 The Background Development of Computers in Local Housing Management

Tracing the history of computer usage in housing management is of considerable interest, for its application has influenced the development of computer technology in general, and this, in turn, has generated further applicability of computerised systems in the field of housing provision. From the 1960's onwards local authorities have recognised the importance of computer developments in housing management and the majority have been eager to extend their use age. As Fleming states[85], "if I did not run computers, computers would run me...I have to do my best to keep up-to-date with developments in this field". But it is since the early seventies that computers in housing work have become common, to the extent that there is now considerable support for an integrated nationwide system.

Although used initially for statistical records and similar routine clerical work, computers, over the last decade, have also played a key role in the housing management functions, particularly in the fields of Rent Accounting, Allocation & Waiting List, Housing Benefits, and Maintenance & Repair work. However, many authorities would gain considerably, in terms of efficiency, from further investment in computer systems, a development that will most certainly be aided by cost reductions in both hardware and software. It is reasonable to assume that, in time, most authorities will change to computerised systems, thus leading to a major reduction in housing management administrative work.

As noted, computers in the early seventies were mainly applied in the financial sector of housing management. The first radical development was related to rent accounting which, as a basically straightforward financial operation proved relatively uncomplicated in its computerisation.

Until 1972, it was only the rent account function which had been computerised in the UK, and the first Scottish authority to use a computer for this purpose was Edinburgh DC in 1967, followed by Inverness DC in 1971, and then by a number of other authorities. The Edinburgh system was merely a computerised file containing a list of properties, the rent and rate charges and some property details necessary for rent and rate assessment. This, of course, was an extremely limited use of computer potential and it is interesting, as Figure 3.1 indicates, that by far the most common application of computerised systems is still to be found in the financial side of local housing management, that is 85% of rent accounting, 63% of arrears procedure and 81% of housing benefit work. The last undoubtedly reflects, following the 1982 change in the Housing Benefits scheme, Government assistance with computer installation and staffing costs, for it is this area that has grown the most in terms of computer application.

The main benefits of such computerisation relate to direct savings in terms of both time and cost, for increased efficiency can result in staff reductions or, at least, more rapid handling of workload peaks. Reduced clerical effort might also be matched by a significant reduction in the amount of rent arrears. Rent

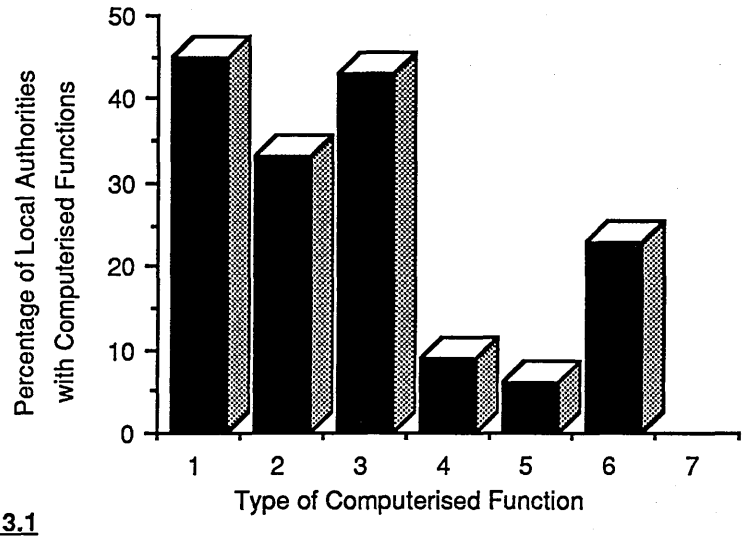


Figure 3.1

Housing Functions Computerised by the number of Local Authorities

accounting, as Macey and Backer[86] point out, is well suited to computerisation, for it is possible to maintain personal accounts for each house, provide printed statements of weekly rent and, arrears and importantly, balance the entire system.

On account of the experience gained in rent accounting during the last 10 years, local authorities have increasingly extended computerisation to allocation and waiting list work. Greater London Council first introduced its letting system in 1974 and the scheme was fully operational by the end of June 1975[87]. In Scotland in 1976 N. Fife DC introduced a computerised letting system, but this was limited to a waiting system operation. A match system was provided by Glasgow DC in 1980, in addition to a waiting list. Yet, up to 1985 only 17% of the Scottish authorities had instituted computerisation for waiting list work and only 11% for allocation work (Figure 3.1).

The major benefit to be obtained in extending computer usage to letting work relates to tenancy control, that is rehousing, letting, waiting list and exchange allocations. In other words the system is capable of controlling efficiently the entire housing stock. The other significant benefit is on staff levels but, as the Local Authorities Management Services and Computer Committee report (The Use of Computers in the Rehousing Process)[88] states, the level of staff changes is dependent on the extent of computerisation and the resultant changes from the new method of dealing with traditional housing problems.

A common comprehensive rehousing system involves both the matching

process and all other aspects of letting, the recording of applications and transfer requests, the monitoring of vacant properties, the updating of property records, the allocation of a property to an applicant and the recording of all final results. Hence, it can be seen that the computer has manifold advantages in terms of both organisational and clerical operations.

Again, as a result of experience gained in the use of computerisation in the financial side of housing, the system has been applied to the fields of maintenance and repair work. The Local Authorities Management Services and Computer Committee report (Computers and Housing Maintenance)[89] commented on the extension of the system into areas other than finance and accounting: "The development of computer system for the work of housing departments had progressed steadily...mainly in the fields of rent accounting, waiting list and letting, there is very little evidence of any detailed work being done in the area of housing maintenance".

Historically, the employment of computers in housing maintenance has been limited: "the use of computers as an aid to management of building maintenance has so far been little developed in this country"[90]. In addition, many local authorities have extended computerisation to jobbing maintenance. This began around 1982, when only 8% of Scottish authorities employed the system. By 1985 some 44% of them employed computer facilities, although no authority reported the use of computerised planned maintenance (See Figure 3.1). In reality, this means that much of the development in this field has taken place during the last 3 years. Repair and

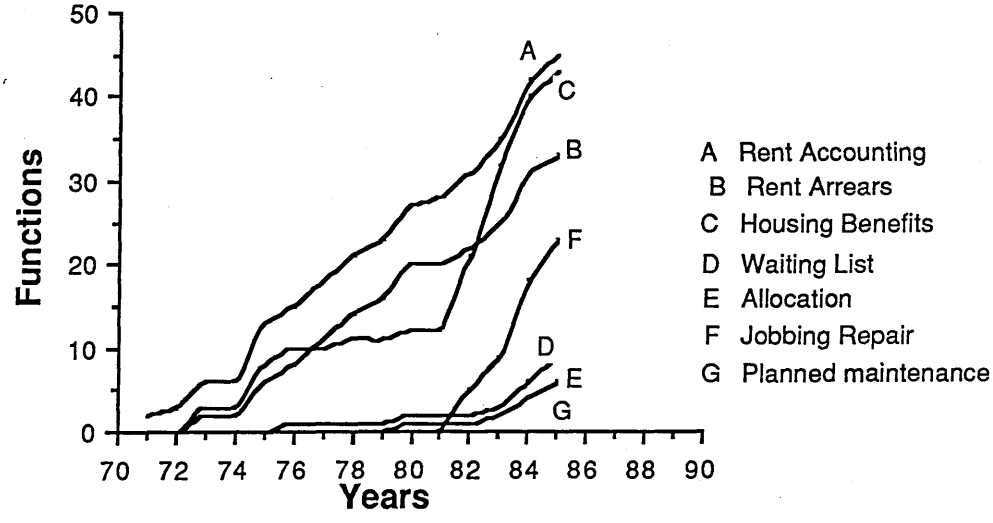
maintenance work, form the second major area of considerable computerisation potential and there is great scope, especially in view of tenant dissatisfaction, in expanding the system as a means of providing efficient services. The benefits are particularly apparent on the property side. This is a housing department's major resource, and property information is less costly to computerise on account of the fact that the physical characteristics of dwellings change infrequently, especially in comparison with the economic and social details of tenants.

Up to the present, however, most computer applications in the field of maintenance have been applied to the jobbing system, with only limited application to costing and Direct Labour Organisation stock control. The value of computerisation is greatest in relationship to planned maintenance work, that is work that is identified in advance and is not dependent on tenant notification. Planning in advance greatly reduces repair and maintenance bottlenecks and leads to a more efficient and co-ordinated service.

The level of computerisation in housing functions varies greatly from one local authority to another, some having highly efficient systems relating to all aspects of housing, whereas others use computerisation only for the most routine tasks. What is significant, however, is the current rate of change affecting local authorities in terms of the increasing implementation of computer usage. It can be said, in fact, that computer application has kept pace with the general growth in housing services. As Figure 3.2 indicates, a marked increase in computer usage has occurred since the early seventies. Currently, over 50 per cent of authorities

Figure 3.2

Housing Functions Already Computerised throughout the years of 1971-85



employ computers for their financial work (Table 3.1) and the majority use computers for Rent Accounting and Housing Benefits work. Yet most authorities reported that they were developing computerised operations for individual functions only. In other words (and as Table 3.1 indicates) integrated computer-based activities have made little headway. It is also noticeable (Figure 3.1) that the greatest impact has been in the fields of Rent Account and Rent & Rates Rebate work. Both are linked to financial transactions and, probably, to the Treasurer's section of the local authority organisation. Such areas are more easily adapted to computerisation. In marked contrast, computerisation of such areas as Repair and Maintenance work, Allocations and Waiting List activities has had, as yet, only a modest impact.

Table 3.1.

Housing Functions Already Computerised throughout the Authorities by Years.

Years	1*		2*		3*		4*		5*		6*		7*	
	**No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
up to 71	2	4	0	0	0	0	0	0	0	0	0	0	0	0
72	3	6	0	0	0	0	0	0	0	0	0	0	0	0
73	6	11	2	4	3	6	0	0	0	0	0	0	0	0
74	6	11	2	4	3	6	0	0	0	0	0	0	0	0
75	13	25	6	11	8	15	0	0	0	0	0	0	0	0
76	15	28	8	15	10	19	1	2	0	0	0	0	0	0
77	18	35	11	21	10	19	1	2	0	0	0	0	0	0
78	21	40	14	27	11	21	1	2	0	0	0	0	0	0

79	23	44	16	31	11	21	1	2	0	0	0	0	0	0
80	27	52	20	38	12	23	2	4	1	2	0	0	0	0
81	28	54	20	38	12	23	2	4	1	2	0	0	0	0
82	31	60	22	42	21	40	2	4	1	2	5	10	0	0
83	35	67	25	48	32	61	3	6	2	4	9	17	0	0
84	42	81	31	60	40	77	6	11	4	8	18	35	0	0
85	45	85	33	62	43	81	9	17	6	11	23	44	0	0

* 1 = Rent Accounting
* 2 = Rent Arrears
* 3 = Housing Benefit
* 4 = Waiting List
* 5 = Allocation
* 6 = Jobbing Repair
* 7 = Planned Maintenance

** Number of Authorities

An important issue relates to the fact that those authorities (67%) using computers in their housing management tasks stress the value and efficiency of the system. It seems highly probable that this view reflects the link between computerisation and adequate staff training, an encouraging observation in view of capital investment costs and staff time. A further 13% of the authorities indicated a slight improvement in their services as a result of computerisation.

Only one authority, Nithsdale, reported no change as a result of computerisation. It was of interest, however, that Nairn reported that the system made matters worse, though it should be pointed out that this authority does not own a computer. The remainder of the Scottish authorities (17%) were unable to cite and specify the advantages gained from computerisation (Table 3.2).

Table 3.2

Influence of Computerisation on Housing Management Functions of Scottish Local Authority's

Opinions Classification	No. of Authorities
Made an improvement	30
Made slight improvement	6
Made no change at all	1
Made matters worse	1
Made matters much worse	0
Unspecified	8

It is the purpose of this thesis to examine the ways in which a computer can be used to perform an integrated organisational system in housing management. In particular, it examines the potential applicability of the computer in the reduction of the major clerical and organisational work involved which, in itself, will lead to a more efficient and sophisticated method of operation.

3.3 Computer Aids to Local Housing Management Functions

3.3.1 Council Housing Functions and its Selection Scheme

The provision of housing services is one of the most important obligations facing district councils and island authorities. "A local authority must be...able to cope with all the tasks of local day-to-day management"[91] and the service it provides has a major impact on the general quality of life and on the economy in the local authority area. This is certainly true for Scotland where, in 1981, some 45% of the housing stock was local authority controlled, compared to 32% in England and Wales[92]. The housing stock also represents a major share of the total assets of these authorities and involves a substantial operational cost. What is vitally important, therefore, is effective monitoring and control of the provision of housing services. Thus, all the areas of housing service (Allocation & Waiting List, Repair & Maintenance, Rent Accounting functions and Housing Benefits) are of major concern to a large section of the community. In dealing with this complex organisation, computers can play an important role and this work examines some of the ways in which they can be used in clerical and organisational work.

In Scotland the organisational problems vary greatly among authorities. On the one hand there are small authorities managing a few council houses and, on the other hand, large authorities managing tens of thousands of properties and responsible for the services and needs of a large population. Table 3.3 indicates the range of these variations found in Scottish authorities in 1985.

Here it should be noted that the authorities' responsibilities in the housing area seem likely to increase further, hence the increasing importance of the computer as an aid to this work.

Table 3.3

Council Housing Stock.

Number of Houses	Number of Authorities
Up to - 10000	29
10000 - 20000	12
20000 - 30000	7
30000 - 40000	3
40000 - 50000 (Edinburgh)	1
50000 - 160000	0
Over - 160000 (Glasgow)	1

Computerisation deals with two broad areas of housing work. In the first place there is the need for an authority's housing resources to be recorded effectively, not only the availability of its stock, housing materials, and replacement equipment, but also the availability of labour, especially for the carrying out of maintenance and repairs. In terms of this primary recording of information, the computer is an effective aid in terms of rent accounting and rent and rebate calculations. The other major area where the computer is of great value concerns decision-making in the areas of rehousing, the initiation of repairs and the entire monitoring of the authority's performance in carrying out its housing responsibilities. It is obvious that these areas are related and the way in which they are tackled depends largely on

the local authority's philosophy and the general scale of the housing problem. Economic and social conditions vary among different authorities, with the result that the policy of one local authority might well be at variance with that of another. However, the general framework of housing policy is established by legislation, but it is a prerequisite of successful computerisation that local variations in housing policy be clearly specified.

The scheme followed should satisfy a number of important criteria:

1. Full account should be taken of peoples' needs and, wherever possible, preferences.

2. The scheme should simplify the investigation of occupants' circumstances and the means of solving their housing problems.

3. There should be ample provision for dealing separately with special cases.

4. It should be possible to retrieve the data on the basis of decisions which have been taken.

5. Tenants and applicants must be able to appreciate the fairness of the scheme.

6. It should be simple to understand, easy to administer, and be undemanding of clerical time.

7. It should be capable of allocating tasks requiring similar data to the same groups of staff. This will minimise data transfers and reduce the risks of duplication and misinterpretation of data.

3.3.2 Alternative Methods of Administering the Council Housing Function

A computerised system is but one of a number of options available to housing management. Hence, it is useful to comment on other methods used to supervise council housing management functions.

The aim of all housing authorities is to have an effective system of recording and storing housing details, while tenants also required a reliable and efficient system, which satisfies, as far as possible, their requirement of an objective approach to housing issues. When discussing such issues it is helpful to itemise them in terms of Allocation, Repair, and Housing Finance.

3.3.2.1 Methods of Council House Allocations

Scotland has had (and still has) a variety of methods of allocating council housing. The criteria that might be used are obviously problematic, yet it has to be stated that each authority has to erect and abide by its own rules in deciding which tenants get which houses[93]. The survey indicated six methods of allocation: 40% of Scottish authorities relied on a points system; 17% depended on groups and points; a further 17% utilised the date order scheme; 16% combined the groups and date order scheme; 4% followed the recommendations of selection officers and committees, and 4% used a combination of all of the above methods. One authority used the points scheme for tenant transfer and a date order for allocation.

(1) Selection by Officers and Committees

In some authorities, particularly the smaller ones, this method is

still common and uses manual processing to allocate accommodation. The various circumstances of applicants are considered and allocation is undertaken by council officers, although special cases are referred to the housing committee. It is common policy for councils to keep separate lists of applicants for each housing area which is under the jurisdiction of a housing officer, on whose recommendation allocation decisions are made.

Many rural district councils maintain that the local and detailed knowledge acquired by the housing officer is of major importance in allocation work: its flexibility facilitates the choice of the right type of house for the right type of applicant. The major disadvantage, however, is the pressure that might be brought to bear on those responsible for tenant selection[94]. Hence, it is of major importance that each authority has its standard rules governing allocation, thus alleviating the difficulties of officers in making fair and unbiased decisions, which rely largely on personal, and hence subjective, judgement. If the latter was the only criterion then the reasons for the selection of tenants would be poorly understood and, in many ways, difficult to challenge[95]. Favouritism and victimisation must be fully guarded against in allocation policy and this can be achieved, at least in part, by the point system method, one that awards housing to those with the greatest needs. The Ash report on Council House Allocation highlighted such difficulties in that they found that some potential tenants were discriminated against on account of their bad reputations. It also noted the existence of discrimination against such categories deemed as 'unrespectable' such as single

mothers and ethnic minorities[96].

(2) Date-Order Scheme

Allocation under this method is governed solely by the date of application (waiting time) and housing priority. But the system is complicated by the fact that other dates might be taken into consideration, such as that of an applicants first date of residence in an area. Commonly, however, this method of allocation rests on the principle of 'first in, first served', that is, it is a queuing system. Such a method works well where there is no great housing need, and where applicants can be housed in a relatively short period of time, say, within one year of registration. One major advantage is that the system is easily understood and is usually accepted by all applicants as a fair method of selection. Yet such a system is no measure of real housing need in that it fails to isolate the real hardship cases, those in dire need of rehousing for a variety of social and economic reasons. Hence, Heath[97] has argued that date order schemes are only efficient and acceptable in areas where there are no special hardship cases. In practice, hardship cases in most local authorities are usually dealt with outside the scheme.

Most of the authorities operating this allocation method were in the Strathclyde and Lothian regions and it is of interest that only one of the nine Scottish authorities using this scheme reported the use of computerisation. Any attempt to aid the efficiency of this method through manual operation will only extend clerical difficulties.

(3) Groups and Date Order Scheme

Most authorities have adapted the date-order scheme by grouping applicants according to their circumstances, thus giving priority to those with greater needs. Some authorities recognise up to 20 groups and categories including the homeless, medical cases, key workers, those in overcrowded dwellings, etc. The main difficulty of the groups and date-order scheme is that it can lead to public accusations of queue jumping[98]. Yet, it is an allocation method that is easily understood by staff, who also find it simple to operate. The question to ask, however, is whether this method measures housing needs, and it should be noted that it is often a cause of complaint and dissatisfaction especially by applicants placed in large groups where the waiting-list mechanism is often slow in operation. A related problem is deciding on the number of houses to be allocated to each group, and whether the main groups should be further subdivided. Although this method has proved popular with New Town authorities, only one of the eight councils (Strathkelvin) using this scheme used a computer.

(4) Points Scheme

Lansley[99] has argued that the 'allocation of local authority houses to individual tenants' should be made 'not through price, but on the basis of housing need, through locally determined administrative procedures'. Hence the basis of the points scheme is the awarding of points (assessed by a variety of factors) according to each applicant's housing needs. Maclennan[100] considered that 'these administratively determined scores, which may vary across

local authorities for a given individual then influence the speed with which a public housing offer is made and the quality of accommodation offered. The objective, therefore, is to weight the relative claims of applicants, many of whom have greatly differing social and economic circumstances. Points can be awarded on the basis of criteria such as medical need, present housing condition, (represented by such as overcrowding, lack of facilities, etc.,) and the length of time an applicant has been on the waiting list. It is important that such criteria are continually revised to keep abreast of changing conditions, locally and nationally. The survey indicated that the points system is the most common Scottish allocation method, although the level of computerisation relating to it is low. Only Stirling and N.E.Fife DC's had partly computerised the system.

In practice, the points system tends to lead to the rehousing of those applicants with the greatest needs. Its main advantage is that the criteria on which it is based are defined but there are often many difficulties as regards the types of weighting applied. This means that the scheme's fairness is not always apparent to the public.

Macey and Baker[101] have acknowledged the problems of devising an ideal points system and argue that when a heavy weighting is given to the length of time an applicant has been on the waiting list (especially if the range of other criteria is narrow), the point scheme becomes similar to the date-order system.

(5) Group and Points Scheme

A variation of the points scheme is to introduce the further grouping of applicants, and many authorities consider this to be the most satisfactory method. A disadvantage is that it is often difficult to explain to applicants, and that it leads to complaints of unfair treatment and of priority being given to particular tenants. Yet, the system is one that is able to respond quickly and sensitively to the changing patterns of demand and supply. It also ensures that certain categories of applicants are neither neglected nor given preferential treatment, and any adjustments can usually be made easily and quickly. But, as with the date-order scheme, it is not always easy to determine the number of houses that should be allocated to each group. Of the nine Scottish authorities using this method, three of them operate computerised procedures.

(6) Combined Scheme

The Cullingworth Report[102] noted from its examination of local authorities that most, in effect, operated combined schemes. Families are allocated accommodation by the points method, single applicants by date-order, and special cases by officer assessment. Cases of 'exceptional' hardship were always dealt with separately, though the definition of 'exceptional' varied between authorities. This type of combined scheme is used by two Scottish authorities, but neither reported the use of computers.

No matter what method is used by a local authority, the efficiency and flexibility in terms of housing allocation can be greatly improved by the use of a computer. The substantial clerical

problems facing local authorities relate to the large volume of rehousing allocations from both would-be tenants and existing tenants. Yet, in Scotland, despite the amount of clerical work involved in interpretation and processing, there is relatively little use of computerisation in allocation and waiting list work. The survey indicated that of the 17% of the authorities using computers, only Stirling, Aberdeen, Clydebank, Cunninghame, Strathkelvin, and Glasgow applied computers to allocations and waiting list procedures. Kirkcaldy, N.E.Fife and Edinburgh have computerised only waiting list work.

In view of the above comments on allocation schemes, it must be said that no single method can guarantee complete fairness. However, it seems the most satisfactory method appears to be that which combines the point and group systems, especially if the information is to be computerised. This method allows the consideration of a large number of factors which are capable of statistical and numerical analysis, and it minimises the risk of inconsistency entering the assessment of applications. Importantly, it also provides a reporting facility which monitors the way in which official decisions are arrived at. Yet, subjective judgement cannot be entirely eradicated and there is much leeway for official discretion within the general bounds of this allocation policy.

Table 3.4.

Allocation method used.

Type of Method	No of Council	%	Manual	%	Computerised	%
Point scheme	21	40	17	81	4	19
Groups and points	9	17	6	67	3	33
Date order scheme	9	17	8	89	1	11
Groups and date order	8	16	7	88	1	12
Selection by Officer and Committee	2	4	2	100	-	-
Combined scheme	2	4	2	100	-	-
Two Method*	1	2	1	100	-	-

* 1 Transfer : points scheme

2 Allocation: date order

3.3.2.2 Methods of Monitoring Council House Repair and Maintenance

Repair and maintenance work is of major importance "to maximise the usable life...of properties"[103] and is largely dependent for its success on local authorities instituting some system of priorities as regards the work required.

In Scotland the two commonly accepted methods of maintenance and repair are 'day-to-day' (or 'jobbing' work) and 'planned' (or 'cyclic' work). The survey indicated that, of the two, 'jobbing' was the more common method (83% of the authorities). Of these authorities only 43% of them used the computer as an aid to its organisation. The proportion of authorities using 'planned' maintenance and repair work was 17%, mainly the large authorities

and the New Towns of Glenrothes, Irvine and Livingstone. All still relied on manual methods. No authority combined both methods.

(1) Day-to-Day 'Jobbing' Repair

As Local Authority Management Services And Computer Committee states[104] "in jobbing maintenance and repairs it is the tenant that notifies the maintenance service of work that is required". Repair work is then allocated according to how serious the defects are, that is, a system of priorities is operated. The time factor involved in dealing with a request for repairs, therefore, depends on the type of defect reported. Of the 53 Scottish authorities reporting the use of this method, 23 reported the use of computers in repair and maintenance work. The majority of these authorities indicated that they specified some time limit for repair and maintenance work. Most operated at least three categories of priority, for example, emergency, urgent and non urgent. Emergency repairs are those dealing with defects that endanger life, threaten health or might lead to structural damage to the building. Most authorities reported that these would be dealt with within 24 hours. Although not as serious as 'emergency' defects, 'urgent' was applied to defects which threaten severe inconvenience to the tenant or damage to the property. Such repairs were reported as being carried out with a minimum amount of delay, normally within one or two weeks. The non-urgent, more general, repairs are undertaken by the mobile work unit within the space of some 8-12 weeks. All authorities reported that delays can often occur due to shortages of labour and the lack of materials and replacement parts.

The survey indicated that the majority of Scottish authorities (57%) used manually operated methods in their recording of repair and maintenance work, that is, the recording of such details as are applicable to each dwelling. These manual methods ranged from the use of the simple local house sheet to that of the property record card and, in particular, the Gilbert system. According to the returns from the authorities, 50% used the latter method, 27% the local house sheet, 3% the Kalamazoo system and 10% depended on external contractors. The remaining 10% did not specify their operative methods (Table 3.5).

Table 3.5.

Housing Authorities using Manually Operated Methods by Number and Percentage

Name of Method	Number of Authorities and their Percentage	
Gilbert	15	50%
Local House Sheet	8	27%
Kalamazoo	1	3%
Contractors	3	10%
Not Specified	3	10%

The house sheet method entails the recording of work undertaken and all correspondence on the relevant house files, while the property record card method records every repair and maintenance item on cards that are stored for easy access. As noted, however, the majority of authorities used the Gilbert system and one authority the Kalamazoo card system. In practice this manual retrieval of information is a time-consuming and laborious exercise and the

analysis that is possible is extremely limited[105]. The absence of any form of statistical analysis is the major shortcoming of the manual method and, in addition, the production of repair lists, either pending or completed, usually takes some considerable time. Errors resulting from human fallibility tend to be greater and cumulative in the manual method.

Tenants are usually better informed when the jobbing maintenance methods are used. It is also fairer in its allocation priorities, and there is greater flexibility in answering telephone and postal requests. Its other major advantage is when the carrying out of day-to-day repairs is by Direct Labour Organisation rather than by contractors. Only 10% of Scottish authorities use contractors for their repair and maintenance work, the majority finding that the Direct Labour Organisation is economical both in its quality and efficiency of service to both authorities and tenants. The system also responds well to emergencies which means that "the number of contractors has been reduced"[106]. The major difficulty with the Direct Labour Organisation relates to the fact that the incidence of repairs is usually variable and unpredictable.

Jobbing maintenance also has its problems, not least the risk of either over, or under-stocking of repair materials and supplies. Labour costing often compounds the difficulty of producing and substantiating realistic budgets. In addition, the initial description of a required job may turn out to be wrong. This means that the job ticket has to be changed and more appropriate tradesmen sent out. It is often the case that tenants are not at

home when tradesmen call which means schedule disruption and re-arrangement. Collectively, these can lead to grave difficulties yet, more often than not the method can be efficiently followed through its various stages.

(2) Planned Maintenance System

This is a method where the council carries out a cycle of inspections in order to determine the nature and scale of maintenance requirements and plans repairs accordingly, that is, on a mobile cycle basis. The Local Authority Management Service And Computer Committee Report(1975) described it as "planned maintenance has as its essence a regular pattern of inspection, a planned programme of fault correction, and the methods for registering"[107]. Identified repair and maintenance work is undertaken in a rota fashion which is only interrupted when unforeseen emergencies demand day-to-day jobbing work. This method depends on a great deal of information being available for each dwelling unit. Planned maintenance schemes embrace such work as internal and external decoration, and the maintenance of gardens, fences, gates, windows, doors, home rewiring, general modernisation, etc. Only 17% of the Scottish authorities adopted such a system which, they stressed, was only undertaken if the finance was available.

One of the major burdens of local authority maintenance departments is keeping lifts in high-rise blocks fully operational. Breakdowns and vandalism are the main problems and most authorities recognise the constant need for refurbishing and renewal programmes[108]. As a

whole "planned maintenance should be comprehensive and systematic, encompassing both short and medium term consideration"[109]. Its important advantage is the periodic provision of accurate information on the state of housing stock. This enables the more efficient organisation and completion of all repair and maintenance work. Importantly, it enables authorities to predict future repair work and to plan ahead. This is of major concern in the preparation of budgets. Repair and maintenance priorities, within the limits of the finance available, can also be better organised. In other words, it is important to see it as a preventive and corrective maintenance system; one that anticipates many of the major housing faults at an early stage. The system greatly contributes to the long-term planning of building maintenance. Forward planning, the recognition of priorities, and the more efficient use of resources are all major concomitants of the planned maintenance system. Its drawback relates to the amount of paper work that is inevitably involved and the added expense of house-to-house inspectors. As regards the former, computerisation would greatly ease this problem, yet no Scottish authority involved in planned maintenance work reported the use of computer facilities.

Currently, Scottish local authorities have between them nearly one million dwelling units, and some 30-40 per cent of this total is under some form of repair and maintenance work at any time. The reason for this is that a sizeable proportion is of pre-war construction with the exception, of course, of the New Towns (Table 3.6). A certain percentage requires modernisation because it fails to comply with modern building regulations. Some dwellings are

simply approaching the end of their physical life. Hence, there is a spiralling of repair and maintenance expenses, and the authorities indicated that 25-35% of their budget went into such work, a figure that continues to increase with the rising costs of labour and materials. It is somewhat curious, therefore, in view of the heavy clerical work associated with planned maintenance, that computerisation has made little impact. Of Scottish authorities, 44% employed computers in jobbing maintenance, but its extension to planned maintenance is but poorly developed.

Table 3.6

Housing Authorities by Percentage of their Pre-War Dwellings and by Percentage of Dwellings Given Repair Attention Annually

Number of Local Authority	% of Dwellings Built Pre-War	% of Dwellings Given Attention
25	20-40	30
10	50 and over	40
18	Unspecified	Unspecified

3.3.2.3 Council House Finance

Handling rents and rates are major tasks for any local authority, for they need complex calculations and the quick and accurate processing of data. This section will confine its discussion to three inter-related areas, namely Rent Accounts (collection and calculation), Rent Control, and Housing Benefits.

Much work is involved in the calculation and collection of rent income. What has to be accurately recorded is the amount paid by each tenant and any deduction that might be set aside. Equally

important are procedures relating to payments of rent arrears by tenants. The latter is particularly time consuming, housing staff spending as much time, if not more, on arrears than on all other areas of administration combined. In other words, the work involved in rent recording is extremely heavy, especially when it is remembered that almost the whole of this income is recorded through the use of the Gilbert, or other manual method, such as the carbon-backed strip of paper. "As an authority's housing stock increases, so the amount of clerical work taken to maintain the manual rent account system becomes ridiculous"[110]. Yet the manual method is still the one most commonly used.Of the authorities who answered the questionairre, 19% used manual rent accounting systems, and the majority reported manual recording of rent collection, before it was sent to the computer for weekly processing. Of those, 90% used manual methods based on the Gilbert system, and only East Kilbride reported that they used carbon-backed strip paper. Manual rent arrears procedure methods were used by 38% of authorities, while 19% of all authorities still used manual procedures in housing benefit schemes.

Among the problems caused by the manual rent accounting method are those relating to the accounting process, and to arrears, which are usually recorded separately from rent collection. The methods used to collect arrears vary between authorities. In addition the amounts of rent and rates rebates are calculated separately and their amounts cannot be directly transferred to the accounting system, but are manually recorded. The disadvantages of this manual method are the possibility of duplication, the fact that no

statistical information is available (nor is the analysis of income), and that delays and poor standards of service occur. In other words day-to-day administration of Council tenancies on a manual basis means that clerical problems are often compounded.

(1) Rent Accounting (Collection and Calculation)

The advantages and disadvantages of the main methods of rent collection have been subject to considerable discussion over the last 15 years or so. Perhaps the initial point to make is that an authority, in adopting a particular method, will be greatly influenced by a variety of factors, including the geographic size and character of the local area, the number and general distribution of its houses, and the general circumstances of the tenants. Many now agree that tenants should be offered a choice as to how rents are be paid and Duncan[111] has stressed the importance of simplified rent collection methods and flexible opening hours of collection offices. Tenants should also be provided with regular statements as regards their rent accounts. The survey indicated that the Scottish authorities operate a wide range of rent collection methods, but authorities differ regarding methods of payment which are acceptable. Of the authorities, 71% operated the local and central area collection method, 11% door-to-door collection, 6% payment by Post Office Giro, and 2% by bank orders and direct debit as shown in Table 3.7. Of the remaining authorities no single method of collection was seen to dominate. The survey also indicated that all authorities allowed their tenants the opportunity to pay in person or by bank order. Of the

40% who used door-to-door collection, many indicated that this was important for special cases such as disabled and handicapped tenants. Giro payment was accepted by 47% of authorities and 74% used the wage & salary deduction method, although the latter was mainly applied to their own council staff (Table 3.8).

Table 3.7

Dominant Methods of Rent Collection by Number & Percentage of Housing Authorities

Dominant Method	Number of Authorities	%
At office(s)	37	70
Door-to-Door	6	11
Giro (Post Office)	3	6
Bank Orders	1	2
Unspecified	6	11

Table 3.8

Accepted Methods of Rent Collection in Number & Percentage of Totals

Method	Number of Authorities	%
Door-to-door	21	40
At office(s)	53	100
Bank orders	53	100
Giro (Post Office)	25	47
Salary deduction	39	74

1. The door-to-door collection

Most authorities previously relied on the method whereby a collector visits tenants on a regular basis to collect rent. The

authorities that still use this as their main collection method are Dunfermline, Sutherland, Midlothian, Clydebank, Cumnock & Doune, and Cunninghame District Councils. It should be noted that such a method has never been used in the Scottish New Towns and most authorities employ this method only for tenants who are elderly or disabled. The main advantage of this method is that it helps authorities to keep in contact with tenants, thereby minimising rent arrears and facilitating the reviewing of properties in terms of any repair and modernisation work. Some have argued that door-to-door collection is the most efficient method of rent collection since not only is it quick, but it also serves as a management link with tenants[112]. In addition the rent book provides the authority with an immediate up-to-date statement in the form of a running balance. Yet there are many problems associated with this method, many of which are related to the problem of finding people at home when the collector calls. The method is also time-consuming and ties down staff resources which could be otherwise utilised. In certain areas there are the added risks of abuse and even physical attacks on collectors, this being one of the main reasons why authorities exploring and instituting different collection methods. As door-to-door collectors record payments (or otherwise) by hand, the method is essentially a clerical one. The best known method is the Gilbert system which the survey showed has been used for many years.

2. Office Collection

This method is widely used by Scottish local authorities and it

provides the tenant with the choice of either paying in person at the central or area office, or sending payment by post. Point rent collection is common in most Scottish local areas and is seen as having the advantage of maintaining personal contact between housing authorities and tenants. In addition, rent payments can be balanced immediately. This is of benefit to all concerned. The main problem, however, is that of security, relating to the necessity of safeguarding large amounts of cash. Many collecting offices are small and the long queues that often develop lead to frustration on both sides. These offices are also used by tenants as forums for complaints, information bureaux, places where they can report the need for repairs and maintenance, and to request transfers. For the tenant this method of payment is often time consuming and can be expensive if long distances have to be travelled between home and payment centre.

3. Agency Collection

As an alternative to office collection and door-to-door payment, the majority of Scottish authorities offer a variety of agency payment methods.

The survey indicated that many authorities were prepared to collect rents through the Post Office, either by the Giro method or by special arrangement such as a voucher system (Tables 3.7 and 3.8). It further indicated the increasing use of bank standing orders and direct debits, although only one authority, Bearsden and Milngavie, reported that as many as 60% of its tenants were paying by this method. It is of interest that, although most authorities

made provision for this, few tenants sent their rent through the post. Deducting rent from wages and salaries was possible in the case of 75% of the authorities, although this scheme involved local authority employees only. In general rent collection methods through agencies favour both the tenant and the local authority. Where payment is made at such venues as banks and Post Offices the risk of physical attack on the collector is removed, but it results in a loss of personal contact with tenants.

(a) Giro Collection

Payment by Giro became a remarkably popular method after the system was introduced in 1972[113]. One of the main advantages is that Post Offices are open 6 days a week and rents can be paid at the same time as Family Allowances, Pensions, and Supplementary Benefits are collected. Hitched[114] has stated that the Giro method is far cheaper than door-to-door collection, yet it fails to provide up-to-date information on arrears. Another advantage is that local authority staff are not involved in handling cash and are thus relieved of security problems. The method, therefore, releases staff for work on other housing tasks. But this system has not produced a faster method of payment and the fact that rent books are not involved has made certain aspects of Local Housing Management more difficult. The system has also reduced the personal contact with tenants.

(b) Bank Order

This is similar to the Giro method and shares its advantages in that it eliminates security risks and also frees staff for other

work. Many tenants, however, do not have bank accounts and of those who do only a small proportion take advantage of the standing order and direct debit methods. As with the Giro method, the use of banks in rent payments breaks the contact between tenants and authorities and poses problems in the collection of arrears.

(c) Salary and Wage Deduction

This method principally applies to local authority employees, the rent being deducted from wages and salaries.

Each local authority has its own method of rent collection, and the survey showed that 25% operated a monthly cycle, 30% a fortnightly cycle and 38% a weekly one. The remaining 7% provided no information. Whatever the method and regularity of payment all authorities face by day-to-day problems involving errors, and their correction, the change of tenants' addresses, and adjustments in rebates. Rent accounting embraces not only the setting up of the appropriate rent, but also its recording, the posting of receipts, and producing the final account. Much of this work is dealt with by housing staff who are continually involved with answering queries and carrying out discussions with tenants.

Although different debit control methods are operated by different councils, it is essential that strict control is maintained on rebates and on arrears. This will be discussed in the next section.

In summary, all methods of rent collection have disadvantages and the consensus is that the most appropriate systems are those that

employ a variety of methods, thus emphasizing the importance of adaptability.

As noted, rent collection and rent calculation methods demand a considerable clerical input which falls to housing management staff. A considerable part of this work is involved in rectifying errors, and dealing with queries and misunderstandings, many of which produce lengthy delays and undermine the degree of efficiency.

(2) Rent Arrears

All local authorities are faced with the problem of rent arrears. Table 3.9 summarises information received from 30 Scottish local authorities, while the remainder reported that they had no firm statistics of arrears. The percentages highlight big differences between authorities, the extremes being found in the Western Isles (where 60% of tenants were in arrears) and in Caithness (where 0.6% were in arrears). Many authorities also reported the incidence of temporary arrears at some time.

Table 3.9

Arrears in Scottish Housing Authorities

District Council	%	District Council	%
Caithness	0.6	Clackmannan	4.0
Kincardine & Deeside	1.0	Stirling	4.0
Berwickshire	1.4	Glenrothes New Town	4.0
Hamilton	1.9	Dunfermline	4.7
Roxburgh	2.0	Cumbernauld New Town	5.0

Badenoch	2.0	Nithsdale	7.0
Sutherland	2.0	Skye & Lochalsh	7.5
Cunninghame	2.0	Kirkcaldy	8.0
East Kilbride	2.0	Strathkelvin	11.0
Eastwood	2.0	Clydesdale	21.0
Livingstone	2.0	Banff & Buchan	25.0
Wigtown	3.0	EastKilbride New Town	26.0
Aberdeen	3.0	Argyll & Bute	32.6
Cumnock & Doune	3.0	Ross & Cromarty	46.0
Ettrick & Lauderdale	4.0	Western Isles	60.0

Local authorities are obviously anxious to keep this aspect of housing management under firm control and considerable time, money, and energy are devoted to this task. It involves a heavy use of manpower and resources. There is a number of complex social and administrative problems relating to the incidence of arrears, and local authorities depend on a number of methods in dealing with them. These are largely governed by their individual housing policies and the methods they use in collection. As Popplestone & Shaw write[115], "it is clear that the recovery of arrears is a substantial industry in its own right". Most authorities work on the general principle that, should arrears arise (and inevitably they do), then a variety of methods is adopted in an attempt to clear a tenant's outstanding, and usually accumulating, debt. These can range from the acceptance of some agreed payment to the extreme of taking the tenant to court. At the conclusion of each collection period a list is usually produced. This is indicates tenants with arrears problems. This stresses the importance of efficient

monitoring, which is dependent on the rapid processing of rent payments. A considerable amount of clerical work is involved, and efficiency and accuracy are greatly reduced by a number of factors, not least problems in accounting systems. Another major problem is the difficulty of contacting tenants, many of whom are deliberately evasive. These problems are the result of the existing inefficient procedure. It seems that priority must be given to tenants' needs, and special situations, if the arrears problem is to be reduced.

(3) The Housing Benefit Scheme

Housing Benefits involve those tenants with low incomes. In some Scottish authorities, as many as 78% receive such benefits. The scheme operates through the mechanisms instituted by the Social Security and Housing Benefit Act of 1982, which replaced various rent and rebate schemes. It is administered directly by the local authorities and is based on detailed guidelines that refer to such criteria as the family income. The main aim of the Act was to simplify what had previously been a complicated and unwieldy system. Unfortunately, however, the system was awarded little extra housing aid expenditure and the main problem is that many people lose out financially[116]. Inequalities arose, according to Homes[117], "because some people were entitled to claim either supplementary benefit or rebates and a large number of claimants made the wrong decision by claiming the benefit which gave them the lesser entitlement". The main advantages of the scheme are that it leads to a faster local authority service and in addition, eligibility to benefit has been extended to such groups as those

living in caravans and houseboats. Furthermore, it reduces the authorities' rent collection work, as tenants in receipt of housing benefit have both their rent and rates deducted. However, the scheme also involves considerable extra work in other areas, for authorities receive a large amount of correspondence from tenants applying for, or already receiving, benefits. This method should help to reduce arrears and assist cash flows and should also lead to an alleviation of anxieties relating to debt problems. The scheme, however, does involve the removal of responsibility and flexibility from the claimant, and there is also a danger that debt problems might be transferred elsewhere, e.g. to heating and lighting charges. The calculation of rebates is complex and demands considerable clerical work. The scheme has to ensure that, at the end of a predetermined period, any necessary action is taken. The decision to renew, alter, or terminate the rebate will depend on whether or not there have been any changes in the applicant's circumstances.

The administration of the housing benefit schemes involves a considerable workload for most housing authorities and this is one of the areas of housing finance in which computers can play a key role.

The above methods and systems (whether dealing with rehousing, maintenance and repair, or housing finance) have a number of things in common. Firstly, it is essential that accurate records of the need and demand for services are created and, secondly, it is essential to keep these records up-to-date. These will now be

discussed under the heading of the "recording mechanism".

3.3.3 The Recording Mechanism: Its Information & Problems

3.3.3.1 The Recording of Need and Demand

A distinction has to be made between the demand for housing and the need for housing. The recording of housing demand is the less complicated of the two, and is usually assessed by the requests for rehousing, repairs, rebates, etc., made to an authority's area offices. This can be achieved from the monitoring of personal requests and those made by letter and telephone. In fact, the survey showed that there are still 21 Scottish local authorities, representing more than 40% of the total, which operate with one main and no area office. Some of these have greater housing stock than other Scottish authorities that have a number of area offices. It is important that the locations of these area offices are made known to potential tenants, as they play a major role in providing information. Unfortunately, this role is often neglected, which means that tenants can be misinformed as to the principles and purposes of local authority policy. Some tenants, e.g. immigrant families, are often ignorant of their rights regarding security of tenancy, while elderly owner occupiers are also often ignorant of the fact that they may be eligible for Council rehousing. Those tenants evicted for rent arrears are usually not aware that they are entitled to rehousing under the Homeless Persons Act. Ignorance is also common as regards who is responsible for maintenance and repairs, and the help that tenants can get for improvements and modernisation. In addition, there are welfare benefits available

which many people do not know about.

Many of these functions are, in fact, restricted by some local authorities. The survey found, for example, that many authorities still do not allow owner occupiers to apply for rehousing, and there are many that have restrictions on residential qualifications. Blanket rules, which require displaced spouses to obtain a separation order, or divorce, before they are allowed to join the rehousing list, are also operated by some authorities. Furthermore, restrictions operate in terms of the choice of housing area offered. Of the authorities replying to the questionairre, 16% indicated that only one choice of area from those offered was accepted, 24% offered two alternatives and 14% said they presented prospective tenants with a choice of three areas. In addition, 16% of the authorities made only one offer to applicants and, should that be refused the penalty was one or more year's delay which could mean that the tenant returns to the bottom of the housing list. Over 50% of the authorities, however, presented waiting tenants with two rehousing offers, and the penalty for non-acceptance was a year's (sometimes two) delay in being offered another. Three offers were available from 18% of the authorities, and 16% indicated that they had a policy of no limit to the number of offers made. Yet, in practice, for each offer rejected there is, as tables 3.10 and 3.11 show, a six months waiting penalty when other restrictions come into operation. Some authorities, for example, are not prepared to consider rehousing unless the applicant has been a council tenant for a prescribed period, this often ranging from one to 5 years. Other authorities

further stipulate that there must be sound reasons for wanting to move, for example medical problems or conditions of overcrowding. No transfer is considered if applicants are in rent arrears and, furthermore, the house from which they are moving must conform to a certain standard of tenant maintenance.

Table 3.10

Housing Authorities by Restricted Area Choices.

No. of Local Housing Authorities	No. of Areas Choice
8	1
12	2
7	3
23	Unlimited
4	Unspecified

Table 3.11

Housing Authorities by Maximum Number of Offers Made

No. of Local Housing Authorities	Offers Made
8	1
26	2
9	3
7	Unlimited
4	Unspecified

Other restrictive conditions include a waiting time of between 2 and 6 months before any request comes up for consideration.

During the regular visits carried out in the course of the survey

to sample Scottish authorities, it was found that many tenants lose money when they make requests for certain repairs. It was apparent that local authorities maintained widely different policies when determining whether repairs are chargeable to tenants.

Many tenants have also lost out financially because authorities have failed to inform them of their eligibility for benefits, particularly supplementary benefit or rent & rate rebates. In fairness, housing staff have little time to do more than inform tenants in arrears that they may be eligible for rent and rate rebates. Hence, advise as regards tenant's rights, and the financial venues open to him, should receive local authority priority.

3.3.3.2 Centralisation and Decentralisation

Where an authority operates several housing offices there is often a major problem in updating records. Glasgow District Council has 16 area offices, Argyll & Bute District Council 9, West Lothian and Ross & Cromarty District Councils have 7, and Edinburgh, Dundee, Clackmannan and Annandale & Eskdale District Councils have 6. The problem with decentralisation is that area offices can quickly become specialists in certain services, yet most authorities agree that it is important for housing applicants to have help and assistance available within a minimum of travelling time. Hence, a decentralised system is based on the idea of taking housing services as close to people as possible[118]. It is also of major importance that the central office functions as a monitoring and general information venue for the whole housing administration,

since it is the place where top decisions are made. Decentralisation, however, also generates difficulties for people requiring re-servicing in different administrative areas. For example, the prospect of registering at several offices in the areas of choice can act as deterrants, especially to the old and infirm. It causes further problems in maintaining up-to-date information on applicants' circumstances and requirements.

The survey showed that 10 authorities had decentralised their allocation and waiting list systems, and 3 of them made use of computerised facilities (though one relied on a centralised computer service) (see Table 3.12). The survey also showed that 16 authorities had decentralised their maintenance and repair work, six of which were computerised. Although only 3 centralised organisations had computer facilities (Table 3.13), 14 authorities had decentralised their rent accounts system, of which 12 operated a computerised system. Of these, 6 had centralised computer facilities (Table 3.14). The survey also indicated that 6 authorities had decentralised their benefits work. Of these, 5 had computerised but none of them had decentralised computer facilities (Table 3.15).

Table 3.12

Housing Authorities' Computer Usage (Rehousing).

District Council	Local Office Computer	Access to Central Computer
Kirkcaldy	Yes	No
Banff & Buchan	No	-
Caithness	No	-

West Lothian	No	-
Cumbernauld	No	-
Cunninghame	Yes	No
Glasgow	Yes	Yes
Inverclyde	No	-
Monklands	No	-
Dundee	No	-

Table 3.13

Housing Authorities Computer Usage
(Maintenance & Repair System)

District Council	Local Office Computer	Access to Central Computer
Berwickshire	No	-
Stirling	Yes	No
Stewarty	No	-
Dunfermline	Yes	Yes
Kirkcaldy	No	-
Ross & Cromarty	No	-
Skye & Lochalsh	Yes	No
West Lothian	No	-
Cumbernauld & Kilsyth	No	-
Cunninghame	No	-
Glasgow	Yes	Yes
Hamilton	Yes	No
Inverclyde	No	-
Monklands	No	-
Strathkelvin	No	-
Dundee	Yes	Yes

Table 3.14

Housing Authorities Computer Usage
(Rent Accounting System)

District Council	Local Office Computer	Access to Central Computer
Berwickshire	No	-
Stewartry	Yes	Yes
Dunfermline	Yes	Yes
Kirkcaldy	Yes	No
Banff & Buchan	Yes	Yes
Caithness	Yes	No
Skye & Lochalsh	No	-
West Lothian	Yes	Yes
Argyll & Bute	Yes	Yes
Cumbernauld & Kilsyth	Yes	No
Glasgow	Yes	No
Hamilton	Yes	No
Monklands	Yes	No
Dundee	Yes	Yes

Table 3.15

Housing Authorities Computer Usage (Housing Benefits)

District Council	Local office Computer	Access to Central Computer
Stewartry	No	-
Banff & Buchan	Yes	No
West Lothian	Yes	No
Cumbernauld & Kilsyth	Yes	No
Hamilton	Yes	No
Monklands	Yes	No

It is obvious, therefore, that a large number of authorities still maintain manual systems, particularly the decentralised authorities where there is a need for the duplication of records between central and local offices.

One solution to this problem lies in the use of multi-access on-line interactive systems, which allow more than one person to use the computer at the same time, and also appear to process different programmes simultaneously. With such a system any application can be run at any terminal. This greatly facilitates rapid communication between local offices and headquarters and it is this technique, and its practical and technological basis, that this study discusses in depth. The method means that there is only one list for any service, e.g. one rehousing list, one arrears list, one contractors' list, etc., and these are centrally stored and controlled, but are accessible from all area offices. All live information is constantly and directly available to the user. No operating staff are required, as any program can be run from any terminal, albeit under the control of passwords.

4. A Critical Review of Existing Work in Glasgow (Case Study)

4.1. Introduction

In the light of the observations made in chapter 3, Glasgow authority's housing management is the subject of the case study which will be discussed in this chapter.

It was described to concentrate on the Glasgow Housing Department for the purposes of this work for a number of reasons:

1. Glasgow Housing Department administers the largest number of Housing Authority owned houses in Scotland.

2. Glasgow has considerable experenience (unlike, for example stirling) of the use of computers in Local Housing Management.

3. Glasgow Housing Department was very convenience to visit.

The problems of council housing in Glasgow are typical of those problems met by housing departments controlling large stocks of property. While these problems do not differ significantly from those of other Scottish authorities, the clerical and organisational difficulties, and the selection systems are radically dissimilar. The problem is discussed in this chapter, together with the nature of the main procedures that have been adopted. Some of them have already been implemented on a computer in an attempt to eliminate the problem areas and to meet the demands of the housing process.

The use of computer services by Glasgow District Council is now considered as being more economic and time effective as regards

their ability to store, and to handle quickly and accurately vast amounts of information. Glasgow District Council Annual Housing Review of 1985 emphasises that "computers are now a significant part of housing management work in Glasgow"[119].

As Glasgow Housing Department is an important part of this research, an additional, more detailed, questionnaire (see Appendix 4) was sent in April 1985. This was followed by 26 visits, during the period April-December 1985, to the Department and its Allocation, Maintenance, and Finance sections, and to the Building & Works Department. The Computer Services Department was also visited. In addition other regular visits were arranged to the System Development Group and to one area office. The purpose of the investigation was to gauge the nature and extent of the main problems facing Glasgow's Housing Department. The findings provide the major information source for this study, which seeks to examine how computers can be used more effectively, particularly as part of an integrated management system. Unless otherwise stated, the statistics quoted and discussed in the following pages, relate to these findings.

The main objective of this chapter is to review briefly the structural organisation and distributive functions of the housing department and its area offices. This is followed by a description of the range of services provided (allocation and waiting list, repair and maintenance, and rent accounting) and a discussion of operating procedures. This includes the role of current computer usage, and its operational problems.

4.2. Functions Distribution and Organisational Structure

Glasgow district council is by far the largest housing authority, in Scotland. The survey into this authority showed that the Housing Management Department employs 3182 staff. Of these, 1334 are non-manual staff, 682 are manual staff and 1166 are MSC (manpower services commission) staff. Some 69% of non-manual staff and 95% of manual staff are employed in 16 area offices situated throughout the District, while the remainder are located at headquarters in Lomond House. The survey showed that the department has, like those of other Scottish Authorities decentralised some functions, but it still relies on a number of other departments to provide certain housing management functions. However, some essential functions are still not under its control. These include the two areas of repairs and computer services. For example, the Build and Works Department is responsible for repairs and maintenance of all the Council's buildings, while the Computer Services Department provides computing services. In addition the department still relies on the Regional Council to provide computer services for the rent accounting system. It also relies on other departments to provide certain services, such as Architecture & Related Services Department for modernisation & conversion, District courts to deal with arrears. It is inefficient to have overlapping services provided by two or more departments each responsible to a different committee. However, the provision of housing management services to tenants will depend on the nature of relationships between Housing Management and other departments. This also extends to outside

organisation such as the DHSS, banks, and the Post Office.

Glasgow Housing Management Department,at present, maintains 16 area offices. These are described in Table 4.1. The major factor influencing the organisation of these offices is the variety of functions executed by them. The structure of area offices is complex because such functions such as allocation and repairs are carried out. The most significant part of the decentralisation process was the devoluation of allocation procedures to the area offices, and lead to an increase in the number of staff in them. Glasgow, like the majority of Scottish authorities, reported an increase in the number of staff employed in allocation after the introduction of a computer system.

Table 4.1.

Distribution of Council Properties & Number of Staff by Area Offices. (July 1986)

Area office	Number of properties	Number of staff
Drumchapel	9,878	67
Anniesland	15,607	60
City North	4,319	26
Maryhill	6,934	51
Possil/Milton	9,771	63
Springburn	15,687	77
Mid East	10,427	126
Gallowgate	13,302	
Baillieston	2,448	15
Easterhouse	13,575	89

Castlemilk	9,854	
Rutherglen	6,463	129
Cambuslang	6,802	
South	17,906	89
Mosspark	14,820	
Pollok	10,131	130
Total	**167,924**	**922**

In addition it would not be acceptable either to tenants or authority staff if a service was not provided with the minimum of travelling inconvenience, or if the local control of the policy aspects of rehousing decisions was lost. The solution to these difficulties is the use of a Multi-Access Computer, i.e the computer can store information and transmit it quickly through private telephone lines to a local display terminal. This technique means that only one list is needed for rehousing, arrears, materials, etc, and the information can be stored and controlled centrally, though it is accessible on demand from any of the 16 area offices.

Another factor is the organisation of repairs and it is useful to discuss briefly the area offices' organisation of repairs. The city is divided into four areas, each with its main depot. The four depots of the Build & Works Department serve geographically related groups housing department offices, as shown in table 4.2. The Build & Works Department would not divulge any information about its depots or provide information on its organisation or its staff, for example the number of foremen, tradesmen, labourers, etc. Another

vital factor is the setting of priorities for programs used (written and developed, and also package purchases) and computer time. This is the responsibility of the District Council Computer Services Department, as are the mainframe computer and its organisation. This department produced programs for the entire District Council and not only for the Housing Management Department based in 112 Ingram Street. It is run by a Director and Committee and has a sizeable staff of 131. It is concerned with both hardware and software but again this department did not provide any information relating to their current implementation of computer systems and their programs used, or to its organisation. Up to now this department has been used by the Housing Management Department only for allocations and jobbing repairs, while the rent accounting system is run by the Strathclyde Region Computer Services Department. The other management functions are still carried out manually. Further discussion of these computers and other related topics is given in sections 4.8 and 4.9.

Table 4.2.

Distribution of Area Offices by Housing Depots.

		DEPOTS	
Hawthorn Street	**Queenslie**	**Rutherglen**	**Nitshill**
Anniesland	Easterhouse	Castlemilk	Pollok
Poss/Milton	Gallowgate	Cambuslang	South
Drumchapel	Mid-East	Rutherglen	Mosspark
Springburn	Baillieston		City-North
Maryhill			

As this study of housing management and other related departments (i.e those sharing the same building, area, and boundaries) has shown, it should be of major concern that an integrated organisation in Scottish authorities be implemented. This would result in much better co-ordination between the related departments. The study confirms that changes in organisation must be made if an integrated Local Housing Management system is to be introduced. These changes would affect relationships between its management and the finance, maintenance & repairs, and welfare computer services. The extent of these changes is determined by the functions attributed to Local Housing Management.

4.3. Housing Stock and Voids.

The authorities' activities over the years have included the provision of housing as an aid to economic expansion, redevelopment, conversion of older properties, the building of houses, the allocation of houses according to housing needs, maintaining the standard of dwellings through necessary repairs, the collection of rent, and the calculation of rent and rate rebates. The survey into the Glasgow authority has shown that it is responsible for the services provided by 16 area offices. The first point to be established was that the total housing stock owned by Glasgow District Council is difficult to determine. According to the Regional Assessor the total housing stock owned by Glasgow District Council was 171,640 (this represents 57.9% of dwellings, compared with 28.3% owner occupied, 9% in the private sector and 4.8% Scottish Special Housing Association)[120]. According to the property reference file the total council housing stock was 167,924. Glasgow District Council maintain over 167,900 dwellings of all types, comprising some 72% of low rise flats, 10% of two storey flats, 7% of high rise flats, 2% of detached houses, 3% of semi-detached houses, 4% of terraced property, and 2% of properties classed as shelter housing and bungalows. Of the authority's stock, 3.9% are of one apartment, 13.4% of two apartments, 54.7% of three apartments, 24.9% of four apartments, 2.9% of five apartments, and 0.2% of six and more apartments. To increase the size range, the council has undertaken a programme of conversions and 32 units were completed during 1985. Also it was estimated that 70 houses were built in 1985, while during the same period the number demolished

was estimated at 200 houses.

The range of property maintained by Glasgow is particularly wide, for the council has been carrying out housing development for more than 50 years. In addition it has taken over property from its predecessors and from private developers. These collectively reflect a widespread variety of design that ranges from historic building (that is pre-1919) to high rise 30-storey blocks. However, some 66% of the local authority properties were constructed in the post war period and 31% in the inter war period, although a substantial number (3659 units) of pre-1919 properties are included in the stock.

Table 4.3. shows that of the 5643 vacant properties, there are 11.8% that are difficult to let due to the length of time that they have been empty or the number of times they have been refused by applicants to whom they have been offered. This will be discussed briefly here because void properties have become an increasingly important part of the housing management's task in the last decade or so. This is because the number of vacant houses has increased due to modernisation, conversion, etc., and any void (i.e. unlet) dwelling loses the authority money. Consequently it is important that when an inspection is made of an abandoned property the enquiries establish the nature of the particular problem relating to the property.

On termination of a tenancy, any damage or rent overdue must be recorded and attempts made to regain overdue rent, together with

the cost of repairs, from the former occupant. Different staff and departments are involved, such as the Housing Management and Build & Works Departments. The termination of a tenancy begin with a notice of termination from the tenant. After that, an inspection of the property is carried out before the termination date to determine the repairs and redecoration necessary and, importantly, whether they are the authority's or the tenant's responsibility. In the latter case then such repairs or redecoration work should be done before the tenant moves. One difficulty is that, because the number of staff are involved, this results a wide range of standards. Another difficulty common to all Scottish authorities is that of conforming to a common standard of tenant repairs when the tenant is moving from the area. Transfers can be denied to tenants on this point, but the staff can do little about 'movers', except to try to get a forwarding address and reclaim the expenses.

Dwellings are vacant for a number of different reasons such as major repairs, demolition, conversion, termination, and other less common reasons which Glasgow does not record, (for example, a house to be sold or which has just been acquired or built). Table 4.3. indicates the various reasons for vacant premises. It shows that 20.9% of the voids were available for letting, while 79.1% have been permanently or temporarily suspended. Those temporarily suspended commonly create more work for staff, since checks have to be made to discover when the work will be completed and to make sure that the usual re-housing procedures are instituted. It is often the case that staff do not have the time to undertake regular inspections of dwellings nor to determine whether repairs have been

finished before rehousing takes place. For occupants, the problem of defining the condition of repairs and decoration of a property causes major problems, in particular for those requesting transfers who choose new properties. Weak management of vacant premises not only costs money, but can also damage tenant/authority relationships. The computer can play a major role in this area and can ease many of the difficulties observed above.

Table 4.3.

An Analysis of Vacant Properties by Status (July 1986).

	Available for let	Not available for let	Total	%
Normal relet	883	0	883	15.7
Available for select	295	0	295	5.2
difficult to let		664	664	11.8
Under major repair		656	656	11.6
Under refurbishment		603	603	10.7
Held for decant		357	357	6.3
Conversion		40	40	0.7
To be demolished		791	791	14.0
Held for pending		1097	1097	19.5
Others.		255	255	4.5
Total	**1178(20.9%)**	**4465(79.1%)**	**5643**	**100.0**

4.4. Allocations & Waiting List Services.

The survey has indicated the enormous rehousing pressures that affect the authority. Problems of rehousing made up the largest proportion of daily complaints and enquiries to area offices. The survey, in Glasgow District Council, also found that, on average, 167 complaint forms were received daily either from people visiting offices or by mail. Of these forms 92 were from new applicants, 65 were transfer requests and 10 were from homeless families. Most of the application forms were the result of people personally visiting offices, and only 15 forms (9 from new applicants and 6 from transfers) were received by post. The study also indicated that an average of 500 applicants and tenants were met each day, the average time spent with each applicant or tenant being 15-20 minutes. A more recent visit to an area office would suggest that 30 minutes is a more realistic estimate. As a result there were some 75,000 applications from tenants and prospective tenants on the rehousing list files. In addition, it was found that over 85% of waiting list applicants were regarded as being in housing need, compared with some 50% of transfer applicants. The average waiting list time for an applicant is 4-5 years, which makes Glasgow, in this respect, the worst in Scotland. That the acceptance rate is low compared to other Scottish authorities is thought to be the result of applicants specifying only 6 choices out of a total of 150 sub-areas.

In terms of the adequacy of the authority's waiting list as regards housing need, the survey found it to be misleading on two counts. Firstly, some people placed on the list were not in urgent need.

Secondly, others in desperate re-housing need were not even on the list. Much of this imbalance was of the points-score system which fails to take account fully of an applicant's full needs and circumstances. The current points scheme is complicated, for it uses 10 different priorities in addition to the special points that can be awarded by the committee and others given under the heading of 'normal factors'. The system lacks both flexibility and fairness in grading tenants, particularly with reference to overcrowding. Two urgent rehousing cases in point were those from two applicants on the same day, one single and the other married with 3 children. They both lived in the same tenement and shared the same amenities and yet the council allocated the same number of rehousing points to both. Neither does the system fairly tackle the question of date of application. For example, if two applicants filed forms, one at the beginning of the year and the other at the end, both would receive a fixed five points at the beginning of the next year. It is necessary, however, that some system is needed to maximise the use of the Council's housing stock. Such a system could improve the value of the reletting pool by making use of criteria which relate to factors other than only size. It is important to stress that mutual exchange between tenants will reduce waiting list numbers, since, at present, the Housing Management Department provides no information on this matter. During discussions with the staff of the Department, it was found that such exchanges are left to the tenants themselves to organise. It could be considered necessary to involve management directly in this area.

There are other areas that must be considered. For instance, the

second generation of a family must receive additional points each year if they remain with their parents, and points should also be given for old age. Perhaps a more useful indicator could be length of time in need. This could be built into a point-awarding system in several ways, such as the duration of overcrowding, the time spent separated, the time spent in lodgings with friends or relatives.

The current point system, however, does identify children living in multi-storeys. Although the problem is not treated in any depth, the system is designed to help families with young children who want to move out of the multi-storeys. It does not award points to families with children who live in deck-access or unmodernised tenement flats. Neither does the present system take full account of overcrowding, since it does not distinguish between double and single bedrooms, nor is any account taken of families living apart as a direct consequence of housing difficulties. Also termination of the current tenancy should be taken into account, as should the condition of the present dwelling and its environment.

In summary, and in the light of the above observations regarding Glasgow's points scheme allocation system, it becomes apparent that a new system should be considered. It is recognised, however, that no system would ensure complete fairness, and that the new method should take into consideration the priorities of the existing system. This proposed method allows for the consideration of factors which the present allocation system tends to ignore, and also allows for the consideration of a large number of factors for use in statistical and numerical analyses.

4.5. Repairs and Maintenance Services.

Both outside contractors and the authority's Build & Works Department share day-to-day repairs, modernisation, planned and other maintenance work. Although the total value of maintenance and repairs was split 60% and 40% between contractors and the Build and Works Department, respectively, some 83% of jobbing repairs by all trades were undertaken by the Build & Works Department from its four maintenance depots.

4.5.1. Responsibilities of the Department

The Build & Works Department employs over 3,800 site staff and is responsible for carrying out maintenance and repair services at the request of the 16 area offices. Its current budget stands in excess of £52m (£54m in 1984), which covers basic repairs such as planned maintenance, lift and fence maintenance, work on empty properties and repairing the effects of vandalism. Over 88% of the existing budget comes from the Housing Management Department. The repair commitment of the Council extends to over 167,900 properties, over 5600 garages and some public buildings with an age range from pre-1919 to those recently built.

The following requirements for improvements and repairs indicate something of the scale of the work. Over 50% of the authority's total stock, in 1985, was affected by condensation or dampens; over two-thirds of the pre-1919 houses required rehabilitation; some 2,500 inter-war houses required extensive modernisation to replace out dated fittings; over 62,000 post-war dwellings needed major

work and, some 41,000 houses urgently needed rewiring. Work in the authority's high-rise flats required the replacement of lifts, water pumps and ventilation shafts, and there were also major problems concerning the replacement of flat roofs.

Planned maintenance is undertaken when essential major repairs and replacements are necessary. It is rarely undertaken on a systematic basis, but is more likely to be governed by the availability of funds.

4.5.2. Problems Associated with the Present System

The survey indicates that the authority was under many and diverse pressures when dealing with its repair and maintenance services. The question of repairs occupies the greatest share of the daily enquiries and complaints received. Survey shows that some 2038 order notifications for various repairs are received every day and it is noted that the backlog of requests for day-to-day jobbing repairs is consistently increasing.

One of the most common daily problems is that of determining responsibility for paying for repairs. When a repair request is received, it is first judged according to whether it involves chargeable items, that is, whether or not the tenant should be asked to pay for the repair. Detailing lists of items and determining whether they should be changed to the tenant is not an easy task. (For example, there are many special cases and exceptions such as the repair work done for the handicapped and disabled). However, a comprehensive list of the items and repair

services that tenants are expected to pay for must be available.

Specifying the precise nature of a defect is another daily problem. Descriptions over the telephone, or even in person at the local authority offices, are sometimes unhelpful, and often inaccurate. This may be due to the tenant being unable to provide full information, or to the staff receiving the repair request failing to acquire or record all the details. Here there seems to be a case for more training of staff, since the maintenance department needs detailed information regarding the cause and extent of the defect before it can determine the staff and materials required to carry out the repair. It is necessary to recognise emergency repairs, which must be given a high priority. The classification of repairs, therefore, into the emergency and non-emergency categories is of major importance, as is the inspection, in order to determine priorities, of the less urgent repair work. Here the services of the computer department can be of invaluable assistance in maintaining up-to-date records.

4.5.3. Processing of Repair Requests

Many of the delays in carrying out repairs result from the slow manual processing of repair requests. The proposed system allows housing management to operate a tighter control on the ordering and processing of repairs, the result being a faster and more efficient service to tenants.

Table 4.4.

Basic Information Related to the Jobbing Repair Priorities (August 1986)

Priority used	Target time to complete	% distribution by priority	% complete on time	Average time to complete
Emergency	24 hours	19	77.8	29.1 hours
Urgent	9 days	48.9	51.2	15.3 days
Cyclic	5-9 weeks	32.1	63.8	36.2 weeks

It also allows repairs to be ordered into various priority categories,such as special emergency (for families with children and for tenants who are elderly or disabled), emergency, urgent, and normal repairs. Also an indication is given as to how long a particular repair should take to complete. Table 4.4. indicates categories used in Glasgow, the proportion of requests allocated to each of the three categories used, the target time for completion, and the actual average time achieved. Difficulties arise from the complicated priorities system and from the high percentage of requests allocated to the emergency repair category. This has the effect of seriously disrupting the organisation and execution of all repair and maintenance work, particularly jobbing repairs done by the Direct Labour Organisation. Table 4.4. also shows the results of repair requests and the proportion of jobs that were executed within the target time. However, it should be noted that some recorded requests were cancelled or reordered because of a failure to gain access to properties. This considerably increases the proportion of requests not completed within the target time and also reduces the quality of service as perceived by the tenants.

It was found that some 30% of the work was delayed by the tenant being out, although the access problem chiefly affected normal repairs rather than emergency work. The problem of access is a major one. A further problem is related to poor workmanship which reflected not only the shortage of skilled labour, but also the pressure from the volume of work. Hence, it is not surprising to say that many of the complaints about housing are complaints about repairs.

In summary there is a number of key problems relating to the area of repairs. The Authority is under heavy pressure and poor communications between Housing Management, Build & Works and Computer Services Departments cause difficulties. The amount of clerical work, duplication of work, and poor methods of arranging this work are all factors that disrupt the speed and quality of the repair service. Perhaps the most frequent complaint was that of poor communication. It would appear, therefore, that the incorporation of planned and jobbing repairs, together with costing and material control as parts of an integrated computerised system would ease many of the difficulties discussed above.

4.6. Finance Services.

The survey of this authority shows that Glasgow relies on the Regional Council to provide computing facilities for its rent accounting system. However, its flexibility, accuracy, security, efficiency and the availability of up-to-date information could be improved significantly. Like the other Scottish authorities, the rent accounting system embraces the rent account (collection & calculation) and a follow-up system, which reduce delays in collecting rent arrears, together with a system for dealing with rent & rate rebates.

4.6.1. Rent Accounts.

The survey showed that Glasgow used three different methods of rent collection. The dominant one, used by 73% of its tenants, is direct payment in the housing offices. Of the rest, 24% pay by Giro and the remaining 3% pay by either banker's order or direct debit. The investigation also indicated that the authority's system of collection was flexible (although not sufficiently so), allowing a diversity of payment periods. However Glasgow does not record any information relating to the percentages of such periodic payment (weekly, fortnightly and monthly). But it also showed, that the payments are consolidated by monthly statements. The main characteristics of the rent collection methods have been discussed in chapter 3, but it is important to consider in this section the flexibility, efficiency, accuracy and file updating of the authority's rent accounting system. The survey showed that door-to-door collection is not used in Glasgow. Significantly, it is the

door-to-door and office collection methods that are the two which provide both authority and tenants with an immediate balance and up-date of the rent account. This is beneficial to all involved. With Giro, the tenant has no record of the existing balance, and there is not always the same stimulus to pay, every time, the rent specified. In particular, the elderly and disabled have consistently expressed a preference for the door-to-door method. Not only does it avoid the necessity of going either to a post office or housing area office (or else having a friend or relation do so for them) but it also provides direct contact with the housing authority on other matters. This is particularly important to those who have no telephone.

The advantage of the Giro and office collection methods is that staff are relieved of much routine work, thus freeing them for other tasks.

Rent accounting is a major task for it deals with many thousands of payments weekly, fortnightly, and monthly. It depends on rapid and accurate data processing, including the maintenance of records. Although the use of computers has greatly changed the way in which rent accounting is undertaken, the way in which they have been used Glasgow by has failed to resolve many of the daily difficulties. The main reason for this is the fact that Glasgow's computerised accounting operations are executed on the Strathclyde Regional Computer. This can create difficulties, for it is the Regional Council that is responsible for setting the priorities of computer time, and the programs used. This can have an important effect on

rent accounting, especially when it is given a lower priority than other jobs, since this causes considerable disruption to the work of the housing management staff.

4.6.2. Rent Arrears.

The survey showed that in August 1986, 42.75% of Glasgow's tenants were in arrears. This is a very high percentage compared with other Scottish authorities. Measures taken by the Authority to reduce this problem include rent & rebate schemes, and close monitoring of tenants' rent accounts. One of the main problems relating to this is the lack of up-to-date information, since its success depends on the processing of vast amounts of data in order to identify missed payments.

Ideally, a print-out giving details of individual arrears cases and the statistics based on them, would be immediately available to the local housing staff. However, if the authority does not use on-line processing techniques these print-outs should be available to staff within 16 hours of the end of the rent period. For example, if the rent period ends on Wednesday evening, it is essential that the print-outs arrive by Thursday morning, since Thursday is the day on which the staff start taking action. If print-outs arrive later than this, because of computer failures, or delays in computer processing , it is unlikely that the housing staff would be able to take action in the majority of cases, before another rent period has finished. In Glasgow a monthly rent period is used. This means that there is somewhat more leeway in monitoring rent arrears, but makes it is the more important that appropriate action

be taken before the next rent period ends, since the amounts of money involved are so much greater.

In Glasgow, an arrears card is prepared for each tenant in arrears. When the computer output of arrears becomes available the staff's initial job is to record every tenant's new arrears onto their separate cards. This job is very time-consuming, and the use of on-line processing will reduce significantly the clerical work in this area. It does, however, create problems in terms of computer storage capacity where mini and micro computers are used. The current use of computer print-outs in Glasgow reduces the clerical work of the staff. These early stages depend on rapid processing, and they should be followed by the automatic production of arrears reminder letters.In Glasgow these standard reminder letters are completed manually. This causes much clerical work, since, as already noted in this section, an average of 42% of all tenants are on the arrears list at any one time. If half of them are sent a reminder letter in any chosen week, then a total of 21,000 letters per week must be sent. However, Scottish authorities vary as to when they send out such reminders. Glasgow sends out a first reminder after one rent payment is missed. This is followed by a second and a final reminder letter, both at weekly intervals. The latter is accompanied by a notice of proceedings for re-possession. Finally a notification of court action is issued. If this work is automatically checked and printed out using a mailing system it will be beneficial to all concerned. However, action for repossessing properties is an expensive and very time-consuming routine. It is fraught with many problems and delays while, at the

same time, the tenant's debts are increasing. What seems to be the case, however, is that the issue of a court order acts as a major incentive to tenants to honour their debts.

The above shows that several difficulties still confront Glasgow, despite the fact that the Authority's staff is allocated a considerable amount of time to tackle the problem of rent arrears. These difficulties are mainly due to such factors as the amount of clerical work involved, and weaknesses in the rent accounting system caused by delays in computer processing. If Local Housing Management is to tackle these difficulties successfully, it would appear that they must install their own computerised management system.

4.6.3. Rent & Rate Rebates.

The survey has shown that problems of rent & rate rebates account for the greatest proportion of enquiries to the housing department. The survey indicated that an average of 500 tenants are met each day and, in addition, some 160 new application forms are received. Although Glasgow reported that the average time spent with each tenant complaint or enquiry was around 10 minutes, regular visits indicated that many interviews took much longer and could last for 30 minutes or more. In addition, there are normally long queues, leading to correspondingly long waiting times for tenants. This obviously leads to frustration on both sides. The survey also showed that the processing of rent & rate rebate applications was carried out centrally at headquarters. For the tenant this often means that time-consuming and costly journeys to the central office

are necessary. The survey showed that, in July 1986, 71% of the tenants were receiving rent & rate rebates. These figures indicate that there must be a considerable number of tenants who are ignorant of the benefits to which they might be entitled, or of where they can obtain more information. It cannot be assumed that people obtain welfare or benefits information that they fully understand, mainly on account of the complexity of the housing benefits scheme and the lack of sufficient staff to explain it. As one manager commented, "the biggest weakness of the housing benefits scheme is its complexity, which makes it very difficult to administer, and also to explain to claimants how their benefit has been assessed". The survey found that many of the staff working in this area had neither the time nor the knowledge to do more than inform tenants, particularly those in arrears, that they may be eligible for rent & rate rebates. It would obviously facilitate the smoother running of the system if the staff in this section had time to provide advice, and assistance with the completion of the required application forms.

As has been mentioned, the rent & rate rebates system in Glasgow requires a considerable amount of clerical work, on account of the manual method of calculation and batch processing computer system used. After manual preparation of paper work, in the area office, it is sent to the central computer for batch processing. The output is then returned to the area office within a week. It follows that its lack of accuracy, flexibility, security and up- to-date information are common problems. In addition, the cost, and possible breach of confidentiality, associated with physically

transporting documents containing such personal information makes the present system unattractive. This is obviously one of the areas of housing management where the use of computers as part of an integrated management system can play a major role in providing a more efficient service.

4.7. Current Procedures in use for Main Management Functions.

At present Glasgow uses largely independent procedures, such as Allocation, Rent Accounts, Rent Arrears, Housing Benefits, and Repairs & Maintenance. The main points that must be established are the degree of complexity of each of the main procedures, the effort and time needed to perform them, and the number of clerical staff required to work them.

4.7.1. Allocation Procedures.

The greatest workload is associated with the Allocation and Waiting List section where the main stages of work were found to be as follows:

1. Application forms are received from applicants/tenants.

2. Application forms are manually checked and interviews are arranged.

3. Application forms are coded and given a reference number.

4. The forms are then dispatched to the operator for computer loading. At the same time any amendments to current applications are notified on another form.

5. Each vacant house is notified on a void property form, which is completed, and the data loaded into the computer. In addition any amendment to existing void details are notified on updated void property forms.

6. Applicants are sorted into waiting lists by points and priorities, or are selected by members of staff. They are then matched with the void properties.

7. The list also includes The termination of a tenancy if the tenant's request is for transfer.

8. Arrangements are made for applicants to view properties and to sign for them, where offers are accepted, or written reasons are given where offers are rejected.

This may not seem a very long procedure, but in fact, some of these stages are complex and the time-scale between receipt of a completed application form and making an offer can be more than 24 hours. In addition there are two other main departments involved, the Housing Management and Computer Services Departments. This leads to problems of cost, flexibility, and two sets of priorities for computer time. Another function related to the allocation system is that of exchanges between existing tenants. These procedures, at present, are carried out manually.

4.7.2. Rent Accounting Procedures.

The Glasgow accounting systems procedures involve three systems, the rent accounts system, a follow-up system which reduces delays in collecting rent arrears, and a system which deals with rebates and allowances. However, the main stages of the rent accounts procedures cover the following areas:

1. Recording the rent due from each of the authority's dwellings the identification of the method of rent collection, and the

particular period of rent payment which applies to each.

2. The recording of, and accounting for, rent receipts.

3. The recording of rent payment to the relevant tenant's personal accounts.

4. The posting of the financial ledger.

Again this is not a long list of procedures but it too is complex, on account of the number of different staff, departments, and agencies involved.

From the management aspect, any accounting system must incorporate a follow-up system which minimises rent arrears. In Glasgow, the main stages of arrears procedures, from the sending of a standard initial letter to eviction are:

1. The identification of arrears.

2. The dispatch of standard written reminders.

3. Visits to defaulting tenants by the follow-up staff.

4. The issue of a Notice to Quit.

5. The legal process of obtaining earnings attachment orders.

6. The application for possession and implementation of a possession order, or suspended order, depending on whether the tenant's household contains people at risk (children, disabled, etc).

It can be seen that the system is inherently complex due largely to the number of different staff and agencies involved. These include housing welfare staff, the staff involved in issuing Notices to Quit and possession orders, and staff in the Solicitor's section, who carry out the court action. In all cases submitted to court, the Housing Management, and the Finance Departments, are involved. In addition the present system requires the use of Regional Council computing facilities.

This means that the Authority depends on the Region computer for the periodic identification of new cases and the changing level of arrears applying to existing cases. This leads to difficulties such as those of security, cost, transport required, together with problems of reliability, flexibility and efficiency.

Again from the management aspect the rent accounting and arrears systems should be interrelated with a system for dealing with rent and rate rebates. At present, the main stages in the Glasgow system are as follows:

1. An application form is received from a tenant (the Glasgow system uses two application forms, one for students and the other for general tenants).

2. The application form is checked and the tenant's total weekly income is calculated.

3. Input documents showing the tenant's reference number, weekly income, etc, are prepared.

4. These documents are dispatched to Housing Benefits Section in the central location.

5. The calculation is carried out and schedules are dispatched to the debit control and the rent collection sections.

The time scale needed for these operations can be as much as a week between input and dispatch. In addition to the stages observed above, all cases are reviewed annually (i.e a new application is completed). Also all cases are updated to take account of increases in rent and rates, and changes in need allowances and deductions. The housing rent and rate rebates section uses a semi-manual system and where an authority has thousands of rebates an its books it can readily be seen that without an on-line computer, such recalculations constitute an enormous task. The problems facing the authority with the current system of rent and rate rebate are greatly increased by changes in legislation, and the clerical work involved.

4.7.3. Repairs & Maintenance Procedures

The survey showed that the authority's repair system is complex. The process usually begins when a tenant notifies either a main Housing Area Office or Housing Sub Office that a repair is required. If reported to a main Housing Area Office the subsequent stages, when it is to be undertaken by the Direct Labour Organisation, are:

A. Deciding the priority (that is, emergency, urgent, or cyclic).

B. For other than emergency priority, inspection by the Build and Works assessors, who visit the tenant to inspect the repair and determine:

1) The technical job description based on a schedule of items.
2) The materials and labour required.
3) The appropriate bonus targets for the tradesmen.
4) The price to be charged for the job.

C. Checking that the materials are available.

D. The issue of a ticket, through the chargehand, to the tradesman.

E. The carrying out of the work.

F. The post inspection of the work and bonus calculations.

G. Termination of the request.

While the procedures for repairs notified at a Housing-Sub Office are similar to the above, repairs are initially recorded on manual report documents which are subsequently forwarded to the main Housing Area Office for input to the computer repair system.

One factor which increases the complexity of the system, is the number of different staff and departments that are involved (Housing Management, Build and Works, and Computer Services Departments). In addition area offices, sub-area offices, depots and private contractors may also be involved. These survey results show that great improvements could be made in the areas of financial cost, transportation, flexibility, duplication, time and effort and the clerical work involved in the present system. Other

difficulties may arise. For example, the initial definition of the job may turn out to be incorrect, which means changing the job ticket and a different tradesman may have to be sent. The tenant may not be at home when the call is made and so the job has to be rearranged for another time.

4.7.4. Effect of these Procedures on Staff.

In general, each of these procedures demands a lot of time and effort by different staff and departments and a large amount of routine clerical work. These problems are interrelated and are very difficult to quantity, one of the main reasons being that most of the repair and maintenance work is dealt with by the Build and Works Department and not by the Housing Management Department. Also most of the work dealing with computer programs and equipment is dealt with by the Computer Services Department and the Strathclyde Regional Computer and not by the Housing Management Department, while work such as rents auditing and repairs charges is dealt with by the Finance Department. The survey showed that, centrally, the Housing Management Department employs a staff of 318 in the Finance Section (rent accounting, arrears control and rent and rate rebates), 230 in allocation & waiting list work, and 130 in the Repairs Section. However, staff in other departments are also involved and as a result these figures are of little value except to housing management staff. They fail to indicate the number of staff used from other departments to perform housing management functions, as the number of such people is uncertain. Neither was the survey able to ascertain the total staff employed in housing

management work on account of the way in which the authority allocated people to its main staffing functions. But the fact is that the Housing Management Department has a very large staff, and so staffing efficiency, particularly the questions of reducing paperwork, re-employment, and other organisational and clerical problems has an important bearing on running costs.

A number of points can be made in conclusion. Firstly, the housing department is more dependent than other departments and agencies on personal contact with their clients. Secondly the complexities of the procedures they operate result in heavy workloads for staff, and difficulties in applying the procedures uniformly in all cases. The procedures should therefore be simplified to improve the quality of the service provided.

4.8. Computer Systems Currently in Use.

In implementing the housing management systems the housing department believes that an important criterion is to provide a rapid response to tenants' needs and enquiries. To this end the use of computers has recently been introduced to certain areas of management functions in Glasgow. However, up to now, only allocation and jobbing repairs functions have been implemented on the District Council computers, while the rent accounting system and arrears recovery functions are still carried out by Strathclyde Regional Council. The other functions still operate either manually or semi-manually.

As a result of experience gained in the use of computers in the rehousing side, Glasgow District Council extended their use to the field of jobbing repairs work in 1984. This system runs on the Council's mainframe, and has been developed by staff of the Housing Management, Build & Works, and Computer Services Departments. However, it is inflexible and of limited application.

4.9. Computer Types and Their Characteristics and Experience

The survey showed that, the authority currently uses 18 mini-computers, 26 microcomputers, and one mainframe.

1. Mainframe.

The mainframe computer is a Honeywell DPS88, used mainly by the housing allocation system, although the repairs system also uses this mainframe. It has 16 Megabytes of core store, and is supported by Honeywell 451 and 501 disc storage devices of, respectively, 18 * 200 Megabyte and 7 * 100 Megabyte capacities. These discs are used as virtual extensions of the core store, by paging information between the core store and the discs as different parts of the executing programs and data are required.

2. Minicomputers.

There is one Nixdorf 8860 minicomputer in each area office. These are used in the Cash Receipt System. These computers support Nixdorf terminals for tellers and cashiers, each having 500 K bytes of main memory and 16 Megabytes of disc storage capacity. The second type of minicomputer is the Honeywell DPS4, with 256K memory size, and 2 * 80 Megabytes of disc storage, based in head office. It supports 10 terminals which are used for processing housing benefit payments. The third type is the Olivetti 2040 with 500K bytes of main memory and 1 * 10 Megabyte of disc storage. This computer is also based in head office, and is used for word processing. The fourth type is the Hewlett Packard 5405, with 500

Kbytes of main memory and 1 * 10 Megabytes disc storage, supported by an Artemis software package. It is used by the Build & Works Department, the Housing Management Department, the Department of Architecture, and the Finance Department to control the Council's Housing Capital Programme.

3. Microcomputers.

There are 26 microcomputers currently used for different housing management functions, including housing benefits and word processing. These computers, include 15 stand-alone, with 256K of main memory and 11 Silrivs (5 * 5000), also with 128K of main memory.

In addition to these there is also Strathacylde Region's computer, which the District Council uses for the rent accounting system.

The survey found that there are some 245 terminals in the Housing Management Department, in the central and area offices. Each of these terminals has a display capacity of 1320 characters, in 24 rows of 80 characters. The various files are held on one Honeywell 451 disc file with a capacity of 200 Megabytes. In addition current security files are held on separate disc units and backup copies are also maintained. Other equipment, such as word processing, is also available. The word processing system is based on the Olivetti Ets 2010 model, of which there is one in each area office. These are supplied with Olivetti ET111 typewriters and printers. There are also 5 ETS 2010 word processors, with KB2000 keyboards, and two Olivetti DY420 daisywheel printers housed in headquarters. These machines work independently, i.e they are not

linked with the main computer. In addition, the Housing Management Department has one Metier240 VDU terminal and one Metier 2413 printer terminal based in head office, and there are three PRV 1688 line printers based in the Computer Services Department.

4.10. Current Practice and Future Development.

From the observations already made, it can be seen that minicomputers are unsuitable for urban authorities, such as Glasgow, which have area housing offices. The main problems relate to limitations on the number of users and time allocation, meaning that only small amounts of data, compared to mainframe, can be processed. There are also limitations in term of security. Microcomputers are unsuitable for Local Housing Management in any local authority due to their ability to process only a small amount of data in a limited way. In addition they are limited in capacity, and security. It has been concluded that the existing computers should be replaced by a new system, based on a mainframe.

The survey also indicated that the computer software in use was a mixture of internally written and externally purchased packages. The Authority uses standard packages for all its housing management functions with the exceptions of Allocation, which were written and developed by Housing Management and Computer Services Departments, and Repairs, which were written and developed by the Build & Works, Housing Management, and Computer Services Departments. Standard packages are used for housing benefits, and also for functions like SPSS (statistical package for the social science). These allow the housing staff to request statistical and other information about applicants, vacant houses, or lets that have been made. Such packages are also used for tenant grants, word processing, and capital programmes. In fact, the survey showed that over 50% of the Authority's functions relied on standard packages. It seems that

there is much more interest in developing in this direction, despite the fact that there is a Computer Services Department with 131 staff, mostly specialising on the computer side. It is worth commenting that many could be written in-house, for example, housing benefits, sale of council houses and tenant grants packages.Such packages are less costly, easier to modify, and are capable of being designed more efficiently for authority requirements.

The language used by Glasgow District Council for in-house written programs is Cobol. However, Pascal is the language used in this research for designing, writing and implementing the programs suggested as being relevant for the housing management functions. Accuracy, efficiency and flexibility are the main objectives of the proposed integrated computerised system. The first of is of obvious importance and the second is important because an inefficient program might well be too costly to run, or will fail to give quick results. Ease of modification ensures that a program can be changed as often as is needed during its life.The survey showed however, that good programming is very difficult to achieve not only in Glasgow District Council but throughout the Scottish authorities.

Accuracy is so seldom achieved that both efficiency and the ease of modification are seen as unattainable luxuries. The basic reason for this probably relates to the diversity of skills an ideal programmer must possess, and to the complexity of their inter-relationships.

The survey also showed that the Honeywell operating system provides it's own Sort technique for the authority to support its own programs. The basic idea of sorting can be described as arranging a set of keys in ascending or descending order. The purpose is to make the records files easier to handle, i.e. to improve the effectiveness of the search algorithms which are to be applied, either within a computer or externally. Thus, sorting is closely related to, or even a part of searching. However, so much attention has been devoted to sorting that it is usually treated as a subject in its own right, yet it is important not to lose sight of the reasons for sorting. However, the Glasgow District Council sort program, in common with that of the Glasgow University ICL operating system, suffers the disadvantage that not only it is not easily modified, but that it can only be used on 'TEXT' Files (i.e where the file is just a sequence of characters, and no fields can be specified). An advantage is that the Sort can be used effectively on the transactions before they are read into their respective files but provided they are in the format of 'TEXT' files. Therefore, two external sorts have been developed and used, and their efficiency has been compared.

The survey also shows that Glasgow uses a mixture of computer facilities. While, its rent accounting section uses the Region's computer facility, Allocation and Maintenance sections use the computer operated by the District Computer Services Department.

The main problems facing the Authority in using an in-house system are those relating to reliability and efficiency, to system cost,

to security, and to changes in legislation. The main problems facing the authority in its use of regional services are those of transportation between the two authorities, the delays associated with batch processing, and the problem that relates to the lack of a direct connection to the Region's computer. Another problem is that of security.

The survey shows that one of the main problems facing Glasgow's computer systems is that of the lack of on-line access, particularly in the areas of rent accounting, arrears recovery, and rent & rate rebates, where the Authority's Management Department relies on the Strathclyde Region computer. The major problem relates to the lack of direct connection to the regional computer. Leading to considerable time being spent in up-dating information. The most common problem facing Glasgow District Council stems from changes in legislation, in that it is extremely difficult for standard packages to keep pace with them. The issue of housing benefit is a case in point. Other problems arise from the system not being interactive, not being integrated, and the absence of links between files. A consistent comment from staff in the System Development Group was that "The computer systems are fairly inflexible. It is very difficult to introduce changes and improvements, and it is time-consuming". The principal developments and future plans to make better use of computerisation by the Housing Management Department are to implement an integrated system, to increase the level of decentralisation policy, and to link mini and micro computers to the mainframe computer.

As a result of initial investigations it was decided to set up an experimental integrated system in order to test these proposals and to study how well they could meet the objectives of housing management. An additional objective was to demonstrate the effectiveness of the computerised system to the Scottish housing authorities and its potential role in housing management. The system is based on the live files and the work of the Housing Management Departments of the Scottish housing authorities, and particularly on those of Glasgow local Housing Management.

5. The Proposed System.

5.1. Introduction.

In chapters 2 and 3, the present condition, characteristics, experience, and role of computers in Local Housing Management in Scotland were considered. Many problems were identified in these areas. In chapter 4,current management procedures operated by Local Housing Management in Glasgow were presented as a case study. This clearly showed that many problems exist in this field, although automated equipment and limited use of computer systems have been employed in an attempt to solve these problems. These were also discussed in the last chapter, (sections 4.8 and 4.9). These systems were analysed and the analysis showed that there are still many shortcomings that require solution, especially in the area of traditional housing functions, such as Repair, Allocation, Rent Accounting and Housing Benefits. Of these, the main problems are clerical and organisational, while there is also a need for more decentralisation.

It is suggested that the answer lies in a computerised integrated housing management system, using a multi-access computer, a technique which facilities direct interaction between users and the system. This could be used to alleviate many of the clerical and organisational problems, in that it greatly reduces time-consuming, mundane work, thus leading to easier, quicker and more reliable operation, and to the efficient control of the operations of the housing department. Here it must be stressed that this will not only bring greater efficiency to existing practices; it will also

introduce specific and unique advantages. In this respect, one major advantage is the possibility of combining both centralised and decentralised systems, thus eliminating many of the existing problems. In order to clarify the concept, it will be useful to explain briefly the principle of housing management functions integrated by the use of computer techniques.

An integrated housing management system combines a number of separate functions administered by housing management and other departments. The information necessary for operating these functions overlaps in many areas. The allocation section, for instance, needs to know which properties are unoccupied in order to be able to match them to the applicants' needs. This section also needs to know the rent charged for a property before it is offered, and the rent & rate rebates section requires access to the rent accounts. Yet other staff administering, say, tenants' charges for repairs, need access to rent information, while the repair and maintenance section needs to know the materials required for the repair of the properties. This illustrates why information should, while being recorded only once on the computer, be accessible (subject to authorisation) to every section. This can be achieved by means of an integrated system (see figure 5.1). With this system all basic data are held only on one file, the master file, while specialist information is recorded on separate files. For example, specialist information such as the allocation reference number, which is normally of use only to allocations staff, is held only within the Allocation subsystem. (Again, each item of information is recorded on only one file.)

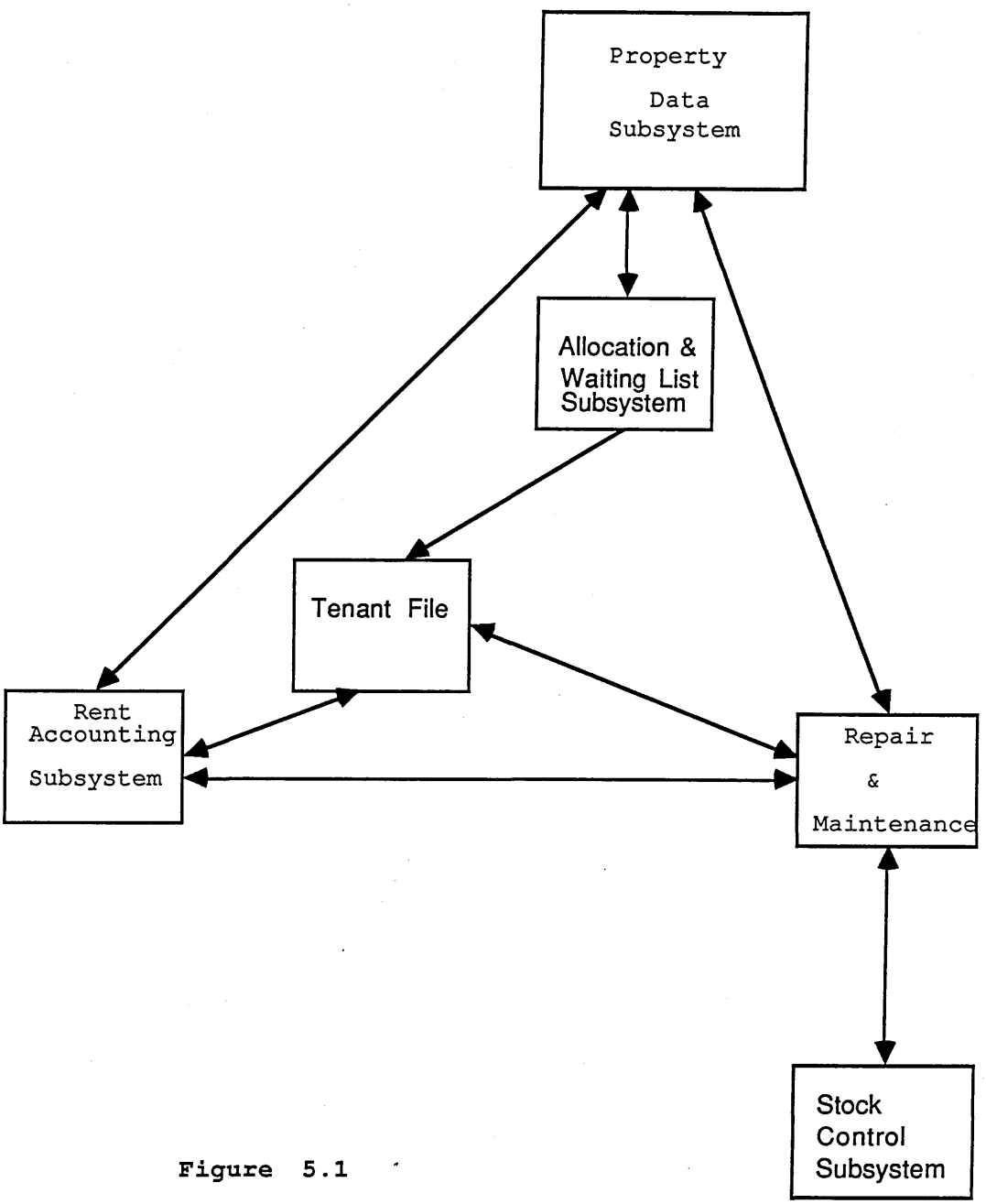


Figure 5.1

System Organisation Chart.

Thus, an interactive computerised system is beneficial to many aspects of housing management. Not only does it ease existing manual procedures, but it also leads to the operation of new techniques in solving various economic and social problems. This is made possible by virtue of the system's ability to deal with repetitive clerical procedures, by its efficient handling of complex office files, and by its multi-access capability. The speed with which it works leads to the more effective use of subsystems and greatly eases the work of housing management.

5.2. Computer Equipment.

The Glasgow University ICL 2988 provides comprehensive computer services. It has 16 Megabytes of main memory, seven FDS disc devices each of 643 Megabytes, and five EDS 200 Megabyte disc devices. These are used as a virtual extension of the main store by paging information between the main store and the discs, as different parts of programs and data are required. It is run under the VME 2900 operating system and interfaced to a local X25 network. The existing network is shown in figure 5.2. It interconnects Hosts, PADs (Packet Assembler Disassemblers) and other networks by means of X25 switches. The PADs connect terminals and micros to the trunk lines. In addition there is a number of Ethernet and Ring networks, both in the Computer Centre and in departments. The network is regularly expanding, and this expansion shows no sign of abating. It started with 2 PADs, and now there are around 40, after only two years. Each PAD supports up to 16 asynchronous terminals and is connected to the campus network, via a synchronous X25 link and a PSE (Packet Switch Exchange). Each PSE concentrates a number of X25 connections which may be links to PADs, Hosts, Gateways, or other PSEs, and is responsible for routing network calls and data between the various networked services. An interesting feature of Camtec's PAD software is its ability to make internal or to allow external virtual circuits to any of its 16 asynchronous ports. Thus a PAD might be regarded as a LAN (Local Area Network) or switch allowing micros to establish connections with each other, either internally from micros connected to the same PAD, or externally from a micro on one PAD to

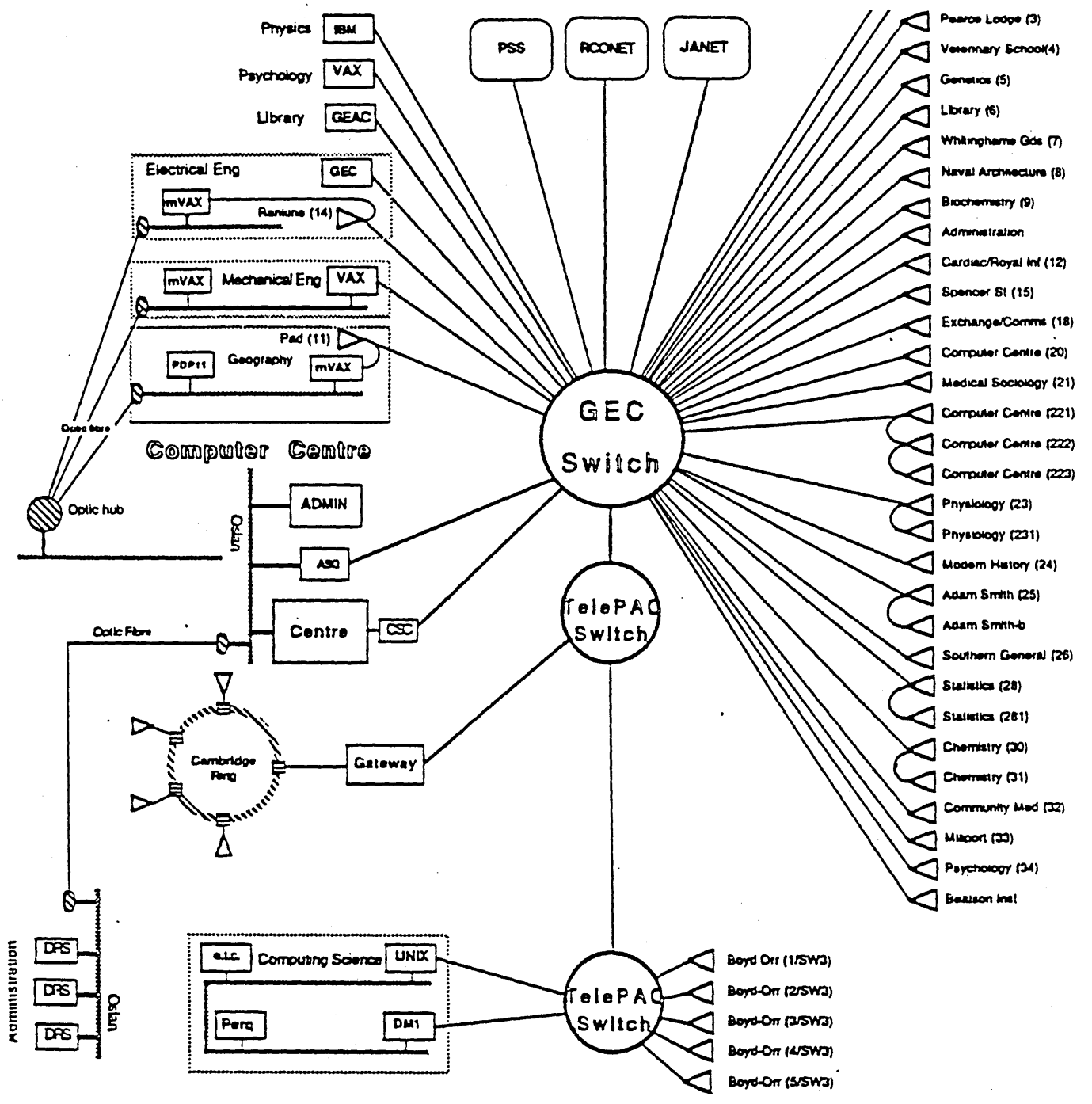


Figure 5.2.

Glasgow University Network

KEY

Ether Repeaters

Ethernet

Ring Repeater

Camtec PAD

Attached net

Attached co

X25 Switch

a micro on another PAD. A package such as KERMIT or TRANSFER may be used to establish the connection, and transfer files, between the co-operating micros. If a serial output device, such as a printer or plotter, is connected to a PAD port then it may be accessed either by networked Hosts wishing to spool output, or micros wishing to share a common peripheral. Though extremely useful, the PAD's LAN capabilities present some obstacles to general resource sharing. These include:

1. A connection has to be established between the Micro and the shared peripheral. Most standard packages,e.g. WordStar,DBASE II, etc. do not support a 'connect to printer' option. Some thought and effort is therefore required to use such packages in this mode.

2. Connections to individual PAD ports are accepted on a first come first served basis. Currently there are no multistreaming or queuing mechanisms available, i.e. once a PAD port accepts a connection all subsequent connect requests from other terminals are failed until the active connection is broken.

Interactive facilities are provided via JNT (Joint Network Team) PADs linked to the network. The X25 network, into which terminals are interfaced, gives access, via JANET (Joint Academic Network) & PSS (Packet Switch Stream networks), to a large number of installations in the UK and Worldwide. The software facilities include compilers, such as Pascal, which is the language of this proposed system. Also there is a wide range of applications

packages dealing with statistical analysis, graphics, text processing, and other routines. In addition, current file transfer facilities include:

1. Most types of inter-media transfer (mainframe, micro, magnetic tape, floppy disc, etc.).

2. A key data-entry machine, which allows direct transfer of print material into machine-readable form.

3. A Key-to-disc service, which is available for printed out text.

The Glasgow University Computer uses the ICL VME 2900 operating system (Virtual Machine Environment for 2900 series computer). This is a development of the original VME/B operating system. VME 2900 is a 'paged' operating system, which means that when a program is being executed only those parts or 'pages' which are currently in use are actually kept in main store. The rest of the program is kept in a 'Virtual Store' on disc. VME is controlled via a language known as System Control Language (SCL). SCL contains a large number of built-in instructions, or commands, together with many special commands dealing with facilities, programs and packages produced by the Computer Service. Also, the way in which commands are constructed is the same, whether they are used in 'Background' (batch) mode or Multi-Access (interactive) mode 'MAC'.

These two modes allow VME to organise the work, and it was under the MAC processing mode that the Integrated Housing Management System proposed in this research was run. So it is important to note that in MAC mode, the user communicates directly with VME via

a terminal (which is usually a visual display unit) or micro-computer running under a 'terminal emulator' program. MAC is available continuously, except during scheduled system development and maintenance times.

Groups of terminals are situated at various sites on the Campus. There are also numerous departmental terminals which users may access. Two IBM microcomputers, each with a VDU, printer, and plotter, as shown in figure 5.3, are installed in the Centre for Housing Research for users to access. They are connected to the University of Glasgow Campus network via a PAD and private telephone line which has a speed of 2400 baud. These terminals have a display capacity of 1920 characters in 24 rows of 80 characters each. These particular models are equipped with fast cursors.

The various files are held on one of the Mainframe FDS discs. These are permanently mounted during normal working time. Additionally, back up copies are maintained on magnetic tapes.

To use the system, it is necessary to log-on to the mainframe and, for file transfer or ECCE (Edinburgh Compatible Context Editor) screen-mode editing, to alter the mode of connection by means of PAD commands. A 'PAD Facts Card' and 'ECCE Summary Card' are available from GUCS (Glasgow University Computing Service) reception.

5.3. Overall Description of the Housing Management System.

Figure 5.1 shows a system organisation chart. The general specification, user specification, and a description of the system are given in chapters 6, 7, and 8 respectively of this thesis. Each refers to one or more items on this chart. Here, it is necessary to discuss the manner in which the different applications together form a system.

The rectangular boxes shown in figure 5.1 are used to represent subsystems within the system itself, and links between the subsystems are shown. Each of the subsystems feeds information to other appropriate subsystems and, particularly, to the central one. Each subsystem requires its own input and produces its own output. Part of the output is the communication of data to other subsystems. This communication of data is usually called the 'system interface'. Thus, the Allocation & Waiting List subsystem is interfaced with the Property Data subsystem for offering purposes. The Rent Accounting subsystem is interfaced with the Property Data subsystem for accounting purposes. The Rent Accounting subsystem is interfaced with the Repair & Maintenance subsystem for the purpose of debiting tenant accounts. The Materials Management subsystem is interfaced with the Repair & Maintenance subsystem for the purpose of planning repair work, and also for costing purposes.

The Property Data subsystem is the centre or hub of the system. All information from the other subsystems is communicated to and

summarised by the Property Data subsystem. This subsystem must be interfaced with each of the other subsystems. However, this subsystem contains property and structure data common to all of the subsystems and also includes the general enquiry and reporting facility incorporated as part of the entire system. Items from Allocation & Waiting list, Rent Accounting, and Repair and Maintenance subsystems must be communicated to the Property Data subsystem. Each of the subsystems (other than Property Data) also performs functions of its own. Each of the subsystems is a logically independent routine which can be implemented either on its own or in any combination with other subsystems, and is the subject of a separate section.

5.3.1. Allocation & Waiting List Subsystem.

Details of an applicant's circumstances and requirements are recorded on the Allocation & Waiting List subsystem. This subsystem calculates points in order to establish priorities, matches properties to applicants, and produces standard letters of offer. Details of vacant properties are passed automatically to the Allocation and Waiting List subsystem from the Property Data subsystem.

The allocation of current vacancies both to current tenants and prospective tenants is a very sensitive issue. The form of the waiting list of applicants is therefore extremely important. The waiting list is constructed on the basis of the criteria used to assess housing need and is calculated on a points scheme. It therefore ought to be a straightforward process to rehouse those

people who score the highest points. If two or more applicants score the same number of points the one who has been on the rehousing list for the longest time is given priority. However, 'time in need' is a far more useful indicator. This has been incorporated into a points calculation program in a number of ways. Factors taken into account include the length of time the applicant has suffered overcrowding, the length of time children and older people have lived in a multi-storey block, and length of time spent lacking standard amenities. The program also automatically updates information about the ages of children and elderly people, the time applicants have spent on the housing list, and the progress made towards a clearance date. A household including an expectant mother is considered as if it included an additional child from a given time before the birth is due. Also included are households which quality for environmental points, such as those who live in unmodernised flats, where the flat was build pre-1960. The system also takes account of a child reaching the age of 16. Any points relating to that child are preserved until the child leaves home. The ability to carry out computer runs which reassess priorities on the basis of these factors is built into the system.

Any application for housing must include details of the householder, such as the size of his family, his employment and income, other circumstances, and his preferences, including the requirements for mutual exchange. It must also give details of the applicant's existing accommodation, and information about any special needs. These factors, and others, will be taken into

account when the applicant's housing need is assessed. Additional factors may include medical problems, the termination of the applicant's present tenure, problems with his environment, and the condition of his existing property. Multiple priorities can be recognised if each factor has a specific weighting. Other factors such as overcrowding (i.e. shortage of living rooms, bedrooms and bedspaces), lack of, or sharing of, amenities (bath or shower, w.c., kitchen, sink, cooker, and storage space), children and elderly persons in the household, children living in multi-storey buildings, etc. must also be considered. Each of these factors is awarded a 'weighting' which is recognised by the system when priorities are evaluated. This method of weighting is flexible and can be altered easily by the official evaluator of housing needs.

The system provides an efficient method of selection and of matching applicants to properties, because it is based on systematic criteria relating both to the housing need and to the waiting time. This method of selection and matching can be expected to reduce the number of refusals. The matches are displayed so that the final decision to make an offer is left to an authorised user. An offer is then sent by a letter which provides information about both tenant and property.

5.3.2. Rent Accounting Subsystem.

The rent accounting function is well suited to computerisation, with its requirements for complex calculation and large quantities of data to be processed rapidly and accurately. The Rent Accounting subsystem deals with three interrelated functions in this field,

namely: Rent accounts, Rent arrears, and Rent & Rate Rebates. This subsystem also uses data from both the Property and Tenant Files. These are used to obtain rent, income, charges, family size, and benefits related information for the calculation of housing benefits. Subsequently, the Rent Accounting subsystem provides a continuously accurate statement of the account.

The calculation and collection of rents is a major task of any authority because it involves many thousands of transactions each year. It follows that the first activity of this system is to control the calculation and collection of rents. It allows tenants to pay rent and all other supplementary charges by a variety of means, such as door-to-door, giro, office payment, salary or wages deductions, direct debit arrangements, or bank standing order. The method chosen will be that which is most convenient for the tenant. The amount paid by each tenant is recorded, set against any deductions that may apply, and his account is updated. The system will also have the ability to carry out many other functions, including prompt update of tenants' rent accounts, the periodic rent accounting and reconciliation, generation of debit, adjustments generated by way of rebates, service charge functions, final account, and year end balance. In addition to the above the system will also be sufficiently flexible to deal easily with change in rent, letters notifying changes in rent are automatically produced, reducing considerably clerical work. The system is also designed to reduce the work involved in dealing with rent cards, since rent cards are not always accurate. The state of a tenant's account is readily available, and is altered by the staff

responsible whenever a transaction takes place. This should result in a considerable reduction in the number of account enquiries. Audit requirements and cashier security are provided by means of a combination of security keys, password control, and secure and sound audit trail.

Rent arrears control is automatically generated by the system, so considerable reductions in arrears may be expected. The system automatically informs the staff as soon as a rent payment becomes overdue, and a standard letter to the tenant involved is produced. Also, contact with a tenant immediately a payment has been missed has been shown to prevent the build up of rent arrears. Such a system of immediate contact is very difficult to achieve in a non-computerised system. The system is also designed to be used to monitor pay-back arrangements made with tenants, and could generate a list to keep a close watch on tenants with poor payment records. The arrears system is also able to deal with particular payments, e.g., back payments of rent and rate rebates.

As rent rebates is an area affected by many factors, which could be constantly changing, it forms a separate function within the subsystem. The process complies with the Housing Benefits Act of 1982 (as amended). This function is designed to meet all the requirements, and to be updated easily, thus minimising both the workload placed on the authority and the possibility of errors. The automatic and prompt updating of tenants' rent accounts should result in a reduction in the number of queries from tenants. Once a rent and rate rebate calculation has been completed any necessary

adjustment will automatically be made to the tenant's rent account and a standard letter will be printed. All factors used in calculating rent and rate rebates can be amended easily by the authorised user, thus ensuring an easy implementation of any changes. In addition the subsystem will be able to deal with many different fields, particularly in future changes in the regulations governing it. Standard letters are produced where cases are due for review, for example, when the tenant's circumstances change, the notification of the result of an application, and the production of an renewal letter the month before a rent rebate is due to expire.

This subsystem is both effective and efficient, as well as having the advantage of flexibility and of providing accurate information which is always accessible to authorised users.

5.3.3. Repair & Maintenance Subsystem.

Two classes of repairs are handled by the Repair and Maintenance subsystem. The first deals with day-to-day, or 'jobbing', repairs of council properties in response to specific requests from tenants, the second relates to the organisation and control of a planned or 'cyclic' maintenance programme.

Usually, a tenant's request for repairs is made by telephone. Alternatively a tenant may visit the local office or send a letter. Planned maintenance is organised by the housing authority. The housing authority carries out a cycle of inspections to establish the maintenance requirements of its stock. The work identified is then undertaken at periodic intervals. Such work normally includes work on the main structure, external work, fabric inspection, etc.

A common system can be used to administer both of these functions, although particular data items (e.g. date of tenant's request) may apply to only one. However, when a tenant notifies the authority that a particular repair is required, details of the request are entered into the computer. In response to an enquiry the system is designed to display all jobs in progress completed or still outstanding, including the current status of each. In the case of new jobs the response message is displayed on the terminal. It contains the job number (a unique computer created number), along with the job description, anticipated start and completion dates for the repairs, etc. Priority is then allocated, depending on the nature of the repair. Access arrangements are then entered into the computer in the form of days and times when the tenant is at home. If access is too restrictive for reasonable job programming, the computer will suggest that an appointment is made and will offer a choice of available dates. Details of an agreed appointment are then entered. A printed letter of confirmation must then be sent to the tenant on the same day, while an order with information about access etc.is sent to the Direct Labour Organisation or contractor. Information, such as current workload and availability of materials, enable the start and finish dates to be predicted. Also, the stock control function takes account of materials earmarked for work in progress, delivery time of materials, late delivers and the minimum quantities that can be ordered. The ordering of materials is built into the system and an analysis report is produced on a regular basis, listing those items that require to be ordered. The Stock Control system is designed to assist authority in keeping

track of its stocks of materials, as well as efficiently managing them. Reports printed include, for example, materials movement report, reorder report, materials reconciliation report and price lists. Also, in the case of any exceptional circumstances which prevent repair work being carried out at the intended time, it is necessary to notify the tenants concerned to prevent any unnecessary inconvenience. By reference to the master file (Property Data), which contains details of the property construction date, and other property characteristics, it is possible to identify recurring problems suitable for inclusion in the rolling program of planned maintenance. The program will devise a suitable timetable in which any planned maintenance work can be carried out and will assist in the preparation of associated costing.

The system is programmed to calculate the cost of a job, using a standard schedule of cost for Direct Labour Organisation.

This subsystem is designed to give access to a good level of information and analysis about the effectiveness of the Direct Labour Organisation and at the same time monitor its financial and repair performance.

5.4. Advantages of the System.

The main advantage of the system is to enable the provision of an improved cost efficient service, which is largely achieved by allowing closer personal contact between the authority and tenants. This requires the maintenance of up-to-date details of occupants' circumstances and individual requirements, and of housing stock. The system has the further advantage of adaptability to changes in government legislation and local authority policies.It also facilitates the greater control of the housing management sector on such issues as allocation & waiting list, repair & maintenance, rent account, the recovery of arrears, and the organisation of housing benefits.

The system also has the advantage of being able, both quickly and accurately,to indicate the needs of applicants and occupants within the frame-work of local housing management policy. Since no item of data is stored on more than one file, it is not possible for errors to be caused by different subsystems using different values for the same item. In this way, better use can be made of housing stock, since no application nor request will be overlooked. This will be achieved by the more effective use and application of all council housing functions, e.g. waiting list procedures, maintenance & repairs, the collection and calculation of rents, the recording of arrears and general housing benefits.

In order to meet the precise needs of both existing tenants and would-be tenants, the system has to be accurate and fully

comprehensive in terms of its description of the housing stock, and occupants' circumstances and general requirements. Another important advantage is that the time normally spent in searching files to answer queries will be greatly reduced. The system's information must be accurate and up-to-date, so amendments to the data should be promptly made if the system's efficiency is to be fully maintained. This calls for data validation in order to identify erroneous input, and requires its correction before it is accepted by the system.

Also, the system ensures that duplication of information in terms of housing functions and management operations does not occur since information is held only once. Subject to appropriate security, just one operation is necessary to enter, add, amend, delete or update an item, which can then be readily made available to all authorised users. Also, computer storage space is saved by this system. In addition, the security of sensitive and confidential information is assisted.

The system also makes it possible to record all requests and applications locally, hence maintaining and improving the personal approach to what, after all, are very human problems. Whereas information under a manual system is often difficult to retrieve, this is not the case with computerised housing management operations. Where local offices have access to an integrated system, then the processing of information may be carried out immediately, in the context of the entire authority, and consequently more effectively. The wider availability of information and its easier access mean that a greater range of

factors can be considered in making decisions. Importantly, the applicants need not travel further than their local office for such an improved service. Here, it should be stressed that the data processing side of housing functions (allocations, repairs, and all financial work) has to remain in the hands of properly trained staff. That is, the computer should never be allowed to have the final say, and it is extremely important that the computer is used as a management tool and not as a manager.

Also, it is important to ensure that adequate arrangements be made for the safeguarding of data should there be a computer failure. Where short term failures occur it is usually more practical to wait for the system's automatic recovery. However, it is also important that printed records should be available to allow the use of temporary manually, operated procedures. This is especially important as a safeguard against prolonged machine failure.

In view to the above observations, it is necessary to identify and describe all the data that will be contained in both the central subsystem and in the other subsystems, and to show where there is a relationship between this information. This is discussed in the following chapter.

6. General Specification.

6.1. Outline Specification.

This system is designed to implement an integrated housing management functions: Allocation & Waiting List, Repair & Maintenance, and Rent Accounting Function. Integration will be achieved by way of the 'three technique', namely: real-time, on-line and batch processing. Real-time and on-line processing will be used for the creation and updating of the files, while batch processing will be used for the updating and provision of management information reports. It will be possible to insert, delete, amend or inquire about, one item at a time directly from the terminal, and have the result displayed on the screen.

Data are held by the system principally on a master file, Property, which contains details of all properties for rent. For details of information held about each property, see section 6.2: Property File. On the other hand applicants' requests for rehousing, from both existing tenants and would-be tenants, are held on the Applicant File. For the information held about each applicant (circumstances & requirements) see section 6.3: Allocation & Waiting List subsystem. The first operations to be performed on the data are vetting and sorting. Input validation is performed on all the data. In the case of an input error, the user is prompted by the message: "Invalid input...Please try again". Note that the program carries out several such checks, and that it proceeds with the sorting only if the data vetting finds no errors. The sort

procedure will be achieved by an external sort method. Two external sort methods are discussed in chapter 8, viz. the 'natural two-way merge' and the 'balance two-way merge' sorts. The next operation is that the program is run to update the files. During the updating process further errors may be detected, e.g. when an attempt is made to delete a property or applicant whose reference numbers do not exist on the Property and Applicant Files, for to add a property or applicant with reference numbers which match an existing property or applicant. Details of any such errors will be written as an error message.

During the updating of the Property File, a Vacant Properties File, which contains details of those properties ready for let is produced. This file will be provided as data to the Offer Program. Also a Points Scheme File will be produced during the updating of the Applicant File. This file will be sorted (i.e put in decreasing order of point number) to put applicants in order of priority.

The Applicant Enquiry Program will request from each applicant, details of the type of property required, the area and sub-area of choice, the type of garden preferred, etc. A 'don't care' option (e.g. typing just new line) will be permitted for each item. If any answer seems suspect, the prompt will be repeated until an acceptable reply is obtained.

A search will then be made of the Vacant Properties File. This will send to the terminal details of each property which potentially satisfies the applicants' requirements. Offer letters are then produced by the Offer Program. If the offer is rejected the

applicant is automatically returned to the waiting list pending a further offer. At the same time the property on offer will be automatically returned to the Vacant Properties File in readiness for a further process of matching. However, the offer will be withdrawn automatically if there is no response after two weeks. However, if the offer is accepted, the date when the tenancy will start must be known. This means that the Tenant File will be updated and a cross-reference to the Rent Accounting and Repair system will be made, since the tenancy start date is clearly relevant to rent accounting (e.g. debits generation, calculation of rent and rate rebates) and repairs involvement. However, the Tenant File contains details of all council tenants. For the information held about each tenant see section 6.4: Tenant File.

The Rent Accounting File contains details of three interdependent functions: Rent accounts, Arrears Recovery, and Rent & Rate Rebates. For the information held about these functions see section 6.5: Rent Accounting subsystem. However, many of the fields comprising these functions are drawn from the Tenant and Property Files. There is also a cross reference between this file and the Repair File, since debits can be made for both applications on a single tenant`s account.

On the other hand, both tenants' requests for repairs and planned repairs are held on the Repairs & Maintenance File. For details of the information held see section 6.6: the Repairs & Maintenance subsystem. Many of the fields comprising this file are drawn from both the Property and Tenant Files.

The operation of the Rent Accounting Update Program is, first, to control the receipt of rents, the periodic rent debits, and adjustments generated by the way of rebates. The next operation is to deal with arrears. There are three types of arrears letter and a list of tenants' arrears showing the current financial position, together with the details of recovery actions taken. The final operation is to deal with calculating the rent & rates rebates; any necessary adjustment will automatically be made to the tenant's rent accounts together with a corresponding letter. Several types of letter will be produced, such as a list of cases for review together with name and address labels, and other details for review.

The operation of the Repairs and Maintenance Program controls the entry of details of work required (either planned, or at the tenant's request), and the charging and scheduling of work. Work can be entered as a job or as an inspection. Pre-determined cost can be set up under a schedule of rates (these can be specified as a total,or divided between materials, labour, & overheads). Once the input has been vetted, the next operation is to run the program to produce an updated Repairs and Maintenance File, a list of resolution errors, and a list of completed or outstanding jobs, including the present status of each job order, which can be shown under the headings specified. At the same time reports provide information to enable the authority to monitor its financial and repairs performance.

6.2. Property File, (The Master File.)

As has been mentioned, the data held by the system will consist principally of a master file Property. This file contains details of all council properties for rent. The records of this master file consist of the following fields, each of which will be discussed in some detail:

1. Reference Number.

This is the key to the system, and offers the user access to most of the data held on the computer files. The adequacy and efficiency of a reference structure is therefore a necessary element of the system. Considerable care and consideration is therefore required in constructing it. It is important, for example, not to have unnecessarily long reference numbers. These can obstruct the user's access to the data held in the system. For example, if an authority is relevantly small in size and in charge of a small number of properties, as are many of the Scottish authorities (Glasgow is exceptional in this context), a simple six character reference number would be more often used. This is because longer reference numbers cause more work for those dealing with them and lead to more errors being made when they are transcribed. If it is possible reference numbers should include a check digit. There are various methods to produce check digits. They all have the same rationale to catch errors in the input of large numbers where accuracy is essential. The method used in check digit is a simple one involving a few steps of basic arithmetic. Details are given in Appendix 5.

The most efficient method of referencing is achieved by including a property number to identify an individual property unit. Each area office must have its own series of property numbers. This method is by far the simplest. The property number can be as short as possible, providing it is long enough to deal with the total number of properties which the system has been set up to cope with. Up to five characters are used to identify each property unit. In the system proposed for an authority of the size of Glasgow, the property reference number represents a combination of the area office, the material depot service, and the property number. Therefore, three additional characters are required: two to represent the area office, and one to represent the material depot. Information related to property, however, usually forms the static units of data. Yet it is also important to keep records on the movement of tenants. Commonly, therefore, a reference number is given a single extra character to give this necessary personal information. This method works on the principle that the information relating to the tenant is important only for the period of the tenancy, and this part of the property reference number is therefore increased when the property is let or becomes vacant. The following example shows a complete reference structure, which applies to the Glasgow authority.

Example - Reference Number : 01/1/00001/1/2

Element of Reference Number	Purpose
01	The area of reference : in this case the first area office, Anniesland. In this example the item recorded by 2 digits and will allow for a range (01 to 16).
1	This represents the material depot that services the unit. The example allows for a range of (1 to 4) because only four depots exist in Glasgow authority.
00001	This represents the property unit number. This example allows for a range of (00001 to 99999) in each area office.
1	In this case, the tenant reference represents the first tenant of a dwelling. The example shows one digit recording this item and therefore allows for up to 9 changes of tenancy.
2	This is the check digit which verifies the accuracy of the preceding combination of numbers

2. **Property Address**.

Since it will be necessary for a number of terminals to access the system, the input, deletion and amendment procedures for this data must be carefully controlled. In addition the number of lines to be given to the full address, including the post code, is very important and must also be carefully considered. One more point to be considered is the total length of the line. Length is of importance as the use of abbreviations can lead to inconsistencies.

Example.

ADDR1 : Up to 25 alphabetic and numeric characters are allowed for insertion of the house number and street.

ADDR2 : Up to 20 alphabetic characters are allowed for the insertion of further definition of the property location.

PCODE : The post code where the property is allocated be entered. This can be up to seven characters.

3. **Property Type**.

This field is divided into two parts, representing two levels of property type descriptions. One character is used and is either 'h' for house or 'f' for flat.

House.

If the status of property type above is 'house', the record will also contain:

A. House Type.

This is a one character code which shows the type of house. The following are the specific codes:

'd' : detached house

'h' : semi-detached

's' : shelter house

'b' : bungalow

't' : terraced house.

B. Garden Type.

This field shows whether or not the property includes a garden. This matter is further considered within the Rent Assessment and Maintenance subsystems. One character indicates the type of garden. The following are the specific codes:

'n' : no garden

's' : small garden

'l' : large garden.

C. Garage Type.

This field indicates the existence of a garage associated with the property. The matter will be further considered with the Rent Assessment and Repairs subsystems. One character indicates the type of garage. The following are the specific codes:

'n' : none

's' : single

'd' : double.

If the status of property type is 'flat' the record will contain:

A. **Flat Type**.

This is a single character that represents the flat type. The following are the specific codes:

'l' : low rise flat

'h' : high rise flat

't' : tenement flat

'd' : deck access.

B. **Building Height**.

This data field reflects the total number of floors in the block of which the flat is part. A two character code indicates the number of floors in the building. For example (00 for ground floor, 01 first floor...up to 25 floors allowed).

C. **Flat Height**.

This data field defines the floor of the building on which the unit is located. Some rents depend on which floor of the building the flat is located.

D. **Lift**.

This field specifies whether, or not, a lift is installed. This is primarily of interest to the Allocation and the Rent Accounting subsystems. However, this field can also be developed by a link to the Maintenance subsystem. A single character code is used: 'y' for yes or 'n' for no, depending on whether or not a lift is available.

4. **Number of Bedrooms**.

It is necessary to state the number of bedrooms in a property, for the purpose of rehousing, and for the purpose of determining rents

and repairs. It is therefore necessary to place both the number and size of bedrooms on record. This is divided into two fields:

A. Double Bedrooms.

It is necessary to enter a single character digit to indicate the number of double bedrooms in the property. The range would extend (0 to 9).

B. Single Bedrooms.

This field requires that one character digit is entered to represent the number of single bedrooms in the property. The range would extend (0 to 9). The total number of bedrooms must be at least 1.

5. Number of Public rooms.

This field indicates the number of public rooms. Some rooms in the property are not considered to fall within the category of public rooms, e.g kitchen, boxroom, bathroom, etc. A single digit is inserted to indicate the number of public rooms in a property. The range (1 to 5) is allowed. The description is checked to make sure that it is sensible (e.g a property with less than 1 and more than 5 public rooms will be rejected).

6. Bathroom.

This field indicates the existence of a bathroom and whether or not a shower is included. This information is necessary for rehousing, rents, and repairs sections. A one character code is used. The following are the specific codes:

'b' : bath only

's' : shower only

'd' : dual (i.e. bath with internal shower).

7. W.C..

The Number of wc's is specified by a one digit numeric code. The range (1 to 3) is allowed. This information its important for rehousing, rent, and repair subsystems.

8. Storage Space.

This field of data, included on the property record, indicates that there is a separate storage space within the unit. A single character code: 'y' is inserted for yes, or 'n' for no depending on whether or not there is a storage space available in the property.

9. Cooker Type.

A single character is used, either 'g' for gas, or 'e' for electric. This information is required for the purpose of repairs and allocation sections.

10. Heating Type.

The type of heating is recorded with regard to the kind of fuel used. This information is important for the purposes of the rehousing and repairs sections. A code structure is used which uses one character to define the type of heating in the property. The following are the specific codes:

'g' : gas

'e' : electric

'o' : oil

's' : soil fuel.

11. Date of Construction.

The construction date code is composed of the actual year of the completion of construction of the property. In the (YYY) format, three digits are used. This information is specifically of use for rents and allocation purposes.

12. Warden Services.

A single character code shows if warden services are available and also of what type. This information is used by the allocation subsystem and also of importance to the elderly alarm network subsystem. A single character code is used. The following are the specific codes:

'n' : no

'r' : resident

'm' : mobile.

13. Alarm System.

This is a single character entry 'y' for yes, or 'n' for no, depending on whether the property is connected to an emergency alarm system.

14. Caretaker Service.

A one character code is used ('y' for yes, or 'n' for no), depending on whether or not a caretaker is available. This information is particularly valuable to the allocation and rent sections.

15. Door Entry System.

A one character code is used ('y' for yes, or 'n' for no), depending on whether or not the property has door entry system facilities. This information is particularly valuable to the repairs, rent and allocation sections.

16. Balcony.

A single character is used ('y' for yes, or 'n' for no), depending on whether or not the property has a balcony. This information is of use to the rehousing section and could also be of use to the rent accounts section.

17. Inspection Date.

The date of the next routine visit by authority staff must be recorded. This piece of information is of use to the repairs & maintenance section. The code is made up of 6 digits representing the date when the property is next to be inspected, in the DDMMYY format.

18. Area Office Code.

These data signify the main area office from which the property is managed. This information is required by the allocation section as well as by other sections. A code made up of two character digits is used to indicate the area office that controls the property. In Glasgow, for example, there are 16 area offices. The specific codes are given in Appendix 6.

A range of (01 to 16) will be allowed for Glasgow. In the case of a new property the character representing the area office which

manages this property will be checked to ensure that it is sensible (i.e. reject a code outwith the range 01 to 16).

19. Sub-Area Office.

This item signifies the sub-area offices of the area office by which the property is managed. This information is of most use for the purposes of rehousing. A code of two character digits is used in the record to define the sub-area office within the area in which the property is located. In Glasgow,the range would extend (01 to 14).

In the case of a new or recently acquired property, the description of the sub-area office controlling this property will be checked to make sure that it is sensible (i.e. reject a property with sub area offices with a code outwith the range 01 to 14). For details is of these codes, see Appendix 7.

20. Rateable Value.

The rateable value is signified by a four digit numeric field representing a whole pound figure.

21. Rate.

This information is necessary to the authority which is responsible for levying the rates poundage. This is especially important for the rent & rate rebates which the authority is responsible for administering. This information is signified by a six digit numeric field which includes the decimal point.

22. **Gross Rent**.

This information relates to the total charges which make up the rent that is payable before the rent & rate rebates have been deducted. This figure is signified by a six digit numeric field which includes the decimal point.

23. **Net Rent**.

The net rent is recorded by means of a six digit numeric field (including decimal point). Rehousing, Rent Account, and other sections find this information very useful. Net rent is a field common to various areas of the housing system. There are, however, various methods of determining net rents. These include, for example, a point assessment scheme which is used to apply a multiplier to the Gross Rateable Value.

24. **Service Charges**.

The total amount of service charges should be accumulated and updated on to this field. A six digit numeric code (including decimal point) is required. However, a link to the fields detailing individual charges should be available to record a full description of how this figure is arrived at, since a legal right of appeal (section 4 of the Housing Building & Control Act) exists against such charges. The record which links these fields should be formatted for headings such as lift, garden, garage, etc. (see below). Each of these fields requires that a question is put. Each of the user's answers is represented by one code (y,n) indicating whether or not there are charges for e.g, a garden, garage, etc. If the answer is positive the amount of the charge is inserted as a

figure. However, if the answer is negative the program automatically goes to the next field. The fields are:

A. **Warden Charges**.

A six digit numeric field (including decimal point) is used to record the charges for warden facilities.

B. **Alarm System Charges**.

The charge for an alarm system if the property is connected to an alarm system network, is recorded by means of a six digit numeric field (including decimal point).

C. **Garden Charge**.

Garden charges are represented by insertion of a six digit numeric field (including decimal point).

D. **Garage Charge**.

Garage charges are indicated by the insertion of a six digit numeric field (including decimal point).

E. **Caretaker Charge**.

The charge for a caretaker is recorded by the use of a six digit numeric field (including decimal point).

F. **Lift Charge**.

The charge for a lift is recorded by the use of a six digit numeric field (including decimal point).

G. **Other Charges**.

Other charges are recorded by means of a six digit numeric field, (including decimal point) representing the amount, which has been

left open for the user's specification.

25. **Property Status**.

This is a means of recording the status of a property, viz. occupied, vacant, held for demolition, under repair. It is an integral element of the basic property data. A one character field is needed to record the status of the property. These data are of use to all subsystems.

6.3. Allocation & Waiting List Subsystem.

Usually, any request for rehousing from both existing tenants, and would-be tenants, is made by completing an application form which includes details regarding the applicant, his family, occupation, income, his housing circumstances and his requirements (including the requirement for mutual exchange). It must also give details about applicants for existing property, information about any special needs, area of choice, and any information related to medical problems, and other details. So the data input to the allocations and waiting list subsystem is related to the applicant's circumstances and requirements. This information is the first point at which the applicant and the council come into contact. The accuracy of this information is therefore important as most of the fields will subsequently be passed automatically to the Tenant File, Rent Accounting, and Repair and maintenance subsystems. The subsystem must therefore display on the terminal that all its information has been verified and is correct before it is stored on the Applicant File. The applicant records contain the following fields, each of which will be described in some detail.

1. **Applicant Reference Number**.

This is an important field because it provides the key to the allocation and waiting list subsystem. The number must be large enough to record the maximum number of applicants anticipated. This field gives the user access to data kept on the computer. On the applicant's first contact with the authority he is assigned a six character code. Automatic creation of this applicant reference

number will be carried out by the system. In order to conserve computer storage, this field must be deleted from the computer when the applicant becomes a council tenant.

2. **Date of Application**.

This refers to the entry which serves to record the date when the tenant or prospective tenant applied to the authority. This is one of the factors used in the points scheme to determine the priority of the applicant.

3. **Applicant Type**.

This is a single character code which indicates whether the applicant is applying for a transfer or whether he is a new applicant.

4. **Applicant's Title**.

This consists of up to four alphabetic characters inserted to indicate the applicant's title, i.e. Mr, Miss, Ms, Mrs, Dr. It is used in the Tenant File and when addressing a letter to the applicant.

Applicant's Household Details - General.

The following fields, from 5 to 10, relate to an applicant's household. They include not only those members who are to be rehoused with him, but also all the other occupants of the household. This information is particularly relevant to allocations, since it is used in the allocations process to

determine the type and size of unit appropriate to the applicant and his family. These fields also have an effect on the determination of the degree of housing need, as they are particularly relevant to the points scheme. This information will, however, also be supplemented by connecting it to the Tenant File. Some of these fields will also be of specific use in the calculation of rent rebates. Up to 9 complete entries can be inserted, each containing the full details as described above. The minimum details of the applicant's household include, not only details of those who intend to be rehoused with him, but also details of all other persons who share the present property, including non-family occupants. These details could provide an indicator to show who, if anybody, would not be rehoused with the applicant. Such information (i.e.those not rehoused with applicant) will be deleted from the computer files when the prospective tenant commences tenancy with the council. However, the other details relate to those people who are to be rehoused with the applicant and will automatically be referenced by the Tenant File and other subsystems. The following fields are therefore held:

5. **Occupants' Names**.

Up to 20 characters are allowed for each name, starting with the applicant's. Names are stored in the form: full first name; initial of one middle name; full surname.

6. **Relationship to Applicant**.

The relationship of the member of the applicant's household to him

is represented by means of a single character code. The following are the specific codes:

'a' : applicant

'b' : partner

'd' : dependant

's' : single non dependant

'c' : couple, non dependent

'o' : others.

7. **Sex**.

A single character code is inserted to represent the sex of each member of the present applicant's household: 'm' is inserted for 'male' and 'f' for 'female'.

8. **Date of Birth**.

Six numeric character code used in a (DDMMYY) format to represent the date of birth of the applicant and those who are living with the applicant at his present address. It is used to show persons within the household of pensionable age, i.e. 60 for women and 65 for men, and also children reaching the age of 16. This is for the use of rebate calculations and in determining deductions for non-dependents.

9. **Rehouse Indicator**.

A single character code is inserted as a rehouse indicator ('y' for 'yes', or 'n' for 'no'). If the answer is yes, the record will also contain:

A. **Disabled Indicator**.

This is a single character code inserted to indicate whether or not the applicant or any of his family member are disabled, ('y' for 'yes', or 'n' for 'no'). This information has important implications in determining the most suitable property for disabled occupants. This field is also of specific use in calculating housing benefits.

B. **Occupants' States of Employment**.

This is a single character code used in conjunction with the field 8 above (date of birth) in order to show the present state of employment of each member of the applicant's family who are aged 16 years or over and are to be rehoused with him. This information is of specific use in calculating housing benefits and in determining deductions for non-dependants. The following are the specific codes:

'e' : employed

'u' : unemployed

's' : self-employed

'h' : housewife

'f' : full-time education

'o' : off-work sick

C. **Supplementary Benefit**.

This is a single character code: 'y' for yes, or 'n' for no, depending on whether or not a person who will be rehoused with the applicant is receiving supplementary benefit. This is for the use of rebate calculations.

D. **Blind Indicator.**

This is a single character code: 'y' for yes, or 'n' for no, depending on whether or not the applicant or person to be rehoused with him is blind. This information is important in calculating benefit, particularly in determining the applicant's entitlement to needs allowance and non-dependant deduction.

E. **Total People Rehoused With Applicant.**

This is a one digit code used in conjunction with the above field (9) in order to compute the total number of people who will be rehoused, including the applicant. This is computed automatically under this field. The information has important implications in determining the most appropriate size of property for the applicant and his family. The permissible range is 1 to 9.

10. **Total Applicant's Household Including Non-Family Occupants.**

This is a single digit code used in conjunction with the above fields (5 to 9) in order to compute the total number of people, including the applicant, living at the present address, (including non-family occupants). This is computed automatically under this field. This information is particularly relevant to the points system, and will be deleted from the computer when the applicant commences tenancy with the authority. The permissible range is 1 to 9, i.e. any zero total will be rejected.

Applicant's Present Residence - General.

The following fields relate to the applicant's present property. These fields are recorded only until such time as the applicant

becomes a council tenant. This information is then be deleted automatically in order to save computer storage and therefore increase efficiency. These data relate to the degree of housing need, in that they describe the property that the applicant currently occupies. They are used in a points scheme. The number of fields needed will depend on the sophistication of the allocation program. For example, in the case of a points scheme, if an applicant scores higher points for living in a property which lacks a bathroom, or if he has to share a cooker, or if there is a shortage of bedrooms, then it is necessary to record these items. The date of application must also be recorded in order to calculate the 'time in need' points. The following fields from 11 to 20 and which describe the applicant's present accommodation must also be maintained by the system.

11. Applicant's Current Address.

This information is relevant to the allocation process. It is important to know where to send letters and where to visit an applicant. It is also important to know the number of lines needed for the present property address, including the post code. A further point to take into account is the total length of the address, which is of the same format as that specified in the Property File (item 2).

12. Property Type.

This is entered as a one character code to show the type of the property that the applicant currently inhabits: either 'h' for

'house', or 'f' for 'flat'.

House.

If the status of property type above is house, the record will also contain:

A. House Type.

This is a one character code which shows the type of the house that the applicant is living in:

'd' : detached

'b' : bungalow

'h' : shelter house

's' : semi-detached

't' : terraced.

B. Garden Type

This field shows whether or not the property that the applicant lives in includes a garden. One character indicates the type of garden:

'n' : none

's' : small

'l' : large.

C. Garage Type.

This field indicates the existence of a garage associated with the property. One character code indicates the type of garage. The following are the specific codes:

'n' : none

's' : single

'd' : double.

Flat.

If the status of property type is 'flat' the record will contain:

A. Flat Type.

This is a single character that represents the flat type that the applicant currently occupies. The following are the specific codes:

'l' : low rise flat

't' : tenement

'h' : high rise flat

'd' : deck access.

B. Flat Height.

This is represented by means of a two character code. It defines the floor that the applicant presently occupies. This field is necessary in the points scheme. The range available extends from 00 to 25.

C. Lift.

This is represented as a one character code:'y' for yes, or 'n' for no, depending on whether or not a lift is available at the applicant's present residence. This field is required in a points scheme.

13. Number of Public Rooms.

This field is represented by a single character code. It defines the number of public rooms in the applicant's current residence. This field allows for a range of 0 to 9. This field is of value in a points scheme.

14. Number of Bedrooms.

It is necessary to state the number of bedrooms in the applicant's present property, for the purpose of a points scheme. It is therefore necessary to place both the number and size of bedrooms on record. This is divided into two fields (the sum of which must exceed zero):

A. Double Bedrooms.

It is necessary to enter a single character digit to indicate the number of double bedrooms in the applicant's present residence. The range available extends from 0 to 9.

B. Single Bedrooms.

This field requires that one character digit be enter to represent the number of single bedrooms in the applicant's present residence. The range available extends from 0 to 9.

15. Type of Heating.

This is a single character code which indicates the type of heating in the applicant's present residence. The following are the specific codes:

'n' : none

'g' : gas

'o' : oil

'e' : electric

's' : solid fuel.

16. Sink Indicator.

This field indicates whether or not the applicant has a sink in the present residence. This field is used in a points scheme. A single character code is used. The following are the specific codes:

'l' : lack

's' : shared

'u' : sole use.

17. Cooker Indicator.

This field indicates whether or not the applicant's present residence has a cooker. It is used in a points scheme. A single character code is used. The following are the specific codes:

'l' : lack

's' : shared

'u' : sole use.

18. Bathroom Indicator.

This field indicates whether or not the applicant's present residence has a bathroom. It is used in a points scheme. A single character code is used. The following are the specific codes:

'l' : lack

's' : shared

'u' : sole use.

19. Toilet indicator.

This is a single character code used to indicate the presence of a toilet. It is used in a points scheme. The following are the specific codes:

'l' : lack

's' : shared

'u' : sole use.

20. Wash Hand Basin Indicator.

This is a single character code inserted. 'y' for yes, or 'n' for no, depending on whether a wash hand basin is present within the applicant's present residence.It is used in a points scheme.

21. Storage Space Indicator.

This is a single character code inserted a 'y' for yes , or 'n' for no, depending on whether storage space is present in applicant's present residence. It is used in a points scheme.

22. Demolition Indicator.

This single character code (y,n) indicates whether or not the applicant's present residence is only temporary, i.e. due in the short term for demolition.If 'y' is inserted for yes, then field 23 will exist. This is the date on which the property will be vacated. If the answer is 'n' for no, then the program will automatically continue directly to field 24.

23. Date of Vacating Property.

This field is connected to field 22 above. It indicates the date or anticipated date when the property must be vacant. A six digit character code represents the date in standard format (DDMMYY).

Assessing Housing Need - General.

The following fields (24 to 33) are taken into account when assessing housing need. An applicant's housing need is assessed by a particular form of points calculation. Both the total housing need points and the detailed points factors showing how this total has been arrived at must be retained. The points which are awarded depend on the applicant's household circumstances. They are specified as a matter of authority policy. However, the record of every applicant must list the factors that apply in each individual issue. This is done because such factors will change from time to time as the applicant's household changes. For example the age of children and adults will increase as the waiting-time lengthens. It is therefore essential to keep a record of the points factors together with a note of the date of the change. However, housing need factors vary between authorities, although most authorities include many of factors listed below. This list is for the new proposal of assessing housing need in the Glasgow Allocation & Waiting List subsystem.

24. Condition of the Present Property.

This is a single character code to represent the condition of the applicant's present property. The code used is:

'a' for first priority, where the present property occupied by the applicant is in a bad state of repair, and where the health of member of the household may be impaired;

'b' for second priority, given to the present property

where the property is in a poor state of repair and may result in normal life being difficult;

'n' for no priority (i.e. not awarded any points) where the property is in reasonable condition.

25. Environmental Problems.

This category includes social effects. A one character code is used to indicate the environmental priority. The code used is:

'a' for first priority, where there is a risk to the health and safety of the applicant's household.

'b' for second priority, where it is difficult to lead a normal life.

'n' for no priority given.

26. Medical Priority.

This takes into consideration the medical condition of the applicant and his family. Certain priorities, each with different points, must be recognised. However, such medical categories require a great deal of skilled judgement. This field is a single character code:

'a' for first priority (where the health of an occupier is likely to be affected adversely by remaining in the property).

'b' for second priority (where the condition of the present residence makes normal life difficult).

'c' for third priority (where the health of an occupier may be influenced by the environment in the present residence.

'n' to be inserted for no priority to be considered.

27. **Termination of Tenure**.

This will be taken into consideration if the matter was not of the applicant's own making. A single character code indicates the priority type of the termination of tenure which is:

'a' for the first priority where an eviction warrant has been served on the applicant specifying a date for eviction from the applicant's present address.

'b' for second priority where a court order for possession has been granted against the applicant's present address.

'c' for third priority where an effective Notice to Quit is standing against the applicant's present address.

'd' for fourth priority, where an applicant has no formal tenancy because he is living with friends or relatives.

'n' for no priority to be taken into account.

28. **Overcrowding**.

The shortage of living rooms, of bedrooms and of bed-spaces is taken into account in calculating the length of time an applicant

has spent in overcrowded conditions. In order to make this calculation, the link between the number of rooms and the number of people living in them must be analysed. Their age, sex and relationship to each other must also be taken into account. A two numeric field is used to record the total number of points for overcrowding.

29. Children Living at Height.

If the applicant has children under 16 years of age and his accommodation is above ground floor level then he is awarded points. A two numeric code indicates the total number of points awarded.

30. Waiting Time.

An extra point per week is awarded in most cases to each applicant for every week he remains on the waiting list. All the points awarded are left open to be adapted to the user's own specification. The system is designed in such a way that it can be easily modified, and it therefore offers flexibility. A three digit code records automatically the accumulation of such points.

31. Elderly Persons and Children in Household.

If an applicant's household includes children under the age of 16 and/or persons of 60 year or over, additional points are awarded. The number of points is left for the authority to specify. A three digit code indicates this figure.

32. Total Points.

If an applicant's need for housing is assessed by some kind of points calculation, then it is necessary to record the total number of housing-need points which have accrued. This total is calculated automatically by the program.

Accommodation Required - General.

The following fields (34 to 44) relate to the accommodation required. Details are kept on the type of property, and areas required. This enables a description to be kept of the applicant's specific and preferred requirements. In general, this means the type of the property, heating type, cooker type, garden, garage, and areas & sub- areas, which the applicant would prefer. All these items of information are recorded by means of code. The system is designed in such a way that the most acceptable choice of available property type, area & sub-area is possible. This corresponds as closely as possible, if not exactly, to the description of properties recorded on the Property File. The fields recorded to describe the accommodation and areas required is as follows:

33. Property Type.

A one character code is used to represent the type of property that the applicant would prefer. The following are the specific codes:

'f' : flat preference

'h' : house preference

' ' (a single blank) : lack of preference.

House Preference.

If the property type preferred is house, the record will also contain:

A. House Type.

This is a single character code which shows the type of house which the applicant prefers. The following are the specific codes:

'd' : detached

's' : semi-detached

'b' : bungalow

't' : terraced

'h' : shelter house

' ' (a single blank) : the lack of preference.

If the applicant has chosen his first preference to be a 'detached' for example, the program is designed in such away that another question is displayed; " Would you like another choice of type of house ?". The reply ought to be (y,n), 'y' for yes, and 'n' for no, depending on the appropriate answer. If the answer is 'no', then the request will be terminated and the program will move automatically to the next field (B. garden type). But if the answer is 'yes' the user has to enter another type of house the applicant would prefer, and the process will continue until either the applicant replies there are no other preferences, or no further types of house remain. The reason for this is to meet the applicant's requirements and therefore to reduce the number of offers refused to as few as possible.

B. **Garden Type**.

This is a single character code which shows the type of garden which the applicant prefers. The following are the specific codes:

'n' : no garden

's' : small garden

'l' : large garden

' ' (a single blank) : the lack of preference.

C. **Garage Type**.

This is a single character code which shows the type of garage which the applicant prefers. The following are the specific codes:

's' : single garage

'd' : double garage

' ' (a single blank) : have no preference.

Flat Preference.

If the property type preferred is 'flat', the record will contain:

A. **Flat Type**.

This is a single character which shows the type of house which the applicant prefers. The following are the specific codes:

'l' : low rise flat

'h' : high rise

't' : tenement

'd' : deck access flat

' ' (a single blank) : have no preference.

If the applicant's first choice is 'l' (i.e. low rise flat) for example, then the computer will screen the question, "Would you

like another choice of type of flat ?". The reply must be (y,n) 'y' for yes, or 'n' for no, depending on the appropriate answer. If the answer is no, then the program will move to the next field. But if the answer is yes, the user must enter another type of flat the applicant would accept, and the process will continue until the applicant has no further choice(s), or until the last type of flat is reached. The reason for this is same as the reason for house type discussed above.

B. **Level of Flat**.

A two numeric code (00 to 25) that indicates the highest floor that an applicant would be prepared to live on, if he has chosen a high rise flat.

34. **Heating Type**.

This single character code shows the type of heating which the applicant prefers. The following are the specific codes:

'g' : gas

'e' : electric

'o' : oil

's' : soil fuel

' ' (a single blank) : there are no preference.

If the applicant's first choice is 'g' (i.e. gas heating) for example, then the computer will display this question, "Would you like another choice of type of heating ?". The reply ought to be 'y' for yes, or 'n' for no, depending on the appropriate answer. If the answer is no, then the program will move to the next field.

But if the answer is yes, the user must enter another type of heating the applicant would accept, and the process will continue until the applicant has no further choice(s), or until the last type of heating is reached.

35. **Cooker Type**.

This one character code indicates the type of cooker preferred. The following are the specific codes:

'e' : electric

'g' : gas

' ' (a single blank) : there is no preference.

36. **Warden Service**.

This single character code indicates a preference for a warden service. The following are the specific codes:

'n' : no

'y' : yes

' ' (a single blank) : there is no preference.

37. **Balcony**.

This is one character code (y,n) indicates a preference for a balcony. The following are the specific codes:

'n' : no

'y' : yes

' ' (a single blank) : if have no preference.

38. **Door Entry System**.

This is a single character code that indicates a preference for a

door entry system. The following are the specific codes:

'y' : yes

'n' : no

' ' (a single blank) : if nave no preference.

39. Areas & Subareas of Choice.

These are two fields, one related to area of choice and the other related to sub-area of choice. Both these fields are indicated by a two numeric code (see appendices 5 and 6.) The area of the applicant's choice is inserted first, followed by the chosen sub-area. For example, in the case of Glasgow, where there are 16 area offices, the codes which represent these areas run from 01 to 16. '01' represents Anniesland, '02' Castlemilk,'03' Easterhouse,..etc, while ' ' (2 blanks) represents no preference. When no area preference is given, then the program makes no request for a choice of sub-area.

If the applicant's first choice is, for example, area 16 (Baillieston), then the program would ask the applicant to give details of the sub-area he would prefer within this area. The sub-area field is, however, as was mentioned earlier, a two numeric digit code. It is inserted to record the applicant's choice of sub-area, in this example of area 16, '01' if Summerston, '02' if Acre Road, '03' if North Maryhill, '04' if South maryhill '05' if Ruchill, or ' ' (2 blanks) if there is no preference. The user is then requested to supply his second choice of sub-area, if any, in the same area. The program then moves on to the third choice, etc., until the applicant either has no further preference or until the

final sub-area left has been requested. The program then requests further preferred areas, each time following the procedure for choice of sub-area described in the preceding paragraph.

40. **Mutual Exchange indicator**.

This single character code (y,n) indicates whether or not existing tenants are willing to exchange by mutual agreement with another tenant.

Offers - General.

A detailed description of the offers made to an applicant and the outcome of these offers must be recorded. A computerised offer program is used to produce an offer letter. This contains details of the property on offer and also of the applicant. This information can be recorded in the offer record which is itself connected to both the applicant's record and the record of the property on offer. It is necessary to include convenience indicators in order to ensure that properties are not on offer to more than one applicant at any one time, and also to prevent the property being offered to an applicant who has already rejected it.

A complete description of the property on offer (e.g. size, rent, charges, type, and other characteristics) will be found in the description of the Property File. The first step in the allocation process involves a search being made through the Applicant File for a suitable applicant for a given vacant property. It is necessary to know the degree of housing need and whether or not the property is within one of the applicants chosen areas & sub-areas. The type

of property must also suit his other requirements. The property must be of the appropriate size to accommodate the total number of people who need to be rehoused along with the applicant, and the record of offer comprises the following fields describing both the property and the applicant.

41. Applicant/Property Cross Reference.

A note must be made on the record of each applicant of the reference numbers of every property that has been, or is currently, on offer to the applicant. The unique property reference (see Property File, item 1) is recorded in this way, enabling the description of the property on offer to be screened. The applicant's reference number must also be recorded in this context.

42. Offer Date.

This refers, in standard format (DDMMYY), to the date on which the property was offered to the applicant. This date appears in the offer letter, which is produced automatically by the system, and is normally posted to the applicant on this date.

43. Number of Offer.

It is useful to record the total number of offers that have been made to each applicant, in order to know the numbers of, and reasons for, refusals by each applicant. This single digit numeric code indicates the total number of offers made to an applicant. The system assumes that each applicant is entitled to nine offers.

44. Terminated Offer Date.

This item concerns the date (with format DDMMYY), on which the offer will be withdrawn if there is no reply from the applicant.

45. Offer Status.

The applicant's response to the offer, whether he accepts or rejects, is recorded under this heading. This is a single character code which indicates the applicant's reply to an offer. If the offer is rejected the applicant is automatically returned to the waiting list to await processing for a further offer. At the same time the property on offer will be automatically returned to the Vacant Properties File in readiness for a further process of matching. However, if the offer is accepted it is necessary to make a cross-reference to the Rent Accounting, and Repair & Maintenance subsystems. In addition, if the offer is accepted the date when the tenancy will start needs to be known, and is recorded in the first record of the Tenant File.

6.4. Tenant File.

The logical agency for the processing of all applications for rehousing is the Allocation & Waiting List subsystem. The acceptance of offer is indicated by entering into the Applicant File the date when the tenancy will start. This information is the first field in the Tenant File. This tenancy start date is also clearly relevant to let cases and to the Rent Accounting subsystem, for instance debit generation and repairs involvement. However, before a Tenant's File is added to the computer files, both the property that the tenant currently occupies, and his circumstances and requirements, must already be on the computer files. Each tenant's record contains the following fields.

1. Tenancy Start Date.

This is a record of the date (with format of DDMMYY), on which the tenancy will begin after the offer has been accepted. The noting of this date initialises the Tenant's File. This date is automatically passed to the Rent Accounting subsystem in order to initiate the normal debit raising process.

Family Details - General.

The following fields (2 to 9) relate to the tenant and his family details. These fields are drawn automatically from the Allocation & waiting List subsystem, since they are used in the allocation process to determine the size of the house appropriate for the tenant and his family. These fields are similar to the corresponding fields in the Applicant File. This

information is of direct use to the Rent Accounting subsystem, and takes account of any rebates to which the tenant is entitled. Some of these data are also used in other sections. Up to 9 complete entries can be inserted. The following fields are therefore held:

2. Names of Tenant's Family.

Up to 20 alphabetic characters are allowed for each name, starting with the tenant's. It is presented in a similar format to that of the occupant's names in the Applicant File, item 5.

3. Relationship to Tenant.

This is presented in a format similar to that of the Applicant File, item 6.

4. Sex.

This is presented in a format similar to that of the Applicant File, item 7.

5. Date of Birth.

This is presented in a format similar to that of the Applicant File, item 8.

6. Disabled Indicator.

This is presented in a format similar to that of the Applicant File, item 9A.

7. Occupants' Employment Status.

This is presented in a format similar to that of the Applicant File, item 9B.

8. Supplementary Benefit.

This is presented in a format similar to that of the Applicant File, item 9C.

9. Blind Indicator.

This is presented in a format similar to that of the Applicant File, item 9D.

Employment - General.

The following fields (10 to 13), relating to the tenant's employment, are held on the Tenant's File. This information is of use to the Allocation & Waiting List and Rent Accounting subsystems. However, the review periods under the rent & rebates scheme will ensure that this information is updated regularly. It is used, if it becomes necessary, to check the tenant's stated income with his employer. In the case of the tenant being self-employed, it is necessary to record the name and address of the tenant's accountant. The minimum number of fields relating to the tenant's employment are as follows:

10. Nature of Employment.

This field records the nature of the tenant's employment. Up to 15 alphabetic characters are allowed.

11. Employer.

This field contains the name of the employer. Up to 30 alphabetic characters are allowed.

12. Employer's Address.

This field records the address of the tenant's employer. It is important to know the number of lines needed for the Employer's address, including the post code. Another point that must be taken into account is the total length of the address, which is formatted in the same way as in the Property File item 2.

13. Employer's Telephone Number.

A ten digit field is required to record the tenant's work telephone number, information which will be accessible to all users of the system.

14. Rent Collection Method.

This single character field shows, by means of a code, the method by which a tenant pays the rent which is due on a property, for instance, manual collection (door-to-door), at office(s), bank standing order, direct debit, giro (post office), etc.

15. Cycle of Payment.

This field shows the period over which the tenant prefers to pay his rent, i.e. weekly, fornightly, monthly.

16. Home Telephone Number.

A seven digit character code is used to indicate the tenant's home telephone number. This field may be accessed by all users of the

system.

Incomes - General.

The following fields relate to the tenant's income. This information is relevant to areas such as Housing Benefits, Allocation, Tenant File, and Arrears Recovery. Cross referencing of this data allows access to many operations. The items of data show the tenant's and partner's detailed income under the different types of income headings. Below is a list of typical types of income. It is important to state that each of the following fields which relate to incomes, should be preceded by a question that requires 'y' for yes, or 'n' for no to be inserted, depending on the appropriate answer (e.g. whether the applicant and spouse receive wages, child benefit, etc.) If the answer to the above question is positive, then it is followed by the amount of income, but if the answer is negative the computer automatically goes to the next field, and so on until the final field is reached. Also, a cumulative total will be calculated and this will be recorded under the item of total income, see item number 32.

17. Tenant's Income.

A six digit numeric field (including decimal point) is used to indicate the amount of the tenant's weekly income. The range of the amount, if any, would extend from (£25.00 to £999.99). This means that any value less than £25.00 or over £999.99 will be rejected.

18. Spouse's Income.

A six digit numeric field (including decimal point) is used to

indicate the amount of the spouse's weekly incomes. The range of the amount, if any, would extend from (£25.00 to £999.99). This means that any value less than £25.00 or over £999.99 will be rejected.

19. Retirement Pension.

A six digit numeric field (including decimal point) is used to represent the retirement pension. The range of figures, if any, would extend from £25.00 to £999.99. This means the computer will reject any figure not within this range.

20. Widow's Pension.

This is similar to fields 18, 19, and 20.

21. Supplementary Benefits.

The description is as above.

22. Family Income Supplement.

The description is as above.

23. Unemployment Benefit.

The description is as above.

24. Child Benefit.

The description is as above

25. Sickness Benefit.

The description is as above.

26. Invalidity Benefit.

The description is as above.

27. Student Grant.

The description is as above.

28. Bank Interest.

The description is as above.

29. Other Interest.

The description is as above.

30. Other Income.

The description is as above.

Note. : In fields 20 to 30 the acceptable range of incomes differs from the range £25.00 to £999.99 used in fields 17 to 19.

31. Total Income.

This field is used in conjunction with the above fields (18 to 31) derive statistical information and to calculate new benefits which arise out of changes in the regulations. The total income of the tenant and that of his spouse is indicated by means of a six digit numeric field (including decimal point). The range extends from £25.00 to £999.99. This means that the description will be checked to ensure that it is sensible i.e. any total income outwith this range will be rejected.

6.5. Rent Accounting Subsystem .

Rent Accounting subsystem incorporates three interdependent functions, Rents Accounts, Arrears Recovery and Rent & Rate Rebates. Most of the fields comprising these functions draw mainly from both Tenant and Property Files, but they are also accessible by other subsystems, Allocation & Waiting List and Repair Maintenance. It is also important to record cross references of use to other subsystems, in particular Repairs and Rents, since debits can be made for both applications on a single tenant's account. It is, however, necessary to insert other data fields to make this application possible. The data fields used by the Rent Accounting subsystem are listed below, but, as they belong principally to the Property and Tenant Files, they will only be outlined here, while they will be discussed at greater length elsewhere. The fields used in the Rent Accounting subsystem are as follows:

The following fields are automatically acquired from the Property File whenever they are required by the Rent Accounting subsystem.

1. **Reference Number** Item 1.

Access to information about rent accounting will most probably be possible via the property reference number.

2. **Property Address** Item 2.

3. **Rateable Value**. Item 20.

4. **Rate**. Item 21.

5. **Gross Rent**. Item 22.

6. **Net Rent**. Item 23.

7. **Service Charges**. Item 24.

8. **Area Offices**. Item 18.

9. **Sub-area Office**. Item 19.

The following fields of information are held on the Tenant File can be made available to the rent accounting subsystem on request.

10. **Tenant's Employment Information**.

A record of the tenant's current employment can be kept in the Tenant File and could be made available to the system on request for the purpose of Housing Benefit claims. This information is kept up-to-date by the review periods used by the housing benefit scheme, and is essential for the purposes of for housing benefit applications. The employment information which is recorded is as follows:

A. **Nature of Employment**. Item 10.

B. **Employer**. Item 11.

C. **Employer's address**. Item 12.

D. **Employer's Telephone Number** Item 13.

11. **Rent Collection Method.** Item 14.

12. **Cycle of Payment.** Item 15.

13. **Total Incomes.** Item 31.

14. **Tenant's Occupant Details.**

Up to 9 occupants will be permitted.

A. **Names of Tenant's Family.** Item 2.

B. **Relation to Tenant.** Item 3.

C. **Sex.** Item 4.

D. **Date of Birth.** Item 5.

E. **Supplementary Benefits.** Item 8.

F. **Disabled Indicator.** Item 6.

G. **Occupant's Employment State** Item 7.

H. **Blind Indicator.** Item 9.

15. **Rent Payable.**

This relates to the total relevant charges minus any appropriate rent and rate rebates.

16. **Last Debit Date.**

This is a record, made in the standard format, of the date upon which the last normal debit was made.

17. **Last Debit Amount.**

This field contains a record of the most recent, and typical,

weekly, fornightly, or monthly debit which was raised on the account. This may not be the same as the rent payable (item 15) as it is possible that some change could have taken place in the rent rates, or benefits, since the normal debit was made.

18. Date of Last Payment.

This is the date, in standard format when the tenant made his last payment on the account.

19. Last Payment Amount.

This relates to the amount of the most recent payment that the tenant has made.

20. Current Balance.

The current balance on a tenant's Rent Account is a crucial piece of information. This is normally the balance at the end of the last accounting period, but it depends on what precisely this cycle is: weekly, monthly, etc. If the collection cycle and the basis on which debits are raised do not coincide, i.e. one may be on a weekly basis and the other on a monthly basis, then both the current balance and the balance when the rent was last collected must be recorded.

21. Year End Balance.

This relates to the balance on the rent account at the end of the last financial year. It is the balance carried over to the next accounting period.

22. **Rent & Rate Effective Date.**

This is a record of the date on which the tenant's present entitlements came into effect. It should be presented in a similar format to that of the tenancy start date (see Tenant File item 2 in section 6.4).

23. **Single Parent Indicator.**

This provides an indication as to whether the applicant is a single parent. It is of use in determining the applicant's entitlement to benefit.

24. **Period Review Date.**

This is a record of the date, in standard format, on which the benefit will next be reviewed. This will be, for example, 50 weeks for council tenants and 12 month for pensioners.

25. **Total Assessed Income.**

This indicates the total assessed income (i.e. after disregards, etc) of the tenant, and is of use in calculating benefit.

26. **Total Assessed Needs.**

This indicates the tenant's total needs allowance and is used in calculating benefit.

27. **Difference Between Income and Needs.**

This information is used in conjunction with item 26 & 27. It is useful in calculating rent rebates. This is done by comparing the tenant's net income, after disregards have been deducted, with the

tenant's needs allowance. The amount by which his income fails to meet the standard amount necessary for a needs allowance is then used in calculating the tenant's entitlement to benefit.

28. **Reason for Change**.

A numeric field indicates the reasons why there has been a change in the benefit. A code within the range 1-9 would cover the various reasons, e.g. increase in income, non-dependent occupant left home. This code could be printed on the letters which advise tenants of the alteration in their benefits.

29. **Correspondence Status & Date**.

It is necessary to record standard correspondence the authority has with the tenant, the type of letter, and the date on which it was sent. This is represented by means of code. There should be enough fields to accommodate at least 9 separate types of letters e.g. a grant letter, a letter of refusal, a review letter, proof of rent letter, etc.

30. **Credit & Payment method**.

This records, by means of a single character code, the normal method of payment of housing benefit to the tenant. The code would show a credit to the rent and rate rebates accounts in the case of the applicant being a council tenant.

Rent Arrears Recovery - General.

The process of recovering rent arrears is closely connected with the Rent Accounts and Rent & Rate Rebate functions. The Rent

Account and Rent & Rate Rebate functions provide the information which leads to the recovery of the arrears. The following fields indicate the various steps in the collection of rent arrears and provide a model which can be applied in any particular case.

31. Recovery Officer.

The role of the recovery officer depends on the policy of the authority which be serves. Debt recovery organisations vary among different local authorities. Some authorities have only local self containing divisions, where the staff are involved with all aspects of housing, while others employ staff who specialise in arrears. As staff responsibilities vary so much among authorities a system operates whereby, if reference numbers do not identify the officer responsible, then a code field is provided to do so. (see Property File, item 1).

32. Initial Correspondence.

The system is designed to produce, at suitable intervals, three standard letters before a Notice of Seeking Possession is served. To facilitate this process a single digit numeric code is used to record the type of letter sent and a further six digit code to record the date on which the next follow-up letter should be sent. The outcome of either a visit or an interview is recorded by means of a code, in order to monitor the recovery of the arrears.

33. Notice of Seeking Possession.

It is necessary to record, using a six digit code, both the service of the notice and its expiry date.

34. Court Procedure.

This relates to the period between an application for a Hearing and the date on which the Court comes to a decision. The following fields come under this heading.

A. Date of application for a Hearing.

B. Date set for a hearing of the case.

C. The decision of the Court.

D. The operative date of the Possession Order, if granted.

Fields A and B appear in the standard format (i.e. DDMMYY), but it is more useful to allow an unformatted narrative field of 100 characters for element C. This field may incorporate information on the Judgement for Debt, and may also relate to Suspended or Absolute Orders. It is also linked to the operative date for the Possession Order, which is recorded under the heading of field D. It is also important to record information on any Appeal stage which may occur.

35. Eviction Process.

A. Decision to Evict.

When the Court has come to a decision to allow eviction, it is then up to the authority to take the final decision to evict. Different authorities follow different procedures with regard to eviction, but in each case the date on which authority was sought to evict must be recorded. This field and others can be used to initiate, and continue automatically, correspondence on the subject, as well as keeping a check on the amount of arrears.

B. Eviction.

This relates mainly to the date of application to the Court for an eviction warrant, which may be automatically generated in co-operation the recovery officer. However, this field is also of importance in recording the intended date of the eviction. This information is useful when deferral, or any other suspension, of eviction is sought.

6.6. Repairs & Maintenance Subsystem

Tenant's requests for repairs are recorded by means of a code, which describes the type of repair required. Each of these codes must be identified and checked for accuracy, and codes which are found to be inaccurate are rejected. The rejection is registered through a single message which appears on the terminal. The coding structure must be as straight forward as possible, and the code must also provide an easily accessible key to the Repair & Maintenance subsystem. The subsystem must also be cross-referenced with other sections, in particular, the stores, Property and Tenant Files. Therefore, as with other fields, there is common ground between the Repairs & Maintenance subsystem and other subsystems. The need to access these and other fields must be considered when the subsystem is being designed.

The following fields will be passed automatically from the Property File:

1. Property Reference Number. Item 1.
This field is necessary to allow the Property record to be accessed.

2. Property type. Item 3.

3. Heating Type. Item 10.

4. Property status. Item 25.

5. date of construction. Item 11.

6. Property address. Item 2.

Also, the following fields will be passed automatically from the Tenant File.

7. Tenant Name. Item 2.

8. Disabled Tenant Indicator. Item 6.

9. Home Telephone Number. Item 16.

It is necessary that a record is kept of the tenant's telephone number on the Tenant File (see item 16). This again assists in making arrangements for access.

10. Access Arrangements.

This field concern the useful days and times when access can be gained to the Property. it is especially relevant for the purposes of repairs & Maintenance and is also very useful for other subsystems.

11. Date Reported.

The date on which the tenant reported the fault is recorded in the DDMMYY format.

12. job/work/Problem Description.

This field is automatically displayed in summary form when the repair is first entered on the computer. A standard specification of the job can be made to allocate space on the computer, and a job description will be printed by means of a code. For the specific code see appendix 8.

13. Job Priority.

This field indicates the degree of priority which the repairs are accorded. This is indicated by means of a single character code, calculated with reference to an existing time-table. The different categories of work are recorded through data fields which indicate the appropriate response times. This depends on how serious that defect is. It is not possible to say exactly, but it can be expected that emergencies must be dealt with promptly, say within 24 hours, while urgent repairs must be dealt with as soon as possible, say within perhaps 5 working days, and normal repairs must be dealt with within perhaps 3 weeks. However, the precise times for each category of work must be left to the discretion of the local authority concerned. For the specific codes see appendix 8.

14. Job/Work Number.

Different range of data fields are required to described the job/work. It depends on the number of orders, which in turn is dependent on the size of the local authority which controls the property. For example, Glasgow needs a 6 character code. furthermore, as well as this specific information a coded character can be of use in recording the name of firm or contractor who is expected to carry out the repairs. The job number will automatically be generated by the system.

15. Planned Maintenance Indicator.

If a system of planned maintenance is operated and work has been begun in accordance with the correct time limits, then a single character code will be inserted to detail the proper manner in

which the work should progress. This code operates according to a timetable which, provides the operator with helpful advice in raising job orders. It is important that this is not confused with the need to record a date for repairs involving the complete structure of the property, which should work on, for example, a seven year cycle. (For details, see appendix 9).

16. Inspections.

This field is relevant not only to the Repair and maintenance subsystem, but also to most other subsystems. All periodic repairs inspections are recorded from the time the repair is first reported to the time when payment is finally made. Detailed descriptions of such inspections are kept under a separate data field.

17. Job Status.

The time that a job takes to complete must be closely monitored to ensure that the authority's response to the repairs has been satisfactory. This field records the current position of the repairs, whether the job has been cancelled and the date and cause of such a cancellation, whether the job is still to be done (outstanding), or whether it has been completed, again with the date.

Method of Charging - General .

Two ways of operating a change are available, i.e. the work entry method and the schedule of Rates method. The method increasingly used most frequently is the schedule of Rates to charge for repairs and maintenance carried out. This method works by according every

item of repairs a standard price. The other method does not offer this facility to estimate in advance the approximate resources needed to carry out a repair. To be able to provide such an estimate, a precosted schedule of rates,relieves some of the burden of the accounting operation. Another advantage of the Schedules of Rates method is that it works out a valuation method of charging. The Local Government Planning and Land Act 1980 part III increased greatly the use of such schedules. This act made it compulsory for competitive tenders to be made for repairs. However, both methods require the following elements: material, labour, equipment, and overheads, to be charged to every standing job record:

18. Item Number.

a unique reference number must be attached to every item on the schedule. A six numeric character code is used to indicate this item number.

19. Item/work Description.

This refers to the automatic display of a description of repairs work after the item work number has been fed into the computer.

20. Charge for Repairs.

It is important to record who is responsible for the cost of the repairs carried out to the property. This involves local policy. This field of most use to the repairs system, but is also of concern to other sections. One character is used to indicate whether it is the tenant or the local authority who is responsible for the cost of the repairs.

21. Trade code.

Every trade that is involved in the repairs must be recorded by means of a one character code field. The trade code is inserted within a range of 1 to 9, for example:

'1' : plumber

'2' : painter

'3' : builder

'4' : glazier

'5' : electrician.

22. Unit of measurement.

A two character code is used to indicate the unit of measurement to which costs are to be applied. This is important to define because of the different nature of work undertaken. The unit may be, for example, a 'window' in connection with replacement of such, or 'per cubic metre' for building, or 'per linear metre' for gutter replacement or 'per item' for other jobs, etc.

23. Labour Details.

Perhaps the most important field in the total cost of a repair is the charge for labour. This charge is recorded in two fields. The Target Hours program is used by some local authorities. This method determines target times by the Direct Labour Organisation for job items through referring to a bonus calculation program. These target hours from the basis on which the client is charged. They are calculated by taking into account the average rate of Direct Labour Organisation costs, including trades. Target hours refer to both standard time and price. The fields discussed below, the

standard minute, i.e. the time allocated to carry out a job, and the charge for labour, are relevant in this context.

24. Material status.

A single character code is used to include whether or not material needed is available, 'y' for yes, or 'n' for no. If yes, as with the labour element, where more than one tradesman may be required to undertake work, more than one component may also be required. Therefore a six numeric digit code (including decimal point) will be used to show the total value of the material. Moreover, it is useful to record the individual prices for materials in a separate price record. This involves a knowledge of the unit rate for labour, plant, or materials, and is therefore linked clearly with the stock material system. However, the price record contains:

A. Stock Item Number.

This field is necessary to allow the materials record to be accessed.

B. Description.

Up to 20 characters are allowed.

C. Code.

A four character code is used.

D. location.

A four character code is used.

E. Unit.

A two character code is used.

F. Cost.

A six character code including decimal point is used.

G. Price Per Unit.

A six character code including decimal point is used.

25. Overheads Value.

Separate totals may be required for the oncosting of the feeder elements of materials, labour, etc. Six numeric characters (including decimal point) are used to indicate the overheads value.

26. Total cost.

A six numeric character code is used to indicate the total cost.

An accumulation of the above mentioned factors is calculated automatically.

6.7 Stock Material File

The amount of the material that will be needed from stock and other resources must be assessed in advance, because the mointering and controlling of stock plays such an important role in ensuring the efficiency of the system. Built into the program, there must be some means of registering the non-availability of stock can be kept, except in an emergency. It is therefore necessary to keep a record of the following data in a Stock File, especially created for this purpose.

1. Stock Item Number

This field is of prime importance as it enables access to the record of stock materials.

2. Description. Item 25B

3. Code. Item 25C

4. Location. Item 25D

5. Unit. Item 25E

6. Cost. Item 25F

7. Quantity Available.

This field is very important in term of the Stock file. This records the number of items of stock which are at present available to be used for jobs of work. A four character code can be inserted to reflect this number. The range could expand from 0000 to 9999 whether the quantity available increases or decreases depending on

how much is replaced.

8. Quantity Draw.

The number of job orders is a useful guide to the number of items that will be withdrawn from the store. This will enable these items to be re-ordered and replaced. A one character numeric code is used to indicate the number of items/units which have been withdrawn from stock.

9. Re-order Level.

A specific level, decided by the authority in advance, is agreed as the level at which re-ordering should begin. The process begins by the authority issuing a letter authorising the ordering of materials. This re-order level, and the need for a letter to be issued, is registered automatically on the computer.

10. Date Re-order

Six numeric characters are inserted to indicate the date on which materials should be ordered for the store. This date is printed at the top of the letter which the authority sends to the suppliers requesting them to supply the required stock. The principle reason for recording this date is to ensure that a check is kept on whether the supplier fulfills the order on time. If the supplier does not forward the goods within the required period, a letter of reminder is sent out.

11. Danger Level.

In the same way that an order-level needs to be determined, it is also important to decide in advance what constitutes a danger

level, so that the authority can take immediate measures to ensure that stocks are always available. They can then re-stock within the scheduled period. The process of sending a second reminder to the supplier comes under this heading. As the reorder level and danger level are the means of determining what stock materials are available, it is natural that they should be linked with the Supplier/Company File.

7. User Specification

7.1. Introduction

This system is designed to implement an integrated housing management system for housing management functions, namely Allocation & Waiting List, Repair & Maintenance, and Rent Accounting (Rents Account, Arrears Control, and Housing Benefits), based on three processing techniques: real-time, on- line and batch processing.

The system holds a number of fields, which are updated immediately with amendments as they occur. In total the system may hold over 150 different pieces of information for each property.

7.2. User Requirements.

This system is designed specifically to meet the requirements of the Glasgow District Council Housing Authority. However, the programs are designed to be altered easily in order to meet the needs of other authorities.

7.2.1. Packages Used.

In this section the most important routines used throughout the system are described. These routines are organised into Pascal program packages. Five packages are used in the system. They are: 'Date', 'Check Digit', 'Money', 'Create Number', and 'Area Office' packages.

The 'Date' package calculates the number of days between any two dates in the twentieth century. The 'Check Digit' package allows the input and output of identification numbers, and their verification using check digits. The 'Money' package checks that any accounting input and output are within a given range. The 'Create Number' package, accepts input, creates identification numbers automatically, produces output, and verifies identification numbers by checking that the sum of all its digits is exactly divisible by a selected prime number. The 'Area Office' package allows input, validation, and output relevant to the area and sub-area offices, including the number of sub-areas controlled by each area office. These packages can be replaced by any other packages in accordance with the requirements of the user. These packages are explained in the next chapter. In the next section the programs

required by the system will be discussed.

7.2.2. Methods Used for Sorting and Searching.

Two external sort methods, arranging in ascending and descending order, necessary for file management, were developed and their efficiency compared. These methods are based on the 'balanced two-way merge' and the 'natural two-way merge'. In addition a 'Binary' search method was developed to search for a given number in the sorted file. These methods are described by Page and Wilson[121]. The more efficiently it can perform these two operations, then the more convenient the program will be for the user. A detailed algorithm for these methods is long, since so many special cases arise some ideas which would be useful in writing such an algorithm are given in the next chapter.

7.2.3. Inputs and Outputs.

The system consists essentially of a series, or group, of linked programs. These programs are designed as stand-alone tools for housing management. The input fields (as specified in chapter 6) are inserted one by one, after a message appears on the screen, through the keyboard. These are validated by the system and any invalid information is rejected by an error message:

"Invalid input...Please try again"

Note that each programs carries out several such checks.

The output of the system depends on the type of service requested. In all cases, however, the system shows on the screen the action carried out in the cases of both valid and invalid data.

The contents of output files can be seen by running the appropriate shell command (see section 7.4). The routines of the five packages, described in section 7.2.1, are used for the input and output of data. The sort and search methods described in section 7.2.2, are used (in revised forms) to manage the files.

Each program's input requirements and output interpretion will be discussed in the next chapter. (Note that the output formats for the data are more elaborate than are input formats).

7.3. **Programs Required.**

The system consists essentially of a series of linked subprograms (hereafter, these will simply be referred to as programs). The descriptions of the programs will be discussed in the next chapter. Since these programs enable users to make major changes to data, access is controlled by a password, or series of passwords, for different levels of access. The proposed password system is described in chapter 9. These programs organise, calculate, and present data. They also create management information reports that facilitate efficient decision-making. These programs are:

1. Property Data Subsystem Program.

This program provides a mechanism by which information is passed to the other subsystems: Allocation & Waiting List, Repair & Maintenance, and Rent Accounting. In this sense, this program differs from the other programs, in that it reads and creates a master file which, in turn, forms the basis of the integrated housing management system. In its present form, the program is designed specifically to maintain a file of properties. Each record of the file will contain fields already described in section 6.2. The program also creates its own Transaction File for the properties. Since the records of the file might be stored initially in a random order, the sort and search methods described in section 7.2.2 are used (in revised forms) to manage the files. The Master File and the Transaction File are then updated to produce information that is passed automatically to

Allocation & Waiting List, Repair & Maintenance, and Rent Accounting subsystems.

Allocation & Waiting List Subsystem Programs.

Two programs are described in this section, the Allocation & Waiting List Program, and the Offer Program. These programs detail applicants' circumstances and requirements, calculate points in order to establish priorities, match vacant properties with applicants, and make offers. Both create tables from data stored in Applicant and Waiting List Files. Many fields of these programs will be deleted automatically from computer storage when the applicant becomes a council tenant, in order to save storage and therefore increase efficiency. In addition many fields will automatically be referenced by the Tenant File and subsequently by other Subsystems.

2. Allocation & Waiting List Program.

This program uses information from both tenants and prospective tenants that is stored in the Applicant File. In addition, the program is designed in such a way as to supply information which is passed to the Tenant File and subsequently to other subsystems, such as Rent Accounting, and Repair & Maintenance. One of its important functions is to calculate points in order to establish applicants' priorities. In its present form, this program is designed specifically to maintain a file of applicants, both tenants and would-be tenants. Each record on the file contains fields already described in section 6.3. This program also creates its own transaction file for the

applicants. It, like the Property Data Subsystem Program described in section 7.3.1, uses many of the packages described in section 7.2.1 for the input and output of these fields. Also the program uses the sort and search methods described in section 7.2.2 (in revised forms) to manage the files. These two files are then updated to produce information that is passed to the Tenant File, and subsequently to the Maintenance & Repair, and Rent Accounting Subsystems.

3. Offer Program .

The program described in this section is linked to both the applicant's record and the record of the property on offer. It passes its information automatically to the Tenant File, and to the Property Data Subsystem Program, through transaction file if the offer is accepted. Subsequently these data are passed to the Maintenance & Repair, and Rent Accounting Subsystems. The main functions of this program are to match properties to applicants according to the priorities and preferences, and to produce standard letters of offer. The Offer Program in turn is updated when an offer is accepted and processed through the Allocation & Waiting List Program.

The Offer Program is normally the source of the many fields passed automatically to the Tenant File. In its present form, the Tenant File is designed specifically to maintain a file of tenants. The sort and search methods described in section 7.2.2 are used (in revised forms) to manage the file. This file is then updated to produce information that is passed automatically

to Rent Accounting and Repair & Maintenance Subsystems.

4. Rent Accounting Subsystem Program.

The program described in this section partly relies on data passed automatically from the Property Data Subsystem and Tenant File. In addition this program requires information to be input from the keyboard. In its present form, the program is designed specifically to maintain a file of rent accounting. The program also creates its own transaction file for the rent accounting functions. These two files, together with the other information that is passed automatically from the Property Data Subsystem and Tenant File, as indicated above, is then updated to produce information that is passed automatically to the Repair & Maintenance Subsystem. The cost of repairs for which the tenant is responsible, as well as rents, are recorded as debits in the tenant's account. This program again illustrates the need for communication between the various subsystems. The Property Data Subsystem provides data concerning property, rent, rates and other information. (For details see section 6.5, items 1 to 9). The Tenant File passes data concerning incomes, family size, and other relevant data. Details are given in section 6.5 (items 10 to 14).

5. Repair & Maintenance Subsystem Program.

This program partly relies on data passed automatically from the Property Data Subsystem and Tenant File, In addition this program requires information to be input from the keyboard. In its present form, this program is designed specifically to maintain a

Repair & Maintenance File. The program also creates its own Transaction File for the repair & maintenance functions. These two files, together with the other information that is passed automatically from the Property Data Subsystem and Tenant File, as indicated above, are then updated to produce information that is passed automatically to the Rent Accounting and Stock Control Subsystems. The Property Data Subsystem provides data concerning property. (For details see section 6.6, items 1 to 6), while the Tenant file passes data concerning tenants. Details are given in section 6.6 (items 7 to 10).

7.4. How to Use the System .

There is a set of shell commands which simplify the use of the system. These are as follows:

1. To run the system, type:

```
EXSCL(,LIBS.ALL)
```

2. To print the contents of the System Program, type:

```
LF(LIBS.ALL,NUMBERING=YES)
```

3. To see the listing of the System Program, Type:

```
ecce(lib1.property)
p*
```

This will list of the entire contents of the System Program on the screen. To list a particular line, or number of lines, then type M#JPK instead of P*, where J is the number of the first line required, and K is the number of lines.

8. System Description.

8.1. Introduction .

The system described here consists of a group of linked programs, which use groups of packages conveniently accessible to any program that needs to use them. The package also have to be explicitly linked to the program, using the system's linker utility. The great advantage of a routine is that it can be compiled independently and then used in any program.

Any program or package has two sections, labelled 'Declaration' and 'Implementation'. The declaration section defines all the constants, types, variables, and subroutines of the packages.

The implementation section of a program contains the executable code for each of the package subroutines. The implementation, however, may be private; that is to say, its structure and inner organisation can not be read by the user. This chapter is concerned with the programs' descriptions, rather than covering the listings or operations of the programs. Section 7.4 describes how detailed listings may be obtained.

First there is a discussing of the five packages used for input, output and validation of data,followed by a discussion of the three packages which may be used for sorting and searching. These were introduced in the last chapter in section 7.2.

8.2. Description of Packages Used.

8.2.1. Description of Input/output Packages.

In this section the many important subroutines that are used throughout the system are described. These subroutines are organised and grouped into Pascal packages. These packages are:

1. 'Check Digit' Package.

Whenever many long identification numbers must be typed into a computer, the chances are high that typographical errors will be made. One way of reducing these errors is to include a check digit in any given number; if the number is entered incorrectly, then the check digit will probably no longer correspond, and an error will be detected.

The subroutines in the check digit package are designed to perform three basic functions:

1. To read the reference number, with or without a check digit.

2. To produce the check digit for a reference number that does not have one.

3. To verify the check digit of a number that does have one.

The package contains three subroutines, which taken together, perform the input and verification of numbers. It can use this package whenever it needs to input the reference number. For details of how to use or list the package see section 7.4.

The package is designed to impose a strict format on the numbers it

reads. Assuming reference numbers are nine digits long plus a check digit, ten digits in all, the package accepts an input value in one of two forms, with or without a check digit. For an input value containing exactly nine, digits (for example, 123456789) the numerical value is assigned, and the absence of a check digit in the input number is detected. An input value with a check digit requires a hyphen between the last digit of the reference number and the check digit:

123456789-7

In this case, the package receives the ten-digit numerical value (hyphen deleted). An invalid input will result in an error message and the prompt for another attempt, until an input ten-digit number (nine digits, hyphen, and check digit) is valid.

2. 'Money' Package.

This package provides for input and output of pound-and-pence values. The subroutines in the money package are designed to perform the following tasks. For the complete listing of the money package see section 7.4.

1. It reads a pound-and-pence input value.
2. It determines whether the value is valid.
3. If the value is valid, it converts the value into pence.

The package contains six subroutines, which together, perform the tasks indicated above.

The package allows a great variety of input values, which may (but are not required to) include leading blanks, a pound sign, and

commas. If the value does not include a decimal point, then it is read as a pound amount with no pence. If a decimal point is included then any number of digits may be entered after it. However, the number will be rounded to the nearest penny. The maximum value allowed is £999,999.99. An attempt to input a larger number will result in the following message:

TOO LONG.

Also, nonnumeric input (other than the allowable characters '£', '.', and ',') will result in error message, and a prompt for a new value.

3. 'Date' Package.

There are may ways of approaching the input and output of dates; the approach used in this package allows easy input, and produces easy-to-read output. The routines in the date package are designed to provide for input, validation, and output of dates. In addition, it includes a scalar date conversion routine that allows the calculation of the number of days between any two dates in the twentieth century.

The package contains three subroutines, which together perform the functions indicated above. For the complete listing of the date package see section 7.4.

The essential requirements of a date package are as follows:

1. The user must be given an adequately clear picture of the required date input format.

2. A reasonable amount of checking must be performed on the validity of the date.

The package reads an input in the following form:

DD-MM-YY

Where dd,mm,yy represent the day, month and year respectively, and the parts of the date are separated by hyphens. An example of correct date input for this format is:

10-11-86

In the case of single-digit days or month, the package will accept two form. Both of the following are correct:

01-01-87 and 1-1-87

In addition to the format requirements, the package checks the day-month-year values as follows:

1. The month, MM, must be from 1 to 12.
2. The year, YY, must be from 1 to 99.
3. The day, DD, must be from 1 to the maximum number of days in the month represented by MM-YY. For February, this package checks to see if YY is a leap year or not.

Thus, this package is designed to read and validate any date from January 1, 1901 to December 31, 1999. An illegal date results in an error message and a new date prompt:

ILLEGAL DATE

DATE:

This package writes the date in the form:

DD MONTH, 19YY

For example, for the date 11-10-86, this package writes:

In some cases it may be more convenient to output the date in the same format used for input. The package allows this.

It will often be necessary to calculate the number of days between two dates. This package provides a simple method of performing this calculation. Starting with 1st of January 1901 as day one, the package counts up the number of days represented by date, and assigns a scalar value. For example, 1st of March 1986 has a scalar value of 31106, meaning it is the 31,106th day since 1st of January 1901. Note that 31st of December 1999 has a scalar value of 36159, which is outside the range of regular integers in small computers. (Typical values of MAXINT are 32767 on a minicomputer and 2147483647 on a large computer.)

4. 'Create Number' Package.

This package is designed to perform three basic functions:

1. To read the input data, without a reference number.
2. To produce automatically the new reference number after the acceptance of the input.
3. Write all the fields, including the reference number, into a table.

Here the number created is of six digit. (This can be modified to any other length of number). The sum of all the individual digits added together is always divisible exactly by 11. (This also can be modified to any other prime number by simple changes in the

package. The package accepts the last number that was created,and if the number does not satisfy the criterion of division by 11, changes this number repeatedly until the criterion is satisfied. This package contains two subroutines to perform the functions indicated above. For the complete listing see section 7.4.

It must be commented here that any create number package is not very effective and thus loses the security it is supposed to provide. A better and more effective way, preferably on the lines of the property reference number (check digit), should be adopted if needed.

5. 'Sub-area' Package.

The identification of area and sub-area determined is essential in this system for housing management application. So this package allows input, provides validation, and produces output. In addition it allows the calculation of the number of sub-areas in every area office automatically. For complete listing of this package see section 7.4.

8.2.2. Description of Sort and Search methods.

In this section, the packages that perform the sorting and searching functions are considered. These packages are incorporated into all programs but each will require a small amount of revision before being incorporated into a particular program. The sort methods are based on the 'balanced two-way merge' and the 'natural two-way merge', while the search method is based on the 'Binary' search.

1. Sort Methods.

A. The Balanced Two-way Merge.

The idea of merging lists of keys is a very basic one in sorting. At its simplest, the balanced two-way merge consists of progressively combining from the beginning pairs of sorted lists into a longer list, and repeating until just one list remains. Details are given in Appendix 10.

This package contains the following subroutines: Merge and Sort, Two way Merge, Balanced Merge, and Write Merge. All of these, taken together, perform the sorting by the 'Balanced Two-way Merge' method.For the complete listing and the operation techniques of this package, see section 7.4.

The balanced two-way merge is quite effective and can be easily analysed. However, a simple improvement can be made which will take advantage of any ordered strings in the original keys. This is the basis of the natural two-way merge.

B. Natural Two-way Merge.

This sort is basically the same as the Balanced Two-way Merge Sort, the only difference being that instead of merging sorted records from the input list, this sort keeps on merging records from both lists until the current record of each input list have keys that are less than the last key sorted into the output list. Details are given in Appendix 11.

Thus the first two subroutines of Balanced Two-way Merge Sort, i.e. 'Merge and Sort' and 'Two-way Merge', are also the first two

subroutines of this sort, except that the subroutine 'Two way Merge' calls the subroutine 'Natural Merge' (instead of 'Balanced Merge'). However, this package contains the following subroutines: Sort and Merge, Two Way Merge, Natural Merge, and Insert Key. All of these, taken together perform the sort by the 'Natural Two-way Merge' method. For the complete implementation and processing technique of this package, see section 7.4.

To enhance the efficiency of both the merges, the unsorted list is initially split into the two lists A and B, using an internal sort method that would sort specific numbers (typically 4 or 8) of records. This is incorporated in a subroutine 'Internal Sort' which accepts a list into which a number of records are to be internally sorted. Two internal sorts are discussed, i.e. the 'Interchange Sort' and 'Quick Sort'. i.e, The Balanced Two-way Merge Sort (using the Interchange sort internal sort) and the Natural Two-way Merge Sort (using the Quick sort internal sort) are described below, and their efficiency compared.

Interchange Sort.

This method sorts the records stored in the list into ascending key order by comparing each current record (starting with the first record in the list) with the remaining records in the list, to find a record that has a key less than that of the current record. If such a record is found, the positions of the two records in the list are interchanged.

Quick Sort .

The method used in the 'Quick Sort' is to start with the first current record of the list within the bounds defined by lower and upper, and to store the record in its final position; i.e. with all records before it having keys that are less than and all records after it having keys that are greater than (or equal to) the current record key. Then recursively it repeats the algorithm for the list both to the left and right of sub-lists, until all records are in their sorted position.

3. Comparison of the Sort Methods.

Two sets of data were used to test the efficiency of the two methods, one had most keys in random order, the other had keys that were almost already ordered. The Natural Two-way Merge is much more efficient than the Balanced Two-way Merge as Natural takes advantage of any already ordered keys. The Quick Sort is inefficient if the keys are already nearly ordered keys. This was shown by using the 'Time' mechanism on the ICL 2988 operating system, which gives the 'real', 'user' and 'system' times for executing a program. Programmers are of course interested in the 'user' time. All programs were used with combinations of the Natural Two-way Merge and Balance Two-way Merge with the Quicksort and Interchange Sort, and the typical times taken by these programs for both types of data (i.e. random and nearly ordered) are shown in table 8.1.

Table 8.1.

Combination of External and Internal Sorts	Data Type: Random — User Time in second	Data Type: Nearly ordered — User time in second
Balanced Merge and Interchange Sort	16.9	9.0
Natural Merge and Quick Sort	16.1	8.3
Natural Merge and Interchange Sort	16.6	7.8

From the above table it can discard the Balanced Merge for the Natural Merge. The only problem is whether to use the Interchange or Quick Sort as the internal sort method. If data for the transactions is to have all transaction for a certain Property always bunched together always, and similarly for the data of the Properties, then it is better to use Interchange Sort. Otherwise the Quick Sort should be used. For this reason these programs are provided are in all program listings. The first listing for each sort program uses the Quick Sort, whilst the second was the Interchange Internal Sort.

It is important to comment here that the two internal sorts discussed gave different performance with different sets of data. There is a number of differing internal sort methods and these should be implemented to find the method that would give the most efficient performance with any kind of data.

4. Sort on the ICL2988.

The Glasgow University ICL2988 operating system provides it's own Sort technique. However, although it is both fast and efficient, it suffers from a number of limitations. Firstly, it can be used

only with 'Text Files' (i.e. where the File is consists only of a sequence of characters), and no fields can be specified. In addition the machine sort routine can not be called from within the program being executed, execution must first be terminated, and sort must then be called as a separate program. Two passes of 'sort' are required to produce the finally sorted files. To overcome these difficulties the two independent sort routines describe above have been written which do not suffer from these disadvantages.

2. Search Method.

Once a list is sorted it can use a very fast searching algorithm, called the binary search, to find an element in the list. The binary search is very simple and elegant. Suppose there is a list of 100 records, and it is required to locate a given key that is known to exist somewhere in the list. (Remember, the keys are now in ascending or descending order). First look at the key in the centre of the list, number 50, and compare it with the key are required. From this comparison it is possible to tell whether the key appears in the first or the second half of the list. Next look at the key in the centre of the appropriate half of the list (either number 25 or 75). Continue cutting parts of the list in half in a similar manner until the required key is found. It is possible to calculate the average number of comparisons that will have to be made to find an element in a list of a given length. For a list of 100 element, the average is about 6 comparisons. This means that any elements can be found very quickly.

8.3. Description of Programs.

The main program begins by displaying the title and prompting for the input of the user name and the password. The prompt is displayed repeatedly and no access is granted until the user types a correct (his) name and password at the keyboard. Then the program offers a menu of six option programs, all of which are illustrated in figure 8.1. The user may access to Property Data, Allocation & Waiting List, Rent Accounting, Repair & Maintenance, Stock Control, or terminate the program. The correct response to the menu is thus an integer from 1 to 6:

'1' : Property Data

'2' : Allocation & Waiting List

'3' : Rent Accounting

'4' : Repair & Maintenance

'5' : Stock Control

'6' : Quit

The full descriptions of these programs will now be discussed:

8.3.1. Property Data Subsystem Program.

Figure 8.2 illustrates the structural division of the Property Data Subsystem Program. To obtain the entire listing of this program see section 7.4. However, the program has two modes of operation, a 'create' mode, and an 'update' mode. The user chooses the mode at the beginning of the program run by typing a 'C' or 'U' on the terminal, C(reate) or U(pdate). The two files created or updated by this program are called 'Property Data' and 'Property Transaction'

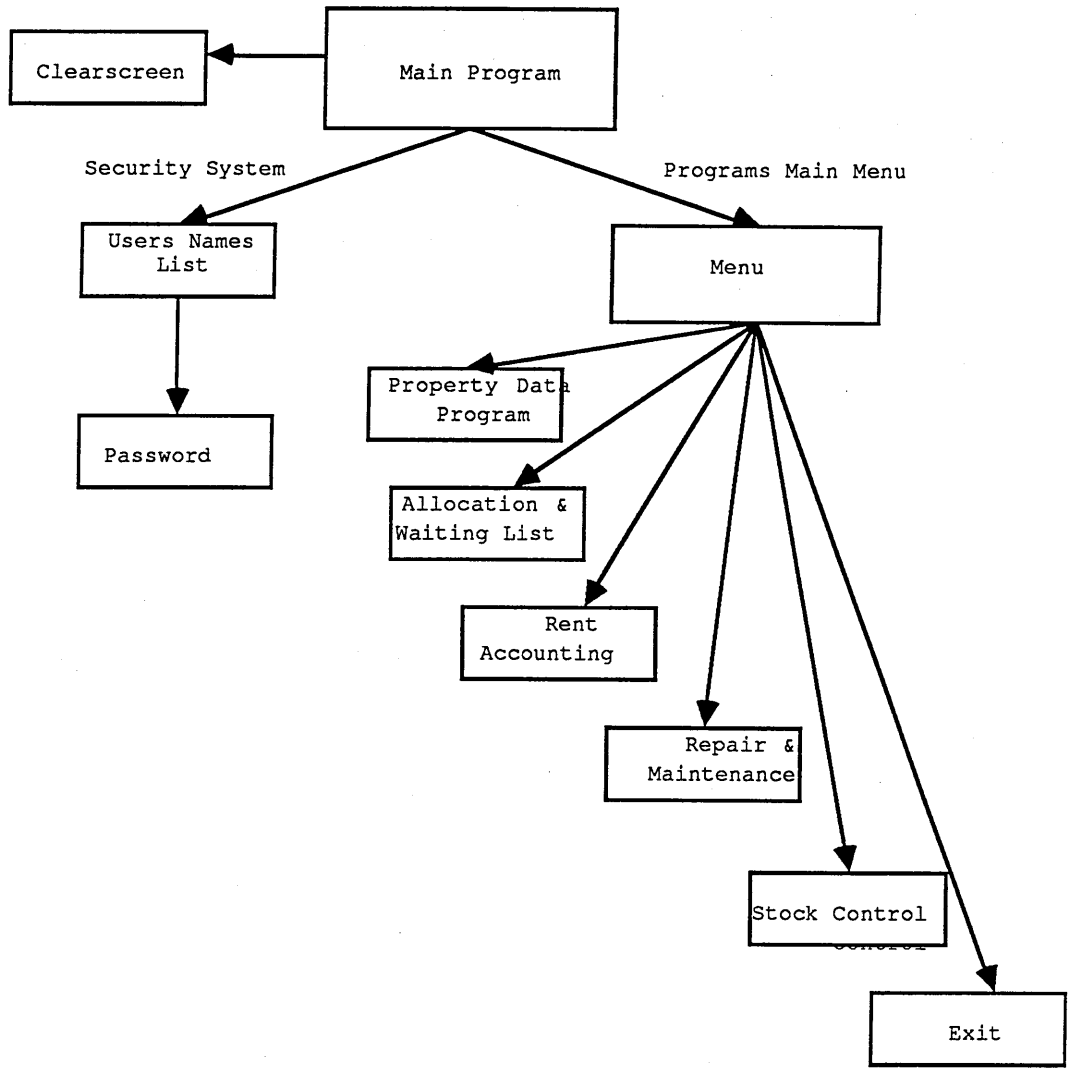


Figure 8.1

Structure Chart for Main Program

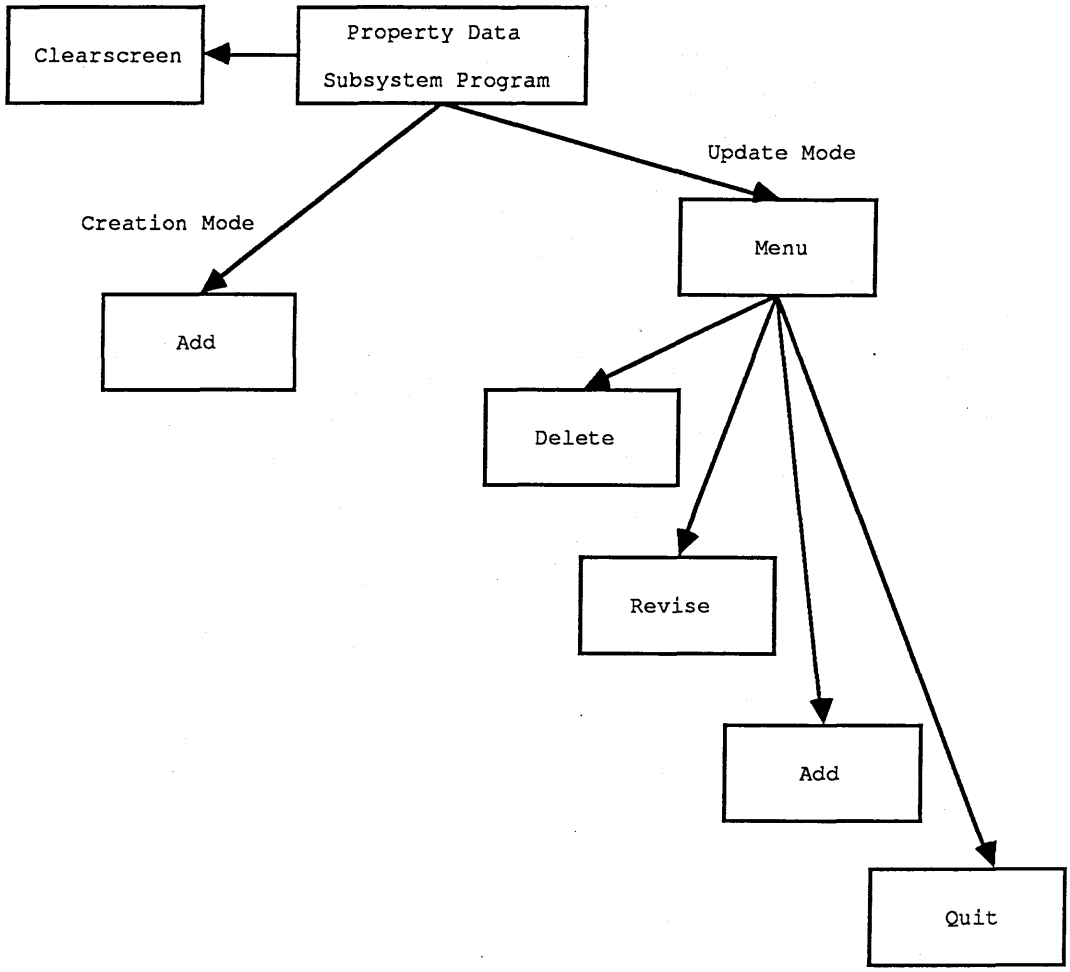


Figure 8.2.

Structure Chart for Property Data Subsystem Program.

in the disc directory. In the 'create' mode, any previous versions of the files will be destroyed. The program will terminate with an I/O error massage if either file is not available for the 'update' mode.

The create mode allows the user only to 'add', records to the new file. The 'add' operation begins with a prompt to the user to type in the relevant data. For these fields the reference number must come first. If the user types a nine-digit number without the check digit, then the program supplies the complete number, e.g.,

Reference number: 111000011

Reference number with check digit: 111000011-3

After the input of the reference number, the program searches the file to make sure it is a new number. If it is not, then an error message appears along with a prompt for a new number:

"This reference number already exists in the file."

Reference number:

After the input of the reference number, the program requires the input of all other fields as already described in section 6.2.

The input packages described in section 7.2 perform validation checks on all input data. In the case of an input error, the user is prompted by the message:

" Invalid input...please try again".

(Note that the program carries out several such checks).

When all the fields have been read, a question appears on the screen:

"Would you like to save details ?"

At this point the user may save the record as it stands by typing a 'Y'. If, on other hand, an error exists in one or more of the fields, the user types an 'N' to abandon the record. Depending on the answer to this question, the program either saves the record and sorts the file again, or throws the record out. After each save, the file must be re-sorted so that the program can check for duplicate reference numbers during the input process. Finally the question then appears on the screen:

'Would you like to make another addition ?'

At this point, the user may either continue to input new records, or end the run of the 'add' operation.

Once the Property Data and Property Transaction Files have been created by running the Property Data Subsystem Program in the 'create' mode, subsequent runs of the program must be in the 'update' mode. The 'update' mode firstly allows the user to insert the current date, which the screen prompts the user to type in. This is input as a single line with the day (integral values from 1..31), month (integral values from 1..12), and year(2 digits in length). Then the update mode offers a menu of four options, all of which are illustrated in figure 8.2. The user may add, revise, or delete a record, or terminate the program. The correct response to the menu is thus an integer from 1 to 4:

'1' : Add a record

'2' : Revise a record

'3' : Delete a record

'4' : Quit.

The 'add' option produces a sequence as already explained in the 'create' mode. The user is not required to input a check digit.

The 'revise' option allows the user to change any field of a record, except the reference number. To identify a record for revision, the user must type the complete reference number (including the check digit).

```
   Reference number: 110099938
   Check digit required
   Reference number: 110099938-9
```

Following this input, the corresponding record appears on the screen, for example:

```
   Reference number: 110099938-9
   1) Address1:     xxxxxxxxx up to 25 characters.
      Address2:     xxxxxxxxx up to 20 characters.
      Address3:     xxxxx up to 7 characters
   2) Property Type: House
      House Type:    Detached
      Garden:        Small
      garage:        Single
   3) ......:        ......
   4)
   :
   :
25) Property Status: Vacant
```

The user then identifies the item for revision by typing '1', '2', '3', ..., or '25':

```
    Which item would you like to revise ?
```

1, 2, 3, 4, ... 25, or Q to Quit

A prompt then appears for the new value of the field:

Property type:

Typing a 'Q' (to quit) in response to the revise menu results in termination of the revision dialogue and an echo of the new version of the record is displayed. Then a question is displayed:

"Is it OK to save the new record ?"

Thus, the user may either save the revised version or keep the old version. If the revision is saved, the old version is lost. The question then appears on the screen:

"Would you like to make another revision ?"

At this point, the user may either continue to revise another record or end the run of the revision operation.

The 'delete' option requires a check digit for identification of the target record. The rationale for this is that whenever an existing record may be deleted, the check digit is required as added insurance that the correct record is found. This option echoes the record and asks:

"Delete this record ?"

This allows the user to change his mind. An answer of 'Y' deletes the record; an 'N' keeps the record in place. The question then appears on the screen:

"Would you like to make another deletion ?"

At this point, the user may either continue to delete records or end the run of the 'delete' operation.

Finally, the question appears on the screen:

"Would you like to make another enquiry ?"

At this point, the user may continue to add, delete, or revise records, or else end the run of the program.

Each time records are added or deleted, the file must be re-sorted, in ascending order, using the reference numbers as the key. Furthermore, each time it is required to access a record in the 'Property Data' file, there will first have to be a search for its reference number in the file, and its position (stored in the file) established, in order to locate the record in the 'Property Data' file. The sort and search packages described in section 8.2.2, are used to perform these functions.

Both modes create tables from data stored in the files. In the 'create' mode, two tables are created, under the headings of the fields of the property transaction type, as explained above. The first table shows the unsorted transaction records as they were read in, and the second the sorted Transaction File.

In the 'update' mode, five tables are created as listed below.

1. The first shows the Property Transaction File as it was read in (under the headings as described above).

2. The second is a list of vacant properties that were found to be ready for let. This list of properties will be matched with the list of applicants ccording to the priority determined by the Allocation & Waiting List subsystem program (discussed in the next section) to provide offer letters.

3. The third produces information related to the Repair Maintenance subsystem.

4. The fourth produces information related to the Rent Accounting Subsystem.

5. The fifth shows the updated Property Data File.

8.3.2. Allocation & Waiting List Subsystem Programs

Two programs are described in this section, the Allocation & Waiting List Program, and the Offer Program.

1. Allocation & Waiting List Program.

Figure 8.3 illustrates the structural division of the Allocation & Waiting List Program. To obtain the entire listing of this program see section 7.4.

This program like the Property Data Subsystem Program, has two modes of operation, a 'create' mode and an 'update' mode. The user chooses the mode at the beginning of the program run by typing a 'C' or 'U' on the terminal, C(reate) or U(pdate). The two files created, or updated, by this program are called 'Waiting List' and 'Applicant' in the disc directory. In the 'create' mode, any previous version of both files will be destroyed. The program will terminate with an I/O error massage unless both files are available for the 'update' mode.

The 'create' mode allows the user only to 'add' records to the new file. The operations are similar to those described in the Data

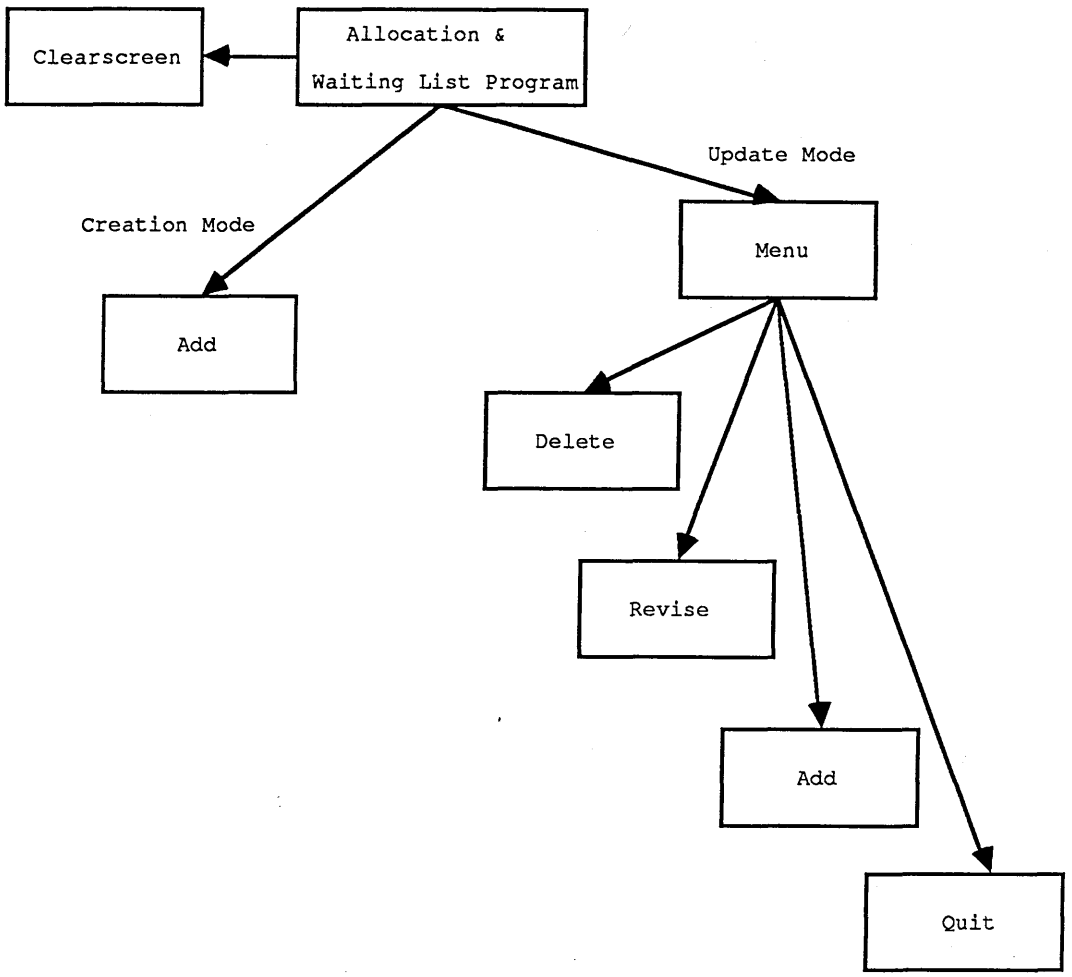


Figure 8.3

Structure Chart for Allocation & Waiting List Program.

Property Subsystem Program. However, the 'add' operation begins with a prompt to the user to type in the appropriate data for each field of the record, except the reference number which will be created automatically by the program using the 'Create Number' package described in section 8.2.1, followed by the other fields. (For the individual length of each of these fields see section 6.3). The input procedure packages described in section 7.2.1 perform validation checks on all input data. In the case of an input error, the user is promoted by the message:

"Invalid input...Please try again".

Once the Waiting List and Applicant files have been created, subsequent runs of the program must be in the 'update' mode. The current date is input, as explained in the 'update' mode of the Data Property Subsystem Program. The 'update' mode offers a menu of four options, all of which are illustrated in figure 8.3. The user may add, revise, or delete a record, or terminate the program. The correct response to the menu is an integer from 1 to 4:

'1' : Add a record

'2' : Revise a record

'3' : Delete a record

'4' : Quit

The other procedures are similar to those explained in the Property Data Subsystem Program.

This mode also performs the calculation of points in order to establish priorities. One of the more tedious tasks in any Local

Housing Management Department is the calculation of points in order to establish priorities. This mode provides a mechanism for the automatic calculation of points system information, which is then passed to the Offer Program. This program matches priorities, applicants, and properties, and produces standard letters of offer. In order to calculate the points, the mode begins by prompting the user to input the current date. From this date the mode calculates the lengths of time that applicants have been on the waiting list. It also takes account of other factors. Details are given in section 5.3.1. This calculation uses the package described in section 8.2.1 and the result is displayed in the screen. During the update process further errors may be detected as reconciliation failures, such as an attempt to delete or revise an application whose reference number does not exist on the Waiting List File. The program then displays an error message similar to that described for the Property Data Subsystem Program. This means that each time 'add', 'delete', or 'revise', options are used, the files must be updated. Each time records are added or deleted, the file must be resorted using the reference numbers as the key. The sorting & searching packages described in section 8.2.1 are used to perform these functions.

Both modes create tables from data stored in the files. In the 'create' mode, one table is created. This table shows for each applicant the applicant reference number, followed by the other fields, as described in the previous section.

In the 'update' mode, the output is in the form of three tables as listed below.

1. The first shows the Applicant Transaction File as it was read in.

2. The second is a list of applicants with the total points allocated to each, together with a matching list of vacant properties, as described previously in the property data Subsystem Program.

3. The last describes the updated Waiting List File.

2. Offer Program.

Two files pass information to this program. First, the Points System File of the Allocation & Waiting List Program provides information on applicants' total points, the total number of people who need to be rehoused along with each applicant, and the applicants' requirements and preferences. Second, the Vacant Properties File of the Property Data Subsystem Program supplies a complete description of the vacant properties that are ready for let (i.e. type, size, rent, rates, and other characteristics). These two files (Points System and Vacant Properties) are the first to be sorted. The sort methods described in section 8.2.2 are used. The Points System File is sorted, in descending order, according to the total number of points determined for each applicant. This is necessary to enable the program to check for the applicant who has the highest points in order to enable matching between vacant properties and applicants.The matches are displayed so that the final decision to make an offer can be left to an authorised user. The program then automatically produces a standard offer letter

containing information regarding the applicant and the property on offer.

The program is designed in such a way that it automatically finds the appropriate size of accommodation for the number of people to be rehoused with the applicant. In order to make a match, the program begins by prompting the user to input the current date as described in the 'update' mode of the Property Data Subsystem Program. From this date the program calculates the ages of members of the household. Together with these ages, their sex and marital status, it determines the suitable size of property, taking full account of social considerations. To obtain the entire listing of this program see section 7.4.

This program produces tables, in which a single line represents each record of the file. The file contains fields selected fields from the input described above. The first table contains details of the letters that are to be posted to each applicant who is to receive an offer. This letter gives details of the property on offer and of the applicant. The form of the letter printed out can be changed by a simple modification of the program. If the offer is accepted, then more information will be produced and will be passed automatically to the Tenant File and subsequently passed automatically to the Accounting and Repair & Maintenance Subsystems.

8.3.4. Rent Accounting Subsystem Program.

Figure 8.4 illustrates the structural division of the Rent Accounting Subsystem Program. To obtain the entire listing of this

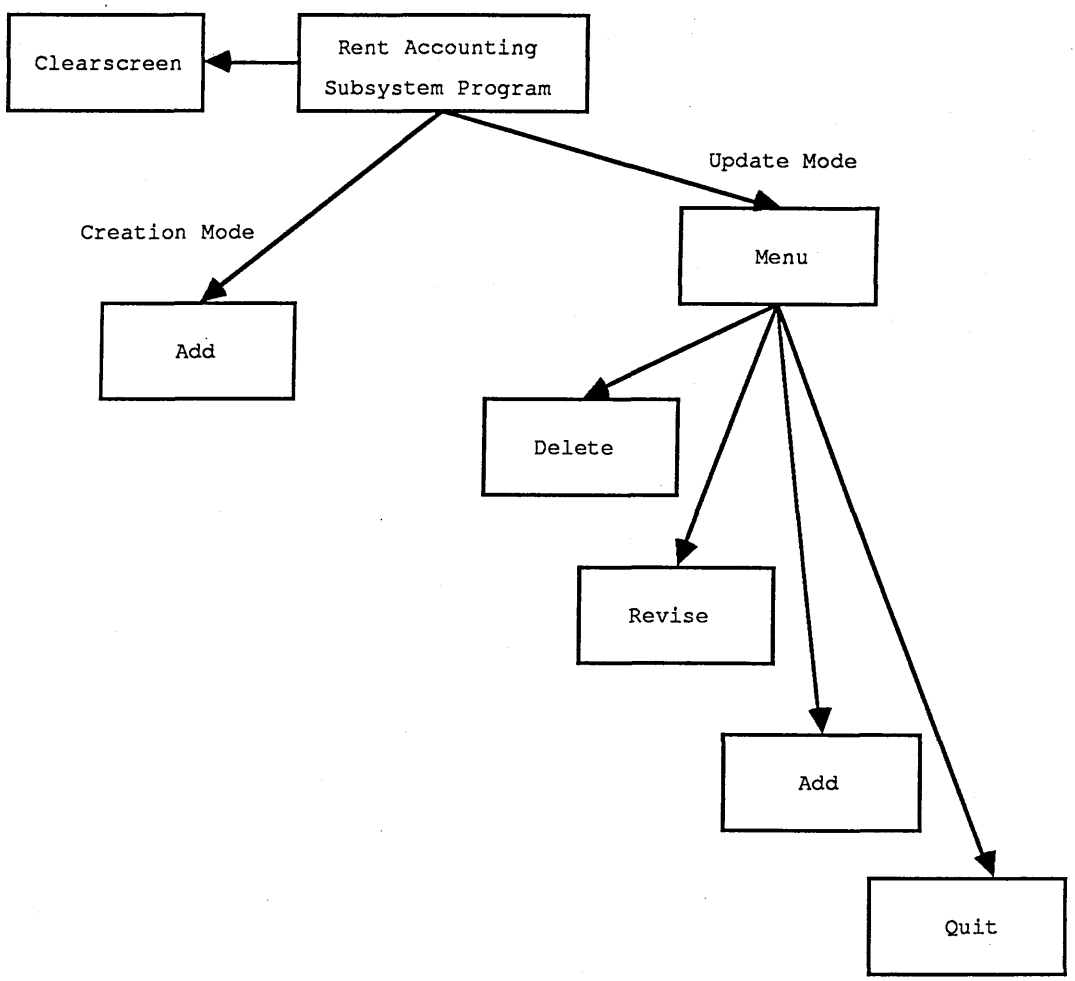


Figure 8.4.

Structure Chart for Rent Accounting Subsystem Program.

program see section 7.4.

The program has two modes of operation, a 'create' mode and an 'update' mode. The user chooses the mode at the beginning of the program run by typing a 'C' or 'U' on the terminal, C(reate) or U(pdate). The two files created or updated by this program are called 'Rent Transaction' and 'Rent Accounting' in the directory. In the 'create' mode, any previous versions of the files will be destroyed.

The 'create' mode allows the user only to 'add' records to the new file.

The operations are similar to those described in the Data Property Subsystem Program. For the length of each of these fields see section 6.5. The input packages developed in section 8.2.1 perform validation checks on all input data. In the case of an error, the user is prompted by the message:

"Invalid input...Please try again".

Once the Rent Accounting and Rent Transaction Files have been created by running the Rent Accounting Subsystem Program in the 'create' mode, subsequent runs of the program must be in the 'update' mode. The 'update' mode allows the user to input the current date as described in the 'update' mode of the Property Data Subsystem Program, which the VDU prompts the user to type in. Also, the 'update' mode offers menu of four options, all of which are illustrated in figure 8.4. The user may add, revise, or delete a record, or terminate the program. The correct response to the menu

is thus an integer from 1 to 4:

'1' : Add a record

'2' : Revise a record

'3' : Delete a record

'4' : Quit.

In addition data passed automatically from the Property Data Subsystem Program, and also the other data which passed from the Tenant File are also input to this mode. This mode performs three interrelated functions namely, rent account (collections and calculations), rent arrears, and rent & rate rebates. Subsequently, it provides a continuously updated statement of the account. These functions are among the most tedious tasks in any Local Housing Management department, because of the large amount of routine work necessary. This mode also controls the collection and calculation of rents, and it embraces all methods of cash receipting and rent collection by computer, as described in section 5.3.2. In order to perform such functions, the mode begins by prompting the user to input the current date. From this date the mode automatically displays to the authorised user as soon as a rent payment becomes due, and a standard letter to the tenant involved is produced.

The mode also provides a mechanism for the automatic calculation of rent and rate rebates information. Also, once a calculation has been completed and a start date given, any necessary adjustment will automatically be made to the tenant's rent account and a letter will be produced. All aspects of calculating rent & rate rebates can be easily amended by simple modification of the

program, i.e. the program is designed to meet all the government's requirements and can cope with new legislation.Subsequently, standard letters are produced where cases are due for review.

Both modes create tables from the data stored in the files. In the 'create' mode two tables are produced under headings of fields similar to those used in the Rent Transaction file as described above. The first table shows the unsorted transaction records, as they were read in, and the second shows the sorted transaction file.

In the 'update' mode, five tables are produced, as listed below.

1. The first shows the Rent Transaction file as it was read in.

2. The second shows information relating to the Repairs & Maintenance Subsystem.

3. The third shows the updated Rent Accounting file.

4. The fourth contains the form of letters that are to be mailed to each tenant whose rent is overdue. There are three types of such arrears letters. Each letter shows the current financial position together with the recovery actions which will be taken.

5. The fifth contains the set of standard letters that are to be mailed to tenants receiving rent & rate rebates, where the cases are due for review.

8.3.5. Repair & Maintenance Subsystem Program.

Figure 8.5 illustrates the structural division of the Repair & Maintenance Subsystem Program. To obtain the entire listing of the program see section 7.4.

The program has two modes of operation, a 'create' mode and an 'update' mode. The user chooses the mode at the beginning of the program run by typing a 'C' or 'U' on the terminal, C(reate) or U(pdate). The two files created or updated by this program are called 'Repair Transaction' and 'Repair & Maintenance' in the directory.

The 'create' mode allows the user only to 'add' records to the new file.

The operations are similar to those described in the Data Property Subsystem Program. For the length of each of these fields see section 6.6. The input packages developed in section 2.2.1 perform validation checks on all input data. In the case of an error, the user is prompted by the message:

"Invalid input... please try again".

Once the Repair & Maintenance and Repair Transaction files have been created by running the Repair & Maintenance Subsystem Program in the 'create' mode, subsequent runs of the program must be in the 'update' mode. Each time records are added or deleted, the file must be resorted in ascending order using the reference numbers as the key. The sorting and searching package described in section 8.2.1 are used to perform these functions. The 'update' mode allows

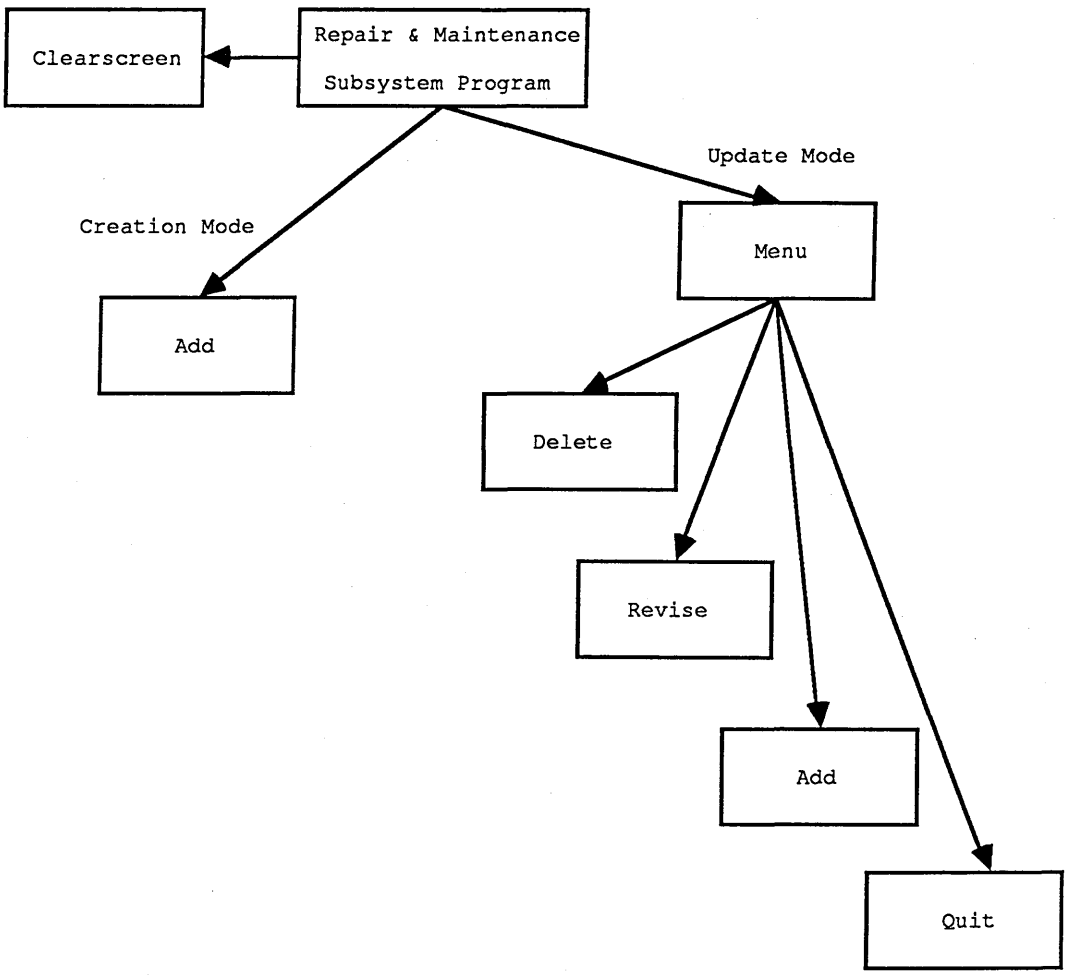


Figure 8.5.

Strucure Chart for Repair & Maintenance Subsystem Program.

the user to input the current date as described in the 'update' mode of the Property Data Subsystem Program, which the VDU prompts the user to type in. Also, the 'update' mode offers menu of four options, all of which are illustrated in figure 8.5. The user may add, revise, delete a record, or terminate the program. The correct response to the menu is thus an integer from 1 to 4:

'1' : Add a record

'2' : Revise a record

'3' : Delete a record

'4' : Quit.

During the update process, further errors may be detected a reconciliation failures, such as when an attempt is made to delete or revise a record whose reference number does not exist on the Repair & Maintenance file. The program then displays an error message similar to those described in the Property Data Subsystem Program.

In addition data passed automatically from the Property Data Subsystem Program and also the other data which passed from the Tenant File are input to this mode. This mode is concerned with two classes of repair: jobbing repairs and the planned maintenance programme. Subsequently, it provides a continuously update status of each and an update statement of the tenants' accounts. This mode controls the progressing of repairs as they are carried out and calculates their cost using the Direct Labour Organisation rate schedule. For details of these functions see section 5.3.3.

The mode also provides a mechanism for the automatic calculation of

the cost of a job. Also, once a calculation has been completed any necessary adjustment will automatically be made to the tenant's rent account and a letter will be produced.

Both modes create tables from the data stored in the files. In the 'create' mode two tables are created under the headings of fields similar to those used in the Repair Transaction file described above. The first table shows the unsorted transaction records, as they were read in, and the second shows the sorted transaction file.

In the 'update' mode, three tables are produced, as listed below:

1. The first shows the Repair Transaction file as it was read in.
2. The second shows information related to the Stores system.
3. The third shows the updated Repairs & Maintenance file.

Also, the system is able to produce several other management reports and letters depending on the authority's requirements. These will be discussed generally in the next section.

8.4. The Printing of Reports.

This system is also able to produce many management and financial reports, depending on the authority's requirements. This means that Local Housing Management must give a precise description of how the final results are to be presented. It has been stressed that design of a housing management system must be based primarily on a clear understanding of output requirements, especially in relation to reports and printed tables. It is up to management to decide what information should be printed. As computers can do the job with great efficiency management can be swamped with a vast amount of information. When information is thus so readily available management is therefore forced to turn its attention to the quality of this information. Tables relating to this question can be found in section 8.3. The most useful management reports list information in order of priority. Reports which contain vast amounts of random information only serve to hinder the decision process. It is therefore necessary, when dealing with computer generated information, for management to be discriminating. A standard routine is used for the printing of every report. It is then more efficient to use that routine each time a report is required than to alter the code for each new report. The printing routine need be recorded only once, although various options, can be adopted, e.g. length of page, and it can then be used for nearly any printing job.

9. System Integrity, Backup and Security.

9.1. Introduction.

So far in the description of an integrated housing management system, the place of the master file within the system, and the use of transaction files and print files have been discussed. This discussion is now extended to take account of the backup and security of those files.

9.2. Backup and Security Files.

Files might be damaged or lost in two different circumstances. These are:

9.2.1. Computer Loss or Failure.

In general the more computer systems come to be depended on, then the more frequently will the loss of information and the loss of processes in course of execution on account of computer failure have to be faced. The integrated circuits, which make up a computer are inherently more reliable than are mechanical devices, i.e. much of the computer's circuitry can give many years of service without failure. However, the input and output devices are still mechanical and, therefore, subject to failure. If one of these mechanical elements, such as a disc drive, fails then information can be instantaneously destroyed. Some of this information may be irretrievable. It is therefore essential that comprehensive backup copies be maintained. This process must be incorporated into the system, if security is to be assured.

9.2.2. Deliberate and Accidental File Deletion.

The creation of backup files, with copies kept away from the computer operations zone, provides protection against the effects of both the deliberate and accidental destruction of files. The use of password security of files provides a method of minimising this problem by ensuring that only authorised users are allowed access to the system. The package described in the next section illustrates the password functions of the system. However, various

levels of password security techniques can be used, such as providing the clear differentiation between the ability to access data and the ability to remove or revise that data. The selection of passwords is also important, and often given little consideration. The survey showed that there is no originality -in any single authority - in the selection of passwords required - in fact, in many cases, the passwords are supplied as part of the system. It should be obvious that security requires that passwords be chosen by the appropriate authorised personal and that they should be known only by these people. It follows that any package which requires anyone other than an authorised user of the files concerned to be involved in the changing of a passwords must be viewed with supervision. In addition, it should be noted that, in many cases, the security of important and confidential files is compromised by the choice of the authorised user of a password which consists of, for example, the first name of his wife or oldest daughter. Passwords must also be changed periodically, especially whenever an authorised user leaves the authority.

9.3. Description of the System Security.

Various levels of security are incorporated into the system. Security is maintained within the system by the use of a password, associated with users' names. In order to change a password another password may be needed to prevent unauthorised access to the system. The security checks incorporate an audit trail of all on-line changes to the program. Normally this information is stored on disc where it is easily accessible and the date of the last revision and the name of the reviser are also recorded. Another check is provided by a report which records any changes made and the name of the person who made the changes.

At the start of the program a prompt is displayed for the input menu of six options. The user may access Property Data, Allocation & Waiting List, Repair & Maintenance, Rent Accounting, Stock control, or terminate the program. The correct response to the menu is an integer from 1 to 6:

'1' : Property Data

'2' : Allocation & Waiting List

'3' : Repair & Maintenance

'4' : Rent Accounting

'5' : Stock Control

'6' : Quit.

The list of the names of the users and the password are also stored on this program and in the interest of security the name of the user and this password must be entered before any success is

allowed to information. The user is first prompted to supply his name and the password. The password does not appear on the screen as the user types it in; instead, a row of

' 's appears, one ' ' for each character of the password:

' '

The user is allowed two attempts to enter the correct (his) name and the password. A welcome message appears if the user is successful:

Welcome to the system

In the case of either or both a user name or a password still being incorrect after two attempts, the program terminates without giving access to the system.

' '

' '

"Sorry wrong attempt!"

"No access granted."

If the correct user name and password are supplied the user is granted access to the system allowing him to conduct an input dialogue to read or alter any file, including the password. Following the input, the new file information is echoed, next the user is allowed to change the password:

"Would you like to change the password?"

If the user answers a 'Y' to the question, and since it would not be desirable for the new password to appear on the screen, some method of verifying the new password is necessary. The method chosen here is to request the user to type the new password twice:

"Please type the new password twice:"

' '

' '

The program checks the two entries to make sure they are the same. If they are, then the new password is recorded. If not, then an error message appears, and the user must type the password twice again:

"Note: these words do not match, please try again."

Then the user has the option of saving the information on the disc or abandoning the entire addition dialogue if anything has gone wrong.

Also, in the interest of security, it might be wiser to maintain more than one password, one for access and one for revision. Only the revision one could be used within the update mode. The password algorithms are incorporated into routines of their own to prevent unnecessary complications in the system as a whole.

10. Conclusion.

10.1 Summary

This thesis is concerned with the use of a computerised system to reduce the clerical and administrative problems encountered by Housing Management organisations.

Chapter 1 contains a review of the historical development leading up to the present organisation of Local Housing Management. This is particularly important in that it does much to explain many apparently illogical practices encountered in present day housing authorities.

Chapter 2 describes the past experience gained by Scottish Local Housing Authorities in the greater or lesser use of computers in housing management. The various types of computer systems currently used and their limitations are also described.

Chapter 3 reviews the possible future use of computers in Local Housing Management system. Alternative systems are considered, together with their consequences as regards partial decentrlasation of housing management operations.

Chapter 4 describes the system currently used by Glasgow District Council. This chapter contains a review of the part of the, Council's organisational structure relevant to local housing management and of the computer systems currently in use. Possible modifications to the existing system are also considered.

Chapter 5 gives an account of the proposed Integrated Local Housing Management System. This chapter contains an overall description of the system, together with a slightly more detailed description of what are considered to be its most important, viz Allocation & Waiting List, Rent Accounting, and Repair & Maintenance subsystems. This probable benefits of adopting the proposed system are also discussed.

Chapter 6 contains a general specification of the proposed system, as well as a more detailed description of the more important data files and subsystems used by it.

Chapter 7 consists of a user specification of the system. It discusses user requirements, the programs required by the system, and how to operate it.

In Chapter 8, a detailed description of the system is given, together with detailed descriptions of the programs and packages used by it. These packages include sort routines developed by the author, which have been proved to be significantly more efficient than those currently used. The printing of reports is also described.

Chapter 9 is concerned with the system security. The maintaining backup files and of implementing an appropriate system of passwords (particularly as regards the modification of programs or files and access to confidential personal data) is stressed. A password system is proposed.

10.2 Innovations Included in the System

As far as the author is aware no other integrated Housing Management computerised system has been developed.

The integrated housing management system meets the needs of both management and community, and at the same time is technically sound. The benefits to be derived are substantial. It is versatile enough to be applied to the several aspects of Housing Management, namely, Allocation & Waiting List, Repair & Maintenance, and Rent Accounting (Rent Accounts, Rent Arrears, and Rent & Rate Rebates). The system can be easily extended to include many other functions of housing management, as explained in section 10.3.

The system reduces time and labour as well as human error, leaving staff free for more demanding tasks. Reduction of costs is only one of the many advantages of the system. Other benefits are that the system uses a modular approach with the result that a local authority can adapt to its own implementation of the housing management integrated system. This enables it to implement the subsystems of its choice.

The survey described in chapter 2 has shown that different authorities use very different computing facilities, so this was an important consideration in the development of the system. The fact that the system is fully integrated would eliminate the problems currently caused by the present practice of local authorities using different computers for different housing management facilities. In some cases the computer used is owned and operated by a different

authorities, and this often results in long turnround times for batch processed input.

Another benefit of the system is its ability to capture, store, and update housing data in one of the integrated housing management subsystems, and then make certain that the same data is available, subject always to the defined security techniques, to the remaining subsystems. The sharing of data is carried out by functions of the central subsystem previously described in section 5.2.

The system, however, differs from most other computerised clerical systems both in the type of difficulties it is dealing with and in the methods it uses to solve these problems. The problem is not one which could be dealt with by an exclusively batch processing system, as is used by many authorities. Instead, it is based on the three operation techniques, real-time, on-line, and batch processing, using interactive processing to maintain the files. Such features distinguish this system from other computerised clerical systems. Remarkably, the system requires a lesser amount of computation than more conventional computing processes, and yet it provides a faster, more reliable and more versatile service than is possible by other means. The system greatly reduces time-consuming, mundane work, and saves memory space, thus leading to easier, quicker and more reliable operation, and to the more efficient control of the operation of housing management. Although it has been clearly shown that many of the clerical and organisational difficulties of housing management functions are eased efficiently by the computerised system, a potential aim for

the system, in the future, must be to develop it to include other functions of the housing management department. This could enable this department to serve other departments' needs as well as its own.

The system described in this work uses only one set of data files, thus removing a major source of some of the problems currently experienced by Local Housing Management organisations - that of different files holding conflicting data relating to the same property. This usually results from the difficulty of ensuring that all relevant files are updated when any change is made. Thus the system allows the Housing Management function to be brought, effectively under central control, while at the same time the use of interactive techniques allows local area offices to access and update data quickly.

A consequence of the ability of such offices to make frequent changes is that file sorting must equally frequently be carried out. Because of this, considerable time was spent on developing the efficient sorting algorithms described in section 8.2.2. These have been shown to be more efficient than the standard packages for sorting available on the Glasgow District Council main-frame.

The system is written in Pascal - a programming language which encourages the writing of structured programs. This feature of the system makes it comparatively easy to alter program segments and subroutines to take account of changes in legislation and Housing Authority policy. It also allows extensions to the system to be carried out easily.

Although Pascal is not yet extensively used in commercial computing environments, it is not difficult to learn, especially for an experienced programmer. It follows that the retraining required to enable existing programmers to maintain and modify the system will not be excessive. In addition Pascal is now extensively used as a teaching language, so it should be comparatively easy to recruit programmers who already have a good knowledge of the language.

As regards the 'front office' staff who would have to use the system, extensive menus are available when required, but these can easily be suppressed by staff who have become familiar with the operation of the system. This means that the time required to train staff in the use of the system will not be excessive.

Although the system is totally integrated, the subsystem which make it up can easily be run independently.

The system incorporates a hierarchy of security to control system modifications, data modification, and the members of staff allowed to access particular items of the data held on file.

10.3 Possible Extensions to Other Housing Authority Functions

1. Right to buy Subsystem

The Housing Act of 1980 gives most authorities' tenants a legal right to buy their houses. In this connection, it is possible to link the integrated housing management system to a subsystem by which management could control progress on applications by tenants to buy their houses.

2. Elderly and Emergency Subsystem.

In recent years, care of the elderly and infirm at home has been assisted by the new technology to provide support. On account of the growing importance of this, the system could be easily extended to include an Elderly and Emergency subsystem to supervise these services.

3. Right to Repair Subsystem.

The Housing and Building Control Act of 1984 (section 28) gives tenants the right to carry out repairs to their properties, and subsequently to recover expenditure incurred. This may be incorporated into the Repair and Maintenance subsystem, allowing management to monitor progress, on confirmation that the tenant has been authorised to undertake work. It could also carry out accounting and correspondence functions.

4. Rent Assessment Subsystem.

The actual methods used by local authorities to determine rent

levels vary from a simple multiplier of Gross Value to highly sophisticated comprehensive points assessment methods. However, whichever method is used, it could be integrated into the Rent Accounting subsystem. This would allow management to control progress in the calculation of fair rents.

5. Former Tenant Subsystem.

The Rent Accounting subsystem could be easily extended to include a system to deal with policies and procedures with respect to former tenants, especially as regards rent arrears. This subsystem would be, in financial terms, a subsystem of Rent Accounting by which management would control progress on credit payments and undertake accounting functions regarding to individual former tenants' rent accounts in the same way as for present tenants. There could also be a link to the Allocation & Waiting List subsystem to allow a search of Former Tenant records when a new housing application is received. The Former Tenant subsystem could also be accessible to the Tenant File, to obtain information on tenant record payments while the applicant was previously a tenant, together with his financial circumstances.

6. Void Control Subsystem.

The control of void properties is an issue related to the size of the authority. The larger the authority then the scale of the problem increases as does the need for computer aid. The computer system, however, cannot directly affect turnround periods, but it can greatly help the monitoring process. However, the computer can record the progress of a property from the termination of a tenancy

to reallocation. There could be links with the Allocation & Waiting List subsystem, as regards reallocation of the properties, with the Repair and Maintenance subsystem for necessary checks of work required, with the Rent Accounting subsystem in connection with rent collection.

7. New Build & Development Subsystem.

This subsystem would allow management to control progress on modernisation and new build schemes. This subsystem could be extended to include the following:

A. Tenants' Grants.

Modernisation may be financed by grants to tenants. This subsystem would provide for internal improvements to such as bathrooms, heating, and kitchens. It would allow management to control progress on applications for tenants' grants and to monitor the work, from establising eligibility for grant, through costing and progress, to completion.

B. House Building.

This would enable the authority to establish the workloads and to obtain a profile of building schemes from concept to completion. By a series of extract reports, it would therefore be possible to highlight delays and overspending.

C. House Conversion.

This often reflects changes in living styles. In recent years the conversion of houses was carried out in order to meet the demand

for larger or smaller houses in areas where there is a shortage of certain sizes of properties. Therefore this subsystem could be used to control progress on the properties to be converted, from concept to termination, including the monitoring of both delays and costs.

D. House Demolition.

This would enable the authority to monitor the progress of demolition and their purpose, whether required by legislation, required to make way for new housing, schools, roads, etc., or where properties become structurally unsound. The system should monitor the work from initial concept to completion and highlight both delays and overspending.

8. Housing Finance Control Subsystem.

The system could be extended to include a variety of more general accounting subsystems, not necessarily connected with Housing Management. These could include such functions as:

1. General Ledger.

2. Management of Capital Income and Expenditure.

3. Control of Mortgages.

4. Budget Control.

10.4. Characteristics of the System.

1. This system requires an adequate number of terminals in each area office, including suitable provision for the teaching of trainees.

2. It requires at least one supervisory terminal, to be used for any supervisory changes to the system. Access from such terminals would be controlled by top security passwords and they would be the only terminals from which passwords and the list of authorised users could be altered.

3. An existing computer installation may be capable of running the proposed system, or it may be necessary to purchase (or rent) a different computer. The system is basically a file handing system, so the CPU capacity required is relatively small. The main requirement is that a relatively large amount of on-line backing store be available. In many cases a mini-computer with a hard disc drive would be adequate. It should be recognised that On-line access time is a major consideration.

4. The system requires approximately 1500Kb of RAM for program storage.The amount of disc store required depends on the number of tenants - disc store of approximately 2-3Kb for each tenant is required. In thecase of Glasgow the system would require four on-line fixed discs torun the whole system efficiently. On the other hand, in small authorities, such as new towns, a suitable mini computer with a single hard disc would probably be sufficient. This means that the cost of suitable hardware would

vary from somewhere in the region of £100 000 in the case of Glasgow down to perhaps £15 000 to smallest authorities. In addition, a remotely located hard disc backup store, costing a few hundred pounds, would be required to provide adequate security for the stored data.

5. Since changes in legislation and changes in housing management policies by the authorities will require modification to the system, the authorities will require some member of staff with a moderate knowledge of Pascal. Since any major changes required by legislation will be common to all authorities, such changes would possibly be most economically carried out by one of the larger authorities or by an outside consultant employed under the auspices of the Council of Scottish Local Authorities, thus distributing the cost among the authorities concerned. Any competent programmer should be in a position to carry out such changes after a short course of training in Pascal. The training of the operators would require considerably less time than that required for the training of a word processor operator.

6. Obviously this proposed system would require changes in work practice, and consultation with the unions concerned will be necessary, preferably from the planning stage. This will be particularly important as regards the changeover period when both old and new systems are working in parallel, since during this temporary period the staff workload will be increased considerably. However, it it suggested that such parallel working in only a few area offices would be sufficient to debug

and validate the system.

7. Another advantage of the system is that it is sufficiently flexible to accommodate changes in administrative and housing policies easily.

8. Because of the sensitive nature of much of the information stored in the data files of the system, particular attention has been paid to security. User access to certain data fields is restricted by the system password hierarchy described by section 9.3.

10.5. Potential Use of the System.

Recent letters in the press have indicated that unreasonable delays occur in the processing of tenants' requests and complaints. The adoption of the proposed system, with its on-line facility, would reduce the time required to process tenants' inquiries to a minimum. In many cases processing time required could well be less than a minute rather than, as sometimes appears to be a case, a week or more.

The amount of staff time Scottish Housing Authorities, in particular Glasgow District Council, put at my disposal in the course of this study indicates a very high level of interest in the proposed system.

Appendix 1

SURVEY OF COMPUTER FACILITES AND USAGE IN HOUSING MANAGEMENT IN SCOTLAND

This appendix gives details of the questionnaire sent to Scottish Local Housing Authorities.

The Questionnaire

Name of Housing Authority

Name and position of person completing the Questionnaire

Name and Tel. No. of contact

---

1. Could you give no. of housing stock under your housing management contorl?

pre war
post war

2. How many people are employed by the housing management department?

3. How many people are using computer?

4. Howmany application forms does your housing department have?

	no
Allocation & waiting list	
Transfer & exchange	
Housing Reabates	
Rent accounting collection method	

5. Do you use any of the followwing methods for repairs & maintance?
also indicte which is computerised? Computerised

☐ jobbing maintainece

☐ planning maintance

☐ other please spicify

6. For jobbing maintenance do you use any of the folling methods for proirity?

methods	lenth of time	charge
emargency		
urgent		
normal		

7. For planning maintenance ,how often?

☐ annually

☐ every 5 years

☐ other, specify

[illegible] to prevent you from accepting any order for transfer from your existing tenants, if he/she has a bad record of arrears?

	Transfer	Exchange
yes	☐	yes ☐
no	☐	no ☐

If yes, please give No. of arrears:

☐ One month

☐ Two months

☐ Other ☐ Specify

9. Do you use any of the following methods for allocations?

☐ Points scheme

☐ Selection (by officers, members, etc.)

☐ Data order scheme (waiting time)

☐ Other: please specify

10. Is there any minimum limit of points to get a house/flat in a specific area? (i.e having enough points for special areas).

yes ☐

no ☐

If yes, please list the points, with areas.

11. Is there more than one waiting list for allocations?

Yes ☐

no ☐

If yes,:

1. How many waiting lists are there?

2. How many applicants in each waiting list?

3. How many times each applicant could appear in those waiting lists?

4. Are waiting lists operated separatly?

yes

no

12. How many choices of area does your department allow for each applicant?

13. How many refusals of area does applicant to your housing department have?

14. What type of Rent Collection methods are used? Also indicate percentage of each?

	Type of Rent Collection	No. of Rents
☐	Door-to-Door	
☐	Bankers Order	
☐	Office	
☐	Giro	
☐	Wage and salary deduction	
☐	DHSS	
☐	Other. Please state which _____ _____ _____	

15. Please indicate the cycle of rent collection.

Weekly
Fortnightly
Monthly
Other, please specify

16. Please give the percentage of your tenants in arrears?

We would like some details about computer facilities in your Housing Management Department

1. Please indicate the systems of activity you have already computerised or are currently developing a computerised system for.

	Already computerised	Date of Establish-ment	Currently Being Developed	Antic live date
A. House Allocations and Waiting Lists				
B. House Maintenance and Repairs				
C. Rent Accounting, Collections and Arrears Control				
D. Rent and Rate Rebates, Allowance (Housing Benefits Scheme)				

E. Other, please state which

2. Are there linkages between different computerised functions (e.g. allocation integrated with maintenance, etc.)?

Yes ☐

No ☐

If yes, state which functions are linked:

If no, how is information passed between different systems (i.e. *Allocation and waiting list
*Maintenance and repairs
*Rent accounting, collection and arrears control
*Housing benefits
*Management information)?

3. What types from the following list of computer facilities your Housing Management computer system use.

	Computer systems				
	Allo-cations and waiting lists	Mainten-ance and repair	Rent account collect-ion & rent arrears control	Housing Benefits	Manage-ment Inform-ation
☐ Have its own computer facility					
☐ Uses a centralised computer within your L.A.					
☐ Use a Region's computer facility					
☐ Private computer service					
☐ Other Please state which _____					

4. How many area offices are under your Housing Management control? Please also indicate how many from these offices use the computer facilities.

	No. of area offices	No. using computer

5. Is the decision taken by the central or area offices for:

Decision	Central	Area Office
A. Allocation and transfer		
B. Maintenance/ Repairs		
C. Rent accounts, collection, and arrears control		
D. Housing benefits.		

6. What types of computer s are used in your Housing Management Department system

	No.
Very large computer (Mainframe)	
Mini computer	
Microcomputer "personal computers" and "desk top computer"	

7. Do you own this computer(s) (i.e. in-house system)?

yes ☐

no ☐

8. Do you rent (lease) this computer(s)?

yes ☐

no ☐

If yes,

1. What type of lease do you have?

☐ Monthly

☐ For one year

☐ For two years

☐ For three years

☐ Other. Please specify _____

2. What is the annual rent and maintenance cost?

£_____

9. Below there is a list of computer information. Could you indicate next to each item which computer of the three categories is represented in your Housing Management Department?

Computer Information	Large Computer (Mainframe)	Mini Computer	Micro Computer (personel computer)
A. What is the Model No.?			
B. Is it: IBM, ICL, DEC, Apple, Honeywell, Univac, Data General, Burroughs, or any other?			
C. What is the size of the processor chip: 8-bit, 16-bit, or other? Please specify (i.e. CPU speed/type)			
D. What is the package cost if any?			
E. How many users can be working at one time?			
F. How much memory is there: 64k, 128k, 256k etc.			
G. What programming languages are included: Basic, PASCAL, COBOL, FORTRAN, etc.			
H. What is the operating system? cp/m, m s/dos, Unix, SOS, etc.			

10. What would you choose in your application systems?

Write & develop your own in-house programme ☐

Software application packages purchased (i.e. computer programmes) ☐

Might choose both ☐

11. Please specify the type of software purchased and what applications it could carry out.

12. What type of data capture devices are used?

A. Punch Card Readers ☐

B. Paper Tape Readers ☐

C. Key to Disk System ☐

D. Key to Diskette System ☐

E. Key to Cassette system ☐

F. Magnetic Ink Readers ☐

G. Optical Readers ☐

H. Other. Please specify.

_____ ☐

_____ ☐

_____ ☐

*If you use a key-to-disk system how many keystations (visual display unit + keyboard) are connected to the main computer (mainframe) in your Housing Management systems?

Main office ☐

Other area offices ☐

13. What type of ouput devices does your computer systems use to produce informa:

Type of Printer	No. of printers	Model No.
A. line printer		
B. Word processor printer		
C. Console type writer		
D. Micro film		
E. Other. Please specify.		
_____		
_____		
_____		

14. What type of computer processing techniques are used in your Housing Management systems?

Processing Technique Used	Housing Management Systems				
	Allocations	Maintenance	Rent Accounting and Arrears Control	Housing Benefits	Others
* Batch processing					
* On-line processing					
* Real-time processing					

15. What types of file organisation are used in your Housing Management systems

File Organisation	Computer systems				
	Allocations	Maintenance	Rent Accounting and Arrears Control	Housing Benefits	Management Information
* Sequential files	☐	☐	☐	☐	☐
* Random files	☐	☐	☐	☐	☐
* Serial files	☐	☐	☐	☐	☐
* Indexed sequential	☐	☐	☐	☐	☐

16. What technique is used to produce programs in your Housing Management system

	Allocations	Maintenance	Rent Accounting and Arrears Control	Housing Benefits	Management Information
* Data flowcharting	☐	☐	☐	☐	☐
* Top-down description	☐	☐	☐	☐	☐
* Others. Please specify	☐	☐	☐	☐	☐
_____					
_____					
_____					
_____					

17. Please give an estimate of your number of staff at your Housing Management Department for:

A. Allocation of waiting list ☐

B. Maintenance & repairs ☐

C. Rent accounting, collection, evaluation & rent arrears control ☐

D. Housing benefits ☐

E. Others ☐

18. Could you indicate the change in your staff levels due to the application of computer:

☐ increased

☐ decreased

☐ no change

19. Could you please give an estimate of the number of your staff:

A. Using the computer with previous experience ☐

B. Using the computer but need more training ☐

in your Housing Management systems.

Computer Staff	No. in each system					TOTAL
	Allocations and waiting lists	Maintenance and repair	Rent Accounting collection & Rent Arrears Control	Housing Benefits	Management Information	
A. Systems managers						
B. Management Managers						
C. System Analyst/ designers						
D. Programmers						
E. Computer Operators						
F. Data entry/ keyboard operator						
G. Librarian/data controller						
H. Interviewing operational staff						
I. Others. Please state which _____						

21. Did your staff receive any training to operate and use the computer?

Yes ☐ No ☐

If yes, could you specify who carried out the training?

☐ Your district council (i.e. in-house)

☐ The agency specialised in computer

☐ Both

22. What is the average of training your staff require?

☐ 1-2 days

☐ 2-3 days

☐ 1 week

☐ 2 weeks

☐ 1 month

☐ More than 1 month

23. What is the current annual cost of the present computer systems facility in your Housing Management Department?

Computer systems depts.	Factors of cost				TOTAL
	Staff	Machine & Equipment	Stationary	Overheads	
A. Allocations system					
B. Maintenance and repair system					
C. Rent Accounting collection and arrears control system					
D. Housing Benefits System					
E. Management Information system					

24. How often are the computer systems updated?

Computer systems

	Allo-cations and waiting lists	Mainten-ance and repair	Rent account collec-tion & rent arrears control	Housing Benefits	Management Information
☐ up-to-date					
☐ daily - give time of day					
☐ weekly, give day of week give time of day					
☐ monthly - give day of the month					
☐ other state which					

25. Please indicate the effect of using computer

- [ ] made an improvement in your housing services
- [ ] made a slight improvement
- [ ] made no change at all
- [ ] made matters worse
- [ ] made disastrous drawbacks

26. What, from the following, might constitute a problem for you in using the computer?

- [ ] capacity and speed of computer
- [ ] size and location of equipment (hardware)
- [ ] risk of unused capacity and economic absolescence
- [ ] maintenance and repairs
- [ ] implementation difficulties within the system
- [ ] reliability/efficiency
- [ ] financial system cost
- [ ] security/confidentiality
- [ ] transport of data between organisation and or area offices
- [ ] software design
- [ ] change in legislations
- [ ] staff utilisation
- [ ] staff attitudes
- [ ] lack of specialised staff

26.
cont'd

☐ inadequate training

☐ other, please specify

27. Are there any future plans that might make a better use of your current computer?

yes ☐ no ☐

If yes, please tick the appropriate boxes of the following

☐ make more integrated system

☐ make a wider decentralisation control

☐ buy more software

☐ buy more equipment (hardware)

☐ customers dealt with

☐ other, please specify

28. Please specify any further functions which your computer would do that it is not current doing.

☐

☐

☐

29. Please write here any other comments you have on

A. the strength of your computer system

1.

2.

3.

4.

5.

B. the weaknesses of your computer system

1.

2.

3.

4.

5.

Appendix 2

Housing Authorities visited in Scotland

District Council	Number of Visits
Glasgow	27
Stirling	10
Edinburgh	3
Dundee	1
Skye & Lochalsh	1
Tweeddale	2
Clydebank	2
Clydesdale	2
Motherwell	2
Strathkelvin	2

Appendix 3

Housing Authorities in Scotland

District Councils

Borders

Berwickshire

Ettrick & Lauderdale

Roxburgh

Tweeddale

Central

Clackmannan

* Falkirk

Stirling

Dumfries and Galloway

Annandale & Eskdale

Nithsdale

Stewartry

Wigtown

Fife

Dumfermline

Kirkcaldy

North East Fife

District Councils (Cont'd)

Strathclyde

Argyll & Bute

Bearsden & Milngavie

Clydebank

Clydesdale

Cumbernauld and Kilsyth

Cumnock and Doune

Cunninghame

Dunbarton

East Kilbride

Eastwood

Glasgow

Hamilton

Inverclyde

* Kilmarnock and Loudon

* Kyle and Carrick

Monklands

Motherwell

* Renfrew

Strathkelvin

Tayside

* Angus

Dundee

Perth and Kinross

Highland

Caithness

Inverness

Lochaber

Nairn

Ross and Cromarty

Skye & Lochalsh

Sutherland

Lothian

* East Lothian

Edinburgh

Midlothian

West Lothian

Islands Councils

Orkney

* Shetland

Western Isles

New Towns

Cumbernauld

East Kilbride

Glenrothes

Irvine

Livingstone

Grampian

Aberdeen

Badenoch & Strathspey

Banff & Buchan

* Moray

*** No response**

Appendix 4

SURVEY OF COMPUTER FACILITES AND USAGE IN HOUSING MANAGEMENT

This appendix gives details of the additional questionnire .

Housing Service Departments

Allocations and Waiting Lists

1. What are the objectives of your Allocations Department?

2. Give a written description of the present activities cycle and procedures of your allocation system.

3. Do you use any of the following methods for allocations?

☐ Points scheme

☐ Selection (by officers, members, etc.)

☐ Data order scheme (waiting time)

☐ Other: please specify

* Could you send a copy of your methods used, together with samples?

4. How many, on average, allocations transactions are received per day? Please indicate number of items in each.

Type of transaction	Number of transactions	No. of items in each
☐ additions		
☐ deletions		
☐ amendments		
☐ offer made		
☐ offer accepted or rejected		
☐ other Please specify		

5. How many, on average, application forms received per day for allocations?

Type of demand	Application Forms			TOTAL
	By Mail	Visiting Office	Others	
* New applications * existing tenants (transfer) * Homeless				

Could you send a copy of your application form completed as a sample?

6. For allocations interviewing: could you tell us -

   * How many applicants meet per day:

   * How much time is spent per applicant:

7. Is there more than one waiting list for allocations?

   Yes ☐

   no ☐

If yes,:

1. How many waiting lists are there?

2. How many applicants in each waiting list?

3. How many times each applicant could appear in those waiting lists?

8. Are there any rules in your allocations department to prevent you from accepting any order for transfer from your existing tenants, if he/she has a bad record of arrears?

yes ☐

no ☐

If yes, please give No. of arrears:

☐ One month

☐ Two months

☐ Other ☐ Specify

9. What sort of computerised reports are produced by the allocations system?

Please list, with copy

10. Please write here any comments you have on:

A. The strength of the allocation computerised system:

B. The weaknesses of the allocation compuerised system:

Maintenance and Repair

1. What are the objectives of your Maintenance and Repair Department?

2. Give a written description of the present activities cycle and procedures of your Maintenance and Repair system.

3. Do you use any of the following methods for repair?

☐ Priority scheme

☐ Data order scheme

☐ Other method. Please state which:

* Could you send a copy of your methods used, together with (sample)?

4. How many on average Repair and Maintenance transactions are received per day, and please indicate number of items in each.

Type of Transaction	No. of transactions	No. of items in each
* New house to be added		
* delete a house (demolition)		
* Maintenance order to be made		
* Other. Please specify.		

5. How many on average repair orders are received per day from your existing tenants?

Repair Order	No.
* By letter	
* By visiting office	
* By telephone	
* Other. Please specify	

* Could you send a copy of your application form for Repairs and Maintenance together with a sample?

6. Are there any rules in your Maintenance and Repair Department which prevent you accepting any order for repairing the house/flat of your existing tenants, if he/she has a bad record in arrears?

yes ☐

no ☐

If yes, give No. of arrears

☐ one month

☐ two months

☐ other. please specify

7. For repairs interviewing and visiting investigations, could you tell us:

For interviewing

1. How many tenants to you meet per day:
2. How much time spent on each:

For visiting

1. How many dwellings do you visit per day:
2. How much time do you spend on each:

8. Are your Maintenance and Repair computer system designed in such a way as to accept a planned reviewing of your council stock for repairing them? (i.e. without any notice or complaints from tenants)

yes ☐

no ☐

If yes, how often?

☐ annually

☐ every 5 years

☐ other. please specify

9. What sort of computerised reports are produced by the Maintenance and Repair computer system? Please list, with copy.

10. Please write here any comments you have on:

A. The Strength of the maintenance and repair computerised system

B. The Weaknesses of the maintenance and repair computerised system

Rent Accounting, Collection and Arrears Control

1. What are the objectives of your Rent Accounting and Arrears Control Department?

2. Give a written description of the present activities cycle and procedures of your Rent Accounting, Collection and Arrears Control system.

3. What type of Rent Collection methods of cash receipting and rent collection by computer are used?

	Type of Rent Collection	No. of Rents
☐	Door-to-Door	
☐	Bankers Order	
☐	Office	
☐	Giro	
☐	Wage and salary deduction	
☐	DHSS	
☐	Other. Please state which _____ _____ _____	

5. How many on average Rent Accounting, collection and arrears control transactions are received per day, and indicate No. of items in each.

Type of transaction	No. of transactions	No. of items in each
* New tenants rent to be added,		
* Rent to be paid		
* Amendments (change methods, of payment, etc.)		
* Others. Please state which. _____ _____ _____		

6. What sort of computerised reports are produced by the Rent Accounting, Collection and Arrears Control system?

Please list with copy

7. Please write here any comments you have on:

A. The strength of the rent accounting, collection and arrears control system:

B. The weaknesses of the rent accounting, collection and arrears control system:

Housing Benefits (Rent and Rate Rebates)

1. What are the objectives of your Rent and Rate Rebates Department?

2. Give a written description of the present activities cycle and procedures of your Rent and Rate Rebates system?

3. Are the Rent and Rate Rebates Amounts deducted directly from the house rent?

yes ☐

no ☐

4. How many on average Rent and Rate Rebate Transactions are received per day, and please indicate the number of items in each.

Type of Transactions	No. of transactions	No. of items in each
* addition		
* deletion		
* amendment		
* others. Please specify.		

5. How many on average application forms received per day for Rent and Rate Rebates?

* Could you please send a copy of your application form with (sample) filled in?

6. How do you compute the Rent and Rate Rebates, together with a (samples) and the operation performed? (Please give a brief description)

7. For Rent and Rate Rebates interviewing, could you tell us:

* How many applicants are met per day:

* How much time is spent per applicant:

8. What sort of computerised reports are produced by the Rent and Rate Rebates computer system?

   Please list with copy

9. Please write here any comments you have on:

A. The Strength of the Housing Benefits system:

B. The Weaknesses of the Housing Benefits system:

Appendix 5

The following are the steps of the check digiting method used.

Suppose the reference number without a check digit is (120000112) The check digit calculation is as follows: Remember that the digits are numbered from right to left, as "least significant" to "most significant".

Position	9	8	7	6	5	4	3	2	1
Digit	1	2	0	0	0	0	1	1	2

1. Starting with the first digit on the right, multiply alternate digits by 2. If the product is greater than or equal to 10 for any given digit except the last, then carry as in regular multiplication. Find the sum of the products and the carries:

Digit	Product	carry
2 * 2 =	4	0
1 * 2 =	2	0
0 * 2 =	0	0
0 * 2 =	0	0
1 * 2 =	2	(no carry for the last digit)
sum =	8 +	0 = 8

2. Find the sum of the remaining digits(i.e., alternate digits starting from the second digit on the right):

   sum = 1 + 0 + 0 + 2 = 3

3. Add the sums from step 1 and 2, and subtract the total from the next higher multiple of 10. The result is the check digit (if the

suns from steps 1 and 2 add up to a multiple of 10, then the check digit is 0):

8 + 3 = 11

20 - 11 = 9

Number with check digit = 120000112-9

Appendix 6

Area Office in Glasgow District Council.

'01' : Anniesland

'02' : Bardowie Street

'03' : Castlemilk

'04' : Drumchapel

'05' : Easterhouse

'06' : Gallowgate

'07' : Mid-East

'08' : Charles Street

'09' : Pollok

'10' : South

'11' : Mosspark

'12' : City North

'13' : Baillieston

'14' : Cambuslang

'15' : Rutherglen

'16' : Maryhill.

Appendix 7

Sub-Area Office by Area Office, Glasgow District Council

'01' - Anniesland

'01' : Mid Knightswood
'02' : North Knightswood
'03' : Garscube
'04' : Netherton
'05' : Anniesland
'06' : Kelvindale
'07' : Jordanhill
'08' : Broomhill
'09' : Temple
'10' : Partick
'11' : Hillhead
'12' : Peterson Park
'13' : Yoker
'14' : Garscadden
'15' : South Knightswood
'16' : Scotstoun
'17' : Whiteinch.

'02' - Bardowie Street

'01' : Milton
'02' : Parkhouse
'03' : Lambhill
'04' : Possilpark
'05' : Hamiltonhill
'06' : Keppoch.

'03' - Castlemilk

'01' : Valley
'02' : Tornusk
'03' : Croftfood
'04' : Glenwood
'05' : Machrie
'06' : Barlie
'07' : Windlaw
'08' : Holmbyre
'09' : Carmunnock
'10' : Dougrie
'11' : Mitchellhill.

'04' - Drumchapel

'01' : Blairdardie
'02' : Kingsridge
'03' : Cleddans
'04' : Langfaulds
'05' : Waverley
'06' : Cairnsmore
'07' : Broadholm
'08' : Pinewood
'09' : Stonedyke.

'05' - Easterhouse

'01' : Bishoploch	'02' : Commonhead
'03' : Lochend	'04' : Rogerfield
'05' : Blairtummock	'06' : Easthall
'07' : Kildermorie	'08' : Provanhall
'09' : Wellhouse	'10' : Queenslie
'11' : Barlanark	'12' : Garthamlock
'13' : Craigend.	

'06' - Gallowgate

'01' : Parkhead	'02' : Lilybank
'03' : Braidfault	'04' : Tollcross
'05' : Shettleston	'06' : Sandyhills
'07' : South Carntyne	'08' : Greenfield
'09' : Carmyle	'10' : Bluevale
'11' : Barrowfield	'12' : Bridgeton
'13' : Dalmarnock	'14' : Carntyne.

'07' - Mid East

'01' : Riddrie	'02' : Haghill
'03' : Springboig	'04' : Townhead
'05' : Ladywell	'06' : Dennistoun
'07' : Duke Street	'08' : Ruchazie
'09' : Cranhill.	

'08' - Charles Street

'01' : Balgrayhill	'02' : East Balornock
'03' : Cowlairs	'04' : Petershill
'05' : Balornock	'06' : Red Road
'07' : Barmulloch	'08' : Springburn
'09' : Sighthill	'10' : Royston
'11' : Germiston	'12' : Craighead.

'09' - Pollok

'01' : Crookston	'02' : Central Pollok
'03' : Corkerhill	'04' : Old Pollok
'05' : Househillwood	'06' : Roughmussel
'07' : North Pollok	'08' : Craigbank
'09' : Priesthill	'10' : Nitshill
'11' : South Nitshill.	

'10' - South

'01' : Pollokshaws	'02' : Carnwadric
'03' : Mansewood	'04' : Hillpark
'05' : Eastwood	'06' : Shawlands
'07' : Cathcart	'08' : Kingspark
'09' : Simshill	'10' : Darnley
'11' : Cessnock	'12' : Kinning Park.

'11' - Mosspark

'01' : Penilee	'02' : Hillington
'03' : Berryknowes	'04' : South Cardonald
'05' : Bellahouston	'06' : Craigton
'07' : Mosspark	'08' : Dumbreck
'09' : Shieldhall	'10' : West Drumoyne
'11' : Langlands	'12' : Drumoyne
'13' : Ibrox	'14' : Govan.

'12' - City North

'01' : Anderston	'02' : Woodside
'03' : Cowcaddens	'04' : Glasgow Cross
'05' : Calton	'06' : Pollokshields
'07' : Gorbals	'08' : Oatlands
'09' : Govanhill	'10' : Crosshill.

'13' - Baillieston

'01' : Baillieston	'02' : Crosshill
'03' : Broomhouse	'04' : West Baillieston.

'14' - Cambuslang

'01' : Eastfield	'02' : Springhall
'03' : Cathkin	'04' : Whitlawburn
'05' : Central Cambuslang	'06' : Circuit
'07' : Westburn	'08' : Overton
'09' : Dechmont	'10' : Lightburn
'11' : Cairns	'12' : Wellshot
'13' : Borgie	'14' : Kirkhill.

'15' - Rutherglen

'01' : Toryglen	'02' : West End
'03' : Farme Cross	'04' : Gallowflat
'05' : Bankhead	'06' : Spittal
'07' : Fernhill	'08' : Blairbeth
'09' : Burnside	'10' : Central Rutherglen.

'16' - Maryhill

'01' : Summerston	'02' : Acre Road
'03' : North Maryhill	'04' : South Maryhill
'05' : Ruchill.	

Appendix 8

Possible Categories of Work with Relevant Response Times

1. Emergencies Repairs - should be dealt with promptly

'101' : burst, or broken tank
'102' : burst, or broken boiler
'103' : burst, or broken radiator
'104' : burst, or broken underground pipe
'105' : burst, or broken pipe
'106' : burst, or broken cistern
'107' : burst, or broken cylinder
'108' : burst, or broken sanitary ware
'109' : gas leak
'110' : dangerous wiring
'111' : roof leak
'112' : dry out occupied house following flood
'113' : choked wc
'114' : board up or reglaze door or groung floor window
'115' : no water supply
'116' : no cooking facilities
'117' : no electricity
'118' : no lights
'119' : gain access to dwelling
'120' : no power at plug points
'121' : taps running full bore
'122' : make lockfast
'123' : no heating
'124' : burst and overflows causing icy conditions externally
'125' : burst and overflows causing serious external flooding
'126' : dangerous chimneys
'127' : dangerous pots
'128' : dangerous cans
'129' : dangerous slates
'130' : dangerous walls
'131' : dangerous buildings
'132' : broken soil pipe.

2. Urgent Repairs - should be dealt with as soon as possible

'201' : leak at tank
'202' : leak at pipe
'203' : leak at boiler
'204' : leak at cylinder
'205' : leak at radiator
'206' : leak at underground pipe
'207' : leak at sanitary ware
'208' : close lights
'209' : kitchen light
'210' : living room light
'211' : stair light
'212' : wc cistern not bursts
'213' : broken waste pipe
'214' : leak at soil pipe
'215' : leak at internal waste pipe
'216' : wc cistern not flushing
'217' : blocked sink
'218' : gutter/fallpipe about to fall
'219' : no water to tank feed taps
'220' : no hot water
'221' : no plug points working
'222' : entrance door not locking
'223' : internal passage door not opening
'224' : broken manhole cover.

3. Normal Repairs - Other Jobbing Repairs

'301' : tank overflow/faulty ball valve
'302' : water hammer
'303' : wc cistern overflow/faulty ball valve
'304' : wc cistern slow fill
'305' : wc cistern not flushing where 2 wc's
'306' : wc cistern poor flush
'307' : stopcock will not turn off
'308' : tap washer
'309' : blocked bath
'310' : blocked wash hand basin
'311' : renew cracked wash hand basin

'312' : renew cracked wc pan
'313' : renew wc seat
'314' : leak at external waste pipe
'315' : leak at gutters/downpipes
'316' : broken glass
'317' : lights renew flex
'318' : lights renew bulb holder
'319' : lights renew shade ring
'320' : faulty light switch
'321' : plug point not working
'322' : storage heater not working
'323' : immersion heater not working
'324' : immersion/tank thermostat faulty
'325' : renew sink
'326' : renew bath or bath panel
'327' : renew wash hand basin
'328' : renew wc pan
'329' : resurface bath
'330' : window - secure loose frame
'331' : window - rain penetration
'332' : window - renew sash cords
'333' : doors - entrance - secure loose frame
'334' : doors - entrance - rain penetration
'335' : doors - door cannot be opened where 2 doors
'336' : doors - faulty locks
'337' : doors - outhouses/shed doors - gain access
'338' : doors - outhouses/shed doors - secure
'339' : stairs - secure handrail
'340' : special features - repair cladding
'341' : garage door will not open
'342' : garage door secure
'343' : replace missing tiles/slates
'344' : fit cowl to chimney
'345' : remedy dampness
'346' : renew/repair fireplace
'347' : repair/renew damper etc
'348' : fit gate post
'349' : repair/rebuild screen walls
'350' : roughcasting repairs
'351' : renew/rebed/regrade paving slabs
'352' : repair steps

'353' : repair/clean out rhones and downpipes
'354' : fit gas cope
'355' : mastic pointing
'356' : renew gulley cover
'357' : repair concrete sills
'358' : renew air vent
'359' : pointing
'360' : repair chimney stack
'361' : sill tiles
'362' : wall tiles
'363' : supply and site pre cast bunkers
'364' : clothes poles
'365' : cleaning out of houses
'366' : uplifting of materials
'367' : delivering of materials
'368' : fencing repair/renewal
'369' : gate repairs
'370' : metal windows
'371' : welding
'372' : graffitti
'373' : rendering
'374' : repair floor tiles
'375' : repair/renew floorboards
'376' : repair cladding
'377' : repair door canopy
'378' : repair sidelight
'379' : TV aerials
'380' : make good decoration after damp proof course repairs
'381' : rotary driers

Appendix 9

The classifications of operations, operational cycle and primary codes.

This bsection details the seven operations that are detailed in the inspection sheets used by the building inspectorate. The operation cycle shown below indicates the seven year cycle operating. The primary codes below are detailed in seven check-lists and represent the components and elements inspected by the building inspectorate.

1. Plumbing & Sanitary Fittings - Inspect General Condition

'11' : bath, wash-hand basin, sink.

'12' : water closet, wc cistern.

'13' : waste pipes, traps, tapes.

'14' : cold water storage tanks, cisterns.

'15' : hot water storage tanks, cisterns.

'16' : roof space (inspect insulation chimney stacks and fire walls) roof timers.

'17' : domestic boiler and fireplaces.

'18' : values and fittings.

2. Mechanical and Special Services - Inspect for Defects

'21' : lifts.

'22' : ventilation systems.

'23' : fire equipment.

'24' : water services (dry and wet rising).

'25' : other services (e.g. aerials)

3. Electric, Gas and Heating Services - Visual Inspections

'31' : electric wiring - check for safety of insulation at meters, G/C lighting flexes.

'32' : electric heaters - chech flexes and G/C.

'33' : gas supply - inspect - intake meters and ventilation.

'34' : gas appliances - check supply and G/C.

4. Fabric Inspection - Inspect for Defects

'41' : windows and sills.

'42' : door units and ironmongery.

'43' : glazing.

'44' : fascia boards.

'45' : rhones and rainwater pipes.

'46' : soil and vent pipes.

'47' : ventilators.

'48' : balustrading.

'49' : special features.

5. Main Structure - Inspect for Defects

'51' : roof coverings.

'52' : rooflightings.

'53' : chimneys and flues.

'54' : gutters.

'55' : sealants and flashings.

'56' : external walls.

'57' : balconies.

'58' : staircases.

'59' : foundations.

6. External Works - Inspect for Defects

'61' : boundary and retaining walls.

'62' : pavings.

'63' : fencing, gates, clothes poles.

'64' : drains and manholes.

'65' : car park, notice boards.

'66' : playgrounds and equipment.

'67' : garages, sheds, workshops.

'68' : landscaped areas.

7. Pre-maintenance Paintwork - Minor Repairs

'71' : glazing.

'72' : removal of defective putty.

'73' : present treatment.

'74' : extent of burning off.

'75' : general condition.

Appendix 10

The Balanced Two-way Merge Sort

Suppose the unsorted keys are in a list. Divide the list into two lists A and B of as near equal length as possible, and make storage space available for two other lists C and D. The method is:

1. The first keys from A and from B are compared and output, in order, on C.

2. The next keys from A and from B are then compared and output, in order, on D.

Steps 1 and 2 are repeated until there remain strings of length 2 on C and D. Now these strings of length 2 are merged to obtain strings of length 4 on A and B.

3. The first keys from C and from D are compared and the smallest is output to A. It is replaced or comparison purposes by the next key from the string it left.

4. The comparison in step 3 is repeated until one string is exhausted, then the reminder of the other string is output to A.

Steps 3 and 4 are repeated until there are strings of length 4 on both A and B. Now these strings are merged to obtain strings of length 8 on C and D, and so on until a sorted list is obtained.

Example.

Starting with keys

18, 23, 02, 50, 42, 63, 20, 28, 33, 03, 47.

Split them into two files A and B

A is 18, 23, 02, 50, 42 B is 63, 20, 28, 33, 03, 47

Merge to obtain strings of length 2 on C and D:

C 18, 63, 02, 28, 03, 42 D 20, 23, 33, 50, 47

Merge to obtain strings of length 4 on A and B:

A 18, 20, 23, 63, 03, 42, 47 B 02, 28, 33, 50

Merge to obtain strings of length 8 on C and D: C 02, 18, 20, 23, 28, 33, 50, 63 D 03, 42, 47

Merge finally to obtain the sorted string

A 02, 03, 18, 20, 23, 28, 33, 42, 47, 50, 63.

Appendix 11

The Natural Two-way Merge Sort

Two lists of approximately equal length are formed, as before. The following operations are then carried out:

1. The first keys from A and from B are compared and the smaller is put in C.

2. The key sent to C is replaced by the next key from the list (A or B) from which it came.

3. Comparison of two keys is continued, sending the smaller to C until it is less than the one sent previously.

4. Now the larger key is sent to C until it also is less than the previous one sent to C. When this happens,the operations 1-4 are repeated, but the keys are sent to list D.

5. The building of an ordered string of keys on C and D is continued until A and B are both exhausted.

6. If there are no strings on D then list C contains the ordered list of keys. Otherwise the names of lists C and A are exchanged, as are those of D and B, and the process is repeated from step 1.

Example.

In the previous example, the first lists A and B are merged onto lists C and D to obtain:

C 18, 23, 63, 03, 42, 47 D 02, 20, 28, 33, 50

Since D is not empty, we repeat the merging process on these two new strings and obtain:

C 02, 18, 20, 23, 28, 33, 50, 63 D 03, 42, 47

D is still not empty so another merging pass is undertaken:

C 02, 03, 18, 20, 23, 28, 33, 42, 47, 50, 63 D empty

The natural two-way merge is finished since D is empty and the sorted list of keys is on C.

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