Accounting for the soldier's pay

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The feasibility study undertaken by the War Office started in 1956. The computer system (I.B.M. 705–II) was ordered in 1958, and operations commenced in purpose-built accommodation in October 1960. This paper, read to The British Computer Society in London in May 1962, gives some details of the Royal Army Pay Corps system and some of the problems that have been met in establishing it.

The reaction of individuals who have not been in the services to the subject of soldiers' pay, might well be a mental picture of a fairly straightforward data-processing application as being quite sufficient to deal with the simple soldier and his "bob a day." On the other hand, those who have been in uniform will know that it is not easy to create a straightforward system to do anything in the army, as there are always contradicting factors to be taken into account and these factors are constantly changing. In addition, the administrative services of the army must anticipate all possible conditions which their arrangements might have to meet, and their plans must be such that they make the smallest possible demand on the resources of a field commander in the first instance, and of course on the army and the taxpayer in general.

The introduction of Automatic Data Processing into the Royal Army Pay Corps was treated as an administrative military operation with the conventional appreciations being made in the first instance. It is of interest, but in no way surprising, to recognize the degree of similarity between this conventional military approach and the thorough feasibility studies completed in the commercial field. Any oversight or wrong assessment of the importance of material factors in either method will lead to an inefficient and possibly unworkable system, and neither government nor commercial management will achieve its object of all-round operational efficiency at the minimum cost.

The general requirements of a system

The most superficial study of the requirements of a system for accounting for the soldier's pay reveals that the simplest area of the problem is the pay; the real problem is the soldier himself. The army has no equivalent in commercial life, for its members need to be mobile both individually and collectively; practically all trades and professions with the exception of those associated with the Stock Exchange need to be included within the organization, and although all this is required in the collective sense, the responsibilities, interests and rights as a citizen and human being of each individual member have to be taken into account. The organization requires homogeneous units or formations to be in predetermined and currently undetermined locations throughout the world. The married men in these units naturally want their families to be with them, and as a result they require married accommodation wherever it

is practicable. They require schools for their children, or the ability to send them to schools in U.K. The married quarters require fuel and light which the army says the individual must pay for. The individuals all require the most modern quarters, but although every effort is made to provide them, there is at present a fairly wide range of standards, and as a result, a wide range of rents. There may not be a quarter waiting for a soldier and his family returning from an overseas station, and it may be necessary for them to go into a specially provided hostel. The charges recovered from families in hostels must vary with the type of accommodation, as this can be anything from accommodation and feeding in a boarding house to a couple of rooms in requisitioned accommodation, with individual cooking for each family. The size of the family will also affect the charges made.

This soldier who goes to a hostel with his family on leaving the plane or the ship on arrival in this country may have to leave them there when he joins his new unit, and it is probable that they will remain in the hostel until a quarter becomes available at the duty station. The soldier's wife has to be provided with money. The soldier could possibly send it to her every Friday through the post, but he may be out on an exercise on Friday, or, although having the best intentions, he may forget to post the money before he does his reconnaissance of the local places of interest on Friday evening. This would result in his wife and children being at the mercy of the butcher if there is to be a joint on the table at the week-end. Such a state of affairs has to be avoided by the provision of alternative monetary arrangements.

It would be possible to enlarge on the multitude of circumstances giving rise to the financial problems associated with every one of the 165,000 soldiers, of the present-day army. In addition to these, the army accounting system has to recognize that every individual will move on the average about every three years. It may be after only a few months, but however long an individual does stay in one place and with one unit, which is itself mobile, this stay cannot be accurately predicted.

This is the problem of the individual and his family. There is also the problem of the organization. Each unit has its operational function; it is usually large and mobile. To retain its mobility it wishes to keep its administration simple and straightforward, and it wishes

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to keep the number of individuals involved in administrative tasks to a minimum. One of the areas where this is quite obviously pertinent is in the payment of troops and accounting for money.

A number of individuals in a unit, or the static supporting services such as the unit quartermaster and barrack services, are involved in functions which can affect the soldier's pocket. Although we have experimented on numerous occasions with cash adjustments for items or services provided, on repayment additional problems are created, and a reversion to putting these items through the soldier's account as credits or charges has usually been the outcome.

It will be recognized from this short background that a basic requirement of any system of accounting for soldiers' pay is that it must be flexible.

The word "pay" in this context includes allowances for wives and in certain circumstances children, travelling, overseas allowances that take into account the varying costs of living, lodgings where barrack accommodation cannot be provided, and of course the standard deductions for National Insurance, Graduated Pensions Contributions, and Income Tax.

### The manual system from which conversion was made

Before describing the current ADP system it might be of advantage to examine briefly the manual system from which we have converted some 180,000 accounts, although the residue following National Service Releases, Regular Discharges and transfers to overseas paymasters for manual maintenance is in the area of 130,000.

The form of input to the system which is created at regimental and headquarters units in the field is illustrated in Fig. 1. This input is sent to the appropriate regimental pay office where a soldier's account consists of five basic forms which are illustrated in Fig. 2 and described below.

Pay history sheet

The history sheet is required because every change of circumstance of a soldier which affects his entitlement requires a number of factors to be taken into account in the determination of his new entitlements as this depends, *inter alia*, upon the following:

(a) Whether he is a regular soldier or a national serviceman.

(b) The period of service for which he is committed. There are different rates for men who have engaged for 3, 6 and 9 years, for men who have completed 9 but less than 15, completed 15 but less than 18, and men with more than 18 years' service. Any former service may need to be taken into account.

(c) The soldier's rank and whether he is fully qualified for that rank.

(d) His trade, and this covers everybody from the inexperienced newly joined apprentice to the highly skilled technologist.
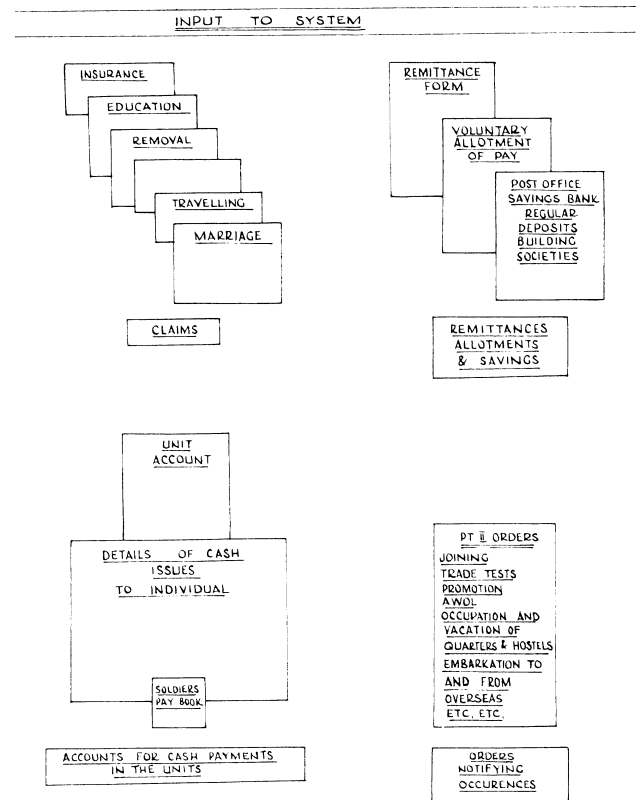
Fig. 1.—Documents created by army units
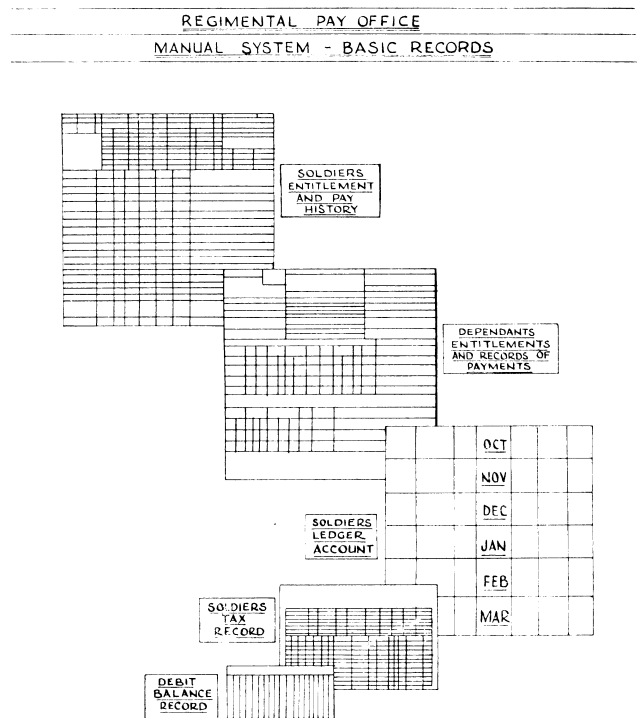
Fig. 2.—Documents maintained for each soldier on the manual system

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(*e*) Any major forfeitures of pay and service for disciplinary and other reasons that he may have suffered.

(*f*) Whether he is married or single, taxable or non-taxable.

(*g*) Whether his family are in a married quarter or not, and whether or not the soldier is able to be living with them.

(*h*) Whether the family is in Germany or elsewhere on the Continent and, if so, the number of children in the family, as an amount equivalent to the National Insurance Family Allowance is paid to the soldier by the army in respect of soldiers' children residing out of the U.K. This in turn is loaded with a varying cost-of-living addition.

(*i*) How long the individual has had his new superfine suit of uniform to which a certain amount of publicity has recently been given. The introduction of this suit creates an additional charge on the soldier for its maintenance and replacement. It has been assessed that the financial effect does not become significant until 3 years after the issue of the new dress, but from a date precisely 3 years after the first issue of this new No. 2 dress a higher rate of clothing allowance will be issued to the individual.

These are the main headings; there are many more. One of the problems is that occurrences, or "casualties" in the army terminology, that give rise to a variation do not necessarily arrive in the correct sequence; casualties 6 months old in time are quite normal, and they are by no means unusual for up to 12 months. Such retro-spective casualties require all variations subsequent to the retrospective item to be taken into account in determining their effect.

The ledger account

The current account card is similar to a bank account. It is credited every month with the entitlement for that month, and this is based on a 4 or 5 week account period. The charges are cash or cheque payments that the man receives in his unit, and odd miscellaneous charges that may arise. The important point is that a running balance is maintained; the soldier is not obliged to draw every penny he is entitled to, and it is surprising what large balances some men are able to accumulate.

Payments to dependents

A simple control is maintained of recurring payments made by army allowance books to wives or dependents. To avoid the soldier having to send money home, when he is separated, the paymaster in association with the soldier determines the weekly amount to be paid, and the paymaster sends an allowance book to the appropriate post office for the payee to collect. The book consists of 52 individual weekly drafts, and the postmaster subsequently cashes a draft each week. The amounts paid to wives vary with the soldier's rank, the allotment
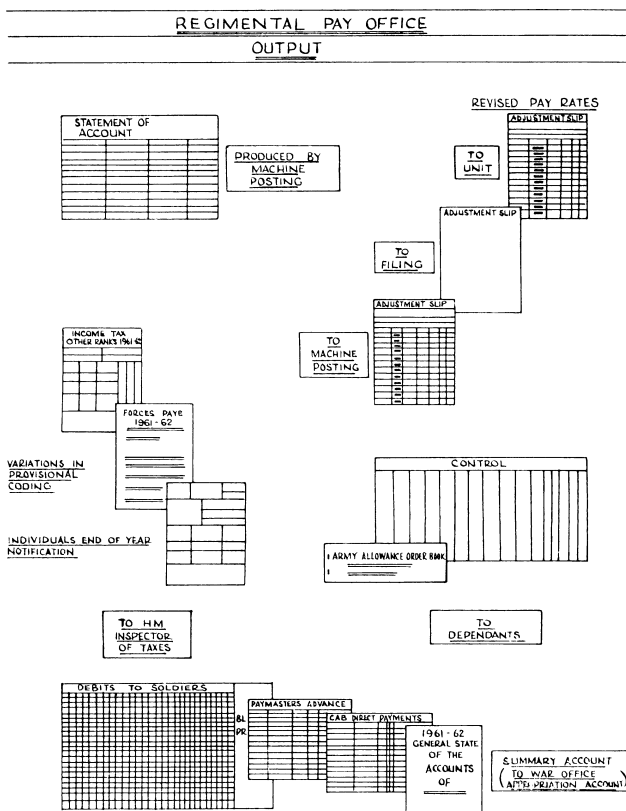

Fig. 3.—**Examples of output of manual system**

he is prepared to make, and whether or not quartering or hostel charges are to be recovered.

There is a requirement for the amount to be varied as the result of certain occurrences such as promotion or change of quarters.

A separate control card is maintained for income tax and graduated pension contribution. Both items cause as much if not more trouble in army accounting as they do in commercial systems.

The other form shown in Fig. 2 is a special control which is required if the man should have an unauthorized overdraft.

The output of the system is illustrated in Fig. 3 and consists of the following:

(*a*) A quarterly statement of account sent to the individual soldier's unit.

(*b*) A notification of the soldier's net weekly entitle-ment.

(*c*) Any army allowance books that may be required.

(*d*) A comprehensive account of all sums credited and charged to the individual accounts spread over a fairly large number of headings and sub-headings. The content of the account forms part of the Army Appropriation Account submitted to Parliament.

A simple example of the reaction to an elementary casualty like promotion to sergeant is as follows.

(*a*) Changes in the history sheet and the assessment of

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the revised weekly rates of pay, etc., income tax deductions, and graduated pensions contributions.

(*b*) A credit to the current account.

(*c*) A change in the rate of payment (in issue) to his wife if payment is being made by army allowance book.

(*d*) An adjustment of the tax already charged, and possibly

(*e*) The subsequent clearance of a debit balance, if the publication of the advancement is belated, where the unit has authorized increased cash issues from the actual date of promotion.

All the basic accounting forms are affected, and a notification to the unit of the revised rates of pay and allowances and the tax offset, and the substitution of the book in issue to the wife are necessary.

Policy requirements within ADP system

This brief description of the manual system provides an outline of the requirement of the ADP system, but there are certain additional basic policy requirements that have to be met and these were specified at the time of the feasibility study. These were, and continue to be:

(*a*) the system must be capable of operation both in peace and war;

(*b*) it must be capable of meeting the needs of mobilization and rapid expansion;

(*c*) the expansion on mobilization must not call for any large increase in equipment or technicians;

(*d*) it must be able to satisfy, in a form understandable by the individual soldier, all reasonable demands for information;

(*e*) it must make provision for security of records against the threat of nuclear warfare, and for the creation of any duplicate records considered necessary;

(*f*) the requirements of public audit must be met;

(*g*) the system must be more economical either in cost or manpower than the existing system.

Description of the ADP system

Input from army units and other sources

The input illustrated in Fig. 1 has not been disturbed. It is not intended to imply that no change has been necessary, but that it was recognized in the early stages that conversion of some 180,000 accounts had to be spread over at least 15 months, and that during this period both the manual and ADP systems would be operating in the army. An O & M exercise was therefore undertaken to redesign forms that would be suitable for both systems, and these were introduced before the conversion of accounts started.

Action in the regimental pay offices

In addition to the maintenance of soldiers' accounts, regimental pay offices, which are linked to their particular corps or regiments, maintain a number of other functions for their particular arms of the service, and these continue

outside of the ADP system being described. Furthermore, during conversion, which took some six months for each office, when training, form completion, punching, and backlog processing were undertaken, it was necessary to continue to maintain the manual system. It was therefore decided that no significant disturbance or difficulty would arise if input forms followed their normal course and were sent to the regimental pay office. This procedure provided certain other advantages which are discussed under "Output" below.

The prime responsibility of the regimental pay office for input received from units, dependents, etc., is to convert it into suitable punched cards for processing by the system. Before this is done the input is clerically checked to establish its accuracy and adequacy, so far as can be established without reference to any other document; it is coded and then passed to punch operators for the preparation of the appropriate card—or cards, since certain operations require more than one card.

Control totals are established from any financial amounts on the input, or where these do not exist hash totals are created from input serial numbers or other suitable data. These control totals are entered in a control account which is sent separately, but at the same time as the punched cards, to the computer centre.

Special boxes with padlocks have been made for the punched cards and these are despatched through the post, or by special parcel delivery by rail, and arrangements made for their collection at Winchester station (the computer centre is 4 miles north of Winchester). Despatch and receipt are carefully controlled as the contents of each box are fitted into a daily schedule which is directly linked to the clearance of resultant output.

Action at computer centre

On receipt of the punched cards they are tabulated on conventional punched-card machines, the totals are agreed with the control accounts, and the information is sorted into the same sequence as on the master tapes containing the soldiers' account, namely the first five alpha characters of the surname, and the army number of eight digits. Any disagreement in control accounts is corrected, if possible by telephone, or by a following retabulation of sub-batches.

The next step is to convert the sorted cards to magnetic tape as an off-line operation, and on completion, the activity reported to the regimental paymaster by the units is ready for computer processing.

Edit run

The first programmed operation is the edit run which checks the punching of the card and any interrelated data. It merges into the output tape any new accounts which have been through the conversion procedure and have been checked and agreed by the regimental paymaster. It sorts casualties, if there are more than one for each soldier, into the sequence in which they will be processed by the program on the next run, and notates

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the casualty with the address of any program routine which is held on the magnetic drum on the next run.

The tape set-up for this run is:

Input 1 Casualties 2 Sequence 3 Transfers- 4 Program
                              change   in
         5 Spare
Output 1 Edited   2 Rejects—   3 Transfers-in
            casualties   general   still unaccepted
         4 Messages   5 Rejects—
                           particular

On completion the tapes are returned to the tape library for control and setting up of the tape requirements for the next run in the sequence.

Updating run

This run takes the edited casualty tape from the edit run.

The tape set-up is:

Input 1 & 2, Soldiers' master   3 Edited casualties
            files
         4 Program   5 Rate Tables
Output 1 & 2, Soldiers' updated 3 Payment Schedules
            master files
         4 Notification to units   5 Miscellaneous Output
            of amended rates
            pay and error
            schedules

Input tapes

The two masters contain the soldiers' accounts for a single regimental pay office. Some offices requires three masters, but number 1 is replaced by the third master during processing. Each individual account is of variable length, with a current minimum of 375 characters and a permitted maximum of 1,900 characters.

This particular program contains approximately 35,000 instructions, and although full use is made of the core memory of 40,000 characters, and the magnetic drum with a capacity of 60,000 characters, inevitably these are not sufficient and the less frequently used routines have to be called in from a subroutine tape when required. This subroutine tape is loaded in place of the program tape as soon as the program has been read into the machine.

The size and complexity of the program is due to:

(a) the range of activity of individual soldiers, which is reflected in their cash entitlement;

(b) the fact that, with minor exceptions, clerical activity on the accounts has been eliminated, and the program reacts to an occurrence and decides what the effect is on the soldier's pay. An occurrence or casualty is simply, "vacated quarters," "promoted sergeant," or "embarked . . ." and the effective date. The program encompasses the many regulations which govern the particular financial reaction to all casualties. Although it is large and complicated, it is this particular program which has led to the maximum staff saving.

A rate-table tape is needed, as memory capacity cannot be spared for the wide range of pay and allowance rates that are required. These tables cover the present date and the prior 12 months for which the program will accept casualties. The most commonly used rates are held in memory during processing, the intermediate on the drum and the balance on tape. The frequency of reference to the various levels is regularly checked and any reallocation made that is necessary. In this way, processing time of the updating run is kept to a minimum.

Output tapes

The product of the run are two updated master tapes, a tape containing error rejections, and the notifications to units of revised rates of pay, a tape containing payment schedules, and a fifth tape containing miscellaneous output. All but the updated masters contain material for printing.

The error rejections are those casualties which give instructions which when matched with the record prove to be unacceptable or suspect, e.g. a promotion to a rank lower than that already held. These rejections include "no trace" items. Also on this tape are the notifications to the units of the revised entitlement emanating from the casualty.

Payment to soldiers' dependants are treated as a priority item in the system, and for this reason the payment schedule tape is printed, together with the rejection tapes, as soon as possible after completion of the run. Schedules are produced from which clerical staff prepare postal drafts and army allowance books for despatch to the soldiers' wives and relatives. Copies of these schedules, error rejections, and the notification of revised rates are all sent to the regimental paymaster who maintains a file for each individual soldier. It will be recognized that the contents of the file, which include individual authorizations signed by the soldier, and copies of all computer output relating to him, form an up-to-date record of the soldier's pay history, present and previous entitlements, and the balances current when statements are prepared each month. With this available the clerical staff at the regimental pay office are able to answer queries without reference to the magnetic-tape file and, equally important, they could reintroduce a manual accounting system, should it ever be necessary. This simple procedure meets the early criticism and apprehension that existed as to the results of any loss or damage to the Computer Centre or its magnetic-tape records.

Distribution run

A great deal of accounting data and messages indicating further requirements to complete an account or eliminate uncertainties are produced by the update run and placed on the miscellaneous output tape, and this tape is sorted and prepared for the printer on the distribution run. The output tapes contain all the miscellaneous output, accounts, and forms of control that are required of the system.
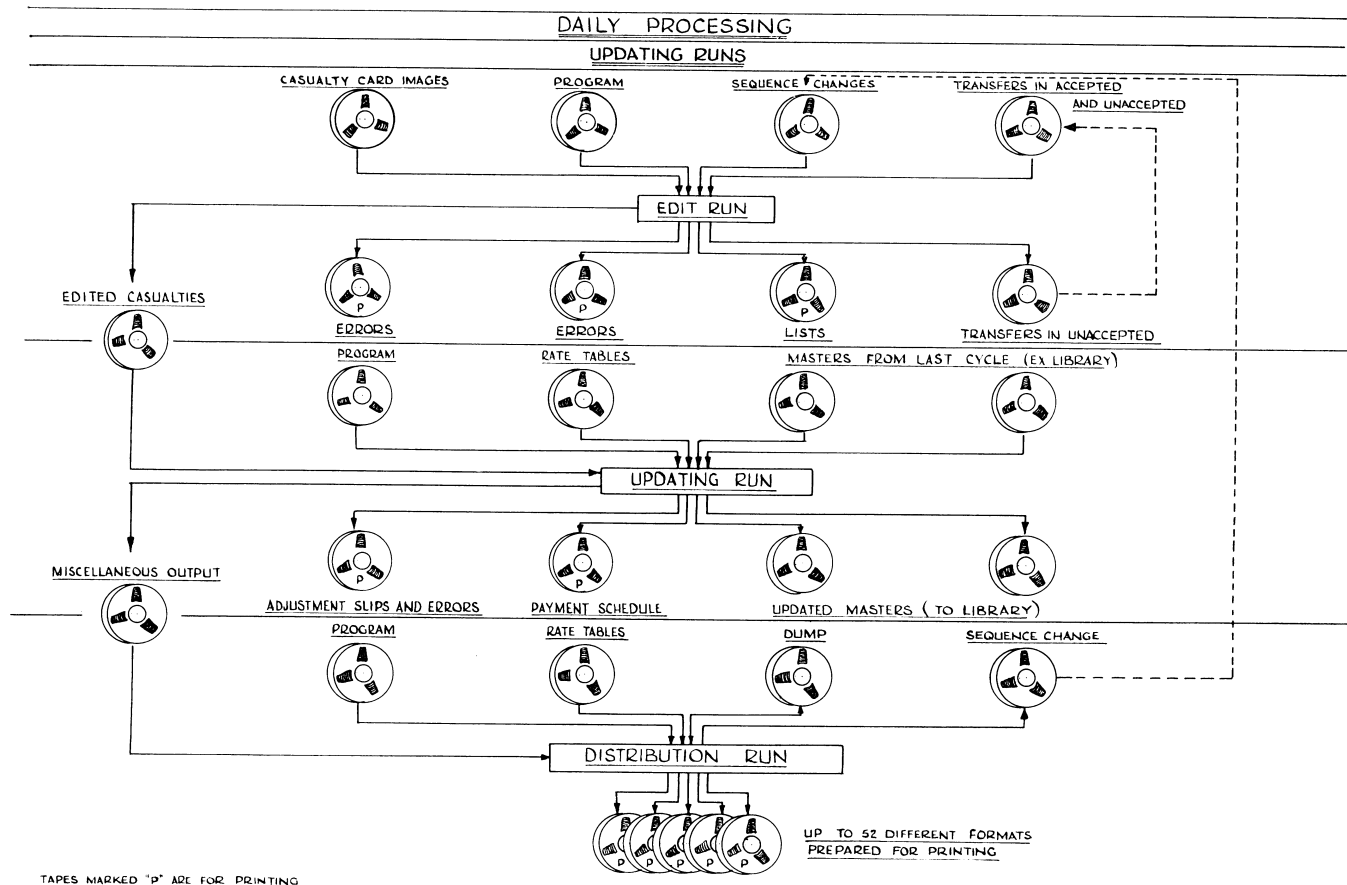
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Fig. 4.—Tape set-up for three interrelated consecutive runs

The tape set-up for this updating operation, which is undertaken three times a week, is illustrated in Fig. 4, and the overall flow of work is shown in Fig. 5.

In addition to this regular schedule there are a large number of regular tasks, involving scrutinies, pruning records, the monthly credit of pay involving credits to the soldiers' accounts and payments to the Post Office Savings Bank, the Building Societies, and the Income Tax Department.

The equipment in use

The machinery in use for 24 hours a day, and until the second IBM 705 computer became operational, for 7 days a week, is

(a) Conventional tabulators and sorters;

(b) 2 × IBM card-to-tape machines;

(c) 2 × IBM 705 Mark II with 40K positions of core memory and a drum of 60K character positions. Each computer has 10 magnetic-tape units on line. The second machine was installed in late August 1962, before the building operations were completed, and it had passed its acceptance tests by the end of the month. The approval for this machine was given considerably less than one year before the building extension was designed and

built and the machine installed. Building started on the first of February and the system was operating 24 hours a day at the beginning of September;

(d) A IBM 1401 system with a 1403 printer operating at up to 600 lines a minute. It is the series "D" configuration and has only a 4K core memory. Its prime function is as a printer, but it is surprising what use that can be made of it as a "slave" to save time on the 705;

(e) A line printer operating at 150 lines a minute; and

(f) A tape-to-card punch.

All work on the 705 is done through the medium of magnetic tape and all peripheral equipment is operated off line, although it can be operated on line if required.

The problems associated with the system

The problems of setting up and operating a system of this nature may be divided into

(a) the precise definition of the system requirement and the selection of the range of equipment required;

(b) programming the system for the machine;
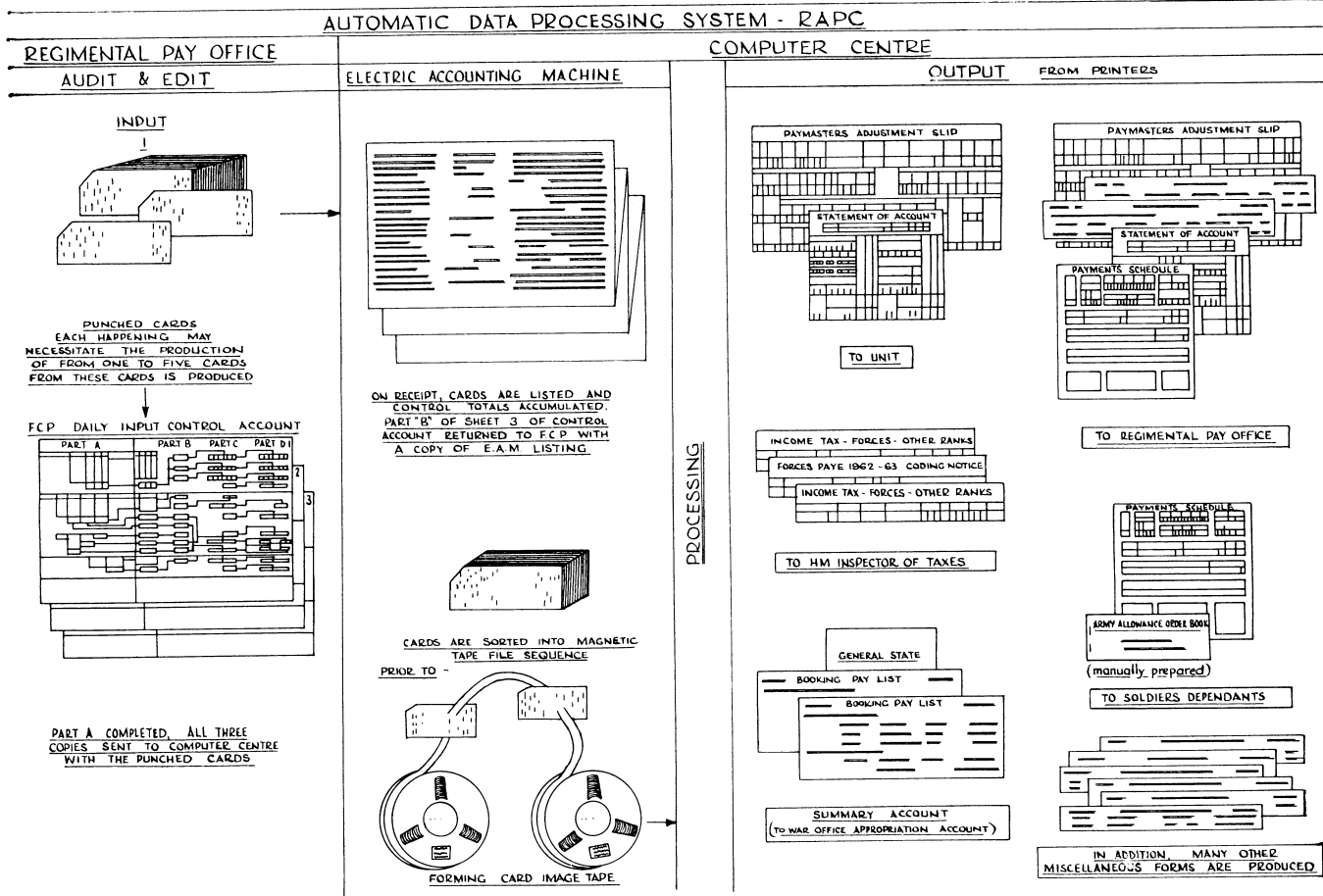
(c) conversion to the ADP system;

Fig. 5.—Illustration of the daily work flow of the system

(*d*) day-to-day operation to ensure a steady flow of work and keeping abreast of those changes in the army as a whole, which directly affect our operations.

Enough has probably been written on the subject of feasibility studies for the time being, and although we carried out ours in 1957 we like to think that we followed the classical approach, but in those days we felt we were evolving it.

Programming the system

A separate paper* has been prepared on the subject of the design and preparation of the programs, and within the limits of this paper it is sufficient to say that programming the application was a problem, and is still not without its trials and tribulations, as seldom a week goes by without a new feature or some change in principle being introduced into the army, and this causes ripples right through our ADP system.

The degree of integration within the system has led to the creation of some quite large programs. They are much larger than we expected when we started into this field, but perhaps we were more than naïve even to express

* See p. 258.

an expectation at that time, as there was no previous ADP experience anywhere in the world on the type of integrated system that we proposed to evolve.

Conversion to the ADP system

Including accounts that we have since transferred out because the men have left the army or gone to the further overseas stations, we have probably converted somewhere in the region of 180,000 accounts, and we seem now to have a conversion system that works.

The initial requirements were standard to all conversions—the transfer of material data from one form, which in our system was basically in pen and ink form, to the magnetic-tape record. The problem was the varying range of data that needed conversion. We finally decided on a series of forms—basically 5 for data common to all accounts and another 13 for the variable areas. The number of forms was determined by the maximum card content, and only one form was allied to a card, but with few exceptions all columns were used.

Accuracy in the completion of these forms was vital, and great trouble was taken in designing the forms to make the clerks' work as straightforward as possible.

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The other requirement was to ensure that the forms were the best possible documents from which to punch. The next question was to decide who was to complete the forms and who to punch the cards. In making the decisions we had to take into account earlier decisions which were:

(*a*) that we required a single cut-off date for a complete regimental pay office—which represents between 8,000 and 14,000 accounts;

(*b*) before disengagement from the manual system the magnetic-tape record for each individual soldier had to be proved to the satisfaction of the regimental paymaster whose accounts were being translated;

(*c*) the period of backlog processing and parallel operation required to be as short as possible in order physically to move the staff who were not required on the ADP system to other work for which they were urgently required, or allow them to be released in the case of National Service men whose periods of service were all drawing to a close;

(*d*) the conversion of the 15 regimental pay offices would be phased over a period of 15 months.

The problems of conversion merit a paper of their own, but perhaps a brief general outline of what we did is of interest.

The clerks in the regimental pay office completed the forms during any spare time and overtime, over a period which started at three months and was reduced for the later offices to three weeks. This period culminated in what we chose to call Conversion day, "C" day, which was in fact a week-end when the forms were finally completed, checked and despatched to the punching agency, a commercial organization with which a contract had been placed.

From this point in time both systems operated within the regimental pay office, but the manual system remained paramount. Editing and card-punching staff had been selected, trained, and placed in position. Casualty cards were then created within the regimental pay office, and sent to the computer centre as if the ADP system were in operation. At the computer centre these cards were controlled as for live batches, but at this stage there were no master accounts to update. From a week after conversion date the punched cards started to come from the agency, and final clearance from the agency took three to four weeks. On receipt of sets of cards at the computer centre they were translated to magnetic tape and edited for any inconsistency which would prevent the formation of a logical account. The paymaster was told of the inconsistencies and he punched and forwarded any correction cards that were required.

When a consistent batch of cards for an account was established a master record was formed for the particular soldier, and a print-out of that record sent to the regimental paymaster for detailed checking against the manual account as it was at conversion date. If he

agreed that it was an accurate record, he fed in an acceptance card, and the magnetic record was moved to an accepted account tape. If he could not accept it the regimental paymaster submitted correction cards, and the print-out procedure was repeated until the magnetic-tape record was correct. With all accounts on the accepted account tape, these now became masters, and the clearance of the backlog of casualties received since conversion date had to be undertaken.

The establishment of the account, clearance of backlog, and the commencement of parallel operation took practically two months for the later offices, but it did take slightly longer in the earlier stages. Our original plan provided three months between conversion and disengagement dates. Although we thought at one stage that we might reduce it to two, the margin for correction would possibly have been too small, and we decided to leave it at three.

Disengagement has no particular major problems. It was very carefully planned, all staff briefed and attention given to every detail. The units were given a record of the soldiers' entitlement at disengagement date, and this was the only indication that they had of conversion having been under way and finally completed. The staff in each regimental pay office expected to become surplus as a result of the introduction of the new system were selected for posting to other pay establishments, and given approximately six months' notice of their move. It will be recognized that this was done before they started to complete the conversion forms. They left their regimental pay offices approximately three weeks after disengagement day.

This early selection of staff who were to leave the regimental pay offices illustrates a very important requirement in the planning within the unit. This was the need for the regimental paymaster to know months before conversion started what his organization was going to look like, what his flow of work would be, and what staff he would require after disengagement had been completed and the new system established.

Scheduling and processing day-to-day operations

In addition to programming and conversion there remain many minor problems although at the time they arise they do not always seem to be minor.

In an organization that has a major application moving forward on a broad front, and that has deadlines to meet and uses such a wide range of expensive machinery, one subject that has to be given a great deal of thought is the daily scheduling of work. It is our principle to create a monthly outline programme some months ahead of the calendar month to which it relates. Some ten days before the month starts a detailed plan is completed, and significant features are circulated to all regimental paymasters for whom we are working. Every day we create a schedule for the forthcoming 24 hours, and very occasionally it is necessary to re-schedule within that period.

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Our focal points are the issue of allowance books for the payment of dependents, and a smooth flow of work to the 705s. It has not yet been possible to establish an even flow to each piece of peripheral equipment, and it is doubtful whether it ever will be.

The two main frames (705) now operate 24 hours a day, 5 days a week. Plant maintenance, as distinct from computer maintenance, is undertaken at week ends. All spare capacity, which varies from day to day, is used for the National Census on behalf of the General Register Office.*

Staff changes and training

Staff changes and the training of replacements is rather more of a problem in a government organization than it might be in a commercial undertaking, as the computer centre is staffed on the understanding that all the military personnel and the civilians of Executive Officer grade and above are normally subject to posting approximately every three years. Within the ADP organization the tour of duty for the staff who require particular training has been increased to four years, and although we have been operational for only just over a year, our original staff who contributed to the planning, programming, and getting the project launched, are already beginning to leave us. Their replacements and the additional staff that we have had join us since the early days have, as a generalization, been trained within the organization of the Royal Army Pay Corps.

Day-to-day program and system amendments

The only other problem of any magnitude, on which I have already touched, is the changes with which we have to cope. The army itself is a very live organization; it is constantly changing its pattern, its requirements, and its internal arrangements.

A large proportion of these changes affect the soldier somehow, and in turn they affect his account, either in monetary terms or the way the various monetary items are controlled or brought to account. These affect the ADP system and the programs. The various changes introduced in April 1962, some of which were confirmed only a few days before they were required to be opera-

tional, led to patches to over seven hundred of our program routines. In addition, an entirely new and large programming run was required at about the same time to meet annual tax requirements, as this was the time that the end-of-year procedure was done for the first time. All of these procedures had to be thoroughly tested, but in spite of a number of difficulties, notifications of the variations to the accounts of approximately 100,000 soldiers serving in this country and throughout Germany were in the hands of the units by the 3rd of April, and the men should have received their revised rates of pay and graduated pensions contribution suitably adjusted by the correct rates of tax for the new financial year, on the first weekly pay day following the increase.

A large proportion of the amendments have to meet deadlines. The pressure felt in meeting these deadlines depends on the size of the problem and the degree to which we have been associated with the early planning. We are usually in the picture on impending developments, but the main problem is that the details of a change usually have to go through a large number of departments who all tend to want to vary the proposals, and by the time they are finalized everybody, apart from the programming staff, is impatient to implement them.

Conclusion

This paper contains only a general outline of the Royal Army Pay Corps' system, the problems and the achievements. In conclusion, it must be said that the present position has been reached only through grim determination and the unselfish loyalty of a first class staff, and this includes everybody, military and civilian, the messengers, the post room staff, the operators, the programmers, and not least our computer suppliers' maintenance engineers. Had the size it would reach and the problems that would arise been realized when this application was first studied five years ago, it is doubtful whether the original working party would have had the courage to make the recommendations that they did—or, possibly more pertinent, whether they would have been accepted. The staff of this unit and everybody associated with the project are nevertheless grateful for the opportunity that was given to them to introduce this new tool of management into a large homogeneous service organization.

Erratum

Mr. A. D. d'Agapeyeff is affiliated to *Computer Analysts and Programmers Limited*, not *Hays Akers and Hays* as stated on p. 172 of the October 1962 issue.