FERRANTI LTD

FERRANTI ATLAS COMPUTER

PROVISIONAL PROPOSALS FOR OPERATOR'S INPUT

AND OUTPUT FOR ATLAS

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This document gives a provisional description of the way
in which it is proposed that communication shall take place
between the Atlas chief operator and the computer. Its purpose
is to give some indication of the intended scope and the implications
of this communication. It must be emphasized that this is only a
provisional description; all comments and suggestions will be
most welcome.

20th December 1961   B.M.M. Hardisty.

A T L A S

Proposed Operators input and output, and related topics

Principles The input and output facilities at the operator's console should enable the chief operator to obtain information about the progress and efficiency of the system, and to control and, if necessary, modify the system – for example in the allocation of program priorities –, and should enable the computer to communicate to the operators such information as is necessary to ensure the smooth running of the system – for example information about perifheral activity, faults etc.

Since some information coming from the computer to the operator is of high priority – since all computation may be held up until some requested action is taken – it is essential that the operator should be able to observe immediately any such information. Therefore, (a) there should be as little delay as possible between the deciding by the supervisor that action should be taken and its communication to the operator, and (b) the output to the operator should be of such an amount and kind that it is not unreasonable to expect the operator to observe, and take action on, any such information. It is therefore desirable (a) to keep the operator's output down to a minimum and yet (b) to ensure that all operator's output is clear, and precise, and adequate.

Similarly it is desirable that operator's input should be clear and precise and at the same time should be as brief as possible so that it may be quickly punched and checked. On the other hand, it must be possible for the operator to initiate any permissible action by the machine – for example, it ought to be possible for the operator to replace completely, or to change substantially, the supervisor system – apart, of course, from the fixed store routines. Accordingly, there must be, at least potentially, great flexibility in the operator's input facilities.

Method It is proposed

(i) that all pieces of operator's input and output information should normally consist of not more than three lines. When no reference to a specific job is made the maximum should be two lines; all job titles should occupy a line to themselves.

(ii) that all action taken by the supervisor in response to an operator request should initiate a piece of output. In this way a check is made that the request has been received and correctly interpreted, and that any necessary action has been taken.

(iii) that any lengthy output requested by the operator (e.g. logging information) should be diverted to one of the normal output channels and that only information as to where this output is to appear should be given on the operator's output channel.

Assumptions

(i) That the operator's output medium is an on-line teleprinter, and operator's input medium is paper tape prepared on a Flexowriter.

(ii) That there may be a separate output medium for a 'magnetic tape operator.'

(iii) That the supervisor keeps a list somewhere, in some form, of all documents and jobs from the time they are read in until they are 'logged.'

Conventions, Headings etc. It is proposed that all operator's input should be preceded by a distinctive heading. This could be either very brief but not explicit or slightly longer and more obviously descriptive. Thus one proposed system of headings for operator input is that they should all begin with the letter X, and should be followed by a second letter to indicate to which group the input belongs, e.g. according as to whether it demands a change to the supervisor (i.e. demands an overall change to the system of operation, whether in the treatment accorded to all programs or to some special or particular program) or whether it simply requests information about some part of the system without essentially altering it. The heading for the print group might be XS, and for the latter XR. Alternatively all operator inputs could simply have a distinctive heading such as 'REQUEST' as 'ORGANISE' etc.

Most operators requests will only be acceptable at the operator's input peripheral. However, in the event of a breakdown of the peripheral or for some other reason, it must be possible for the operator to take over any of the other input peripheral and to tell the supervisor through any of the other peripheral to accept operator inputs either at that or some other peripheral.

Similarly all operators output will normally come out on the on-line teleprinter on the operator's console but, in the event of a breakdown of this equipment or for some other reason it must be possible for the supervisor to take over any of the other output peripherals and to tell the operator somehow that it has done so. Perhaps the only thing to be done in such a case is to use the hooter.

Operator Requests. The following is a possible list of operator requests, together with brief comments on their possible effect and response and an indication of why it thought that they might be necessary. It is assumed that all the requests and the responses will be preceded by a suitable heading. The actual form of words used in the requests and responses is not of course to be taken as definitive, indeed it may be considered best, in the interests of brevity, to use some simple code whether of numbers or letters, rather than plain English; however this sort of detail can be decided at a very late stage in the construction of the supervisor.

I Priorities (XS type)

Request GIVE (xxx) PRIORITY TO JOB
    (Title)

Response (xxx) PRIORITY GIVEN TO JOB
    (Title)

 or (xxx) PRIORITY REQUESTED FOR JOB
    (Title)
    JOB ALREADY COMPLETED; OUTPUT ON CHANNEL(S) X (Y)

 or (xxx) PRIORITY REQUESTED FOR JOB
    (Title)
    TITLE NOT RECOGNIZED

(xxx) may be either TOP, HIGH, NORMAL or LOW

Action In general this request controls the speed with which the system will deal with the specified job, although the actual details are not entirely straightforward. Roughly, the effect is as follows:-

TOP PRIORITY: the specified job is dealt with as soon as possible, any programs currently under execution being suspended if necessary to make room for it. The only limitations on this are that (a) if the specified job needs more tape-decks than are available without unloading tapes of others current jobs, or (b) if all suitable output peripherals are engaged in long sets of output, then the execution of the specified job may be delayed.

HIGH PRIORITY: the specified job is put at the head of the queue of jobs waiting to go on the action list, that is, the program will be transferred to the active list and then exouted as soon as sufficient main store. space etc. becomes available, but no programs will be suspended or output interrupted.

NORMAL PRIORITY: the specified job is given the same priority and treatment as will normally be given to all incoming programs. This request will normally only be used for a job which has previously been explicitly accorded some other priority.

LOW PRIORITY: the specified job is treated as NORMAL until it reaches the execute list, when it will always be put at the bottom of the list. In other words it will find its way to the computing stage in the normal way, but, if it is being time-shared with any other programs it will always be treated as of lower priority than other programs under execution and will only be executed when all others are held up (e.g. by drum or tape transfers).

The response 'JOB NOT RECOGNIZED' might be either due to the fact that the job description document has not yet been read into the machine, or because the job has already been completed and logged and all record of it lost to the machine.

The response 'JOB ALREADY COMPLETED' indicates that the job has already been executed and that the output has started to appear, or has already completely appeared on the specified channel(s).

Note It will be noticed that the request 'TOP PRIORITY' does not give the specified program absolute priority; it may be held up because it needs magnetic tape units or output peripherals which are already occupied. It would be perfectly possible to have an ABSOLUTE PRIORITY category of request which would cause all programs using any required tape-decks or output peripherals to be suspended immediately also, but it is not felt that such a category is desirable or really necessary. For one thing it may cause the interruption of something like a binary tape which would therefore have to be started completely again; for another, the peripherals concerned might be coming free in the very near future anyway and the disruption might be quite unnecessary. In any case most output peripherals (namely the paper-tape punches and the line-printer) have to be disengaged and their output interrupted every 15 minutes of continuous output in order to have their paper re-loaded, and magnetic tapes may take several minutes to unload and re-load. Moreover any estimates on how long the tape units are going to be occupied for depend both on the program running time estimates of the programmers concerned and also on the way in which the various programs currently being executed are being held up either by each other or by peripheral activities, and may thus be very inaccurate. If for any reason the operator does wish to reduce the delay on a TOP PRIORITY job, then this may be achieved by requesting the suspension (II below) of any programs using any of the required peripherals.

II Suspending programs (XS tape)

Request   SUSPEND JOB
            (Title)

Response   JOB SUSPENDED
            (Title)
            (xxx)   (one of alternatives listed below).

Action, general. The specified job is immediately suspended in all its phases; that is, if it is being executed it will be dumped, if its output is appearing this will be interrupted, if it is not yet on the execute list it will be removed completely from the job list, etc. In all cases suitable information is printed on the operator's and the programmer's output to enable the program to be restarted.

Action, details, and responses

(i) If the job input is not yet complete then (xxx) will be INPUT INCOMPLETE DETAILS ON CH. X DUMPED (a)/(b)/(c) and these details should? specify which input documents it is necessary to feed in again, as well as how to recover the job description.

(ii) If the job is completely read in but its compilation or execution not yet started, the (xxx) will be JOB WAITING, DETAILS ON CH. X, DUMPED (a)/(b)/(c)

(iii) If the job is currently under execution and its output not yet begun, it will be dumped, and (xxx) will be JOB IN EXECUTION, DETAILS ON CH. X, DUMPED (a)/(b)/(c)

(iv) If the job is currently under execution and its output has begun, it will be dumped and its output suspended, and (xxx) will be JOB IN EXECUTION, DETAILS ON CH. X, OUTPUT ON CHS. Y,Z, DUMPED (a)/(b)/(c).

(v) If the job has been executed but its output not yet started, then (xxx) will be JOB EXECUTED, DETAILS ON CH. X, DUMPED (a)/(b)/(c).

(vi) If the job has been executed and its output is appearing, then (xxx) will be JOB EXECUTED, DETAILS ON CH. X, OUTPUT ON CHS. Y,Z, DUMPED (a)/(b)/(c)

(vii) If the job has been executed and its output already completed, then no action in suspending it can be taken although, if it has not yet been logged, the supervisor can still recognize its title. In such a case the complete respon... will be   JOB SUSPENSION REQUESTED
                                        (Title)
                                        JOB COMPLETED, OUTPUT ON CHS. X,Y.

        If the supervisor recognizes the job title, then the job must fall into one of the above seven categories.

(viii) If the supervisor does not recognize the job title, the complete response will be
                        JOB SUSPENSION REQUESTED
                        (Title)
                        TITLE NOT RECOGNISED

Note. Because there may be a lengthy delay on the resumption of the specified job, or, indeed, it may never be required to resume it at all, it is proposed that, after the job has been suspended and the information about the action taken printed on the operator's output, all record of the job should be lost to the system - apart from any necessary entry in the log. Accordingly the job may only be resumed by reference to the tape position of the dumped job:-

        Request   RESUME JOB
                       TAPE (a)/(b)/(c)

Note   This last request is identical in effect to a standard 'undump' request made by an ordinary programmer; the only difference is that whereas the latter request is fed in at any of the input peripherals, the former is only acceptable at the operator's input.

III Recording the progress of a job though the system (XR type)

Request   RECORD JOB PROGRESS
           (Title)

Response (immediate) JOB PROGRESS RECORD
              (Title)

followed by a sequence of responses of the form:-
        JOB PROGRESS
        (Title)
        (xxx)

where (xxx) may be JOB WAITING, or JOB IN EXECUTION, or JOB IN EXECUTION OUTPUT
ON CH. X, or JOB EXECUTED, or JOB EXECUTED OUTPUT ON CH. X, or JOB COMPLETED,
OUTPUT ON CH x or JOB SUSPENDED DETAILS ON CH. Y, or Job DUMBED DETAILS ON CH.Y
The qualifier 'OUTPUT ON CH X' will only appear against one of the items, or
may appear on its own, depending on the degree of overlap between execution,
output, and operator's output.

If the title is not recognized then the first, and only, response is
        JOB PROGRESS RECORD REQUESTED
        (Title)
        TITLE NOT RECOGNISED.

Purpose This request is designed primarily for the occasions when a user has
direct access to the machine, or when a long run is being performed, and it
is desirable, for example, to have immediate information if a 'monitor' occurs
or if the computation has otherwise terminated, but it can also be used for
short runs if necessary.

Converse :-

Request   STOP RECORDING JOB PROGRESS
           (Title)

Response   JOB PROGRESS RECORD STOPPED.
           (TITLE)

IV Obtaining information about the activity of the system (XR type)

(i)   Request GIVE STATE OF SYSTEM

        Response STATE OF SYSTEM
                 DETAILS ON CH. X.

Action Prints out on CH X contents of each job list, i.e. Input list, Active
list, Execute list, Output list.

This information is 'staticized' by transferring all the entries and their
states on to a single list as near as possible at one instant of time, and then
picking up the details of each entry when possible from wherever these happen
to be (e.g. on the input system tape). This is so that the state of the
machine will be truly given at one instant of time; otherwise if, for instance,
the job list is scanned, and the details and the state of each job obtained in
order, then, by the time the state of one job has been determined, the state
of the others may have changed, and so a completely false picture of the state
of the system might be obtained.

Note that the separate lists are not mutually exclusive in their entries -
e.g. one job may appear simultaneously in the execute and the output lists

The details which would be given about each entry might simply be the title of the job or might also include details about the priority of the job and the stage reached by the job in passing through the phase (e.g. is execution almost complete, has output started and on which channel? etc.)

(ii) Request GIVE STATE OF JOB
            (Title)

      Response STATE OF JOB
            (Title)
            (xxx)

Action Similar to 'Record Progress', but only one set of output is given, corresponding to the current state of the specified job.   It might also give an estimate of the stage of execution (as in (i) above)

(iii) Request   GIVE STATE OF PERIPHERALS

      Response STATE OF PERIPHERALS
            DETAILS ON CH. X.

Action Gives a list of the jobs on which each of the peripherals (output and magnetic tape) is engaged, together with an estimate of the time for which each will be further thus engaged and, where relevant, information about the 'back-log' of programs which have already been allocated use of each peripheral.

V Removing _____ , peripherals and magnetic tapes from the system (XS type)

(i) Request FREE (PERIPHERAL X)

      Response (delayed) (PERIPHERAL X) FREED

Purpose This request is to tell the supervisor that a certain peripheral is to be unavailable to the system for a considerable period of time (e.g. for routine maintenance) and that therefore no futher jobs should be allocated to it. Normally when an peripheral is disengaged by the operator (or? by the supervisor – e.g. if a fault is detected), the supervisor assumes that this is merely to permit, for example, a new reel of paper to be loaded, and therefore it will soon again be available: so the supervisor continues to allocate jobs to peripherals on the assumption that the one concerned is available.

Action The supervisor will not allocate any further jobs to the specified device, but will not interfere with any job currently using it.   If this device is a magnetic tape unit, and if there are any jobs which have been put on the active list whose execution depends on the availability of that unit, then these programs are temporarily removed from the list.   Similarly, if the device is on output peripheral and there are any jobs on the execute or the output list which cannot be put out until that peripheral is again available, then the jobs are suspended, and, if there are any jobs on the active list which cannot now be completed, they are removed from the list.   If the device is an input peripheral, then the reading in of any current document will be completed first.

(ii) Request STOP AND TRANSFER (PERIPHERAL X)

      Response (PERIPHERAL X) STOPPED AND TRANSFERRED.

<u>Action</u> The use of the specified peripheral is terminated as soon as possible
(for an output device this means at the next 'natural break', e.g. the end of
a card for the card-punch, the next 'long-throw' for a line-printer or paper-
tape output; for a magnetic tape in the middle of a transfer, at the end of
the transfer).   The peripheral is then disengaged and appropriate action
taken to transfer the job to another similar or suitable peripheral (for
example, if the device is a magnetic tape deck, then the supervisor will
request that the tape on it be unloaded and loaded on another deck as soon
as one is vacant; if the device is an output peripheral, then the current output
is transferred).   The device is then removed from the system - i.e. no
further jobs are allocated to it.   If the device is an input peripheral, then
the partial document being read in (if any) is abandoned by the supervisor.

<u>Purpose</u> This request permits a peripheral to become vacant almost immediately
either because there appears to be something wrong with it or because it is
urgently wanted for a high priority job and would otherwise not become
vacant for a long time.

<u>Notes</u> (a) If, as a result of the above request, a job cannot be continued,
then it is suspended, as in group II.

(b) The above specifications assumes that 'natural breaks' occur at frequent
intervals in any output.   This assumption is necessary not only for the above
purpose but also because breaks must perforce be made in output on occasions
when paper or paper-tape runs out.   Accordingly programmers will be encouraged
to put frequent breaks in their output (either in the form of genuine 'break-
point's or in the form of 'long throw' symbols within any long output stream).
In any case, since the line-printer uses paper perforated into pages, it is
in the programmer's interests to arrange his output accordingly.   On receiving
the above request for an output device, the supervisor essentially simulates
a 'paper low' request.   With this, or with a genuine 'paper low' condition, if no
'natural break' is found within the length of paper corresponding to the warning
distance given by the 'low paper' signal, then the supervisor has to break the
output at any arbitrary point (e.g. at the end of any line).

(iii) <u>Request</u> RECONNECT (PERIPHERAL X)

<u>Response</u> (PERIPHERAL X) RECONNECTED

<u>Purpose</u> This is the complement of (i) or (ii). Normally a peripheral will be
assumed to be available whenever its engage button is pressed, but, if a request
(i) or (ii) is made, then it will be treated by the supervisor as if it were
not available until a request (iii) is made.   This, for instance, permits the
use of engineer.'s test programs to check the performance of a serviced peripheral
whilst the rest of the system is being used for normal jobs. Alternatively, the
peripheral can be re-attached to the system by means of a REMOTE/SEMI-REMOTE/
NORMAL allocation (see IX below) or by means of a specific allocation to a
particular program (see · XII below).

VI   <u>Logging information</u> (XS type)

<u>Request</u> GIVE LOG

<u>Response</u> LOG ON CH. X.

<u>Action</u> The logging information (i.e. details of programs run, and cost, etc.
since the last logging information was given) is put out on a suitable output
channel, the internal logging list is cleared and, if it exists, a magnetic tape
logging file is updated.

VII <u>Running test programs</u> (XS type)

   <u>Request</u> CALL IN TEST PROGRAM $(X)/(Y)$

   <u>Response</u> TEST PROGRAM $(X)/(Y)$ CALLED IN

<u>Purpose</u> This enables various engineer's test routines which do not interfere with the otherwise normal running of the system to be used. For example, whenever an output peripheral has been serviced, it is desirable to test it before reconnecting into the system. Thus if test program (X) is a program for testing output peripherals, 'TEST PROGRAM $(X)/(Y)$' will test peripheral (Y).

<u>Action</u> Give program (X) top priority, calling it from drum, magnetic tape if necessary, and obey it as soon as possible.

VIII <u>'Batch Running'</u> (XS type)

(i) <u>Request</u> BATCH RUNNING - (xxx)

     <u>Response</u> (possibly delayed) COMPILER (xxx) AVAILABLE

     Here (xxx) is the name of a compiler (e.g. NEBULA, MERCURY AUTOCODE, etc.)

<u>Purpose</u> This request tells the supervisor that a number of jobs are expected using the specified compiler, and that, therefore, once it has been called in (if it is a 'non-standard' compiler, it may be stored on magnetic tape rather than on drum), it should be kept in main store, if possible, until further notice.

<u>Action</u> No immediate action, but, as soon as a program is encountered which uses the specified compiler, this is brought into the main store part of the supervisor and left there, if possible, until further notice.

(ii) <u>Request</u> END BATCH RUNNING - (xxx)

     <u>Response</u> (possibly delayed) COMPILER (xxx) DELETED FROM MAIN STORE.

<u>Action</u> The supervisor scans through the jobs already read in but not yet compiled to see if any of them use the specified compiler. If not, then the compiler is immediately deleted. Otherwise the compiler is deleted as soon as there are no uncompiled programs in the job list which need it.

<u>Note</u> It is, or should be, possible, in general, to have simultaneous batch running on more than one non-standard compiler at a time. However, this must obviously be subject to the storage requirements of the object programs. Presumably, if there is not room for any particular object program because of the space taken up by any compiler which is not in current use, then this compiler must over-written and called down again when required. In other words, the effect of the 'BATCH RUNNING' request is to give the specified compilor a certain priority in its claim for storage space in the main store, but not an absolute claim.

IX <u>Linking of input and output channels</u> (XS type)

   <u>Requests</u> MAKE PERIPHERALS (xxx)
               INPUT: $X_1, X_2, \ldots X_i$
               OUTPUT: $Y_1, Y_2, \ldots Y_j$

     where (xxx) is either PERMANENTLY REMOTE, REMOTE, SEMI-REMOTE, SEMI-REMOTE A, SEMI-REMOTE B, or NORMAL. $i \geqslant 1$, $j \geqslant 1$.

<u>Or</u> MAKE ALL SEMI-REMOTE PERIPHERALS NORMAL

<u>or</u> MAKE ALL (REMOTE AND SEMI-REMOTE) PERIPHERALS NORMAL.

<u>Response</u>   PERIPHERALS MADE (xxx)
            INPUT: X_1, $X_2 \ldots X_i$
            OUTPUT: Y_1, $Y_2 \ldots Y_j$

<u>Purpose</u> These requests are to enable particular output devices to be associated
with program read in from particular input devices.   With the 'REMOTE' or
'PERMANENTLY REMOTE' specifications, this association is absolute (until
countermanded by a corresponding 'NORMAL' request), i.e. all programs read
in from one of the specified input channels and no others will have their
results put out on the specified output channel(s).   With SEMI-REMOTE, this
association is not absolute, but the supervisor is allowed, under certain
circumstances, to put out output from other programs on the specified channels,
and, if necessary, to put the output of any of the specified programs on output
channels other than those specified; with SEMI-REMOTE A only the first B only
the second.

        This state can be cancelled either by a specific 'NORMAL' request or
by one of the general requests above.   Neither of these latter include the
'PERMANENTLY REMOTE' peripherals, which can only be changed by a specific request
referring to them.

        The 'PERMANENTLY REMOTE' request is intended to refer to physically remote
stations connected by data-link, whilst the others refer to temporary associations
within the main installation.

<u>Notes</u> (i) Any request referring to some but not all of a set of peripherals
referred to by a previous request will cause the others to be set to NORMAL.

        (ii) If <u>all</u> output devices are locked up in a   REMOTE or PERMANENTLY
REMOTE association with some, but not all, of the input devices, then no programs
can be accepted from the other input devices, except ones with no output
(e.g. 'off-line' transfers to magnetic tape).

        (iii) Strictly the association of particular input devices with particular
output devices derives from the input of the job description.   In other words,
even if other documents are fed in on other input devices, then the output
for the job will be on the specified channel(s), provided that the job
description is read in on one of the prescribed channels.

<u>Action</u> Mostly explained above.

        With SEMI-REMOTE, if output is put out on other than the specified channels
or vice versa, then information to this effect is printed on that channel and
on the operator's output.

X <u>Changing the supervisor program etc. (XS type)</u>

(i) <u>Request</u> ACCEPT SUPERVISOR INPUT
            (followed by a section of supervisor program in Intermediate Input,
with suitable control directives).

<u>Response</u> SUPERVISOR INPUT ACCEPTED

(ii) <u>Request</u> CHANGE SUPERVISOR PARAMETERS

        (followed by a section of supervisor program in Intermediate Input, with
suitable control directives).

        <u>Response</u>   SUPERVISOR   INPUT   ACCEPTED

(ii) <u>Request</u>   CHANGE SUPERVISOR PARAMETERS
(followed by some sort of list specifying the parameters it is desired to change, together with their required values)

<u>Response</u> SUPERVISOR PARAMETERS CHANGED

(iii)   <u>Request</u> PRINT SUPERVISOR PARAMETERS

<u>Response</u> SUPERVISOR PARAMETERS ON CH. X.

<u>Purpose</u> Enables additions and corrections to be made to the supervisor program, and the state of the program to be determined. The 'PARAMETERS' are the various parameters of the supervisor (ϵ.g. no. of drums, tape-units, core store pages etc.), which may change from time to time or from installation to installation.

<u>Action</u>   Self-explanatory in general; details not yet decided.

(iv) <u>Request</u>   ACCEPT COMPILER
(xxx)
(followed by compiler in some suitable form)
where (xxx) is the name of the compiler.

<u>Response</u>   COMPILER ACCEPTED
(xxx)

<u>Action</u> Copies the compiler on to the System Library magnetic tape, allocates an internal reference number to the compiler and adds its title to the compiler directory.

(v) <u>Request</u>   COMPILE COMPILER
(xxx)
(followed by possibly a compiler compiler and then the compiler description in some suitable form)

<u>Response</u> (delayed) COMPILER COMPILED
(xxx)

<u>Action</u>   Similar to (iv) above, except that the compiler is compiled before being written on to magnetic tape.

(vi) <u>Request</u>   ACCEPT LIBRARY ROUTINE
(xxx)
(followed by library routine in some suitable form)
etc, as for (iv), reading 'library routine' for 'compiler' throughout.

XI <u>Testing periods</u> (XS type)

(i) <u>Request</u> BEGIN TESTING PERIOD

<u>Response</u> TESTING PERIOD BEGINS

<u>Purpose</u> A 'testing period' is regarded as a time when programmers/users are present either to run their own programs or to study their own results when they appear. A lower running efficiency is acceptable during these periods . in order to give the users greater ease of use of the system.

<u>Action</u> Gives information at operator's output (or? on line-printer - at Manchester) about the progress of every job, e.g. (a) when each job is started, (b) the channel(s) on which output will appear, (c) an indication if a program has an untrapped monitor. Also, during the testing period, the supervisor keeps a directory of all input, output, and dumped documents, so that, within the period, a user may refer to any of his documents by name, whether for correcting or for other purposes.

(ii) <u>Request</u> END TESTING PERIOD

<u>Response</u> TESTING PERIOD ENDS.

<u>Action</u> Discontinue printing out above information and destroy document directory.

XII <u>Special output</u> (XS type)

(i) <u>Request</u> PRINT FROM MAG. TAPE
             (type of equipment) n
             (xxx)
where (xxx) specifies the source and the length of the material to be printed
from magnetic tape.

<u>Response</u> (a) OUTPUT FROM MAG. TAPE (b) OUTPUT FROM MAG. TAPE COMPLETE
                 (type of equipment) n   (type of equipment) n
                 (xxx)   (xxx)

<u>Purpose</u> This request is intended for cases where the output is to be dealt
with in a special manner - e.g. special pre-printed forms are to be used on the
line-printer or a Flexowriter. In such cases the output must first of all be
put on to a private magnetic tape. The operator may then disengage the
appropriate output device (by means of a request of group V). The special
forms may then be loaded, or whatever action is required taken, and the out-
put initiated by means of the above request. The output device is not properly
re-connected into the system, so that no other output will be allocated to
it, either before or after. When the special forms have been removed, the
device may be re-connected into the system by request V (iii).

If, as may sometimes happen as with ordinary long programs, the fact that
the device is occupies for a long time causes a blockage on other programs,
then the operator may wish to interrupt the special output, load some ordinary
paper, and run some ordinary programs, and then re-load the special paper and
continue. This is made possible by the following requests:-

(ii) <u>Request</u> INTERRUPT OUTPUT FROM MAG. TAPE
             (type of equipment) n
             (xxx)

<u>Response</u> OUTPUT FROM MAG. TAPE INTERRUPTED
             (type of equipment) n
             (xxx)

<u>Action</u> Similar to request V (i), except that a note is made by the supervisor
of the stage which the output has reached and of its source, so that it can be
restarted by (iii) below:

<u>Note</u> This request refers to both the output device and the source. This
provides a check. If they do not match, then an output will indicate this, e.g.:-
             INTERRUPT OUTPUT FROM MAG. TAPE REQUESTED
             (type of equipment) n
             (xxx)
             NOT RECOGNISED

(iii) <u>Request</u> CONTINUE OUTPUT FROM MAG. TAPE
             (type of equipment) n
             (xxx)

<u>Response</u> OUTPUT FROM MAG. TAPE CONTINUED
             (type of equipment) n
             (xxx)

Note (a) The specified output channel (or even type of equipment) in this request need not be the same as in the original request, since, for example, it may be more convenient to re-load the special paper on to a different Flexowriter. This is the main reason why request (ii) mentions the source, since this is the only reference which cannot change.
(b) As with any job suspensions, the supervisor is allowed to request the removal of the private tape concerned during the interruption, but does not automatically do so.

XIII Dumping information (XR type)

(i) Request GIVE DUMPING INFORMATION

Response DUMPING INFORMATION WILL BE GIVEN

(ii) Request CEASE GIVING DUMPING INFORMATION

Response NO FURTHER DUMPING INFORMATION

Purpose It may be considered desirable for the operator to take special action if an untrapped monitor occurs, e.g. if a batch of programs is being run for a customer, then he may wish to know immediately if any of them go wrong, whereas he may have to wait some considerable time before he can study the whole set of results.

Action For each program which has an untrapped monitor, prints
                UNTRAPPED MONITOR
                (Title of job)
                DUMPED ON TAPE (a)/(b)/(c)

XIV Magnetic tape (XS type)

(i) Request ADDRESS TAPE ON DECK X
                GIVE IT NUMBER Y

Response (delayed) TAPE ON DECK X ADDRESSED
                AND GIVEN SYSTEM NUMBER Y

Purpose For setting the block marks etc. on a new tape.

Note On the Manchester machine, only channel 7 (i.e. deck 7) has provision for addressing tapes. So part of the above is redundant. But the situation may be different on other installations.

        The tape deck is not taken into the 'system' for the above operation, so that no jobs will be allocated to it before or after the addressing operation. Thus if the deck has previously been a part of the system, it should first be removed by means of a request from group V.

Action The tape is addressed and gives the title FREE.

XV Anything else (XS type)

Request ACCEPT EXTRACODE PROGRAM
        (followed by a program in some suitable form)

Response EXTRACODE PROGRAM ACCEPTED

Purpose However many operator requests are explicitly provided for, there will always be other actions called for, or other pieces of information required. This request causes a program to be read in (from the operator's input) and compiled in the ordinary way, except that it is initially entered under extracode control. This gives it access to all programs, compilers, V-store, etc., and thus it can initiate any desired action. Obviously such a facility must

be used with care, but it does not offer any essentially **greater** danger than, for instance, the facility of adding to the supervisor.

<u>Action</u>   As stated above.

<u>Note</u>   The programs which will be acceptable under this scheme will probably have to be written in Intermediate Input, or in one of a restricted range of compiler languages, since the facility for obeying under extracode control must be built into the compiler, even though it will only be possible for it to be called in by an operator request.

Output from machine to operator not in response to an operator request, and which is for information only

(i)   LOGGING INFORMATION IS ON CH.X

> This will be given without an operator request, either at predetermined time intervals or whenever the logging list in the machine is full.

(ii) FAULT : (xxx)

> This may take a great variety of forms, and no details have yet been decided. Some faults will require action by the operator or duty engineer, but some may be able to be overcome by automatic machine action or may correct themselves, and require no external action.   Nevertheless, in all cases it is desirable that the operator should be informed that an error has occurred.

?(iii) INPUT WELL TAPE LIMIT REACHED
  <u>or</u> INPUT WELL TAPE WITHIN LIMITS AGAIN

> The first of these will be put out in order to discourage the operator from feeding in further documents until the second is put out.

> <u>Also</u> JOB (xxx) NEEDS DATA (YYY), (zzz)

> This is a more specific piece of information indicating that the input well tape limit has been reached because not all the documents for a job have been read in, and it is one of the documents of that job which is causing the input tape limit to be reached.

Output from machine to operator not in response to an operator request, but requiring action by the operator

(i)   FAULT : (xxx)

   (See above)

(ii) (PERIPHERAL X) NEEDS ATTENTION

For instance the time-printer may have run out of paper.

Machine requests to Magnetic Tape Operator

(i)   MOUNT TAPE (xxx) ON DECK X

   Here (xxx) may be the number and/or the title of a tape.

(ii) MOUNT FREE TAPE ON DECK X

(iii) REMOVE TAPE ON DECK X AND GIVE IT NUMBER Y AND TITLE (xxx)

(iv) REMOVE TAPE ON DECK X AND CALL IT FREE.

(v)   REMOVE TAPE ON DECK X AND LEAVE ITS NUMBER AND TITLE AS BEFORE, NAMELY
        NUMBER Y AND TITLE (xxx)

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