

PART 3 : ASSOCIATED PROGRAMS

CONTENTS

1. MASTER PROGRAM INPUT SEQUENCES
  - 1.1 Purpose of Input Sequences
  - 1.2 Description of System
  - 1.3 Production and Modification of the SystemAppendix A : Control Data for Input Sequence  
Appendix B:: Layout of Interim Modifications  
Appendix C : Loading Procedure for Master Program  
Appendix D : Data for Paper Tape or Decimal Card Start
  
2. MAGNETIC TAPE SENTINEL PRODUCTION PROGRAM (09004)
  - 2.1 Purpose and Scope
  - 2.2 Data
  - 2.3 Results
  - 2.4 Procedure
  - 2.5 Operating NotesAppendix A : Control Data and Sentinel Layout (09004)
  
3. MASTER ROUTINE GENERATOR (08004)
  - 3.1 Purpose and Scope
  - 3.2 Data
  - 3.3 Results
  - 3.4 Procedure
  - 3.5 Operating NotesAppendix A : Control Data  
Appendix B : The Generation Process  
Appendix C : Master Routine Input Sequences

## 1. MASTER PROGRAMME INPUT SEQUENCES

### 1.1 Purpose of Input Sequences

The Master Programme Input sequences are a standard part of the LEO III Software system.

They provide facilities to:

- (a) Load the Master Programme held on magnetic tape in either Intercode Pass 3 or Input Sequence format (see below).
- (b) Load temporary modifications from paper tape or cards.
- (c) Copy the store (including the Master Programme) onto magnetic tape.

The Input Sequences also perform part of the 'Initial Set Up' procedure.

The Input Sequences are written in Intercode thereby ensuring ease of modification and documentation.

### 1.2 Description of System

#### 1.2.1 Loading the Input Sequences

The Input Sequences are designed to be loaded by means of the magnetic tape start key. If an installation does not have the magnetic tape start facility it can be simulated by means of the paper tape/card start facility and a special paper tape/card as specified in Appendix D.

The magnetic tape start reads the first block of the magnetic tape on any route of channel 0, 1, 16 or 17. This block contains the primary input sequence which reads the next block, containing the secondary input sequence, into division 1 and this in turn reads in the first two divisions of store.

If doubtful block, route closed or alignment failure occurs on reading this tape, the computer halts and the operator must start the procedure again.

When loading is completed the main input routine will lie in the latter half of division 1 and division 0 will contain a version of the Master Programme. The full identity of the version is typed out and alarm 77 then offered with four options:

- (i) to read the date from the indicators, and proceed direct to the initial set up routine (section 1.2.8.).

- (ii) to read control data and pass through the main input routine (sections 1.2.2 to 1.2.7) before entering the initial set up routine.
- (iii) to read the date from the indicators, and proceed direct to the initial set up routine (section 1.2.8), but avoiding unloading the tape start tape.
- (iv) to read control data and pass through the main input routine (sections 1.2.2 to 1.2.7) before entering the initial set up routine, but avoiding unloading the tape start tape.

The first and third option allows a Master Programme to be loaded without the use of control data. The date which must be stacked in the form DD M YY (e.g. 11 77 66), is range checked in these cases but the Master Programme identity is not. However, this identity has been typed out and should have been checked by the operator before the alarm was dealt with.

### 1.2.2 Control Data

#### (a) Standard

The standard control data contains five blocks of information held in fixed field form:

- Block 1 The first block holds the sentinel '%/0/0/0/0/%' and the date (DD M YY). The date is range checked. If this check fails the route is set to manual, a comment is made, and on the route being re-opened the programme will expect to re-read the control data.
- Block 2 The second block contains three words. The first word contains the programme identity, the second the Intercode serial number and the third the interim modification number (see section 2.4) of the Master Programme required.
- Block 3 The third block contains up to five 5-digit modification identifiers.
- Block 4 The fourth block contains up to two 5-digit numbers specifying the tapes onto which new copies are to be written. If the tape numbers are preceded by 'TOTAL', the contents of the 'tape start' tape will be copied up to the end sentinel.
- Block 5 The fifth block contains an indicator if the Master Programme loaded at the end of this run is not to be entered. The programme will return to alarm 77 so that another run can be performed without repeating the tape-start procedure.

For layout of control data see Appendix A.

(b) Non-Standard

Non-standard control data may be submitted in the following form:

To produce new versions of Input Sequences

The control data contains '>>>>' in its first word. The purpose is to facilitate the production of new versions of the input sequences and its use is reserved for those responsible for Input Sequence production. The control data specifies certain routes and facilities to be used on the installation for which the new version is being made (see section 1.3).

The block contains ten items in variable field form. Following the control data word (>>>>) are three items in channel and route form specifying the routes to be used in future by the typewriter, for submission of control data, and for modifications respectively. The next item specifies the total number of divisions in the first bank of store to be catered for, and the next three are indicators specifying whether the Saxby clock, millisecond timer and lockout are to be tested. They should be numeric and if they are non-zero the test will be carried out. The next item is an indication of whether the installation will have magnetic tape on channels 0 and 1, or 16 and 17; the last item specifies the number of divisions in the second bank of store. The routes and number of divisions are range checked and if this check fails the route is set to manual and a comment typed. On the route being re-opened the programme will expect a control data word (>>>>) and will not accept standard control data until the former control data has been read and processed successfully.

When the table of routes and facilities has been updated a comment is typed to enable it to be checked. This block is followed by the standard control data or the second type of control data.

1.2.3 Errors on Attempting to Read Control Data

If the programme is expecting a control data word but does not find one the route is set to manual and a comment typed. On the route being opened the programme tries again.

If doubtful block occurs on reading control data the route is set to manual and a comment typed. The paper tape or cards must then be re-aligned to the start of any previous control data heading block.

#### 1.2.4 Loading the Master Programme

The process of loading the Input Sequences will also have loaded a version of the Master Programme into the store; a comparison is made between the identity of the Master Programme in the store and that requested by control data.

If the check fails and the Interim modification number is non-zero, a report is made and the loading process must be repeated or corrected control data fed.

If the check fails and the Interim modification number is zero, a check is made on the magnetic tapes loaded (if any) to determine if one contains the required Intercode (i.e. ex Translator) version of the Master Programme. If one does, that version is loaded, otherwise the operator either loads the required Intercode version or repeats the complete loading process.

If doubtful block occurs on reading the Intercode version, the block number is checked and if the block is the one expected it will be re-read up to six times. If then it has still not been read successfully the programme is abandoned and the whole loading process must be repeated. If the block is not the one expected the occurrence is treated as an alignment failure.

If alignment failure occurs and the first word of the block contains a faulty block marker the programme reads the next block and checks that. Otherwise the programme conducts a limited search. If at the start of the search or at any time during it the tape appears to be aligned before the required block, the programme reads up to a maximum of a hundred blocks. If at the start of the search or at any time during it the tape appears to be aligned after the required block, the programme steps back ten blocks. If the tape then appears to be aligned, before the required block, control is passed to the appropriate procedure, but if not a comment is typed and the programme abandoned.

#### 1.2.5 Interim Modification

The facility to make temporary modifications to the Master Programme and Input Sequences is reserved for the use of Master Programme Programmers. Its principal function is to assist in trials of new versions and issues of the Master Programme but it could if the need arose be used to amend an operational version of the Master Programme pending the arrival of a new Intercode version.

The format of interim modification is shown in Appendix B. Several checks are carried out and if any fails, the route is set to manual and a comment is typed. Such failures are of two types. If the failure occurs when the program is expecting a block heading a new set of modifications or if the wrong set of modifications is submitted the above comment is followed by a route closed comment and the correct set of modifications will be expected when the route is opened. On the other hand, if an error is discovered in the middle of a set of modifications, it is possible that the Master Program has been corrupted and accordingly the comment is followed by 'ABANDON' and the whole loading process must be repeated with the offending set of modifications either amended or omitted.

If doubtful block occurs the route is set to manual and a comment typed. The tape must then be aligned to the beginning of the set of modifications and on the route being opened the set will be re-read. Each set of modifications is headed by a block containing the identifier of that set. The identifiers must be the same as those on the control data and the sets of modifications must be submitted in the order given on the control data. Every time the Master Program is modified by a batch of modifications the interim modification number is stepped by one.

#### 1.2.6 Production of New Copies

New copies of the Input Sequences and (possibly modified) Master Program may be made by specifying the numbers of the new tapes on the control data (see Appendix A).

These tapes must bear sentinels as a check is made on the tape number. If this check fails the tape is unloaded and when the route is re-opened the check will be repeated. As many tapes must be written as are specified in the control data.

The first blocks on the tape are described in section 1.2.1, i.e. there is first a block containing the primary input sequences, then one containing the secondary input sequence, then up to thirty-two containing the contents of the first two divisions of store.

Finally the standard sentinels are written, to enable the tape:

- (a) to be used again without re-sentinelling;
- (b) to hold additional software programs after the Master Program.

If doubtful block occurs when writing any of the blocks up to and including the source block the program will attempt to re-write the whole tape up to three times. If this fails, standard sentinels are written on the tape, which is then unloaded and removed from the new copies list. Otherwise the program will attempt to re-write in the usual manner. However, if it fails to write the block correctly after ten attempts, the copy is abandoned.

2. MAGNETIC TAPE SENTINEL PRODUCTION PROGRAM (09004)2.1 Purpose and Scope

This program writes onto magnetic tapes the 'Start of Tape' sentinels followed by the 'End of File' sentinels. These include alignment mark words to prevent running back past the beginning of the tape, a tape number which is checked to be in the Released Tapes Index when a file is opened for output, and a 'Xeronic Word'.

2.2 Data

- (i) The magnetic tape(s) on which sentinels are to be written.
- (ii) Control data on paper tape or cards consisting of a list of tape numbers on which sentinels are required. The tape numbers must be specified in the order that the tapes are loaded. Up to 15 tapes may be written in succession using one control data file. If more than 15 tapes require sentinels, the program may be re-entered from the final alarm. For layout of control data see Appendix A.

2.3 Results

- (i) Six 'Start of Tape' sentinels  
One 'Source' block  
Three 'End of File' sentinels } on each tape

For layout of sentinels see Appendix A.

- (ii) Log comments (see 2.5.2)

2.4 Procedure

The program is allocated normally with two files, A1 (magnetic tape output with alternate routes) and C1 (paper tape or card input).

On entry the control data is read and sentinels are written on the first tape, which is then rewound, read, checked and unloaded. A comment is typed and the magnetic tape route alternated (if allocated) to deal with the next tape.

The magnetic tape input/output actions are performed in the program using two annexes. The route is tested before each action in the Master Program, and if a doubtful block caused by another program is discovered, it will be dealt with in the normal manner. If another program discovers a doubtful block caused by 09004 it will simply set up an indicator in the special chapter of 09004.

If sentinels are found to be wrong on checking, or if doubtful block occurs on reading or writing, the tape is rewound and the sentinels are rewritten. A log comment is made recording the occurrence of a doubtful block or of an error in the sentinels. After three unsuccessful attempts to write sentinels the tape is unloaded and writing commences on the next tape (if any).

When end of control data is reached Alarm 44 is given with options to unload or submit further control data and tapes.

2.5 Operating Notes2.5.1 Allocation Details

## (i) Chapter Lengths:

- |                    |                    |
|--------------------|--------------------|
| 1. 504 short words | 2. 506 short words |
|--------------------|--------------------|

## (ii) Routes Required:

MF Input	A1 (Alternate routes)
PT/CARD Input	C1

(iii) The program is re-entrant and may be timeshared.

2.5.2 Log Comments

09004 SENTINELS ON (xxxxx)	Sentinels written correctly on specified tape which has been unloaded.
09004 DB (cr) (xxxxx)	Doubtful block on specified tape. Tape rewound and writing of sentinels recommenced.
09004 ID (cr) (xxxxx)	Sentinels on specified tape found to be in error when read. Tape rewound and writing of sentinels recommenced.
09004 (xxxxx) ABANDONED	Three unsuccessful attempts to write correct sentinels on specified tape have been made. Tape is unloaded and next tape commenced.

2.5.3 Alarm\* 44 ALL TAPES HAVE SENTINELS

Block end or zero word reached on control data

OPTION 1 - Unload program

OPTION 2 - Write sentinels on further tapes using new control data.



APPENDIX A: CONTROL DATA AND SENTINEL LAYOUTS (09004)1. CONTROL DATA/////09004C1101  $\overline{BE}$ (Up to 15 five-figure tape numbers the last followed by  $\overline{BE}$ )/////09004C1301  $\overline{BE}$

2. SENTINEL LAYOUT (as produced by this program)

Start of Tape Sentinels

1
50001
Tape Number
$\overline{BE}$ Word

2
50002
Tape Number
$\overline{BE}$ Word

3
50003
Tape Number
$\overline{BE}$ Word

4
50004
\\ \\ \\ \\
$\overline{BE}$ Word

5
50005
\\ \\ \\ \\
$\overline{BE}$ Word

6
50006
Tape Number
$\overline{BE}$ Word

'Source' Block

7
30 7
??
Date
09004
$\overline{BE}$ Word

End of File Sentinels

8
//////
FINIS
$\overline{\text{BE}}$ Word

△△△△

£ £ £ £     3
//////
9
$\overline{\text{BE}}$ Word

(END)
(END)
9
$\overline{\text{BE}}$ Word

*End of file,*

△△4△2

*End of reel,*