

ELLIOTT 900 SERIES SIMULATOR

ALDENHAM UTILITIES

Aldenham School possessed two 920A computers and later a 903. The 903 now resides at The National Museum of Computing and the 920As are in the Science Museum store at Wroughton.

Chris Moller, the master in charge of computing at Aldenham wrote a number of utilities to help with programming and debugging software for their machines.

Moller modified the Elliott T.23 loader to allow relocatable programs to be loaded into any area of clear store of suitable size. This allowed debugging and diagnostic utilities to be loaded "on top" of other system without overwriting it. The U.6 - ALDRLB utility converts T.23 format into the relocatable format.

U.1 - READIT

A utility to print out clear stores, loader etc.

Load READIT at 8181. The program will load into an area of clear store and output "?" on the teleprinter. Input the desired option and READIT will demand a tape be loaded and interpret it is an "initial instructions" program, printing out the program. Once complete the program deletes itself from store.

Option 1: print instruction in decimal form.

Option 2: print instruction in octal form (in parenthesis).

Option 4: print instruction location (in parenthesis).

Options can be or'd together.

U.2 - PUNCHIT

A utility to assemble loaders etc suitable for use with initial instructions.

Load PUNCHIT at 8181. The program will load into an area of clear store and demand a tape be loaded containing the program to be assembled. A binary tape will be punched corresponding to the program. Once complete the program deletes itself from store.

ELLIOTT 900 SERIES SIMULATOR

The input consists of a simplified dialect of SIR which includes

- 1) instructions, with absolute addresses, e.g., /5 65
- 2) decimal constants, e.g., +10, -141
- 3) octal constants, e.g., &77
- 4) comments (...) - n.b. enclosed brackets must be nested
- 5) terminating halt code.

Return, Erase and Runout are ignored. All other characters are treated as separators.

A typical tape will be:

```
0 8179
8 8182
-N
N further instructions and/or data
Halt code
```

U.3 - STORE

STORE is a program for interrogating the contents of memory.

Load store at 8181. The program will load into a clear area of store and demand teleprinter input.

The commands available are:

```
R address - output contents of address in B F N form
A address - output contents of address in B F &N form
I address - output contents of address as an integer
O address - output contents of address as an octal group
\ address - output contents of address as an alphanumeric
              group.
```

word address - store word in address

```
L start address end address
    - list specified block of store
```

```
S word start address end address
    - find first occurrence of work in specified block
      of store
```

```
*X (0<=X<=7)
    - set list command option
      1 Show addresses
      2 Show addresses in octal
      4 Include locations containing zero
```

ELLIOTT 900 SERIES SIMULATOR

M word - set mask for search

T address - trigger to address (i.e., jump)

X - exit, i.e., T 8181

The format of a word can be:

B F N	e.g., /15 8191 or 15 6144
B F &N	e.g., /15 &17777 or 15 &14000
B F ;+N	e.g., 8 ;+0 or 5 ;-3
Integer	e.g., +13171 or -5
Octal	e.g., &777777 or &37400
Alphanumeric	
	e.g., \ABC or \[]^

The format of an address can be:

N	e.g., 8177 or 8225
&N	e.g., &17761
:+N	e.g., ;+1 or ;-5

or just input Return to get next address in sequence.

On exit (X), the rest of the U.3 tape is read in to delete the program from store.

U.4 - MAP

A program to list areas of store that are non-zero.

Load map at 8181. The program will load into an area of clear store and issue a '?' prompt to the teleprinter. Input an option digit in the range 1-7:

Option 1: Output addresses in decimal
Option 2: output addresses in octal
Option 4: Output store modules 0 and 1 (otherwise just module 0)

These options can be or'd together.

MAP does not list the area of store it occupies. After listing is complete, MAP deletes itself leaving the area occupied zero once more.

ELLIOTT 900 SERIES SIMULATOR

U.5 ALDCOPY

This is a program for copying paper tapes on a machine with at least 16K of store. ALDCOPY should be loaded at 8181 and self-triggers at 8. It has three entry points selected by a character input at the teleprinter following a '*' prompt:

- L - load and store a master tape
- C - compare a tape against stored master
- P - punch a copy of stored master.

The normal method is to load the master tape by typing L. The tape will read to the end (up to a maximum of approximately 32,000 characters) and unload. Retrigg at 8 and type C to re-read the master tape and compare against store. If ALDCOPY is happy, it will type "OK" and prompt '*' again: type P to make a copy. This can be checked by typing C and so on.

If any character disagrees with that in store ALDCOPY will punch runout, the character expected and the character read, then further runout.

U.6 - ALDRLB Generator

This program reads in a T.23 format tape and converts it in AldRLB format.

There are two entry points:

- 32 dynamic stop after loading program
- 33 trigger program once loaded.

A locator and loader are punched, then the program is read in and translated. Finally if the checksum is o.k., a clear store that will remove the program from memory is loaded. If appropriate the program is then triggered.

AldRLB queries "HOW MANY WORDS LONG IS THE PROGRAM?". The user should input a number greater than or equal to the length of the program, e.g., NEXT-FIRST. AldRLB then queries "WHAT RANGE OF ADDRESSES SHOULD BE CONSIDERED RELATIVE?". Input two numbers giving the FIRST and LAST addresses of the program.

It is recommended programs be assembled at 4096 to avoid problems with small magnitude constants being treated as 0 n or /15 n rather than +n or -n respectively. Note errors may still arise with larger magnitude constants. To handle this,

ELLIOTT 900 SERIES SIMULATOR

AldRLB next asks "WHAT RANGE SHOULD BE QUERIED?". Enter a range covering the problematic addresses. If there are no problem areas, enter 0 0.

The program then reads in the T.23. (Note the T.23 loader should be removed first: just the data part is read). If a word with a queried address field is encountered, AldRLB types the word in instruction format and awaits input:

- &: requests the word be retyped as an octal group
- f: requests the word be retyped as an alphanumeric group
- +: requests the word be typed as an integer
- A: indicates save the word with absolute address
- R: indicates save the word with a relative address.

Note 1: the input program must not contain any 0 0; instructions.

Note 2: the loaded program should set it's first location to be the start of the main program, then jump to 8181 to read in the clear store. When complete the program should jump to 8162 to be cleared from store.

U.7 - UNIDUMP-B

This is a program for dumping the entire contents of one or both modules of the store to paper tape.

The program is loaded at 8181 and waits for teleprinter input: type 1 or 2 to specify how many modules are to be dumped.

The program overwrites 8135-8179. If this contains important information, use U.8 instead.

U.8 - UNIDUMP-C

This program runs in two stages and can dump a program located anywhere in store, including locations 8135-8179. It only corrupts location 7.

The process is illustrated in DEMO8:

- 1) Load program to be dumped
- 2) Load U.8
- 3) When U.8 has loaded, type 1 or 2 for number of store modules to be dumped
- 4) When U.8 has finished punching clear stores and loaders, reload the program to be dumped (omitting any initial clear store)

ELLIOTT 900 SERIES SIMULATOR

- 5) Jump to 7. A complete tape is now produced of non-zero store, excluding UNIDUMP-C itself.

The output consists of:

- 1) 1 or 2 clear stores
- 2) T.23 (triggered at 8181)
- 3) Body of program 8-8134, 8192-16383 as appropriate
- 4) 8135-8179 in initial instructions format.

Note 4) will cause the instruction at 8177 to be obeyed. It is often convenient to patch this to 8 8177 or to jump to resume the dumped program before running UNIDUMP-C.

U.9 - UNIDUMP-D

This program dumps areas of store specified by a data tape. It is designed to overcome some of the disadvantages of T.22/23, namely:

- a) all characters except 0-9 are ignored
- b) the data tape is read in completely before punching begins
- c) clear stores can be specified
- d) a trigger address can be specified
- e) skips (large areas of zeros) are not punched
- f) input can be from teleprinter or paper tape.

When UNIDUMP-D is loaded it types '?'. Type input device: 1 for paper tape reader, 3 for teleprinter. The remainder of the data consists of:

- a) an option:
 - = 0 - no clear stores
 - = 1 - clear 8-8179
 - = 2 - clear 8-8179 and 8192-16383
- b) the trigger address (8171 for dynamic stop)
- c) up to 10 pairs of addresses (FIRST, LAST) for blocks to be dumped
- d) a halt code.

Errors:

- E1: FIRST > LAST
- E2: Too many groups
- E3: Address out of range
- E4: Device or option > 3

U.9 does not dump itself. U.9 will dump 8135-8191 if this is included in an address group.

ELLIOTT 900 SERIES SIMULATOR

The program may be retriggered at 7 at any time. If a restart is made before data entry is complete, the program returns to stage 1. If a restart is made after punching has begun, a new copy will be made without the need for repeating data entry.

ALDENHAM Folder

DEMO1: shows the use of READIT to display the clear store at the head of AJHAlgol Tape 1.

DEMO2: Shows the use of PUNCHIT to output the ACD 8K Clear Store program.

DEMO3: Shows use of STORE.

DEMO4: Shows the use of MAP to show the store used by AJH Load and and Go Algol.

DEMO5: Shows the use of ALDCOPY to duplicate itself.

DEMO6: Shows use of ALDRLB to build the MAP utility and compares result to image of distributed binary.

DEMO7: Shows the use of UNIDUMP-B to dump a copy of the 16K AJH load-and-go Algol system.

DEMO8: Shows the use of UNIDUMP-C to dump a copy of 903 SIR.

DEMO9: Shows the use of UNIDUMP-D to dump a copy of AJH Load and Go Algol.

SYSTEM FILES

READIT.BIN - U.1 READIT sum-checked binary.

PUNCHIT.BIN - U.2 PUNCHIT sum-checked binary.

STORE.BIN - U.3 STORE sum-checked binary.

MAP.BIN - U.4 MAP sum-checked binary.

MAP.900 - U.4 MAP source.

ALDCOPY.BIN - U.5 ALDCOPY sum-checked binary.

ALDRLB - U.6 ALDRLB sum-checked binary.

UNIDUMP-B.BIN - U.7 UNIDUMP-B sum-checked binary.

UNIDUMP-C.BIN - U.8 UNIDUMP-C sum-checked binary.

(Sources for U.1-U.8 can be found in my paper tape archives in the MASTERS/ALDENHAM folder).

ELLIOTT 900 SERIES SIMULATOR