

# **ICL 1900**

# **Emulator**

# **Handbook**

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## General Introduction

The ICT (later ICL) 1900 series computers was a range of 24-bit mainframes, initially launched in September 1964 with support finally being withdrawn in 1984.

During the mid to late 1970s, the 1900 series software continued to be supported on the 2903 series (2903 2904, 2905 & ME29) of small office machines and on the larger ‘New Range’ processors (2950, 2960, etc.) under DME (later CME).

Why another 1900 emulator, when there is already a perfectly good emulator, the George 3 Executive Emulator by David Holdsworth and Delwyn Holroyd, which successfully runs the GEORGE 3 Operating System?

- G3EE will only run GEORGE 3
- Inaccurate emulation speed (runs much too fast)
- Limited peripheral types (but sufficient to run a reasonable system)

We have set out to achieve:-

- Hardware level emulation
- Reasonably accurate emulation of speed (processor and peripherals)
- Ability to run different Executives, Operating Systems and even diagnostics
- Emulation of a wide variety of peripheral types

We believe that there is a ‘market’ for both emulators, G3EE giving a quick and easy taste of a 1970s GEORGE 3 Operating System, supported by ICL 1967–1984 and known to be running as a production system until 2011 on a 2966 under CME; and the 1904S emulator giving a more realistic impression of those days. We used G3EE as a bootstrap for our project, which may not have got started without it – many thanks to David and Delwyn.

In addition to the 1904S emulator, there are separate emulators that cover the unsuffixed processors (1904, 1905, 1909 and FP6000) and the ‘baby’ 1901A, also a PF56 emulator (used as a disc controller or communication front-end processor) used with 1900 series mainframes.

# **Part 1: 1900 Basics (to be supplied)**

## Part 2: 1904S Emulator



## 2.0 Introduction

This section attempts to explain the configuration and use of the ICL 1904S emulator (author: WJ Gallagher). The ICL 1904S was a mainframe computer built at ICL's West Gorton (ex-Ferranti) factory which could have from 96KWords up to a maximum of 256KWords of store fitted. The 1904S emulator can also be configured to emulate the 1904A, 1904E, 1904F, 1905E, 1905F, 1906, 1907 and 1903T processors.

The 1904S emulator consists of an Operators' Console window, which contains the main processor, store and most peripherals, plus a number of additional windows which form the User Interface ('UI') for the peripherals. Communications terminals each have separate windows.

The system is controlled via the Operators' Console window (as on a real machine), with peripheral actions (loading/unloading media, etc.) controlled from the various peripheral UI windows.

## 2.1 Installation

The 1904S emulator should be installed in the 1900 directory structure which contains all of the necessary files.

Each machine requires a separate .ini file to define its hardware configuration (there can be more than one 'machine'); this configuration **must** match the Executive in use (no change from a real system), if not things will not work correctly. Each machine is given a 3 digit machine number, 621 for the basic issued emulator system.

The configuration files are named 1904s\_MC0*mmm*.ini, where *mmm* is the machine number of the emulated 1904S, and consist of a number of sections described in section 1.??? below.

The downloaded zip file (em1900.zip) should be unpacked into folder C:\em1900 (the assumed default), any other location will require any shortcuts to be adjusted accordingly.

The tree created should look like:-

```
C:\em1900
  \bin                - Emulator programs (download separately)
  \data               - Basic Peripheral files
  \data\binary        - Card image 1900 binaries
  \data\execs         - Card image Executives (not 1904S)
  \data\setup-info    - Files used to configure the system
  \discs              - Exchangeable Disc library (ED8/30/60/200)
  \drums              - *DR/*HD (196x/2815) files
  \fds                - *FD (Bryant 2B) files
  \formatloops        - *LP format loop files
  \logs               - System logs, including console hard copy
  \tapes              - Magnetic Tape library
```

Files held directly under C:\em1900 (for use with the 1904S emulator) are:-

```
em1904s-621          - Shortcut to start 1904S emulator
1904s_MC0621.ini     - System definition file machine 621

TW7071-1             - }
TW7071-2             - }
TW7071-3             - } Shortcuts to start TTY emulator
TW7071-4             - } on *MX channels 1-6
TW7071-5             - }
TW7071-6             - }

TW7086-7             - }
TW7086-8             - } Shortcuts to start Termiprinter emulator
TW7086-9             - } on *MX channels 7-10
TW7086-10            - }

README.TXT           - Basic installation instructions
```

## 2.2 Running the 1904S emulator

The emulator should be run from the top level directory (a shortcut is provided) with the programs being held in ./bin, or from a command line:

```
bin/1904s.exe -M mmm -S ss
```

Where:

-M mmm = machine number (mandatory)  
-S ss = .ini file boot channel override (optional)

More than one instance of 1904s.exe may be run, but each instance must have a unique machine number.

The emulator, from information in the .ini file, will start the various peripheral 'UI' programs required, apart from the communications devices (TTYs, Termiprinters, 7181 VDUs, 7020 RJE terminals, etc.). The 'UI' applications can be started manually if desired, but it is not recommended.

If the SI Boot Channel has not been set (=0 in .ini and no -S parameter supplied), it will be requested on the main console. This allows the required boot media to be loaded (cards, paper tape, magnetic tape or PF56 to be booted) via the 'UI' before initiating the main bootstrap process.

Once the system has been started, the required Executive (E6RM or EWG3) needs to be loaded in the same manner as on a real 1904S processor, followed by any Operating System(s). Information on this may be found in the following technical manuals:-

- TP4403 – 1903T to 1904S Operating
- TP4334 – GEORGE 3 and 4 Operations Management
- TP4345 – Operating Systems GEORGE 3 and 4
- TP4432 – GEORGE 2 Disc Based Operating System
- TP4448 – MAXIMOP System
- TP4445 – Using MAXIMOP

On the main operators' console, whether or not the console 'buttons' extension is in use, 'INPUT' (keyboard key = 'TAB') must be pressed before typing and either 'ACCEPT' (keyboard key = 'RETURN') or 'CANCEL' (keyboard key = 'ESC') pressed to terminate the input.

It is recommended that the date entered be 28 years in the past, this avoids any 'Year 2000' problems with utilities and keeps the calendar the same.

## 2.2.1 SI Boot Channel

With the configuration supplied with machine 621, the following values are valid:

- SI Boot Channel = 24 – EDS8 on Operator's Unit No. 40 (E6RM)
- SI Boot Channel = 25 – EDS8 on Operator's Unit No. 50 (EWG3)
- SI Boot Channel = 26 – MT on Operator's Unit No. 30 (depends on tape loaded)
- SI Boot Channel = 27 – MT on Operator's Unit No. 33 (depends on tape loaded)

This value may be set in the .ini file if only a single system is to be used

## 2.2.2 Booting E6RM

The following example shows an E6RM system being started, following entry of the boot channel (if required):

**LIB. NO. / HOW MANY K?** 001A/256K

**L001A/EXEC 621 01A**

**EXEC M/C 621 ISS 01A PE 000V GRT7/08 05/05/82**  
**NAME 1904S EMULATOR INITIAL RELEASE (SYS621)**  
**ANY MODIFICATIONS?** N

**E6RM MARK 1 VERSION 5 (GEN 54)**

**DATE PLEASE?** FRI06APR90

**TIME PLEASE?** 0950

**OVERLAY DEVICE NO.?**40

**TRANSFER OVERLAYS?**N

**U40 SU \*310000**  
**09/51/02**

The system is now loaded and ready for use. Programs may be loaded and run directly by operator command or an operating system such as GEORGE 2 and/or MAXIMOP may now be started.

### 2.2.3 Booting EWG3/G3

The following example shows an EWG3/G3 system being started:

```
B/S LOADED
EXEC FILE ? G3EXEC

GEORGE 3 W.G. EXEC GEN 41.
MENDS 1 - 0788 INCLUDED

1904S EMULATOR INITIAL RELEASE (SYS621)
CHANGE CORE SIZE ?N

DATE PLEASE? FRI06APR90

TIME PLEASE? 0950

READY

DA ICLKGEXDUMP
NOT FOUND

DA ICLKNIBOOTEX
NOT FOUND
DA GEORGE3A
OK
LOADED

09.50.08
SCF SYSTEM NOT RUNNING
RESTORE?
N

JOURNAL DATA MAY HAVE BEEN LOST
GENERATION 2 OF SYSTEM JOURNAL STARTED
UNIT U29 HAS BECOME INOPERABLE

GEORGE MEAN TIME: 1005076
GEORGE 3 MK8.67 READY .
FINISHED :SYSTEM,BACKMAP : 1 LISTFILES
09.51.00 6APR90
```

The system is now loaded and ready for use. Jobs may now be entered into the system and MOP started.

### 2.2.4 Closing the Emulator

The emulator can be closed by pressing Ctrl/[ on the main console. Any Operating System(s) running should be correctly closed beforehand other disc corruption may occur.

## Part 3: ICT 1905 Emulator



## 3.0 Introduction

This section attempts to explain the configuration and use of the ICT 1905 emulator (author: WJ Gallagher). The ICT 1905 was a mainframe computer built at ICL's West Gorton (ex-Ferranti) factory which could have from 8KWords up to a maximum of 32KWords of core store fitted. The 1905 emulator can also be configured to emulate the 1904, 1909 and FP6000 processors. These processors were the first of the 1900 range processors, derived from the FP6000 from Ferranti (Canada).

The 1905 emulator consists of an Operators' Console window, which contains the main processor, store and most peripherals, plus a number of additional windows which form the User Interface ('UI') for the peripherals.

The system is controlled via the Operators' Console window (as on a real machine), with peripheral actions (loading/unloading media, etc.) controlled from the various peripheral UI windows.

## 3.1 Installation

The 1905 emulator should be installed in the 1900 directory structure which contains all of the necessary files.

Each machine requires a separate .ini file to define its hardware configuration (there can be more than one ‘machine’); this configuration **must** match the Executive in use (no change from a real system), if not things will not work correctly. Each machine is given a 3 digit machine number, 111 for the basic issued emulator system.

The configuration files are named 1905\_MC0*mmm*.ini, where *mmm* is the machine number of the emulated 1905, and consist of a number of sections described in section 1.??? below.

The downloaded zip file (em1900.zip) should be unpacked into folder C:\em1900 (the assumed default) any other location will require any shortcuts to be adjusted accordingly.

The tree created should look like:-

```
C:\em1900
  \bin           - Emulator programs (download separately)
  \data         - Basic Peripheral files
  \data\binary  - Card image 1900 binaries
  \data\execs   - Card image Executives
  \data\setup-info - Files used to configure the system
  \discs       - Exchangeable Disc library (ED8/30/60/200)
  \drums       - *DR/*HD (196x/2815) files
  \fds        - *FD (Bryant 2B) files
  \formatloops - *LP format loop files
  \logs       - System logs, including console hard copy
  \tapes     - Magnetic Tape library
```

Files held directly under C:\em1900 (for use with the 1905 emulator) are:-

```
em1905-111      - Shortcut to start 1905 emulator
1905_MC0111.ini - System definition file machine 111

IT1938-6       - Shortcut to start 1938 TTY emulator

README.TXT     - Basic installation instructions
```

## 3.2 Running the 1905 emulator

The emulator should be run from the top level directory (a shortcut is provided) with the programs being held in ./bin, or from a command line:

```
bin/1905.exe -M mmm
```

Where:

-M mmm = machine number (mandatory)

More than one instance of 1905.exe may be run, but each instance must have a unique machine number.

The emulator, from information in the .ini file, will start the various peripheral 'UI' programs required, apart from the communications device (1938 Interrogating Typewriter). The 'UI' applications can be started manually if desired, but it is not recommended.

If the SI Boot Channel will be requested on the main console to allow the required boot media to be loaded (cards, paper tape or magnetic tape) via the 'UI' before initiating the main bootstrap process.

Once the system has been started, the required Executive (E4BM) needs to be loaded in the same manner as on a real 1905 processor, followed by any Operating System(s). Information on this may be found in the following technical manual:-

- TP4167 – 1904, 1905, 1906, and 1907 Console Operating

On the main operators' console, 'INPUT' (keyboard key = 'TAB') must be pressed before typing and either 'ACCEPT' (keyboard key = 'RETURN') or 'CANCEL' (keyboard key = 'ESC') pressed to terminate the input.

It is recommended that the date entered be 28 years in the past, this avoids any 'Year 2000' problems with utilities and keeps the calendar the same.

### 3.2.1 Boot Channel

The Executive for machine 111 is supplied on both cards (recommended) and magnetic tape, the following boot channels are valid:

- Boot Channel = 15 or 16 – E4BM loaded from cards
- Boot Channel = 24..31 – E4BM loaded from magnetic tape

This value must be entered after the executive has been loaded on the required device.

### 3.2.2 Booting E4BM from Cards

The following example shows an E4BM system being started, following entry of the boot channel (15 or 16) after loading the Executive card deck into CR15 or CR16.

```
EXEC M/C 111ISS 01A PE 0001 GRT5/04 08/11/90  
NAME 1905 ORIGINAL SYSTEM MINUS TRUSTED  
ANY MODIFICATIONS? N
```

```
DATE PLEASE? SAT01DEC90
```

```
TIME PLEASE? 0000
```

```
CHARGING
```

```
12/49/49
```

The system is now loaded and ready for use. Note that the time may be entered as '0000', this machine is fitted with a digital realtime clock. Programs may now be loaded and run.

### 3.2.3 Booting E4BM from Magnetic Tape

The following example shows an E4BM system being started, following entry of the boot channel (24 – 31) after loading the Executive tape onto MT24 – MT31.

```
LIB. NO. / HOW MANY K? 001A/32K
```

```
L001A/EXEC 111 01A
```

You should now continue as at 3.2.2 above.

### 3.2.4 Closing the Emulator

The emulator can be closed by pressing Ctrl/[ on the main console. Any programs running should be correctly closed beforehand.

# Part 4: To be Supplied

# Part 5: ICL 1901A Emulator



## 5.0 Introduction

This section attempts to explain the configuration and use of the ICL 1901A emulator (author: WJ Gallagher). The ICL 1901A was a small mainframe computer built at ICL's Stevenage factory which could have from 4KWords up to a maximum of 16KWords of core store fitted.

The 1901A emulator consists of a main window, showing the control panel (lights and switches), an optional Operator's Console (not E1HS) and built-in peripherals. There may be a small number of additional windows which form the User Interface ('UI') for any external peripherals.

The system is controlled via control panel and the optional Operators' Console window (as on a real machine), with peripheral actions (loading/unloading media, etc.) controlled from the both the main and peripheral UI windows.

## 5.1 Installation

The 1901A emulator should be installed in the 1900 directory structure which contains all of the necessary files.

Each machine requires a separate .ini file to define its hardware configuration (there can be more than one 'machine'); this configuration **must** match the Executive in use (no change from a real system), if not things will not work correctly. Each machine is given a 3 digit machine number, 385 for the basic issued emulator system.

The configuration files are named 1901A\_MC0*mmm*.ini, where *mmm* is the machine number of the emulated 1901A, and consist of a number of sections described in section 1.??? below.

The downloaded zip file (em1900.zip) should be unpacked into folder C:\em1900 (the assumed default), any other location will require any shortcuts to be adjusted accordingly.

The tree created should look like:-

```
C:\em1900
  \bin                - Emulator programs (download separately)
  \data               - Basic Peripheral files
  \data\binary        - Card image 1900 binaries
  \data\execs         - Card image Executives
  \data\setup-info    - Files used to configure the system
  \discs              - Exchangeable Disc library (ED8/30/60/200)
  \drums              - *DR/*HD (196x/2815) files
  \fds                - *FD (Bryant 2B) files
  \formatloops        - *LP format loop files
  \logs               - System logs, including console hard copy
  \tapes              - Magnetic Tape library
```

Files held directly under C:\em1900 (for use with the 1905 emulator) are:-

```
em1901A-385          - Shortcut to start 1905 emulator
1901A_MC0385.ini     - System definition file machine 111

README.TXT           - Basic installation instructions
```

## 5.2 Running the 1901A emulator

The emulator should be run from the top level directory (a shortcut is provided) with the programs being held in ./bin, or from a command line:

```
bin/1901a.exe -M mmm
```

Where:

-M mmm = machine number (mandatory)

More than one instance of 1901A.exe may be run, but each instance must have a unique machine number.

The emulator, from information in the .ini file, will start the various peripheral 'UI' programs required. The 'UI' applications can be started manually if desired, but it is not recommended.

The system now can be started and the required Executive (E1HS) loaded and the system run in the same manner as on a real 1901A processor. Information on this may be found in the following technical manuals:-

- TP4156 – 1901 Operating with Handswitches
- TP4381 – 1901 to 1903S Operating

Where an Operators' Console typewriter is being used, the 'ACCEPT' key is 'ESC' and the 'CANCEL' key is 'BACKSPACE'. There is no need to press 'INPUT' before typing, unless to interrupt output.

It is recommended that the date entered be 28 years in the past, this avoids any 'Year 2000' problems with utilities and keeps the calendar the same.

### 5.2.1 Boot Channel

The Executive for machine 385 (E1HS) is supplied on cards which should be loaded into the internal card reader (which may be preset in the .ini file, 'Exec = execs\e1hs.txt').

The Boot Channel has to be set on the hand switches (or preset in the .ini file, with 'Switches = \*37200126')

## 5.2.2 Booting E1HS from Cards

The following steps should be taken:-

- 1) Set mode switch to LOAD - preset
- 2) Allocate CR04 (having selected the card deck execs\elhs.txt - preset)
- 3) Set \*37200126 on the hand switches (for CR04) - preset
- 4) Press GO and wait for the GO light to extinguish
- 5) Set mode to RUN, passing through RESET
- 6) Press GO - Executive identifier \*70100601 will be displayed
- 7) Executive is loaded, now enter current date
- 8) Set switches for Day of Week (bits 0-11) – e.g. \*0005 for Friday
- 9) and Day (bits 12-23) – e.g. \*0003 for 3<sup>rd</sup>
- 10) Press GO
- 11) Lights should show \*00000001 (date okay so far)
- 12) Set switches for Month (bits 0-11) – e.g. \*0005 for May
- 13) and Year (bits 12-23) – e.g. \*0610 for 68
- 14) Press GO
- 15) Lights should show \*70100601 (Executive ready)

### Notes:-

#### Day of Week and Day

DoW is entered in the top 12-bits as a number between 0 (Sunday) and 6

Day is entered in the bottom 12-bits as 2 characters in the range 01 to 31

#### Month and Year,

Month is entered in the top 12-bits as a 2 characters in the range 01 to 12

Year is entered in the bottom 12-bits as 2 characters in the range 66 to 99

#### Errors

Lights show \*00000101, Day is out of range - correct switches and press GO.

Lights show \*00000102, Month is out of range - correct switches and press GO.

Lights show \*00000103, Year is out of range - correct switches and press GO.

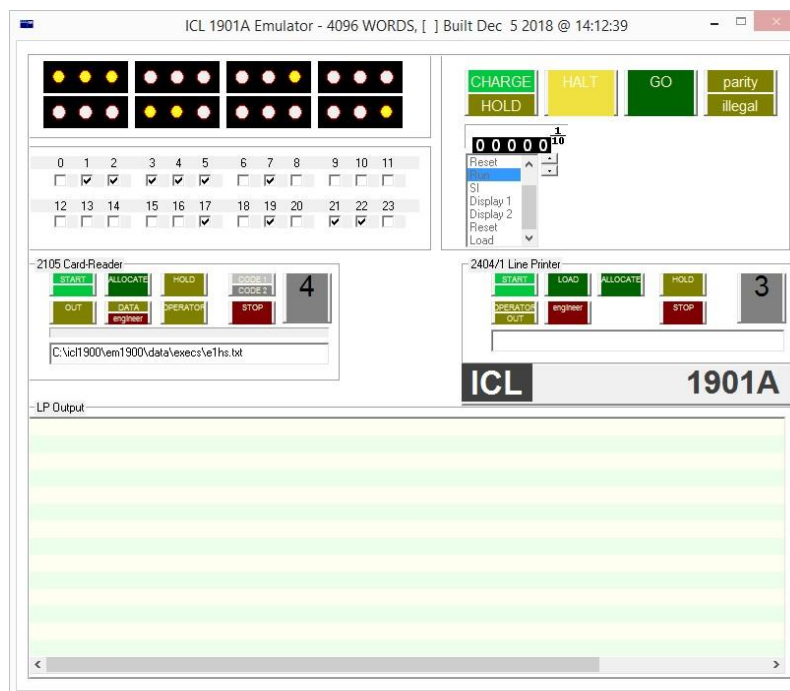
Lights show \*00000104, DoW is incorrect - restart at step 8

## 5.2.3 Running E1HS

Programs may now be loaded and run by entering the appropriate commands on the hand switches, pressing GO and reading the result from the light display.

For example, to load and run #XRLP (card list):-

- 1) Press 'hold' on CR04, if necessary, to clear the card reader
- 2) Press 'allocate' on CR04 to select the binary deck (e.g. binary\quad.txt)
- 3) Press 'allocate' to put CR04 online
- 4) Set \*14000004 (LO 4) on the hand switches
- 5) Press GO
- 6) Lights show \*30000000 (program loaded)
- 7) Press 'allocate' on LP03 to specify the LP output file
- 8) Press 'allocate' to put LP03 online
- 9) Press 'hold' on CR04, if necessary, to clear the card reader
- 10) Press 'allocate' on CR04 to select the card deck to be listed
- 11) Press 'allocate' to put CR04 online
- 12) Set \*01000031 (GO AT 25) on the hand switches
- 13) Press GO
- 14) #XRLP will list the card deck to the printer
- 15) Lights show \*06005050 (HALT:- HH)



## 5.2.4 Closing the Emulator

The emulator can be closed by setting the mode switch to 'OFF', the top most position.

## Part 6: Peripheral UI Programs



## 6.0 Peripheral UI Programs

This section attempts to explain the use of peripheral UIs (author: WJ Gallagher) to simulate the control panels on the various emulated peripherals. These are used in a similar manner to those on the real peripherals.

These programs are held in `./bin` and may be run directly from a command line (not recommended), but are normally run automatically from the `.ini` file.

They enable the Allocate/Hold functions on the basic peripherals, to 'load' card or paper tape input files or create output files. On magnetic peripherals they are the mechanism for loading/unloading magnetic tapes and exchangeable disc packs.

A peripheral UI is required for most peripherals (or peripheral cluster).

### 6.1 BP.exe

This is used to control the basic peripherals (TR, TP, CR, CP, GP and optionally LP instead of LP.exe) and requires one instance per configured peripheral. It is also used to control a cluster of slow (194x) or high speed (2851) drums. To manually start the UI:

```
bin/bp.exe -M mmm -S ss -m -s
```

Where:

<code>-M mmm</code>	=	machine number (mandatory)
<code>-S ss</code>	=	SI Channel (mandatory)
<code>-m</code>	=	minimise after start (optional, but usual)
<code>-s</code>	=	assume start pressed (optional, but usual)

For TR, TP, CR, CP and GP the UI contains 4 buttons/indicators:

<code>START</code>	–	Used to connect to processor, both halves lit when connected
<code>ALLOCATE</code>	–	Used to select a file or continue after 'hold', lit when file connected
<code>HOLD</code>	–	Used to pause peripheral, or disconnect file when paused
<code>STOP</code>	–	Used to disconnect/stop UI (not normally required)

For TR and CR there is an additional indicator 'DATA' which lights if an invalid (non-1900 character set) character has been read and a progress bar.

For LP there is an additional button/indicator 'LOAD', which allows a format loop to be selected.

When selecting files for TP, CP and LP any existing file chosen will be appended to, for GP it will be overwritten. The default file extension for paper tape files is `.tp7`, card and printer files use `.txt` and graph plotter files `.gplt`.

When a GP file is released, the file is automatically passed to `gplot.exe` to convert it to a bitmap (`.bmp`) of the plot, which will then be opened in your default viewer.

## 6.2 LP.exe

This is used to control the line printers and requires one instance per configured printer (unless BP.exe has been used). To manually start the UI:

```
bin/lp.exe -M mmm -S ss -m -s
```

Where the parameters are as for BP.exe.

The UI contains 5 buttons/indicators:

START	– Used to connect to processor, both halves lit when connected
LOAD	– Used to select a format loop (while not allocated)
ALLOCATE	– Used to select a file, lit when file connected
HOLD	– Used to pause peripheral, or disconnect file when paused
STOP	– Used to disconnect/stop UI (not normally required)

When selecting files for LP any existing file will be appended to. The default extension is '.txt'.

## 6.3 MTS.exe

This is used to control the magnetic tape transports and requires one instance per cluster. To manually start the UI:

```
bin/mts.exe -M mmm -S ss -m -s
```

Where the parameters are as for BP.exe.

For each transport on the cluster the UI contains 4 buttons/indicators:

Unit No.	– Operator's Number, lit when operable (red when rewinding)
SECURE	– Lit when a WPR has not been requested
LOAD	– Used to select/load a tape
UNLOAD	– Used to unload a tape

Also shown is the name of the currently mounted tape. It should be noted that once a tape has been mounted, a further press of 'load' is required to bring the tape online. Similarly, a tape that has been unloaded by program can be brought back online with a press of 'load'. One or two presses of 'unload' are required to dismount a tape, depending on whether it is in a loaded or unloaded state.

## 6.4 ED.exe

This is used to control the EDS8 exchangeable disc transports and requires one instance per cluster. To manually start the UI:

```
bin/ed.exe -M mmm -S ss -m -s
```

Where:

-M mmm = machine number (mandatory)  
-S ss = SI Channel (mandatory)  
-m = minimise after start (optional, but usual)  
-s = assume start pressed (optional, but usual)

For each transport on the cluster the UI contains 4 buttons/indicators:

Unit No. – Operator’s Number, lit when transport operable  
LOAD – Used to select/load a cartridge  
HOLD – Used to request a cartridge be unloaded

Also shown is the name of the currently mounted cartridge. It should be noted that ‘hold’ doesn’t actually unload a cartridge, but instead passes a request to Executive that the cartridge is required to be unloaded. Once all files have been closed and the cartridge is free Executive will send an unload command to the transport.

## 6.5 GPLOT.exe

This program is used to convert a .gplt file output by the Graph Plotter into a viewable .bmp file. This program be set as the default application for file type .gplt, to enable automatic viewing of the plot after a plotter file has been released. On completion of the conversion the .bmp file created is opened using the default viewer.

To manually start it:

```
bin/gplot.exe filename.gplt
```

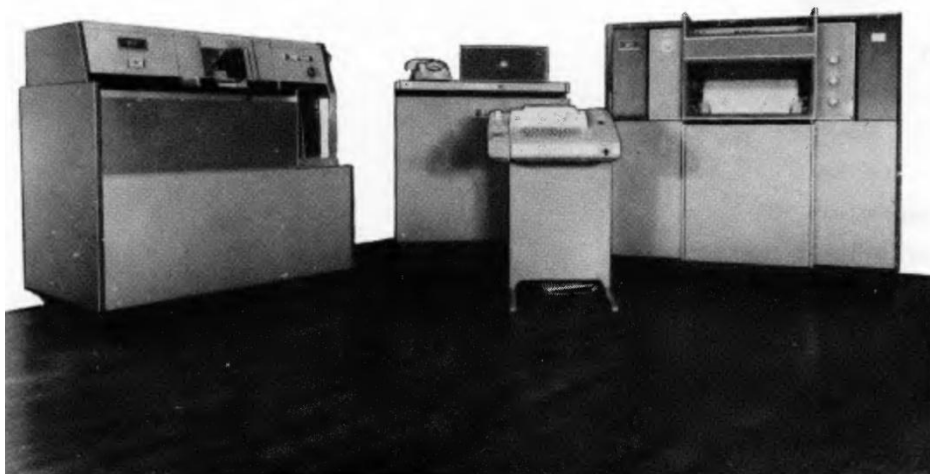
## 6.6 WG-CONSOLE.exe

This program emulates the buttons and lights on the right hand side panel of a West Gorton Operators’ Console.

Instead of using the keys ‘TAB’, ‘RETURN’ and ‘ESC’ the buttons ‘INPUT’, ‘ACCEPT’ and ‘CANCEL’ can be used, along with ‘F1’, ‘F2’, ‘F3’, ‘F4’ & ‘F5’.

The ‘P1’, ‘P2’, ‘P3’, ‘P4’ and ‘EXEC lights show program activity

## Part 7: Data Terminals



## 7.0 Introduction

This section describes the various data terminals available with the 1900 emulators. Currently just the basic TW7071 and TW7086 teletype type devices and the 7020 Remote Job Entry terminal.

These ‘terminals’ need to be manually started, they are not started as part of the emulator load process as are the User Interface programs. It is easiest to start them after the 1904S/1905 emulator and related UIs are loaded and running.

## 7.1 Installation

The various data terminal emulators are installed in directory `./bin` as a standard part of the installation. Any new/additional versions should also be copied into this directory. They will normally be run from the top level directory as `./bin/xxxx.exe`.

## 7.2 TW7071.exe and TW7086.exe

These are emulators for simple asynchronous teletype type terminals, the KSR33 (TW7071) 10cps teletype and the Termiprinter (TW7086) 30cps terminal.

To run them:

```
bin\TW7071.exe host port parity noise  
bin\TW7086.exe host port parity noise
```

Where:

- `host` = IP address of host 1904S (normally ‘localhost’)
- `port` = TCP port on Multiplexor/Scanner/Communications Processor
- `parity` = 0 (none), 1 (even), 2 (odd) – must match `.ini` file setting
- `noise` = 0 (silent) or 1 (enable sound)

Multiple copies of `tw7071.exe` and `tw7086.exe` may be run simultaneously, providing each is linked to a separate host/port.

## 7.3 RJE7020.exe

This is an emulator for the 7020 Remote Job Entry terminal and can be used with both GEORGE 3 (directly), GEORGE 2 (via #XKVB/Communications Manager) or via a program written using Multiplexor Housekeeping. It is connected via a synchronous port on a 7007 Multiplexor, 7930 Scanner or 7903 Communications Processor.

To run a 7020 terminal:

```
bin\rje7020.exe -h host -p port -a addr -l site -D spec -S n -B -G -X
```

Where:

- h = IP address of host 1900 (normally 'localhost')
- p = TCP port on Multiplexor/Scanner/Communications Processor
- a = Specify address as per switch setting (-a 1 through -a 12, default -a 1)
- l = Site name (optional, display for identification)
- D = Allows user specification of the config parameter (optional)  
It uses the same format as the G3 HW command entry:  
-D (CR,LP,TW,TW,TR,TP) – default all devices present  
-D (CR,LP,TW,TW) etc.
- S = Short card working, where n is a multiple of 8 < 80 (optional)
- B = Suppress blanks (optional)
- G = Autostart (optional)
- X = Operate as a 7013 instead (optional)

Multiple copies of RJE7020.exe may be run simultaneously, providing each is linked to a separate host/port.

## 7.4 TLSA.exe

This emulates a Transparent Line Sharing Adaptor which connects either via a synchronous port on a 7007 Multiplexor, 7930 Scanner or 7903 Communications Processor and allows up to 8 remote VT7181s to connect to a single port (line). It can also be used for multiple 7020 terminals, but not a mix of the two types.

To run it:

```
bin\tlsa.exe -h host -p port -l local
```

Where:

- h = IP address of host 1900 (normally 'localhost')
- p = TCP port on Multiplexor/Scanner/Communications Processor
- l = TCP port for multiple 7181/7020 connections

Multiple copies of tlsa.exe may be run simultaneously, providing each is linked to a separate host/port and uses a different local port.

## Part 8: PF56 Emulator



## 8.0 Introduction

This section attempts to explain the configuration and use of the PF56 emulator (author WJ Gallagher), which is designed to work with the 1904S emulator. The PF56 was used as a controller both for discs (2812) or communications (7903) on the larger 1900 series computers. It was a 16-bit processor with its own store linking to a 1900 host processor via a Standard Interface channel. There could be multiple PF56s connected to a 1900, each on its own SI channel.

The function of the PF56, disc controller or communication processor, depended both on the application modules fitted and the Dedicated Control Program (DCP) loaded.

## 8.1 Installation

The PF56 emulator (pf56.exe) should be installed in folder ./bin, a sub-folder of em1900, as part of the 1900 emulator installation. A .ini file (pf56-*mmm-ss*.ini), held in em1900 alongside the main system .ini file, is required for each invocation.

## 8.2 Running the PF56

Multiple copies of pf56.exe may be run simultaneously, each copy providing either a cluster of discs (EDS30/60/200) or a communication processor, linked to its own SI Channel.

The PF56 emulator opens a single window for each invocation (cluster), showing the console log and other information depending on operating mode (2812 disc controller or 7903 communications processor). The small amount of operator control/intervention required for each 'processor' is via this window including the loading of the Dedicated Control Program (DCP), loading/unloading disc packs, etc.

The emulator is normally run automatically from the main processor's .ini file, but can also be run manually if required (not recommended); in which case it should be run from the top level directory:

```
bin/pf56.exe -M mmm -S ss
```

Where:

-M mmm = machine number (mandatory)  
-S ss = SI Channel Number (mandatory)

The contents of the .ini file determine whether it is running as a 2812 or 7903, but must match the definition in the main system .ini file.

Although the PF56 is a processor in its own right and has an operators' console, very little 'operating' is required once the DCP has been loaded and in practice the PF56 can be ignored (minimised) unless the logging information output from time to time is of interest.

When typing commands on the PF56 emulator console, the 'ACCEPT' key is 'ESC' and the 'CANCEL' key is 'BACKSPACE'. There is no need to press 'INPUT' before typing, unless to interrupt output.

## 8.3 Loading the DCP into PF56 emulator

Before the PF56 can be used a DCP (or basic test program) must be loaded, just as a 1900 requires an Executive. The DCP can be loaded using one of three methods:-

- 1) From the Paper Tape Reader (especially engineers' tests, but any DCP or program)
- 2) From a disc, selectable transport (usual for 2812 DCPs)
- 3) Via the DDE interface from the 1900 (usual for 7903 DCPs)

### 8.3.1 Loading from the Paper Tape Reader

- 1) Ensure the Port Select switch is set to 5-CPU
- 2) Press LOAD and select the required .wush file
- 3) Press GO, when the LOAD light extinguishes

Follow the Operating Instructions appropriate to the DCP/Test Program.

### 8.3.2 Loading from a Disc

These steps are required before the 1904S can be booted if the 1900 Executive is going to be loaded from a disc on a 2812 cluster.

- 1) Ensure the disc cartridge containing the DCP is online.
- 2) Ensure the Port Select switch is set to 3-EDS.
- 3) Set the hand keys with the number of the port in which the EDS module is situated (left-hand 8 keys) and the number of the transport to load from (right-hand 8 keys).
- 4) Press LOAD (it should very briefly light)
- 5) Press GO, when the LOAD light extinguishes, to enter the Bootstrap. A "?" will then be typed on the typewriter console.
- 6) Type the identifier for the DCP required ('Z' for EZDB – DCP for EDS60). If this is correct the DCP will be loaded, otherwise operator action will be requested.
- 7) The DCP is entered, types its identifier and requests the date. If this does not happen return to step (4) and try loading again

The boot cartridge is normally pre-loaded in the .ini file and the settings for steps (2) & (3) are normally preset in this file.

For further operating instructions, see section 8.4.

### 8.3.3 Loading via the DDE Interface

To use this method the 1904S system needs to be up and running

- 1) Load and run #SS80 in the 1904S processor
- 2) Ensure the Port Select switch is set to 4-DDE
- 3) Press LOAD (it should briefly light)
- 4) Press GO, when the LOAD light extinguishes

The Port Select is normally pre-set in the .ini file.

For further operating instructions, see section 8.5.

### 8.3.4 Closing the PF56 emulator

This is simply achieved by pressing the 'STOP' button twice, but beware if running as a 2812 disc controller of doing this until all of the loaded cartridges have been 'spun down' and unloaded, otherwise there is a strong risk of data loss. Similarly, in 7903 mode any communications programs should have already been closed.

## 8.4 Using the PF56 as a 2812 Disc Controller

When the PF56 emulator is operating as a 2812 disc controller, there are a set of buttons vertically on the right-hand side of the window representing the attached disc 'transports'. The number of buttons depends on the number of transports defined 1-9 (EDS30/EDS60) or 1-8 (EDS200) in the Executive and .ini files, which must match.

These buttons both show the current status of the transport and allow operator actions on the transports. The number shown on the button is the Operators' Unit Number of the transport and the background colour indicates the status of that transport:-

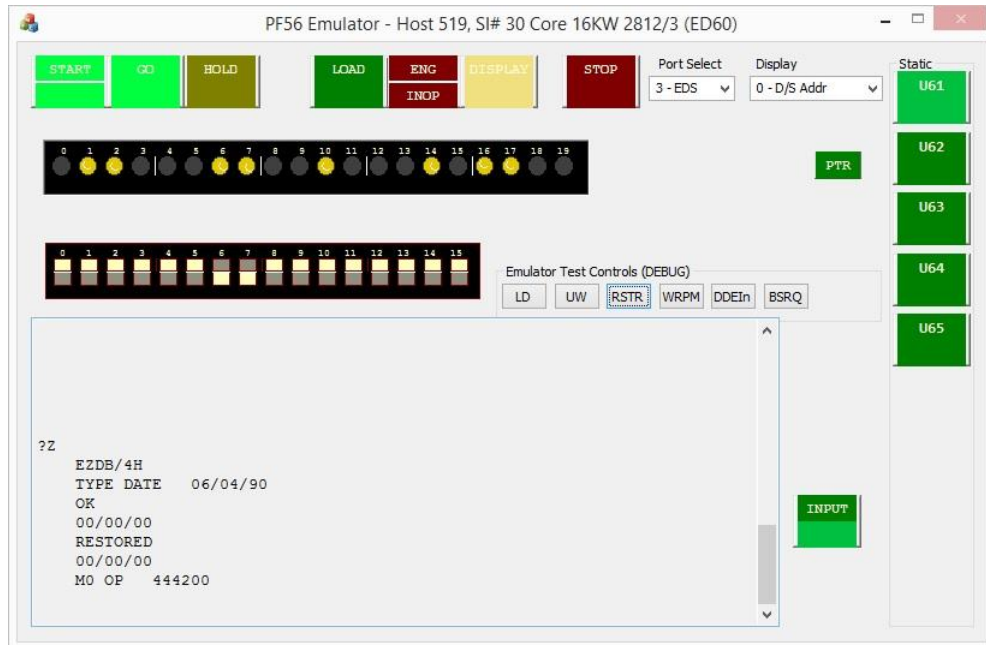
- Green (unlit) No cartridge loaded
- Green (lit) Cartridge loaded and ready
- Yellow Cartridge loaded, HOLD set
- Red Cartridge loaded with Online Test Switch set

To action a specific transport, click the appropriate button to open a transport window. You can then:-

- Load a cartridge (when no cartridge currently loaded) by pressing START and selecting the required cartridge. If the transport is required for an OLT, tick 'OLT Enabled' before selecting the cartridge.
- Request the current cartridge be taken offline by pressing HOLD. This will signal Executive, which will spin the drive down when all files are closed.
- Forcibly remove the cartridge by pressing STOP – not normally recommended.

Once running the 2812 requires no operator intervention in normal circumstances. There are various console commands available, most of which are used for test purposes.

The only command an operator may require is 'MS' to force the printing of statistics, which are output at regular intervals provided there has been disc activity. Just type MS and press accept. If there has been no disc activity since the last report, nothing will be printed.



If there are multiple disc controllers, they should all be loaded in turn before booting the 1904S.

## 8.5 Using the PF56 as 7903 Communications Processor

In addition to the DCP a Specification defining the communications equipment connected is also required. This information can be input via the console (not recommended), read from the attached paper tape reader, or downloaded with the DCP when being loaded via the DDE interface by #SS80.

For full operating instructions, see TP4439 Operating Communications Controllers.

**EZ5A/7/A/ST2**  
**32K STORE**  
**DCP READY**  
**SA0DS00A/7A READY**

## 8.6 Installing Bootstraps, DCPs and OLTs

Usually the Bootstraps, DCPs and OLTs would be installed on a newly initialised cartridge (created by running #XPJ1/#XPJ2) by the site engineer.

Assuming a newly initialised EDS60 cartridge with an Executive Overlay Area, the next step is to create an ICLKHARDFILE to contain these items. This can either be created manually using #XPJC or as part of the #DCPD run.

A sample set of #XPJC parameters might consist of:-

```
XPJC1,1,444200,ICLKHARDFILE,1,0,2,4,M,
XPJC4,S(2,3,0,295)*
****
```

This should be followed by the run of #DCPD, which must be run before #ENGF is used to install E6RM and its bootstrap. Parameters for #DCPD are:-

```
DCPD7,444200,*
DCPD6,444200,*
DCPD5,444200,*
****
```

The DCPD7 line is only required if #XPJC has not been used to create ICLKHARDFILE.

The run instructions, using the appropriate library tape (EDS30/60 or EDS200) are:-

```
FI#DCPD#DCPS      OK
0#DCPD; U35 AS 0 OM*34100
0#DCPD; DELETED :- LO #DCPD  35 OK
S#DCPD/6 X.Y.Z
0#DCPD; HALT:-
CLSD U35 PROGRAM DCPS/0/0 :- *116 RET 3994
  GO#DCPD21      OK
0#DCPD; DISPLAY :- DCPD/6 X.Y.Z
0#DCPD; UNIT  8 USED AS  0
0#DCPD; DISPLAY :- CSN 444200
0#DCPD; DISPLAY :- EDS  60 LEV1 B/S VERSION 3 WRITTEN
0#DCPD; U35 AS 0 OM*00100
0#DCPD; LOAD SU *444200
U60 SU *444200
0#DCPD; CORE    6912
0#DCPD; DISPLAY :- WARNING "GO" OVERWRITES HARDFILE
0#DCPD; HALTED :- 'ON 0' TO APPEND
  GO#DCPD      OK
0#DCPD; DISPLAY :- EDS  60 LEV2 B/S VERSION 4 WRITTEN
0#DCPD; DISPLAY :- KA0DM11A/2  WRITTEN AS A
0#DCPD; DISPLAY :- KA0DM11B/2  WRITTEN AS B
0#DCPD; DISPLAY :- KA0DM11C/2  WRITTEN AS C
0#DCPD; DISPLAY :- KA0DM11D/3  WRITTEN AS D
0#DCPD; DISPLAY :- KA0DM11E/2  WRITTEN AS E
0#DCPD; DISPLAY :- KA0DM11F/3  WRITTEN AS F
0#DCPD; DISPLAY :- KA0DM11G/1  WRITTEN AS G
0#DCPD; DISPLAY :- KA0DM10A/2  WRITTEN AS I
0#DCPD; DISPLAY :- KA0DM10B/C  WRITTEN AS J
0#DCPD; DISPLAY :- KA0DM10C/2  WRITTEN AS K
0#DCPD; DISPLAY :- KA0DM10D/2  WRITTEN AS L
0#DCPD; DISPLAY :- KA0DM10E/2  WRITTEN AS M
```

```
0#DCPD; DISPLAY :- KA0DM10F/2 WRITTEN AS N
0#DCPD; DISPLAY :- KA0DM00T/1 WRITTEN AS T
0#DCPD; CORE 14592
0#DCPD; DISPLAY :- EZDD/1H WRITTEN AS X
0#DCPD; DISPLAY :- EZDD/1H/03 WRITTEN AS Y
0#DCPD; DISPLAY :- EZDB/4H WRITTEN AS Z
0#DCPD; UNIT 8 FREE
0#DCPD; CORE 5888
0#DCPD; HALTED :- RUN COMPLETE
CLSD U35 PROGRAM DCPS/0/0 :- *116 RET 3994
DE#DCPP OK
0#DCPD; DELETED :-
```

As seen above, this has written DCP L1 and L2 Bootstraps to cartridge \*444200, DCPs EZDD/1H, EZDD/1H/03 and EZDB/4H, along with a set of OLTs.

E6RM and its bootstrap can now be added to the cartridge, once an ICLKEXECFILE file has been created.

## Part 9: PF56 Test Programs



## 9.0 Introduction

This section attempts to explain how to use the various test programs we have for the PF56 on of the PF56 emulator (author WJ Gallagher), the controller that ICL used as the 2812 Disc Controller (EDS30/60/200) and the 7903 Communications Processor on the bigger 1900 series computers.

We have no documentation from ICL regarding how to run these program, so we have had to figure out how to run them and interpret the results ourselves.

Therefore the following could be rather error-prone. Anyone with knowledge will be most welcome to provide corrections, brickbats or documents as appropriate.

## 9.1 Basic Stand Alone CPU Diagnostics

Currently we have six diagnostic programs which appear to provide a progressive series of tests, with each test assuming that the previous test has been completed.

The test programs are loaded via the integrated paper tape reader, so the 'Port Select' switch needs to be set to 'CPU'. To load a program click the green LOAD button, select the appropriate test 'tape' (.wush file) and when the LOAD light extinguishes, follow the instructions for the specific program.

### 9.1.1 Initial Jumps Test (SA00PUIJ)

```
Handswitches: Ignored
Display:      Set to X7
              The test sets values into X7 and halts to communicate
              results to the user
Press GO:    The lights should display *07070 (hex)
Press GO:    The lights should display *FFFF0 (hex)
```

If you change the 'Display' switch to position M0, then each time you click GO the value of the next instruction address will be displayed. Comparison with the assembly listing will show where in this rather simple but essential diagnostic program execution has reached.

### 9.1.2 Initial Functions Test (SA00PUIF)

```
Handswitches: Set (hex) F080 (Switches 0,1,2,3 and 8 on)
Display:      Set to X7
              The test sets values into X7 and halts to communicate
              results to the user
Press GO:    The lights should display *00070 (hex)
Press GO:    The lights should display *07070 (hex)
Press GO:    The lights should display *F8F80 (hex)
Press GO:    The lights should display *00250 (hex), the processor is
              running, GO light is lit
```

Changing the 'Display' switch to other positions will show the program state as it is running

### 9.1.3 Interrupt Levels Test (SA00PUIL)

Handswitches: Switches 1, 2 and 3 control the test selection.  
Switch 0 controls report to the console (on) or by halts.  
Running with only one of switches 1, 2 or 3 on forces  
running of that test.

Display: Set to Levels and Conditions

Press GO: The program will start running with the lights showing  
the 'Levels and Conditions' with lights 4 through 7  
indicating the level suspension binaries and lights 8  
through 15 displaying the ZNVCPQRS status bits.  
Clicking the HOLD or DISPLAY buttons will cause program  
interrupt requests and a suitable message will be typed  
on the console.

### 9.1.4 General Function Test (SA00PUFA)

This is the most complex test that we have of the CPU.

Sixteens tests, many with multiple sub-tests are executed sequentially in level 0 and if switch 3 is off, the entire test set is then repeated in levels 1, 2, 3 and 4. The program then repeats the execution in level 0.

Handswitches: Switches 3 controls multi-level testing.

Display: Set to Levels and Conditions

Press GO: The program will start running a set of tests.

## 9.1.5 Function Timer Test (SA00PUFT)

Handswitches: Unknown  
Display: Unknown  
Press GO: Unknown

## 9.1.6 Typewriter Test (SA00PUTT)

This program provides 6 tests for the console typewriter, each of which is in some way designed to exercise or test the working of some aspect of the console typewriter and the logic associated with it. All of the tests, except test 6, are printer only tests and are used to exercise the printer, to check for platen alignment and the correct movement of the print drum. Test 6 is used to test the operation of the keyboard and the INPUT button.

Handswitches: Test selection.  
Switch 1 repeated output of 64 character set.  
prints 64 line pattern.  
Switch 2 print names of control characters.  
Switch 3 carriage return test.  
print multiple lines of varying length.  
Switch 4 worst case print drum exerciser.  
print 3 lines each of 12 patterns.  
Switch 5 repeated output of single character.  
prints 64 lines, for all characters.  
Switch 6 input test.  
when entered the operator can type messages at  
the console, on pressing ACCEPT the message will  
be typed back to the operator. Any characters  
typed when the INPUT light is active will result  
in a message to that effect.  
The test will terminate on receipt of the accept  
unless switch 14 is set on before ACCEPT is  
pressed. With switch 14 active the test is  
continuous. Clearing SW14 and pressing ACCEPT  
will cause the subtest to complete.

Display: As required  
Press GO: Set switch to select test, press DISPLAY to run test.

## 9.2 2812 On Line Test (OLT) Programs

We have various diagnostic programs for discs, which are loaded with the DCPs.

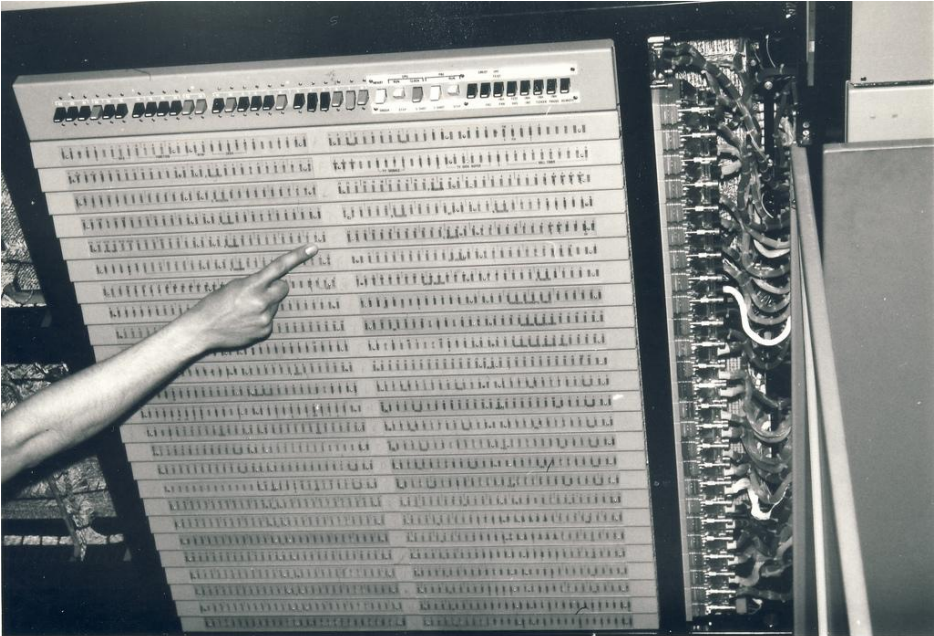
These test programs can be loaded and run from the disc via console commands. The transport(s) under test should have a test cartridge loaded in 'OLT' mode.

EDS30			EDS60			EDS60 (Dual)			EDS200			Test Description
A	SA0DM00A	/2	I	KA0DM10A	/2	A	KA0DM11A	/2	A	LA0DM00A		Format/Write/Read
B	SA0DM00B	/2	J	KA0DM10B	/2	B	KA0DM11B	/2	B	LA0DM00B		
C	SA0DM00C	/2	K	KA0DM10C	/2	C	KA0DM11C	/2	C	LA0DM00C		Alternating Seek Test
D	SA0DM00D	/3	L	KA0DM10D	/3	D	KA0DM11D	/3	D	LA0DM00D		
E	SA0DM00E	/2	M	KA0DM10E	/2	E	KA0DM11E	/2	E	LA0DM00E		
F	SA0DM00F	/2	N	KA0DM10F	/2	F	KA0DM11F	/3	F	LA0DM00F		
						G	KA0DM11G	/1				
			T	KA0DM00T	/1				T	LA0DM00T	/E	DCP Trace Facility

## 9.3 7903 On Line Test (OLT) Program

The 7903 DCP has an in-built test program SA0DS00A, which is loaded as part of the DCP, for testing communication to remote devices. See TP4439 for full instructions.

# Part 10: Configuration Files



## 10.0 Configuration files

The configuration files (.ini files) are text files which define the configuration of an emulator. They are named:-

- 1901a\_MC0%M.ini
- 1904s\_MC0%M.ini
- 1905\_MC0%M.ini
- pf56-%M-%S.ini

where %M is the 3 digit machine number and %S an SI channel number.

The configuration described by a .ini file must match the Executive configuration for that machine.

These files consist of a number of sections (section name enclosed in square brackets), some optional, each containing a variable number of keyword entries (identifier followed by '=' then value).

## 10.1 Sections Overview

There are five section headings, the last of which is repeated for each SI Channel that has a peripheral connected.

- |                                 |   |
|---------------------------------|---|
| ➤ Description (optional)        | - Describes the configuration (display only)      |
| ➤ Processor (mandatory)         | - Describes the processor options                 |
| ➤ Interface-SInn (mandatory WG) | - Describes the peripheral, nn=channel number     |
| ➤ Terminal-n (mandatory SV)     | - Describes the peripheral, n=channel number      |
| ➤ Switches (mandatory PF56)     | - Initial settings for processor control switches |
| ➤ Module-n (mandatory PF56)     | - Describes the hardware options fitted           |
| ➤ SCNn (mandatory 7903)         | - Describes the scanner equipment fitted          |

The terms SV and WG used above:-

- SV: Stevenage (1901A, 1902A, 1902S, 1902T, 1903A, 1903S)
- WG: West Gorton processors (1904/1905/1906/1907/1909 unaffixed and 1904 affixed)

## 10.2 [Description] Section

This section, if included, contains a single keyword 'Text' which should be followed by a text string describing the configuration. The 1904S and 1905 emulators will display this at the top of the configuration when starting.

## 10.3 [Processor] Section

This section describes the characteristics of the processor, using various keywords, some of which are dependent on emulator and processor type.

Keyword	Value	Emulator	Description	Value Range
Type	ProcType	1904S	Specifies the type of processor (and whether FPU fitted in certain cases)	1904S, 1904A, 1903T, 1904E, 1904F, 1905E, 1905F, 1906, 1907
		1905		1904, 1905, 1909, FP6000
Core	Value (K)	1901A	Specifies the number of KWords of core store fitted	4, 8, 16
		1904S		64, 96, 128, 160, 192, 256
		1905		8, 16, 24, 32
		PF56		8, 16, 24, 32
HWFP	Boolean	1904S	Specifies if Floating Point Unit fitted to 1904S, 1904A or 1903T	True/False
Boot SI Channel	Value	1904S	Hardware channel for loading	0 (def), 4-21 and 24-41
Mill Timer	Boolean	1905	Hardware Mill Timer fitted	True/False
TOD Clock	Boolean	1905	Hardware Digital Clock fitted	True/False
Buttons Wanted	Boolean	1904S	Whether to run the WG console extension UI (Lights/Buttons)	True/False
		1905		
CCF	Boolean	1901A	Commercial Computing Feature (hardware group 4 functions) fitted	True/False
SCF	Boolean	1901A	Scientific Computing Feature (hardware group 13 functions) fitted	True/False
Console	Boolean	1901A	Operators' Console fitted	True/False
Exec	Text	1901A	Pre-load name of file holding the Executive to be loaded	File name
Keyboard	Text	1901A	Keyboard Language	UK, US
		PF56		UK, US
Hand Keys	Value (Octal)	1901A	Initial Setting of Processor Switches	*00000000 - *77777777
	Value (Hex)	PF56		x0000 - xFFFF

## 10.4 [Interface-SInn] and [Terminal-n] Sections

This is used to define the peripherals attached to the processor, and repeated for each active channel. 'INTERFACE-SInn' is used for the 1904S and 1905, 'Terminal-n' for the 1901A; reflecting the different terminology used between West Gorton and Stevenage systems.

For 'INTERFACE-SInn', nn has a range of 04-21 (slow channels) and 24-41 (fast channels), channels 22 and 23 are not available.

For Terminal-n', n has a range of 1-7; 1-4 being standard SI channels, 5-7 for the in-built CR, LP and TEDS

Keyword	Value	Description	Value Range
Type	PeriType	Specifies the type of peripheral	See Peripheral Types table
Operators Unit No.	Value	Operators Unit No.	4 to 99
UI Command	Text	Name of UI program to run for this peripheral	BP.exe, LP.exe, MTS.exe, ED.exe
Format Loop	Text	Name of format loop file to pre-load (line printers only)	Filename
Number of Transports	Value	Number of transports on a cluster device – Magnetic Tape (not 1974), Discs, Drums	From 2 to 8 Varies according to device
Density	Value	Recording density (1974 only)	200, 556, 800
Transport n File	Text	Preload filename for a disc transport	Filename
<b>Following Keywords are for the 7007 Multiplexor only</b>			
BasePort	Value	IP/TCP Port for first line	Port (usually 10000)
Control Word Base	Value	Exec address for MX Control	Address ( usually 4096)
Number of Lines	Value	Number of lines fitted	10, 21, 31, 42, 52, 63
Default Speed	Value	Default Line Speed (bps), if not specified for a line	50, 110, 300, 1200 async 1200, 2400, 4800 sync
Parity	Value	Default Line Parity	0 (none), 1 (even), 2 (odd)
Line n Speed	Value	Specify speed for line n	50, 110, 300, 1200 async 1200, 2400, 4800 sync

Line n Parity	Value	Specify parity for line n	0 (none), 1 (even), 2 (odd)
Line n Sync	Boolean	Specify line n is synchronous	True/False
Line n Sync Timeout	Value	Specify timeout delay (mS)	Typical 1000
Line n Echo	Boolean	Specify 'echo' for line n	True/False
Line n Murray Mode	Value	Specify 'Murray' code	1=5-bit Murray code
Line n Sentinel	Boolean	Specify if line n is a sentinel	True/False

## 10.5 Valid Peripheral Types

PeriType	Description	Notes
TR1915/1	1000 cps paper tape reader	NSI - 1905 only
TR1915/2	1000 cps paper tape reader	
TR1916/1	300 cps paper tape reader	NSI - 1905 only
TR1916/2	300 cps paper tape reader	
TP1925/1	110 cps paper tape punch	NSI - 1905 only
TP1925/2	110 cps paper tape punch	
RP2601	300 cps paper tape reader/110 cps punch	1901A only
RP2602	1000 cps paper tape reader/110 cps punch	1901A only
LP1930	1000 lpm 120pp line printer	NSI - 1905 only
LP1931	300 lpm 120pp line printer	unbuffered
LP1932	600 lpm 120pp line printer	unbuffered
LP1933/1	1200 lpm 96pp line printer	
LP1933/2	1200 lpm 120pp line printer	
LP1933/3	1200 lpm 160pp line printer	
LP2404/2	300 lpm 120pp line printer	unbuffered 1901A internal
LP2405/2	600 lpm 120pp line printer	unbuffered 1901A internal
LP2430/2	1350 lpm 160pp train printer	
LP2430/3	1350 lpm 160pp train printer	
CR1911/1	900 cpm card reader	

<b>PeriType</b>	<b>Description</b>	<b>Notes</b>
CR1911/2	900 cpm card reader	
CR1912/1	300 cpm card reader	
CR1912/2	300 cpm card reader	
CR2101/0	1600 cpm card reader	
CR2101/1	1800 cpm card reader	
CR2101/2	2000 cpm card reader	
CR2103	300 cpm card reader	reduced facility
CR2105/1	300 cpm card reader	1901A internal
CR2106/1	600 cpm card reader	1901A internal
CP1920/2	100 cpm card punch	
CP1922/1	33 cpm card punch	
CP2151	100 cpm card punch	buffered
GP1934	graph plotter	NSI - 1905 only
GP1934/1	graph plotter	
GP1934/2	graph plotter	
GP1934/3	graph plotter	
GP1934/4	graph plotter	
GP1934/5	graph plotter	
GP1934/6	graph plotter	
MT1971	7-Track NRZI 200/556 bpi (slow)	Cluster Device No. of Transports = 2, 4, 6
MT1972	7-Track NRZI 200/556 bpi	
MT1973	7-Track NRZI 200/556/800 bpi	
MT1974	7-Track NRZI 200/556/800 bpi	NSI - 1905 only
MT2504	9-Track PE 1600 bpi	Cluster Device No. of Transports = 2, 3, 4
MT2505	9-Track PE 1600 bpi	
MT2506	9-Track NRZI 800 bpi	
MT2507	9-Track NRZI 800 bpi	
MT2508	9-Track PE 1600 bpi	

<b>PeriType</b>	<b>Description</b>	<b>Notes</b>
MT2509	9-Track PE 1600 bpi	Cluster Device
MT2510	9-Track PE 1600 bpi	No. of Transports = 2, 3, 4
CT2501	8-Track Cartridge Tape	1901A only
DA2801	EDS-4	Cluster Device
DA2802	EDS-8	No. of Transports = 2 - 8
DA2807	DEDS-6	Cluster Device
DA2808	DEDS-8	No. of Transports = 2, 4, 6, 8
DA2820	TEDS-1	Cluster Device
DA2821	TEDS-2	No. of Transports = 2, 4, 6, 8
FD2804	Bryant 2 fixed disc	Cluster Device
FD2805	Bryant 2A fixed disc	No. of Transports = 1 - 4
FD2806	Bryant 2B fixed disc	
DR1962	Slow Drum	Cluster Device
DR1963	Slow Drum	No. of Transports = 1 - 4
DR1964	Slow Drum	
HD2851	High Speed Drum	
ES2812	2821Controller	ED30, EDS60, EDS200
IT1938	Interrogating Typewriter	
UX7010	Uniplexor (Sync)	
UX7070	Uniplexor (Async)	
MX7007/2	Multiplexor	
SC7930	Scanner	
CC7903	Communications Processor	
ID7180	Local VDU Controller (mk.2)	
PB7210	Inter-Processor Buffer	

## 10.6 [Switches] Section

The switches section is mandatory and defines the initial position of the CPU function switches on the PF56 processor. There are 3 function switches plus the 16 hand keys.

- Initial Mode Setting - Sets processor mode, should always be set to 0 (Operator)
- Initial Port Setting - Sets the load address, value 0 (Check) to 6 (Port 1)
- Initial Display Setting - Sets the light display output, value 0 to 29

The MODE (Engineers' Control) switch has 8 positions:-

0	Operator (normal position)
1	Run
2	SIn
3	SStep
4	Alter
5	Display
6	SWP
7	SIWP

The PORT SELECT switch has 7 positions, defines the boot module and display source:-

0	CHECK
1	OFF (CPU Display Register)
2	Module 5 (processor)
3	Module 4 (typically DDE)
4	Module 3 (typically EDS)
5	Module 2 (typically MCIU)
6	Module 1 (typically unused)

The DISPLAY switch has 30 positions, some of which are:-

0	Active levels and Conditions
1..7	X1 .. X7
8..15	M0 .. M7
16	X0
17	RA
18	RF

Example:

```
[Switches]
Initial Mode Setting = 0
Initial Port Setting = 2
Initial Display Setting = 8
```

## 10.7 [Module-n] Section

These sections define which features have been fitted to the PF56, to define its function (2812 disc or 7903 communications controller). Each module (0-5) can contain a single feature, with Module-5 containing the processor (already defined).

### 10.7.1 [Module-4] section

This section defines the module fitted in to Slot 4, which is normally the DDE; the link to the 1900 parent processor. There are 4 keywords required for the DDE configuration.

- Type – defines the module type (DDE)
- Operators Unit No – defines the unit no of a 7903 or the first disc transport
- Hostname – defines TCP/IP host for linking to the processor
- Port – defines TCP/IP port for linking to the processor

Example:

```
[Module-4]
Type = DDE
Operators Unit No = 60
Hostname = localhost
Port=2812
```

### 10.7.2 [Module-3] section

This section defines the module fitted in to Slot 3, which is normally the disc drive interface when the PF56 is being used as a 2812 Disc Controller. There are 4 keywords required for the DDE configuration.

- Type – defines the module type (EDS-30, EDS-60, EDS-200)
- Number of Transports – defines the number of disc transports attached
- Transport n File – defines a disc cartridge to be preloaded on transport 'n'
- OLTn – defines that transport 'n' be switched to test mode (True)

Example:

```
[Module-3]
Type = EDS-60
Number of Transports = 5
Transport 0 File = ./discs/444200.eds60
OLT5 = True
```

### 10.7.3 [Module-2] section

This section defines the module fitted in to Slot 2, which is normally the MCIU. This has 4 ports, each of which can have a scanner selector connected, There are 2 keywords required for the MCIU configuration, the second of which may be repeated. Additional sections are required to describe the scanner selectors connected.

- Type – defines the module type (MCIU)
- Portn – defines which ports have scanners connected (n=0..3)

Example:

```
[Module-2]
Type = MCIU
Port0 = SCN0
Port1 = SCN1
```

### 10.7.4 [Module-1] section

This section defines the module fitted in to Slot 1, which is not normally used. A second alternative MCIU (selected by the specification tape) could be fitted, both MCIUs cannot be active together. If another MCIU were fitted, the parameters are the same as for Module-2 above. If nothing is fitted to this module, this section should be omitted.

### 10.7.5 [Module-0] section

This optional section defines the module fitted in to Slot 0, which is normally the Code Converter, an extension to the DDE when the PF56 is being used as a 7903 Communiations processor. There is just the single keyword required.

- Type – defines the module type (CC)

Example:

```
[Module-0]
Type = CC
```

## 10.8 Scanner Sections

The scanner sections are optional and only required when configured as a 7903. The number of sections must match the number of active ports defined for the MCIU.

Each scanner selector connected to a 7903 MCIU port can have up to 3 scanners (each of 16 lines) connected, giving a maximum of 48 lines per scanner selector and 192 lines per MCIU.

The scanner types and engineers links need to be defined for each scanner selector.

The only scanner type currently available is the 7930/3 – scanner universal 16 lines.

For details on the engineer's links to TP4439 page 36.

### 10.8.1 [SCNn] section

This defines the scanners connected to the scanner selector connected to port 'n' of the MCIU.

- Type0 – defines the scanner type connected as scanner 0 (7930/3)
- Type1 – defines the scanner type connected as scanner 1, if required
- Type2 – defines the scanner type connected as scanner 2, if required
- Engineer Link – defines the engineers' links (A, B, C or D)

Example:

```
[SCN0]
Type0 = 7930/3
Type1 = 7930/3
Engineer Link = D
```

# Appendices

## Appendix 1 – Example 1904S Configuration File

```
[Description]
Text=1904S EMULATOR INITIAL RELEASE (SYS621)

[Processor]
Type=1904S
Core=256
HWFP=true

[Interface-SI04]
Type=TR1916/2
Operators Unit No=4
UI Command=BP.exe

[Interface-SI05]
Type=CR1911
Operators Unit No=9
UI Command=BP.exe

[Interface-SI06]
Type=TP1925/2
Operators Unit No=10
UI Command=BP.exe

[Interface-SI07]
Type=CP1920/2
Operators Unit No=13
UI Command=BP.exe

[Interface-SI08]
Type=LP1933/2
Operators Unit No=14
Format Loop=standard.ini
UI Command=LP.exe

[Interface-SI09]
Type=LP1933/2
Operators Unit No=15
Format Loop=standard.ini
UI Command=LP.exe

[Interface-SI10]
Type=MX7007/2
Operators Unit No=29
BasePort=10000
Control Word Base=4096
Number of Lines=10
;
; TTYs on L1-L6
;
Parity=1
Default Speed=110
;
; Termiprinters on L7-L10
;
Line 7 Speed=300
Line 8 Speed=300
```

Line 9 Speed=300  
Line 10 Speed=300

[Interface-SI11]  
Type=GP1934/4  
Operators Unit No=19  
UI Command=BP.exe

[Interface-SI24]  
Type=DA2802  
Operators Unit No=40  
Number of Transports=6  
Transport 0 File=./discs/310010  
Transport 1 File=./discs/310011  
Transport 2 File=./discs/310012  
Transport 3 File=./discs/310013  
Transport 4 File=./discs/310014  
UI Command=ED.exe

[Interface-SI25]  
Type=DA2802  
Operators Unit No=50  
Number of Transports=6  
Transport 0 File=./discs/310000  
Transport 1 File=./discs/310001  
Transport 2 File=./discs/310002  
Transport 3 File=./discs/310003  
Transport 4 File=./discs/310004  
UI Command=ED.exe

[Interface-SI26]  
Type=MT2504  
Operators Unit No=30  
Number of Transports=3  
UI Command=MTS.exe

[Interface-SI27]  
Type=MT2504  
Operators Unit No=33  
Number of Transports=3  
UI Command=MTS.exe

## Appendix 2 – Example 1905 Configuration File

```
[Description]
Text=Putney Bridge House 1905 System (circa 1965)

[Processor]
Type=1905
Core=32
Mill Timer=true
TOD Clock=true

[Interface-SI04]
Type=TR1915/1
Operators Unit No=4
UI Command=BP.exe

[Interface-SI05]
Type=TR1916/1
Operators Unit No=5
UI Command=BP.exe

[Interface-SI06]
Type=IT1938
Operators Unit No=6
Parity=1

[Interface-SI08]
Type=TP1925/1
Operators Unit No=8
UI Command=BP.exe

[Interface-SI09]
Type=TP1925/1
Operators Unit No=9
UI Command=BP.exe

[Interface-SI10]
Type=GP1934/4
Operators Unit No=10
UI Command=BP.exe

[Interface-SI12]
Type=LP1930
Operators Unit No=12
Format Loop=standard.ini
UI Command=LP.exe

[Interface-SI13]
Type=LP1933/2
Operators Unit No=13
Format Loop=standard.ini
UI Command=LP.exe

[Interface-SI15]
Type=CR1911/2
Operators Unit No=15
UI Command=BP.exe
```

[Interface-SI16]  
Type=CR1912/2  
Operators Unit No=16  
UI Command=BP.exe

[Interface-SI18]  
Type=CP1920/2  
Operators Unit No=18  
UI Command=BP.exe

[Interface-SI24]  
Type=MT1974  
Density=556  
Operators Unit No=24  
UI Command=MTS.exe

[Interface-SI25]  
Type=MT1974  
Density=556  
Operators Unit No=25  
UI Command=MTS.exe

[Interface-SI26]  
Type=MT1974  
Density=556  
Operators Unit No=26  
UI Command=MTS.exe

[Interface-SI27]  
Type=MT1974  
Density=556  
Operators Unit No=27  
UI Command=MTS.exe

[Interface-SI28]  
Type=MT1974  
Density=556  
Operators Unit No=28  
UI Command=MTS.exe

[Interface-SI29]  
Type=MT1974  
Density=556  
Operators Unit No=29  
UI Command=MTS.exe

[Interface-SI30]  
Type=MT1974  
Density=556  
Operators Unit No=30  
UI Command=MTS.exe

[Interface-SI31]  
Type=MT1974  
Density=556  
Operators Unit No=31  
UI Command=MTS.exe

## Appendix 3 – Example 1901A Configuration File

```
[Description]
Text=Basic 1901A Hand Switch System
```

```
[Processor]
Core = 4
Console = false
Exec = execs\elhs.txt
Hand Keys = *37200126
```

```
[Terminal-1]
```

```
[Terminal-2]
Type = CR2103
Operators Unit No=5
```

```
[Terminal-3]
Type = RP2601
Operators Unit No=1
```

```
[Terminal-4]
Type = CP1920/2
Operators Unit No=6
UI Command=BP.exe
```

```
[Terminal-5]
Type = CR2105/1
Operators Unit No=4
```

```
[Terminal-6]
Type = LP2405/2
Operators Unit No=3
```

```
[Terminal-7]
```

## Appendix 4 – Example 2812 Configuration File

```
[Description]
Text = 2812 disc controller

[Processor]
Core = 16
Hand Keys = x0300
Keyboard = UK

[Switches]
Initial Mode Setting = 0
Initial Port Setting = 4
Initial Display Setting = 0

[Module-4]
Type = DDE
Operators Unit No = 60
Hostname = localhost
Port=2812

[Module-3]
Type = EDS-60
Number of Transports = 5
Transport 0 File = ./discs/444200
Transport 1 File = ./discs/444201
Transport 2 File = ./discs/444202
Transport 3 File = ./discs/444203
Transport 4 File = ./discs/444204
```

## Appendix 5 – Example 7903 Configuration File

```
[Description]
Text = 7903 comms controller
```

```
[Processor]
Core = 32
Hand Keys = x0001
Keyboard = UK
```

```
[Switches]
Initial Display Setting = 8
Initial Mode Setting = 0
Initial Port Setting = 3
```

```
[Module-4]
Type = DDE
Operators Unit No=24
Hostname = localhost
Port=7903
```

```
[Module-0]
Type = CC
```

```
[Module-2]
Type=MCIU
Port0=SCN0
Port1=SCN1
```

```
[SCN0]
Type0 = 7930/3
Engineer Link = D
```

```
[SCN1]
Type0 = 7930/3
Engineer Link = D
```

## Appendix 6 – Example 7903 Specification

```
M2
U0
C310
E
L0 D7071 I1 M4
L1 D7071 I2 M4
L2 D7071 I3
L3 D7071 I4
L4 D7083 I5
L5 D7083 I6
L6 D7083 I7
L7 D7083 I8
L8 D7181 I9 A40 S4800
L8 D7181 I10 A42
L8 D7181 I11 A44
L8 D7181 I12 A46
L9 D7023 I13 A43 S2400
L9 D7021/3 I14 A42
L9 D7022 I15 A41
OP
AUTO 0 7
QLSA 8 48
END
```