

# Marconi 'Myriad I' Digital Computer Type S 3304

Myriad is the first of a third generation of computers to be produced by The Marconi Company and was the first machine of this type to be commercially available anywhere in the world. It uses micro-miniature techniques and epitaxial planar silicon semiconductors to achieve higher reliability than was possible using conventional transistor techniques. Myriad operates at ultra-high speed, is exceptionally small and is suitable for all applications that may be performed in real time.

## FEATURES

High reliability with silicon micrologic modules and diode transistor logic.

Ultra-high speed—add 2.4–2.8  $\mu$ s, multiply up to 20.40  $\mu$ s (including store access).

True multilevel priority interrupts.

Expandable storage to 32,768 words directly addressable.

Small physical size—versions for commercial, military and mobile applications.

Engineered to stringent military specification (DEF 133).

Sophisticated programming aids; User Code, Algol, Fortran and Coral compilers.

## Equipment

Myriad is a parallel binary fixed point machine with single address operation, a word length of 24 bits with facilities for double length working and extensive built-in input/output facilities. Most single length instructions take only 2.4–2.8  $\mu$ s, multiply taking up to 20.4  $\mu$ s.

The make-up of the machine consists of an arithmetic unit, a series of registers and counters and one or two directly addressable store units. The input and output gates of these units are commoned to two internal highways and all data transfers are made via these highways. Two similar highways are used to connect peripheral units to the computer.

The store units are self-contained, incorporating timing circuits, address and data registers. The basic block is of 4096 words and two of these may be linked to give 8192 words, with a cycle time of 1.2  $\mu$ s and access 0.4  $\mu$ s. Alternatively one or two blocks of 16,384 words may be used, giving a maximum

of 32,768 words with a cycle time of 1.4  $\mu$ s and access 0.5  $\mu$ s. This latter store unit may also incorporate autonomous access and store protection facilities. Additional bulk storage, in the form of bulk ferrite, magnetic drums, disc or tape, may be added via the input/output highways.

Of particular use with external stores is the interrupt input/output system. This is a hardware facility which allows data transfers to be made to or from the computer via the normal highways in a minimum time of 5  $\mu$ s for access and transfer. Eight levels are provided with priority allocation, each capable of handling multiple peripheral devices. This system means the computer only services a peripheral when it is necessary to transfer data; it does not need to investigate peripherals by time wasting program routines.

The basic circuits of the computer are constructed from microminiature diode transistor logic elements in T05 cans. This type of logic is inherently the most reliable in operation, i.e. noise immunity, etc. and the design is well established. It is the very low stage delay time of 8 ns per element which gives the computer its high speed operation.

The engineering form, based on a sub-board, main-board, unit hierarchy is such that faults may be isolated to a quickly replaceable unit, using diagnostic programs and employing junior engineers. Vigorous worst-case tolerancing, component selection and general quality control have all contributed to a high reliability and the expected mean-time-between-failure is 3000 hours in the most pessimistic case.

The computer draws its power from self-contained battery supplies, which are continuously charged. This enables the machine to withstand mains transients, and even complete mains failure for up to 3 minutes. During this time automatic shutdown may be performed, allowing the computer to be restarted, either locally or remotely, in an orderly manner on restoration of power.

## Peripheral Equipment

Conventional peripherals include:

Paper tape reader 1000 char/sec

Paper tape punch 150 char/sec

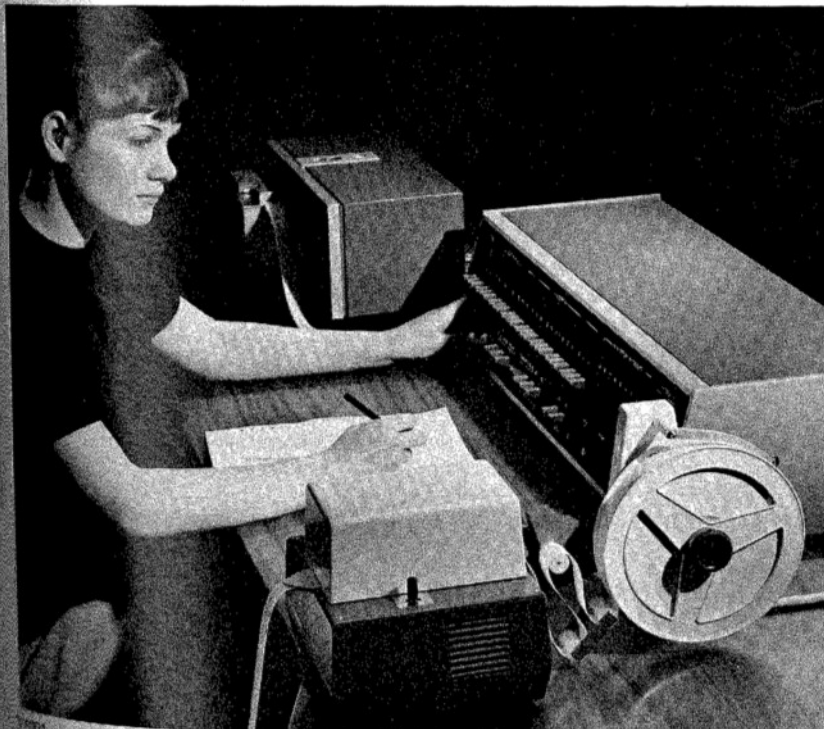
Input/output typewriter 10/15 char/sec

Alpha-numeric keyboards.

Industry-compatible magnetic tape systems.

Random access magnetic disc storage with interchangeable disc units.

Bulk ferrite storage.



interface for telegraph channels and teleprinters.  
 Graph plotters.  
 Curve followers.  
 High-speed printer.

Special application units include:  
 Tabular CRT display systems.  
 Graphical CRT display systems.  
 CRT display systems for Radar.  
 Wide range of specialized link equipments for Radar.  
 High-speed data links.  
 High-speed digital scanner.  
 Precision analogue scanner.  
 Synoptic chart plotter.

### DATA SUMMARY

**Type:** Parallel binary fixed point single address.

**Word length:** 24-bits.

**Representation:** Binary.

**Number range:**  $-1 \leq x < +1$ .

**Storage:** Coincident current ferrite core stores.

(i) 4096 word block.

Expandable to two blocks, i.e. 8192 words.

Cycle time 1.2  $\mu$ s. Access time 0.4  $\mu$ s.

(ii) 16,384 word block.

Expandable to two blocks, i.e. 32,768 words

Cycle time 1.4  $\mu$ s. Access time 0.5  $\mu$ s.

Autonomous access and store protection facilities available as optional extras.

**Input/output:** Common input and output highways; 4000 peripheral addresses available.

**Interrupt:** 8 levels of external interrupt with priority, capable of accommodating multiple devices.

Data transfers in 5  $\mu$ s.

**Order speeds:** Add, fetch, ect. 2.4-2.8  $\mu$ s.  
 Multiply 20-40  $\mu$ s max.

**Function code:** 52 orders working on both registers including:

Fetch, Add, Subtract, Store, Exchange, Collate, Not Equivalent, Complement, 7 shift actions, 5 jump actions, 4 link actions. Spare codes available.

**Instruction format:**

Store address 15 bits.

Function code 6 bits.

Modifier digits 2 bits.

Stop digit 1 bit.

**Power supplies:**

200-250 } volts a.c.  $\pm 10\%$   
 100-125 }

Single phase 45-65 Hz

1000-1500 W

3-minute no-break facility.

### Dimensions:

Width 6 ft (183 cm)

Depth 3 ft (91 cm)

Height 2 ft 9 in. (84 cm)

Weight 1200 lb (540 kg)

### Environment:

*Forced air cooling:* 10°C to 45°C, relative humidity 90%.

*Closed circuit system:* -10°C to >55°C, to saturation.

### Software:

User Code compiler.

Algol compiler.

Fortran compiler with segmentation facilities.

Coral compiler.

Sub-routine library.

Test routines.

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