



A POWERFUL COMPUTER BASED TEST FACILITY CONTROL AND DATA MANAGEMENT SYSTEM

INTRODUCTION

Cussons Autotest IV Test Facility Control and Data Management System has been purpose designed to meet the complex and demanding requirements of current test facilities engaged in both routine operations and advanced research work, as a complete system. The system utilises a powerful real time VME computer for control and data logging connected via a high speed data link to a PC for system display, programming and networking, providing the operator with a familiar interface and an essential engineering tool. The system is provided as a compact package using a conventional 19 inch mounting system for convenient installation within existing or new facilities.

HARDWARE FEATURES

- ◆ VME computing power provided by two Motorola processors working in tandem on one modular VME card. M68060/50MHz and M68360/25MHz
- ◆ High quality VME interface cards utilised
- ◆ OS9 real time multi-tasking operating system for in VME unit.
- ◆ Latest high specification desk mounting PC hardware supplied as standard.
- ◆ Dedicated Ethernet data link between VME unit and PC provides up to 10Mbits/sec transfer rate using TCP/IP protocol.
- ◆ Auxiliary Ethernet data connection available for connection to clients data network using TCP/IP protocol
- ◆ VME unit housed in robust 6U high by 19" card frame presenting a clean front panel. All connections to the unit are made via the rear panel
- ◆ Comprehensive engine test programme structure provided

SOFTWARE FEATURES

- ◆ Operation and preparation of specific application schedules requiring basic computer skill's.
- ◆ System menu driven with secured access above operator level
- ◆ User selectable Input and Output channel designations

- ◆ 16 analogue output control channels are available as standard
- ◆ Control output assignments can be time structured to provide:
 - Direct open loop control
 - Closed loop control via internal 3 term control software with feed-back signals user selected from any input channel or derived parameter
- ◆ Non linear input channel calibration
- ◆ Direct digital pulse train inputs and analysis routines
- ◆ Fully automatic or manual operation retaining data processing and alarm monitoring
- ◆ Individual test cycles linked by supervisory test cycle management routine
- ◆ User definable multiple level time structured alarm and message capability
- ◆ Menu selectable data format
- ◆ Wide parameter selection listing including derived results and recognised corrected performance data
- ◆ Test log summary built in
- ◆ Rolling historical data log available for analysis following shut down
- ◆ Routine engine performance and cycle durability record graphics output, optionally available
- ◆ Keyboard controls together with 17" colour svga display enable conventional instrumentation displays and manual controls to be dispensed with if desired, alternatively system can be integrated with optimised manual input devices.

HARDWARE SYSTEM SPECIFICATION (STANDARD)

Main System Controller : Single board computer with M68060/50MHz super-scalar 32 bit processor in tandem operation with M68360/25MHz communications processor; 16.5Mb RAM comprising - 12 MB of DRAM, 4Mb FLASH, 0.5Mb SRAM; EPROM capacity of 2Mb; 2 committed RS232D serial ports, additionally one RS232D port and one RS485 opto-isolated port; SCSI-2 interface; 10Base2 Ethernet interface; PCMCIA card adapter

System Bus : VME-IEEE 1014, 16/32 bit bus structure with 15 slot J1 backplane with jumper less interrupt routing system

Operating System : OS9 V3.0, multitasking, real time EPROM based operating system

Communications: Ethernet 10Base2 using TCP/IP protocol for PC connection. Three RS232D serial ports for connection to external devices. One RS485 high speed serial link

Analogue Input : 64 differential input channel A-D card; 14 bit resolution with individual channel software selectable gains of x1, x10 x100; Maximum channel sample rate 58KHz (stand-alone operation); overall gain accuracy (at G=1) $\pm 0.008\%$ FSR; channel acquisition rate configurable up to 100Hz for maximum 32 channels; Signal input levels $\pm 5\text{mV}$ to $\pm 10\text{V}$;

Analogue Output: 16 Channel D-A card; 12 bit buffered analog outputs; four selectable output ranges from 5V to $\pm 10\text{V}$ (applies to all channels); maximum Settling time = 2.5mS; 16 outputs can operate at 100Hz update rate; total error $\pm 0.06\%$ FSR; Output load per channel up to 5mA at $\pm 10\text{V}$.

Digital Input : 64 independent opto isolated digital channels; 24VDC contact closure or open collector inputs; 500VDC isolation from input to VME bus.

Relay Output : 32 independent change over contacts; 2A @ 38VDC max. switching capacity; 20W max. continuous power; 300VDC channel to channel isolation; 500VDC isolation from channel to VME bus.

Frequency Input : 16 channels for TTL pulse train inputs, comprising two 8 channel cards; 16 bit counter/timer devices; Max. operating frequency 800KHz.

Construction : Packaged in a 6U high 19" racking system for panel mounting, enclosure incorporates a 200W power supply. All interface connections are made via the IO cards front panels that are rearward facing, together with all communications ports. The unit presents a clean front panel when rack mounted

Watchdog : Internal hardware watchdog circuit, with a relay contact for connection to external shutdown circuitry. Software controlled fail safe operation; Watchdog fails

when not accessed by software for at least 15mS

Other hardware system configurations are available on request.

SUMMARY OF SOFTWARE FEATURES

Autotest IV has been developed to take advantage of the earlier proven system structure using a "C" based source code and plain language operator interface/application programmes, running within a multi-tasking OS9 environment utilising a PC windows based front end. In summary, the major system revisions on Autotest IV are as follows:-

- a. VME unit executable code written in Ultra C, ANSI standard. Object code stored on PC hard disk and down loaded into VME memory when Autotest system initialised
- b. PC software written in Microsoft Visual Basic V4.0 together with third party utility tools
- c. Microsoft Access V7.0 database for all on-line and configuration data
- d. Fully user definable windows environment for operator preference
- e. Data logged in text format to PC hard disk and is available for further data analysis by importing into any spread sheet package
- f. Logical Test Group structure where each group contains configuration data specific to the nature of the tests to be undertaken. Within each test group a dedicated format of derived parameters, screen displays etc. can be defined along with as many test programs relating to each test groups function as required. There is no limit to the number of test groups.
- g. Powerful sequence creator allows complex test patterns for controlled parameters to be produced through a user friendly table editor and graphical realisation screens.
- h. System provides for multi-level programmable alarm monitoring on all logic input channels and all "measured" and "derived" parameters .
- i. For vehicle test cell applications a Drive Cycle editor and execution module is provided along with all clients preferred drive cycles
- j. Built in calibration module for use with all input channels, powerful curve fit routine allows channels to be corrected by linear, power or polynomial fits. Up to 15 calibration points per channel may be defined in a maximum of 50 calibration groups comprising any number of input channels
- k. No software limit to quantity of input channels, output channels or derived parameters
- l. Two formula libraries for standard functions and application specific functions are supplied, the later can be modified by the user
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