

2317 CONTROL PROCESSOR**CONTENTS**

Paragraph	Title	Page
1	APPLICATION	3
2	SPECIFICATION	4
2.1	Functional	4
2.1	Performance	4
2.3	Power Required	4
2.4	General	4
2.5	Connections	4
3	GENERAL DESCRIPTION	5
4	CIRCUIT DESCRIPTION	6
4.1	68HC11 Microprocessor	6
4.2	Read Only Memory	6
4.3	Random Access Memory	6
4.4	Address Decoder	7
4.5	RS422/485 Communication Ports	8
4.6	Watchdog IC	9
5	INSTALLATION	8
5.1	Mechanical	8
5.2	Link Settings	8
5.3	Connector Pinouts	8

6	PARTS LIST	10
6.1	Capacitors	10
6.2	Diodes	10
6.3	Integrated Circuits	10
6.4	Oscillators	10
6.5	Resistors	10
6.6	Transistors	10

DRAWING LIST

Module	Drawing No.	Title
2317	231700-A3	Circuit Diagram

1 APPLICATION

The 2317 is a complete microprocessor sub-system. It may be used anywhere complex control functions are required. It also allows any system of which it is a part to be remotely controlled using RS422/485 protocol.

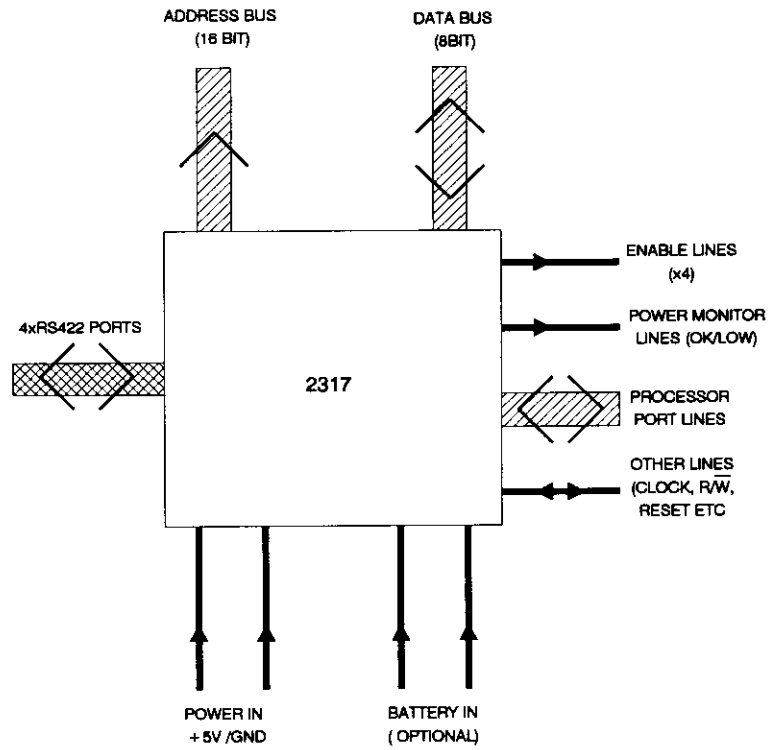


FIG.1 SYSTEM BLOCK DIAGRAM

2 SPECIFICATION

2.1 Functional

Processor signals available on connectors:

Address bus (A₀ to A₁₅)
 Data bus (D₀ to D₇)
 Port A (PA₀ to PA₇)
 Port D (PD₂ to PD₅)
 Port E (PE₀ to PE₇)

Other signals available on connector:

CLK, R/W, $\overline{\text{IRQ}}$, RAMEN, $\overline{\text{RD}}$, $\overline{\text{RW}}$, $\overline{\text{RESET}}$

Outputs:

Memory mapped enable lines (EN₀ to EN₃)

Control:

4x2 wire RS422 ports

Inputs (optional):

VBAT, ROMSEL0, ROMSEL1

Indications:

Active low signals for +5V low and +5V OK (LED, LED)

Adjustments:

Normal or test mode selected via a jumper

2.2 Performance

Speed:

8MHz crystal gives 2MHz master clock

Communications speed:

3.6864MHz crystal provides programmable RS422 baud rate (50 to 38.4kbaud)

2.3 Power Required

5V at 200mA approx.

2.4 General

Board size:

120mm x 85mm approx

Weight:

100g approx

Temperature range:

Operating: 0°C to 50°C

Storage: -10°C to +70°C

2.5 Connectors

0.1" pitch round pins

3 GENERAL DESCRIPTION

The module comprises the following main blocks;

- 68HC11 microprocessor
- Read only memory (ROM)
- Random access memory (RAM)
- Address decoder
- RS422/485 communications ports
- Watchdog IC

Clearly the microprocessor is the primary component on this card. All the other devices exist to service the microprocessor. The program is stored in the ROM from where it is read out and executed. The RAM may be used by the program to store data. The address decoder provides enable lines for the on card ICs. Additionally it provides four memory mapped enable lines for external use. RS422/485 communication is provided by means of a DUART (Dual universal asynchronous receiver/transmitter) and four bidirectional receiver/drivers. The watchdog IC provides power on reset, supply voltage monitoring and switch over to battery operation (if a battery is fitted).

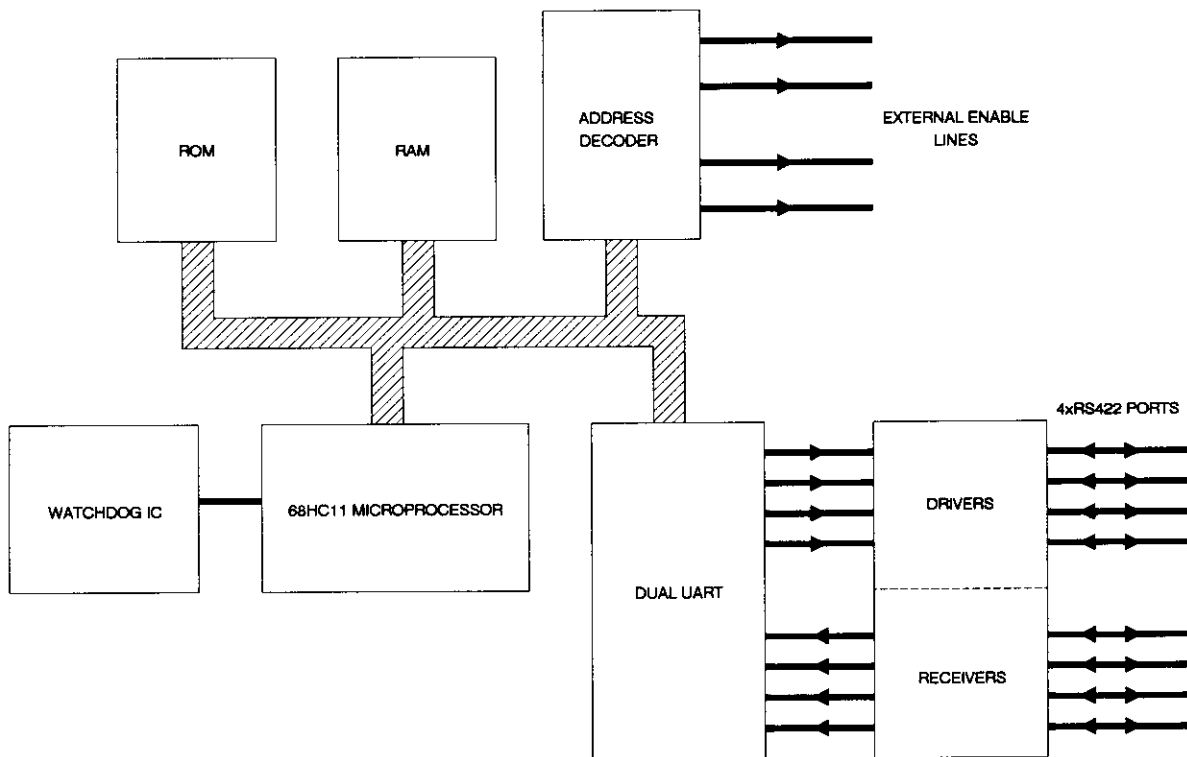


FIG.2 INTERNAL BLOCK DIAGRAM

4 CIRCUIT DESCRIPTION

4.1 68HC11 Microprocessor

The exact processor type is M68HC11A0FN. This is the 52 pin PLCC type with 256 bytes of internal RAM. The following port lines are available externally:

Port Line	Function
PA7	Input/output
PA6	
PA5	Outputs
PA4	
PA3	
PA2	
PA1	Inputs
PA0	
PD5	
PD4	Inputs/outputs
PD3	
PD2	
PE7-PE0	Inputs
	As well as being available as general purpose inputs PE7-PE0 may be used as analogue to digital conversion inputs.

4.2 Read Only Memory

The 2317 is normally fitted with a 27256 type EPROM which gives 32kbytes of program space. However since a 32 pin socket is fitted on the 2317 larger EPROMs may be used. If this is done then ROMSEL0 and ROMSEL1 must be used to select pages of ROM. ROMSEL0 and ROMSEL1 are used as follows:

EPROM	ROM SEL0	ROM SEL1	INTERNAL EPROM ADDRESS
27256	High	Don't care	[0000..7FFF]
27512	Low	Don't care	[0000..7FFF]
	High	Don't care	[8000..FFFF]
27010	Low	Low	[0000..7FFF]
	High	Low	[8000..FFFF]
	Low	High	[10000..17FFF]
	High	High	[18000..1FFFF]

4.3 Random Access Memory

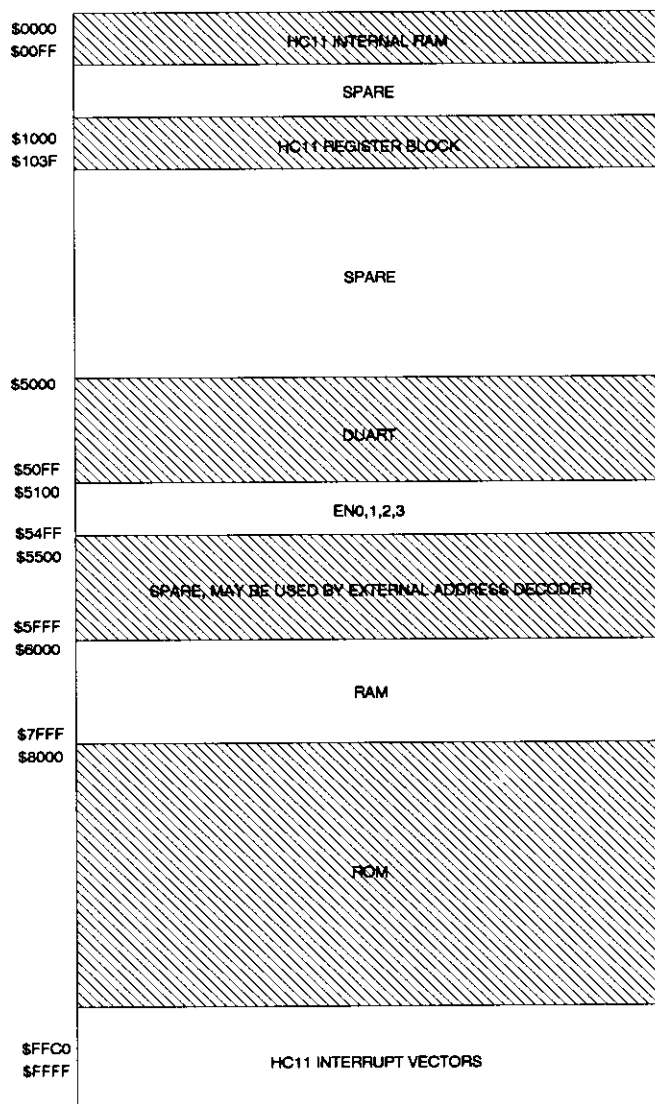
IC4 is a 6264 type RAM chip. This is an 8kbyte static RAM. RAM enabling and battery back-up are controlled by the watchdog IC. Addressing is controlled by the address decoder.

4.4 Address Decoder

The address decoder enables other chips on the 2317 according to the address map. It also provides four mapped enable lines for external use as follows:

Enable	Address	Sense	Gated with processor clock ?
EN0	5100..51FF	Low going read/write	N
EN1	5300..53FF	High going write only	Y
EN2	5200..52FF	Low going read/write	Y
EN3	5400..54FF	High going write only	Y

The full address map is as follows:



**4.5 RS422/485
Communication
Ports**

The 2317 has four bi-directional, two-wire ports (which may be use as two four-wire ports). The port lines have 10kΩ pull up/down resistors and 6V8 zener protection diodes. SN75176 type transceivers are used to buffer the data. Two of the transceivers have their data direction set directly from port D, of the 68HC11, bits zero and one. The other two are set using the two general purpose outputs of the DUART. The address decoder provides read and write lines for the DUART decoded from the processor's READ/!WRITE line. The interrupt line of the DUART is connected to the processor's maskable interrupt thereby allowing interrupt driven communication.

4.6 Watchdog IC

The watchdog IC provides a 200ms reset pulse and monitors the voltage supply as follows:

Voltage	Action resulting
4.8V	Sets the LED line low
4.65-4.8V	Sets the LED line low
< 4.65 V	Disables the RAM read/write

If a battery is fitted, when the +5V rail falls below the battery voltage then the battery provides the supply for the RAM.

5 INSTALLATION



WARNING: This module contains static sensitive components and full anti-static precautions should be taken when handling it.

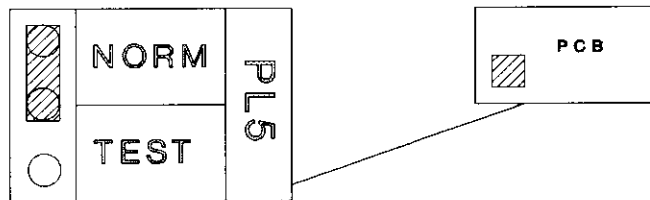
5.1 Mechanical

The unit is push fit into it's parent PCB sockets via edge connectors PL1, PL2, PL3 and PL4. It may be supported on nylon pillars and secured in place with M3 screws.

5.2 Link Settings

5.2.1 Test/Normal Mode Select

The module is set to test /normal mode by jumper select as shown below as shown below



5.3 Connector Pinouts

5.3.1 PL1 Connector Pinout

PCB main edge connector, 32 pin round pin strip

Pin	Function	Pin	Function
1	+5V	17	A1
2	D0	18	A2
3	D1	19	A3
4	D2	20	A4
5	D3	21	A5
6	D4	22	A6
7	D5	23	A7
8	D6	24	A8
9	D7	25	A9
10	+5V	26	A10
11	PE0	27	A11
12	PE1	28	A12
13	PE2	29	A13
14	PE3	30	A14
15	GND	31	A15
16	A0	32	GND

5.3.2 PL2 Connector
Pinout

PCB main edge connector, 16 pin round pin strip

Pin	Function	Pin	Function
1	+5V	9	PA0
2	PA7	10	PD5
3	PA6	11	PD4
4	PA5	12	CLK
5	PA4	13	R/W
6	PA3	14	IRQ
7	PA2	15	RAMEN
8	PA1	16	GND

5.3.3 PL3 Connector
Pinout

PCB main edge connector, 16 pin round pin strip

Pin	Function	Pin	Function
1	+5V	9	PE4
2	EN0	10	PE5
3	EN1	11	PE6
4	EN2	12	PE7
5	EN3	13	PD3
6	RD	14	PD1
7	WR	15	GND
8	RESET	16	GND

5.3.4 PL4 Connector
Pinout

PCB main edge connector, 16 pin round pin strip

Pin	Function	Pin	Function
1	+5V	9	RS422 TX2-
2	LED	10	ROMSEL1
3	LED	11	RS422 RX1 +
4	VBAT	12	RS422 RX1-
5	RS422 TX1 +	13	GND
6	RS422 TX1-	14	RS422 RX2 +
7	ROMSEL1	15	RS422 RX2-
8	RS422 TX2 +	16	GND

6	PARTS LIST	CIRCUIT REFERENCES	PART DESCRIPTION
6.1	Capacitors	C4, C5 C2, C3 C6, C7, C101 TO C111 C1, C201	10pF ±2% 100V CERAMIC PLATE 15pF ±2% 100V CERAMIC PLATE 100nF -20 +80% CERAMIC 1µF 35V 20% TANTALUM BEAD
6.2	Diodes	D1 TO D8	C6V8 5% 0.4W ZENER (D035)
6.3	Integrated Circuits	IC5 IC7, IC8, IC10, IC11 IC2 (PROG. TO PA146A) IC6 IC4 IC9 IC1	74HC373 OCTAL LATCH TRISTATE SN75176 RS 422 TRANSCEIVER PALC22V10 10 OUTPUT 12 INPUT SCC2692AC1 DUART HM6264 CMOS 8kΩx8 RAM MAX695 PSU MON & WD FOR MICROPROCESSOR 68HC11 MICROPROCESSOR 52 PLCC
6.4	Oscillators	XL2 XL1	CRYSTAL 3.686MHz IQD A169A CRYSTAL 8MHz
6.5	Resistors	R1, R4 R2 R3 R5 RN1 TO RN3	1kΩ 1% 0.5W STANDARD FILM 5.6kΩ 1% 0.5W STANDARD FILM 15kΩ 1% 0.4W METAL FILM 10MΩ 5% 0.33W CARBON FILM 10kΩx8 5% 0.19W SIL NETWORK
6.6	Transistors	T1, T2	VN2222L N-CHAN VMOS