MOTOROLA

M68IOS1

INPUT/OUTPUT SUPERVISOR

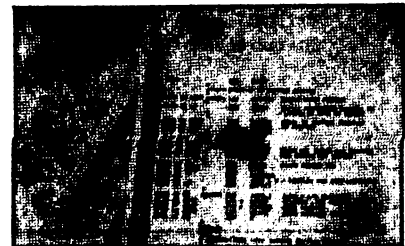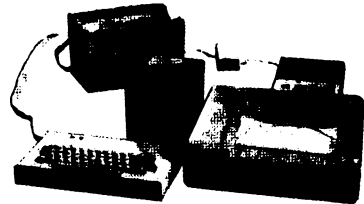**POLYVALENT DEVELOPMENT SYSTEM**

INPUT/OUTPUT SUPERVISOR

PDS

The M68IOS1 Input/Output Supervisor Firmware provides the user with an efficient means to interface the Polyvalent Development System Peripherals (CRT, Keyboard, Printer) to either a co-resident MINIBUG Firmware and a user's software or to an external asynchronous line such as the TTY connection of the EXORciser.

- Compatible with M68DIM1 and M68DIM2 16-line x 32-character Display Interfaces (PIA 8020, PB7 = 0)
- Compatible with M68DIM6 16-line x 64-character Display Interface (PIA 8020, PB7 = 1)
- Can work with co-resident standard I/O Routines
- Standard ACIA main system connection (8-bit word, 1 stop bit)
- Cursor control
- Background control (white-on-black or black-on-white display).

When the display page is full, the next line will be displayed at the bottom line, and the whole page is shifted one line up, loosing the top line (Scroll-up Display).

IOS CONTROL CHARACTERS

| Code	Effect	Co-resident configuration received by		Terminal configuration		
		Keyboard	ACIA (8010)	Off-line received by Keyboard	On-line received by Keyboard	ACIA (8008)
CtrlE	Erase screen	X	X	X	X	X
CtrlB	Background change for subsequent characters	X	X	X	X	X
CtrlO	Change mode of Operation (local/on-line)	—	--	X	X	X
CtrlG	Sound the bell (negative pulse on CA2 of PIA 8020)	--	X	X	—	X
CtrlU	Cursor Up one line		X	X		X
CtrlW	Cursor doWn one line		X	X		X
CtrlN	Cursor to Next character		X	X		X
CtrlH	Cursor to previous character (Back Space)		X	X		X
CtrlL	Cursor to home (Form Feed)		X	X		X
CtrlC	Clear page from cursor		X	X		X
CtrlK	Kill line from cursor		X	X		X
Null	Not transmitted		X	X		X
Rubout	Not transmitted		X	X		X

Co-resident configuration

The co-resident software MINIBUG and the user's program communicates with IOS Firmware through the IOS ACIA located at 8010.

The IOS routines are accessed by NON MASKABLE INTERRUPTS generated by its interfaces. If another source generated the NMI, IOS gives control back to E005 location, which is the MINIBUG NMI service routine.

— If a character was received in the IOS ACIA (8010) coming from the user's MINIBUG ACIA (8008) it is transmitted to the Printer PIA (8004) and to the Display Interface Module. The non-visuable characters are not transmitted.

— If a character was received in the Keyboard PIA (8020), it is transmitted to the IOS ACIA (8010), in order to be received later on in the user's MINIBUG ACIA (8008). If CtrlE (Erase screen) or CtrlB (Background Change for subsequent characters) were received from the Keyboard, they are not transmitted to the ACIA.

ROM address	DC00 to DFFF*
RAM address	A000 to A07F shared with MINIBUG Firmware
IOS ACIA address	8010
Printer PIA address	8004
Keyboard PIA address	8020 (PA0 to PA6)
Bell line	CA2 of PIA (8020)
Hardware Top-of-Page line	
pointer PIA address	8022
User's Stack Pointer	Saved
Space required in user's stack	28 bytes
Restart action	initializes IOS interfaces, jumps to MINIBUG Restart Routine
NMI action	IOS action and jumps to MINIBUG NMI Routine
SWI, IRQ action	jumps to MINIBUG SWI, IRQ Routine
Start up action	Erases screen, Restart

*The ROM should be wired with the following address patterns:
1101 11XX XXXX XXXX
or 1111 ..XX XXXX XXXX
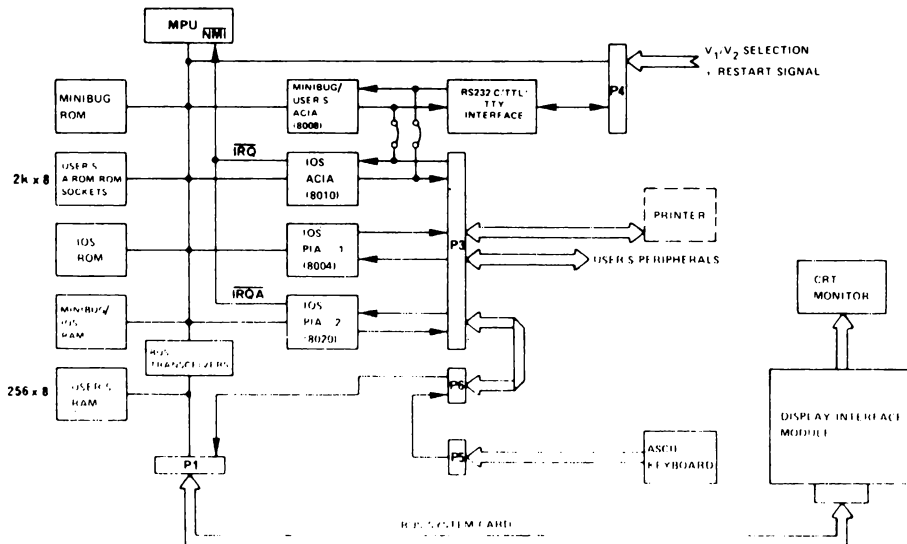
Terminal Configuration

The external system, as the EXORciser, communicates with the IOS Firmware through ACIA located at 8008.
The characters to be printed are stored in a buffer of 123 characters, which is sent to the printer when full or at least each 300 ms without receiving a new character from the terminal ACIA. The PA7 line of the PIA (8020) is pulled high during Printer Operation. This line should be connected to the CTS line of the main system ACIA (i.e. DEBUG ACIA) in order to inhibit the transmission of new characters.
The Keyboard accesses to IOS routines by generating a NON MASKABLE INTERRUPT.
Two modes of operation are possible:

Local mode (Off-Line)
— The ACIA (8008) is not taken into account.
— The characters received from the Keyboard PIA (8020) are transmitted to the Display Interface Module and to the Printer Buffer. The non-visuable characters are not transmitted.

On-Line mode (full-duplex)
— The characters received from the ACIA (8008) are transmitted to the Display Interface Module and to the Printer Buffer. The non-visuable characters are not transmitted.
— The characters received from the Keyboard PIA (8020) are transmitted to the ACIA (8008). All characters, except CtrlB, CtrlE and Ctrl0 are transmitted.

ROM address	DC00 to DFFF*
RAM address:	
scratch pad	A000 to A07F
Printer Buffer	0000 to 007F
ACIA address	8008
Printer PIA address	8004
Keyboard PIA address	8020 (PA0 to PA6)
Bell line	CA2 of PIA (8020)
Hardware Top-of-Page line	
pointer PIA address	8022
CTS line	PA7 of PIA 8020

*The ROM should be wired with the following address pattern,

    1101 11XX XXXX XXXX
    or 1111 ..XX XXXX XXXX[1]

[1]Note: in this configuration, A9 is set to 0 by hardware when the MPU accesses to FFF8 to FFFF vectors.