

ISI 487 Type A Interface/Print Formatter
Programming Description

Version 1.3

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PROPRIETARY

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This specification details the programming model of the ISI-1272 microprocessor based print formatter as used with the Centronics 350 series printer mechanisms to implement the Model 487 Type A printer. The coax interface included on the same board is identical to that used on the 736 printer (ISI-1194) and is therefore not described.

The ISI-1272 utilizes the 6809E microprocessor with 4K of 3270 buffer RAM, 12K of program RAM, 2K of printer communications RAM, 16K of character generator ROM, and 32K of program ROM. Printer output is implemented using shared RAM (see Centronics specification number 80002176). The clock generator provides synchronized clocks for the 6809E and the 8X02A (in the coax interface) so the interface never needs to pause (via SYNC or otherwise) for the coax interface to access the RAM. In addition, circuitry is provided to allow the microprocessor to control printer buffer size and the RESET status of the coax interface.

Address Map

| <u>Address</u> | <u>Description</u> |
|----------------|---------------------------------------------------|
| 0000-0FFF | 3270 Buffer RAM |
| 1000-1FFF | RAM Stack and variable RAM |
| 2000-3FFF | RAM Expansion stack and variable (Optional) |
| 4000-4FFF | Reserved |
| 5000-6FFF | Character generators (1-4 or 5-8 see 7800) |
| 7000-77FF | Printer communications RAM |
| 7800 | Non-volatile RAM Save (Write Only) |
| 7880 | Control Panel "Units" Digit (Write Only) |
| 7888 | Control Panel "Tens" Digit (Write Only) |
| 7890 | Control Panel "Hundreds" Digit (Write Only) |
| 7898-789F | Reserved |
| 78A0 | Control Panel "Ready" Indicator (Write Only) |
| 78A1 | Control Panel "Hold Print" Indicator (Write Only) |
| 78A2 | Control Panel "Test" Indicator (Write Only) |
| 78A3 | Control Panel "Check" Indicator (Write Only) |
| 78A4 | Control Panel "Double" Indicator (Write Only) |
| 78A5 | Control Panel "Dual Case" Indicator (Write Only) |
| 78A6 | Control Panel "8 LPI" Indicator (Write Only) |
| 78A7 | Control Panel "Cut Sheet" Indicator (Write Only) |
| 78A8 | Control Panel "NLQ" Indicator (Write Only) |
| 78B0 | Control Panel "Function" Indicator (Write Only) |
| 78B8-78BF | Reserved |
| 7900 | Clear FIRQ (Write Only) |
| 7980 | HOLDIT Latch (Write Only) |
| 7A00 | Beeper Pulse Latch (Write Only) |
| 7A80 | Beeper Click (Write Only) |
| 7B00 | Character Generator Mapping Latch (Write Only) |
| 7B80 | Coax Interface Control Latch (Write Only) |
| 7C00-7CFF | Non-Volatile RAM |
| 7D00-7D7F | Reserved |
| 7D80 | Control Panel Keyboard (Read Only) |
| 7E00-7E7F | Reserved |
| 7E80 | Device Status Register (Read Only) |
| 7F00-7F0F | 6522 VIA |
| 7F80-7FFF | Reserved |
| 8000-BFFF | ROM #2 |
| C000-FFFF | ROM #1 |

Note: Unspecified addresses are invalid as they readdress existing addresses due to incomplete decoding.

Register/Peripheral Descriptions

70C0-77FE - Printer Communications RAM

This is the 350 printer communications RAM as described in the Centronics document number 80002176. It is inaccessible except when HOLDIT is high and GOTIT is low.

7800 - Save Non-volatile RAM Contents

Writing anything to this address causes the data currently in the non-volatile RAM to be copied into the hidden ROM so that it will be available when the printer is next powered up. The non-volatile RAM will be unavailable for about 10 milliseconds after writing to this address.

7880, 7888, & 7890 - Seven Segment Displays

These addresses allow data to be latched into the seven segment displays on the control panel. They address the "ones", the "tens", and the "hundreds" digits respectively. See the description of the 74LS247 decoder in the Texas Instruments TTL Data Book for details on what will be displayed. The decoders are connected without ripple blanking enabled. All three default to "0" displayed at power up.

78A0-78B0 (Non-inclusive) - Front Panel Indicators

Writing a one to these addresses will turn on the LED indicator on the front panel associated with that address. Writing a zero will turn the indicator off. All indicators default to off at power up.

7900 - Clear FIRQ

Writing anything to this address will clear the FIRQ request flip-flop. This flip-flop defaults to cleared at power up.

7980 - HOLDIT Latch

This address controls the state of the HOLDIT signal which is used to determine which processor has access to the communications RAM. Writing a one to this address sets this signal to a high state, writing a zero sets it to a low state. This signal will default to a low state.

7A00 - Beeper Pulse Latch

Writing a one to this address will cause the beeper to pulse on and off about once a second. Writing a zero will cause the beeper to remain off. This latch defaults to the off state.

7A80 - Beeper Click

Writing anything to this address will cause the beeper to "click" once. This is intended to allow the keyboard to have audible feedback. After writing to this address the program should not try to click the beeper again until the previous click is completed. (About 100 ms.)

7B00 - Character Generator Mapping Latch

Writing a one to this address causes the second set of four character generators to be selected for use by the printer. Writing a zero causes the first set of four to be selected. This latch defaults to the first set of character generators.

Note: The second set of character generators is optional

7B80 - Coax Interface Control Latch

This latch is used to control certain aspects of the coax interface. The bits are assigned as follows.

Bit 0 - CXENBL - 0 = Coax interface is disabled from all processing
 1 = Coax interface is allowed to run

Bit 1 - DISCTL - 0 = Printer is in the enabled state
 1 = Printer is in the disabled state

Bit 2 - ***** - * - Reserved

Bit 3 - BUFSZ - 0 = Configure the printer for the small (2K) buffer
 1 = Configure the printer for the large (4K) buffer

Bit 4 - ***** - * - Not defined

Bit 5 - ***** - * - Not defined

Bit 6 - ***** - * - Not defined

Bit 7 - ***** - * - Not defined

Note: All bits default to the zero condition.

7C00-7CFF - Non-volatile RAM

Four bit wide RAM the contents of which can be "saved" for retrieval at power-up by writing to 7800.

Note: At the present only 7C00-7C3F are implemented although the entire address space is reserved.

Note: The design lifetime of this part is only 1000 save cycles. Therefore save cycles should be kept to a minimum.

7D80 - Control Panel Keyboard

Reading this address retrieves the contents of the keyboard encoder. It does not clear the Keyboard Interrupt flag (see

the VIA description). Consult 487/468 Control Panel Functions document for details on scan code definitions. Only bits 0 through 4 are defined at this address. Bits 5 through 7 should be masked off.

7E30 - Device Status Register

Bit 0 - GOTIT - 0 = Printer does not have control of communications RAM
 1 = Printer has control of communications RAM
 Bit 1 - PFAIL - 0 = Printer power OK
 1 = Printer power is failing
 Bit 2 - ***** - * - Not defined
 Bit 3 - ***** - * - Not defined
 Bit 4 - ***** - * - Not defined
 Bit 5 - ***** - * - Not defined
 Bit 6 - ICTLL - 0 =
 1 =
 Bit 7 - ICTLH - 0 =
 1 =

7E00-7E0F - 6522 VIA

The VIA is used to interface the two banks of options switches to the 6809, as a programmable interval timer, and to allow control of those signals which may cause a standard (IRQ) interrupt. The device is connected as follows. See 6522 specification sheet for programming details.

Peripheral Register A

Bit 0 - Option switch 1
 Bit 1 - Option switch 2
 Bit 2 - Option switch 3
 Bit 3 - Option switch 4
 Bit 4 - Option switch 5
 Bit 5 - Option switch 6
 Bit 6 - Option switch 7
 Bit 7 - Option switch 8

Peripheral Register B

Bit 0 - Option switch 9
 Bit 1 - Option switch 10
 Bit 2 - Option switch 11
 Bit 3 - Option switch 12
 Bit 4 - Option switch 13
 Bit 5 - Option switch 14
 Bit 6 - Option switch 15
 Bit 7 - Option switch 16

Note: 0 = Switch closed, 1 = Switch open

CA1 - CALARM

A negative pulse on this signal indicates that the coax has received an ALARM command from the host. The pulse width is approximately 250 ns.

! CA2 - KBREQ

! A negative transition on this signal indicates that new data
! is available in the keyboard register.

! CB1 - GOTIT

A negative transition on this signal indicates that the print controller has finished the last operation requested and status is available in the communication RAM.

! CB2 - KBREQ

! A positive transition on this signal indicates that the
! control panel key which had been depressed has been released.
! (This is really the same signal connected to CA2).

Interrupts

i All three interrupt inputs to the 6809 are used. The NMI input is connected to the power fail signal from the print controller. When the power is failing the coax interface should be disabled at once.

The FIRQ input is connected to the coax request as in previous devices. Clearing this interrupt (by writing to 7900) acts as an acknowledgment of the interrupt.

All connections to the IRQ input are through the 6522 VIA. The possible events which may cause an IRQ are keyboard data available, GOTIT falling, coax alarm request, or a timer. All of these may be masked within the VIA.