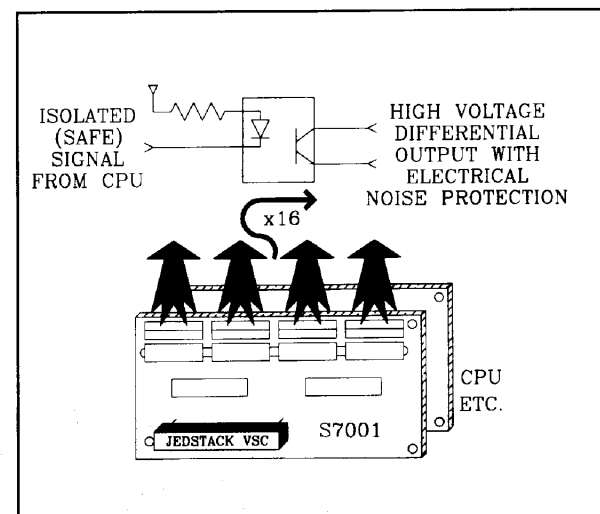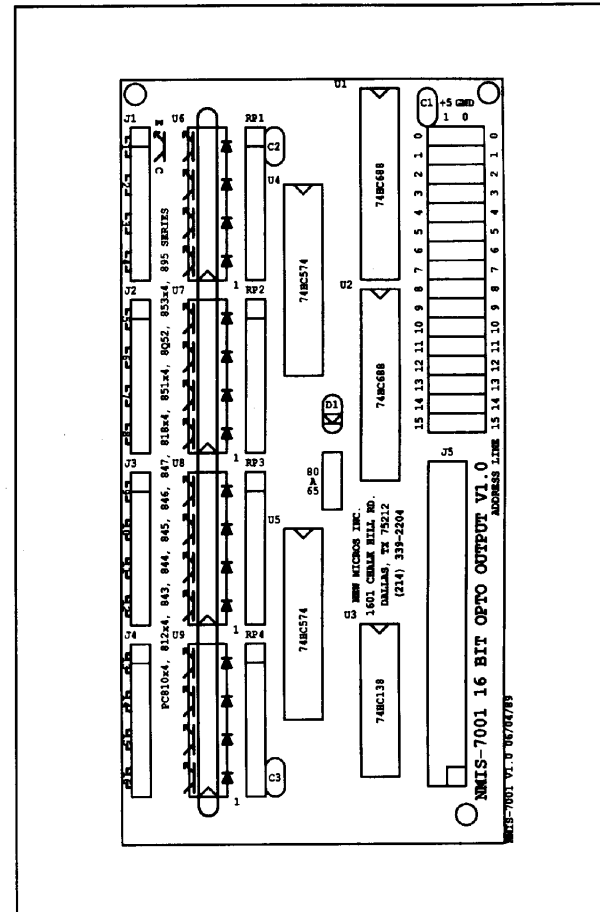# NMIS-7001 OPTO OUTPUT CARD

The NMIS-7001 16-Bit, Optoisolated Output Cards provide a JEDSTACK™ computer system with control of 16 optically isolated output lines. The outputs on both are arranged to be easily connected by four 8-pin connectors to individual wires.

## FEATURES

- 16 individual optically isolated output lines write as two consecutive bytes in memory

- Arranged as four quad optoisolators

- Four 8-pin connectors to individual wires

- User-replaceable resistor packs in machine tool sockets for LED series current limits

- 5000 V$_{RMS}$ Isolation (max.) (NEC PS2501-4)

- 300% transfer ratio (max.) (NEC PS2501-4)

- 3/5uS typical rise/fall time (NEC PS2501-4)

- Ouput transistor max. ratings:
  80 mA, 80V, 120mW (NEC PS2501-4)

Pins on Connectors J1 through J4 are attached to individual output control points. The series-limiting resistors which protect the LED's in the optoisolators from high currents are socketed to allow replacement according to the current drive range desired. For a typical 20mA drive from a 5V source the resistors will be 180 ohms. Four optoisolator chips are provided. They also are socketed to allow replacement by the user. The optoisolator LED's are controlled by the drivers from two 8-bit latches. These latches are connected to the data bus, and accept data from the processor as controlled by the chip selects. Logic "1" written into the latches turns the LED's "on" and vice versa. When the LED's are "on" the output transistors of the optoisolators are "on" and vice versa.

A Vertical Stacking Connector in the lower right hand corner (top view) provides connections to the processor's address and data bus, control signals, 5V power and ground. Address decoding of the latches' space in memory is accomplished by two octal comparators and 16 two-position jumpers. Each jumper setting corresponds to the state of a particular address line. The NMIS-7001 occupies two address locations. Any 2-byte boundary in the 64K address space of the JEDSTACK™ processor's bus can be selected by correct jumper placement.





**Application**

**Document # S7001DS**          **Data Sheet**          **Rev 1.0  Feb. 27, 1990**

## DESCRIPTION

The NMIS-7001 16-Bit Opto Output Card is designed to stack on the 2x4"s™ NMIS Series, the "100 Squared"™ NMIX, and the "Generic Target Computer"™ NMIT Series (with the Vertical Stacking Connector added to the latter) of single board computers. The "JEDSTACK"™ provides interface signals to the board including address lines, data lines, control lines and 5V power and ground. The fast HC devices allow access times approaching 90nS.

The opto outputs are controlled by octal latches. The addressing of the octal latches on the NMIS-7001 is sensed by two octal comparators that decode the 15 address lines (A15 - A1) and one control line (AS' for F68HC11 systems, CSEX' for R65F11 systems) in order to select only two active location out of a 64K address space. The remaining address line (A0) and one control line (R/W') are used to gate the signals to the latches.

By the design of the optoisolators, an inversion occurs in the output. If the outputs are used with pull-ups to connect to data lines they again invert the data back to a true condition. If the outputs are used as individual control points, it may seem their operation is inverted. When a "zero" is written, the optoisolator's LED is on, and the output transistor is on. When a "one" is written, the optoisolator's LED is off, and the output transistor is off.

Despite the use of HCMOS throughout the design, the NMIS-7001 is not a particularly low power device. Whenever one of the optoisolator's LED's is on, the current limiting resistor's current will be switched to ground. The current will vary according to the size of resistors used in RP1 through RP4, but will typically be 20mA. With 16 total pull-ups which can be switched to ground, several hundred milliamps can be used.

Besides the chips provided with the board, a wide range of possible opto chips which can be used in these locations. Some of the reasons for picking a particular type optoisolator chip can be: speed response, current transfer ratios, isolation voltage between input and output, and cut-off frequency. If a different characteristic is desired, it is important to keep in mind, the board was designed for a particular group of quad optoisolators. They can be distinguished from other types by examining the pattern of signals on the output pins. The ones that have a regular repeating pattern of anode - cathode - anode - cathode, etc., are the type for which the board was designed, (such as the PS2501-4 from NEC and the PC843, PC844, PC845, PC846, PC847, and the PC8Q52 and PC895 series from Sharp, and their equivalents from other manufacturers. The type which will not work, have a double repeating pattern of anode - cathode - cathode - anode, etc. A number of single unit devices that can be stacked end to end can also be used in the board, such as the PC810, PC812, PC818, PC851 and PC853 series from Sharp, and their equivalents from other manufacturers.
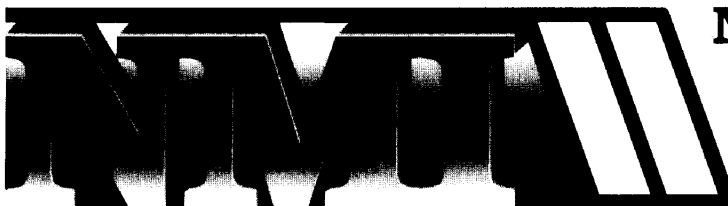
| ADDRESS | Bit # 7 | Bit # 6 | Bit # 5 | Bit # 4 | Bit # 3 | Bit # 2 | Bit # 1 | Bit # 0 |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| XXX0 | OUT 8 | OUT 7 | OUT 6 | OUT 5 | OUT 4 | OUT 3 | OUT 2 | OUT 1 |
| XXX1 | OUT 16 | OUT 15 | OUT 14 | OUT 13 | OUT 12 | OUT 11 | OUT 10 | OUT 9 |

**Register Summary**