G O L D E N   H A W K   T E C H N O L O G Y
M I D I   G O L D   5 0 0

INTRODUCTION

MIDI GOLD 500 is a complete Musical Instrument Digital Interface for the Commodore Amiga 500 Personal Computer. It allows the Amiga 500 to communicate with the wide range of MIDI compatible synthesizers, drum machines, and other MIDI devices available today. MIDI GOLD 500 connects easily to the external serial port, and is compatible with all Amiga MIDI software packages. This document provides both installation and technical information.

FEATURES

o MIDI IN - Allows the Amiga 500 to receive data from any MIDI compatible device.

o MIDI OUT - Two dedicated MIDI OUTs are provided. Each output allows the Amiga 500 to send data to any MIDI compatible device. Multiple OUTs permit the user to connect more than one device that does not support MIDI THRU.

o MIDI OUT/THRU - This output can function as either a MIDI OUT (for a total of three OUTs), or as a MIDI THRU. A toggle switch selects either OUT or THRU operation.

o SERIAL PASS-THRU - This feature enables any standard serial device (such as a printer or modem) to share the Amiga 500 serial port with MIDI GOLD 500. A switch is used to select either MIDI or SERIAL operation.

WARRANTY/SUPPORT

MIDI GOLD 500 is covered by a full two (2) year warranty which includes all parts and labor. Please return the enclosed warranty card within 10 days of purchase.

If you have any questions concerning the installation or operation of this product, please contact Golden Hawk Technology or your local Amiga dealer for additional information.

Golden Hawk Technology
427-3 Amherst St. Suite 389
Nashua, NH
03063

Technical Support Number: 603-424-0269

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INSTALLATION AND OPERATION

INSTALLATION PROCEDURE

MIDI GOLD 500 is attached to the serial port via two retaining screws which run through the inside of the interface. A small screwdriver is required for installation.

o Make sure the Amiga 500 power switch is OFF.

o Turn each of the MIDI GOLD 500 retaining screws counter-clockwise (by placing a screwdriver in the slotted end) until the threaded rods on the opposite end are flush with the unit.

o Locate the SERIAL PORT on the back of the Amiga 500.

o If another serial device (such as a printer or modem) is already connected to the SERIAL PORT, disconnect it from the port.

o Plug MIDI GOLD 500 firmly onto the SERIAL PORT connector.

o Turn each of the retaining screws clockwise to secure the interface to the SERIAL PORT. Make sure the screws have seated properly on each side. Do not overtighten!

o An additional serial device may be connected to the Serial Pass-Thru connector provided on the back on the interface. Refer to the description of the MIDI/SERIAL switch below for information about controlling the pass-thru.

OPERATION

o MIDI/SERIAL SWITCH

The switch labeled MIDI and SERIAL is used to effectively turn the interface ON and OFF. With the switch in the MIDI position, all MIDI connectors are activated, allowing the Amiga 500 to send and/or receive data from all MIDI devices connected to the interface. In the SERIAL position, Serial Pass-Thru operation is selected. All MIDI connectors are deactivated, and the serial device connected to the pass-thru (if any) can now be accessed.

o OUT/THRU SWITCH

The switch labeled OUT and THRU is used to select the function of the MIDI OUT/THRU connector. With the switch in the OUT position, the connector functions as an additional MIDI OUT. In the THRU position, the connector functions as a MIDI THRU, providing a direct copy of the data coming in the MIDI IN connector.

NOTE: The MIDI THRU connector will provide a copy of the MIDI IN data regardless of the position of the MIDI/SERIAL switch.

GENERAL INFORMATION

A Musical Instrument Digital Interface (MIDI) is an asynchronous serial device that operates at a speed of 31.25 Kbaud. Each serial byte is ten bits in length (start bit - 8 data bits - stop bit), and has a period of 320 microseconds. Data is transmitted over one or more 5 mA current loops. Logic 0 is current ON, and logic 1 is current OFF. Each output drives one and only one input. The receiver is optoisolated for noise and voltage isolation. All connectors are 5-pin 180 degree female DIN type. Pins 1 and 3 are not used, and pin 2 is connected to ground only on the MIDI OUT and THRU connectors.

SERIAL PORT INTERFACE

MIDI GOLD 500 utilizes five of the twenty-five lines available on the Amiga 500 serial port. The following table describes the function of each line within the interface.

PIN #	NAME	INTERFACE FUNCTION
2	TXD	Transmitted MIDI Data (OUT)
3	RXD	Received MIDI Data (IN)
7	GND	System Ground
9	+12v	+12 Volt Power
10	-12v	-12 Volt Power

MIDI OUT AND THRU CIRCUITRY

The MIDI OUT and OUT/THRU connectors are 5-pin 180 degree female DIN jacks with the following pin configuration. Refer to the schematic on page 6 for more details.

PIN 1 - Not used

PIN 2 - GND

PIN 3 - Not used

PIN 4 - Connected to the +12 volt supply through a current limiting resistor. This pin provides approximately a 5 mA current source for the photodiode in the optoisolator at the receiving end.

PIN 5 - MIDI data output. A logic low completes the current loop of the photodiode in the optoisolator at the receiving end (logic 0 is current ON, logic 1 is current OFF).

MIDI data is transmitted by the Amiga 500 in asynchronous serial format through the Transmit Data (TXD) line on the serial port. For each MIDI OUT, the data is applied to a 2N3904 type transistor. This transistor acts as a switch, converting the -12V to +12V RS232 voltage swings into a 5 mA current loop. Each serial data bit is transmitted by turning the current loop either on or off (logic 0 is current on, and logic 1 is current off). These on/off conditions are translated back into serial data bits on the receiving end.

In the case of the MIDI OUT/THRU, data is transmitted in the same way described above, except that the source of the data can be selected. A SPDT switch is used to select the data source. With the switch in the the OUT position, the source is the Amiga 500 serial port. In the THRU position, the data is a direct copy of the data coming in the MIDI IN connector.

MIDI IN CIRCUITRY

The MIDI IN connector is a 5-pin 180 degree female DIN jack with the following pin configuration. Refer to the schematic on page 6 for more details.

PIN 1 - Not used

PIN 2 - Not used

PIN 3 - Not used

PIN 4 - Supply current for the photodiode of the optoisolator.

PIN 5 - MIDI data input. A logic low completes the current loop of the photodiode in the optoisolator (logic 0 is current ON, logic 1 is current OFF).

The MIDI IN circuitry is based on a PC900 type optoisolator which provides noise and voltage isolation between the Amiga 500 and any MIDI device connected to the interface. The anode of the optoisolator's photodiode is connected to pin 4 of the MIDI IN jack. This pin provides the supply current required for the photodiode to operate. The cathode of the photodiode is connected to pin 5. MIDI data on the transmitting end is used to open and close a current loop which turns the photodiode off and on. The output of the optoisolator is open collector. When the photodiode is on, the output goes low, and when the photodiode is off, the output is open. A pullup resistor to the +12 volt supply forces the output high during an open condition. The output of the optoisolator is then applied to a 2N3906 type transistor. This converts the +12V to GND voltage swings of the optoisolator to the -12 to +12 RS232 voltage swings required by the Amiga serial port. The output of the transistor is connected to the Receive Data (RXD) line on the serial port. This is the received MIDI data.

SERIAL PASS-THRU CIRCUITRY

The Serial Pass-Thru is a 25-pin male D-Subminature connector with the following pin configuration. Refer to the <u>Introduction to the Commodore Amiga 500</u> for more information on the serial port.
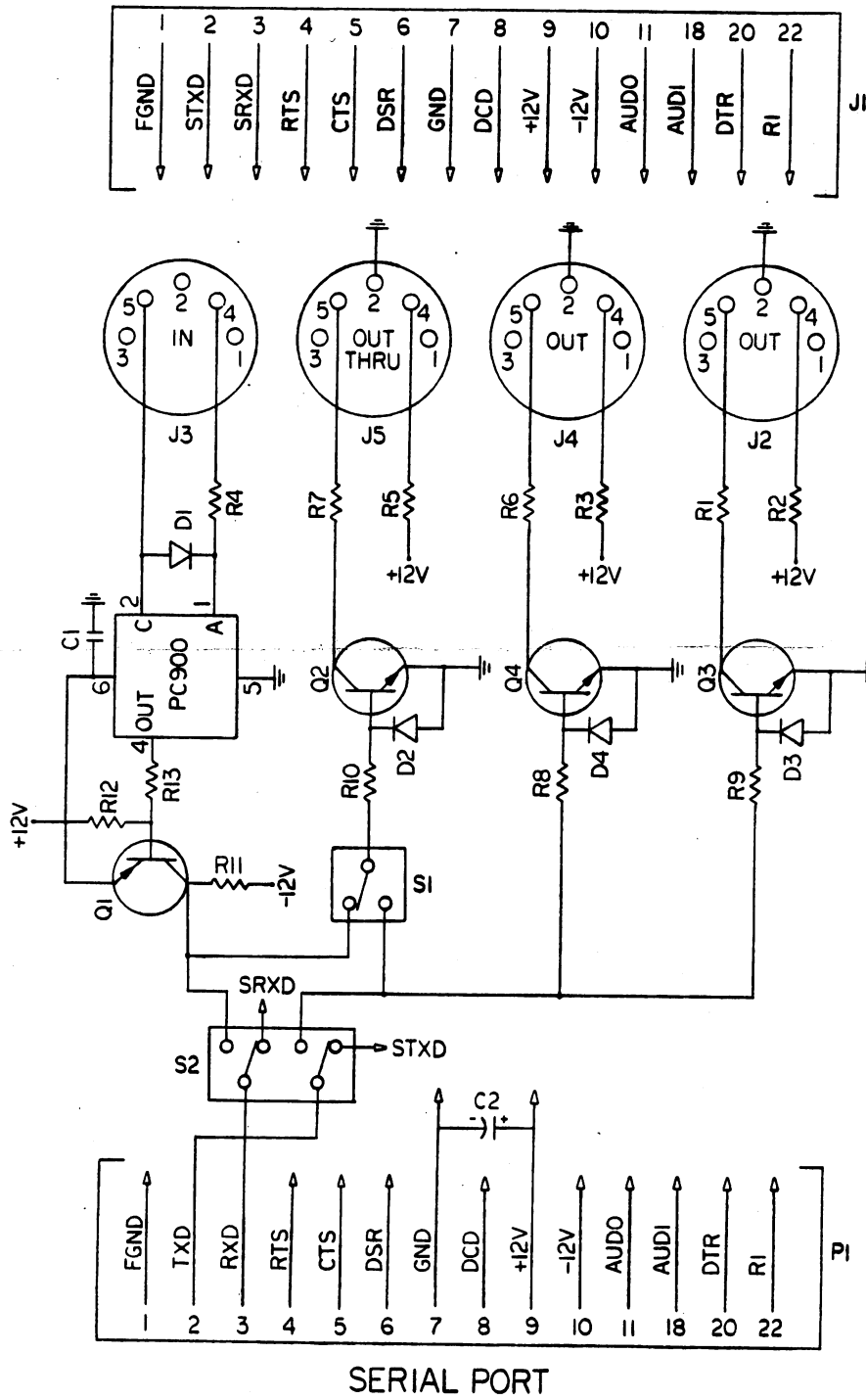
PIN 1 - Frame Ground

PIN 2 - Transmit Data (switched)

PIN 3 - Receive Data (switched)

PIN 4 - Request to Send

PIN 5 - Clear to Send

PIN 6 - Data Set Ready

PIN 7 - Signal Ground

PIN 8 - Carrier Detect

PIN 9 - +12 Volt Power

PIN 10 - -12 Volt Power

PIN 11 - Audio Output

PIN 18 - Audio Input

PIN 20 - Data Terminal Ready

PIN 22 - Ring Indicator

NOTE: All other pins are not used.

The Serial Pass-Thru is a copy of the Amiga 500 serial port connector. All signals available from the serial port are present on the pass-thru. The pass-thru is activated by a DPDT switch which controls lines common to both MIDI and serial operations. Since both MIDI and serial operations cannot be performed simultaneously, the switch is necessary to select the desired operation. The Transmit Data (TXD) and Receive Data (RXD) lines are the only signals which are common to both types of operations.

MIDI GOLD 500 SCHEMATIC

SERIAL PASS-THRU

1	2	3	4	5	6	7	8	9	10	11	18	20	22	
FGND	STXD	SRXD	RTS	CTS	DSR	GND	DCD	+12V	-12V	AUDO	AUDI	DTR	RI	J1

J3 IN
J5 OUT THRU
J4 OUT
J2 OUT

5 2 4 3 1 (connectors)

R4 D1
R7 R5 +12V
R6 R3 +12V
RI R2 +12V

C1
PC900
C 2
OUT 4
6
5
A 1

Q2 Q4 Q3
D2 D4 D3
R10 R8 R9

RI2 RI3
+12V
Q1 RII -12V
S1

SRXD
S2 → STXD

C2
GOLDEN HAWK TECHNOLOGY
MIDI GOLD 500-REV A

SERIAL PORT

FGND	TXD	RxD	RTS	CTS	DSR	GND	DCD	+12V	-12V	AUDO	AUDI	DTR	RI	
1	2	3	4	5	6	7	8	9	10	11	18	20	22	P1

COMPONENT LIST

IC1	PC900 optoisolator
Q1	2N3906 transistor
Q2,Q3,Q4	2N3904 transistor
R1,R2,R3,R5,R6,R7	820 ohm 5% resistor
R4	220 ohm 5% resistor
R8,R9,R10,R12	10K ohm 5% resistor
R11,R13	4.7K ohm 5% resistor
D1,D2,D3,D4	1N4148 diode
C1	0.1uF ceramic capacitor
C2	10uF electrolytic capacitor
P1	25-pin female D-Subminiature connector
J1	25-pin male D-Subminiature connector
J2,J3,J4,J5	5-pin 180° female DIN connector
S1	SPDT switch
S2	DPDT switch