

Assemble Manual Ver2.0 139-edition Last revision 97/12/13  
(C) Mathematical Assist Design Laboratory

## 1st

This kit, sponsored by some corporations located in Gunma, is intended to have enough performance to use in wide range (from trial to practical) by anyone (from beginners to engineers). "Kit" means not only inexpensive but also to encourage customer's creative minds. You will enjoy and apply the kit with your own expertise. So door opens both side, we do not warrant the kit except the parts malfunctions in the initial condition.

GID; Gunma Industrial Development Center, a corporation of our sponsor, is a "Third sector organization, so we use this name.

MAD has Copyright All Hardware and SoftWare. Therefore we allow you to free use (re-copy, re- print, re-write and customise).

- If you need spare parts, you can order them from M.A.D. via mail.
  - Please mail the following items,
  - return envelop with correct return address and enough postage stamps.
  - parts description, names and quantities.
  - 1.5 \* (total of the costs from the parts list) payment. (50% is a handling charges.)

## Please follow this instruction, sequentially

By opening the kit, you should prepare following tools and supplies.

- a soldering iron; sharp tip, about 15 Watt
- extra-fine solder
- cleaner pad for the tip of soldering iron
- Nipper
- Radio pinch
- 5 centimeter conductive wire (to use as jumpers between connectors and Ground/Common)

And recommendation,

- vise or clipper tool to fix the kit at free position
- magnifier

DO NOT USE,

- Acid soldering paste
- BIG soldering iron

## The following items are included in the kit.

1. documentation and floppy disc
2. This instruction
3. circuit schematic
4. parts layout illustration
5. specification sheets of MAX186 and 74HC14, the integrated circuits
6. floppy disc including sample software

- Parts. If you have lack of the parts, please contact us.

parts name	quantity	unit	cost	ext description
enclosures	2	100	200	clear and gray plastics case
label	1	10	10	GID/RS232C/Analog
Dsub 25(male)	2	58	116	connector
Dsub 25(female)	2	58	116	connector
PCB	1	650	650	2 layers, thru-hole, grass-epoxy-resin
MAX186	1	2030	2030	ADC IC
74HC14	1	22	22	schumidt inverters

LP2950CZ-5.0	1	140	140	positive power supply IC 78L05
LM320LZ-5.0	1	50	50	negative power supply IC 79L05
Diode shot key	6	29	174	black plastics coated
Diode Si-SW	1	3	3	grass coated
33 kilo ohm	3	3	9	1/16W resister
0.01uF	1	8	8	103 ceramic capacitor
0.1uF	4	10	40	104 ceramic capacitor
1uF	2	15	30	deep blue tantalum capacitor
33uF	2	15	30	power supply, additional 1uF
4.7uF	1	15	15	deep blue tantalum capacitor
FD(3.5)	1	42	42	DOS 1.44MB
package	1	65	65	package
software	1	500	500	WWW home page maintenance
misc.,	1	1200	1200	instruction manuals, communication and transportation
		total	5450	

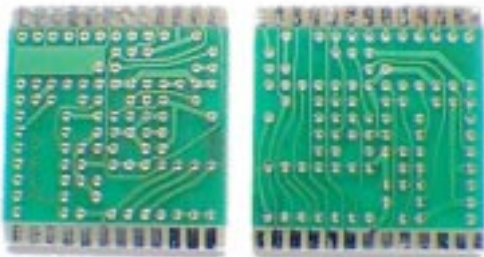
- This listed unit costs are gross prices about a lot of 100 - 1000.
- The pair of Dsub 25 (male and female) connector is spare, can be use for your trial.

## Sequential assemble

- Assemble sequentially according this instruction.

Confirmation of the both side of PCB, parts side and solder side

Parts side                  solder side



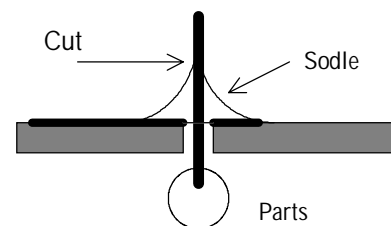
Dsub 25 female connector (Analog input side)

Analog side has wide ground pattern to reduce noise, under the MAX186(ADC). The parts shall be inserted from the parts side of PCB, them soldered them from solder side.

Dsub 25 male connector (RS232C side)

General procedure for soldering

1. Form the conductor lead of the parts according to the PCB holes
2. left the leads as long, insert them into holes just to fit them to PCB
3. reverse PCB without cutting the leads, then solder them
4. Heat both parts and solder, keep heating for 1 - 2 seconds after melting solder. Because soldering is not painting an adhesive.
5. Cut surplus lead.



Update the parts list

The counts of the label is updated by the lot number. Cut and paste them fit.

Install Dsub 25 connector

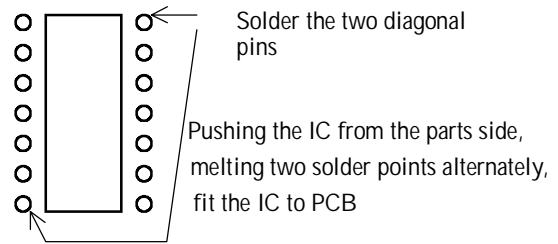
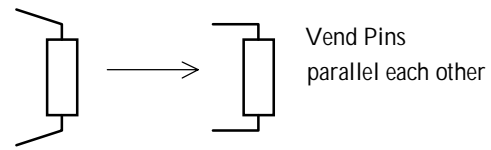
- Assemble the connectors at the both edge of PCB.
  - Refer the parts layout map, male connector at RS232C side, female connector at analog input side.
  - If you feel hard inserting the connector in to the PCB holes, the pins of connectors can be vended and spread carefully by screw driver.
  - You should assemble them into the enclosure, with installed PCB to the both connectors. Because, independent soldering process without the enclosure can cause difficulty to fit to the enclosure.



- After inspection of fitting the pins of connectors and solder pads, solder every portion.

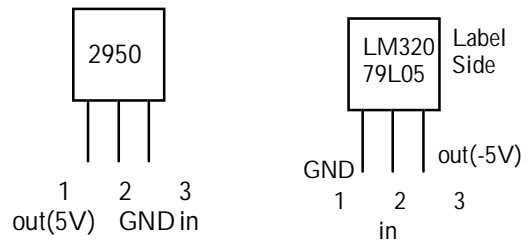
Install ICs; 74HC14, MAX186

- Discharge your static electric by touching like a steal desk, before handling ICs. Not only winter also summer seasons, it can be dangerous of static charge by an operation of air conditioner.
- How to install Many Pins IC.
  - Vend the pins of IC using a flat surface to make both side lines parallel each other.
  - Insert them into the holes of PCB, first of all, solder the two diagonal pins temporarily.
  - Pushing the IC from the parts side, melting two solder points alternately, fit the IC to PCB.
  - Finally, solder every pin.



Power regulators

- Refer the parts layout map carefully, install LP2950 and LM320L(79L05).
- LP2950 for positive power supply, and LM320L(79L05) for negative power supply. The kit include some equivalents.

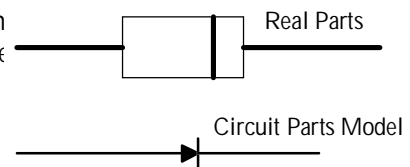


These regulators supply steady positive/negative 5 volts to internal circuits, from RS232C's 8 - 15 Volts signal lines. LP2950 for positive is nominated as ultra low power self consumption.

Diodes installation

The black one is the shot key diode, glass one is silicon switching diode. The glass diode must be inserted at the centre of the seven row.

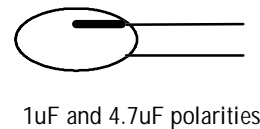
Current direction is marked.



Resistors and Capacitors

- All resistors are 33 kilo ohm, and capacitors are several types.
- As (104)capacitors has wide lead, please reform them strait with radio pench. 1st and more tear drop type capacitors have polarity. A positive pole is marked vertically. In case of 3rd capacitor, negative pole is marked.

Values	indicates	quantity	comments
0.01uF	103	1	
0.1uF	104	4	
1uF	1	2	
4.7uF	4.7	1	
33uF	33uF	2	5mm cylinder



- Additional 33uF is recommended for a stable operation.
- To add 33uF capacitor,
  - when you assemble 1uF capacitor, leave the leads as long. Do not cut them, notes the polarities of the leads, add the 33uF to the leads from solder side, then cut surplus leads of 1uF one.

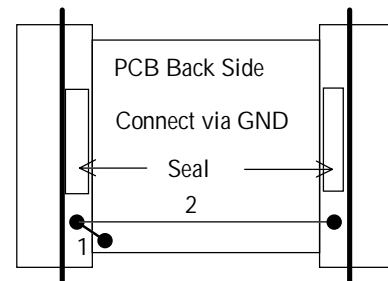
### Frame ground wiring around Dsub 25 connector

Connecting between systems and/or Earth ground through this unit, an impulse current, which depends on voltage between them, can make serious damage to ICs. "Frame Ground Wiring" is to make it escape.

Before contacting the signal lines, the connector enclosure can be connected to each other to make each systems equal voltage.

- Connect the PCB's Ground to the enclosure by conductive wire (not included in the kit)

1. Metal portion of analog connector should be connected to 25th pin with a surplus lead.
2. Metal portion of each connector should be connected by twisted conductive wire (not included in the kit).



### Case and Seal

Put the enclosure and labels to indicate COM port and analog input. RS232C, ANALOG labels are recommended to put internal side as an illustration, GID-ADC label also are recommended to put internal side of the clear enclosure.

If you intended not to re-open, you can fix with epoxy-resin. ABS is hard, but the clear side is easy to scratch. Be careful. Some space is available to install a small circuit and/or sensor.

## Testing the operation

### Preparation

- OS must be prepared by your self with DOS or DOS windows of WINDOWS (WIN3.1, WIN95). Testing software (GIDTEST.EXE) must be selected according your PC,PC98 or DOS/V
- The floppy disc has PC98 and DOS/V directories, you can find GIDTEST.EXE in them.
  - PC98 is supported only standard serial interface.
  - DOS/V machine is supported COM1, 2, 3 and 4.
- RS232C side of GID-ADC shall connected to the communication port of PC.

### Testing

Type "GIDTEST 3" at "C>" prompt. This is only one example. "3" means selecting COM3. Default of this number is "1"(COM1).

- Keyboard operation
  - "/" a mode of measurement with +/- 2047mV
  - "\*" a mode of measurement with +4095mV
  - "Q","q" make slow down ADC clock pulse
  - "W","w" make speed up ADC clock pulse
  - "." freeze the screen
  - other key quit the testing

The screen will display channel 1 to 7, from the left to the right in a line par one sample. You may read some values without any inputs.

Too fast ADC clock pulse may cause an error measurements. Making it slower, the errors will fade out, though it takes more time to measure.

Please try to check the operation with providing about 1.5 Volts to ADC. If you could get only 0(zero) or 4095 value or no measure value, you should check again COM Port number.

### CAUTION, Absolute limitation of the signal source for testing.

- As the analog input is not protected, providing over 5 Volts to the input will destroy the IC. To limit the sink current less than 0.1mA (100 micro Ampere), Adding a 1 to 100 kilo Ohm resistor to the input as series is recommended.
- While testing the operation, around 1 Volt signal is reasonable.

- If you have not any suitable signal source, connecting about 1 feet wire to the input and putting your hand near to the wire, you will be able to observe an alternative current noise from your hand.

General CAUTION

- The design has been intended not to destroy the module or your PC with any incorrect assembly.
- The module can connected the COM port of PC directly or via cable.
- If male/female trouble from a connector, you should use “gender changer”.
- Do not confuse COM port and PRINTER connector in type of PC compatible.
- The module can not operate with incorrect COM port number. The number is normally 1, 2, 3 or 4.
- The COM port have to be assign only for the module, exclusively from other applications.

General Reason of malfunction

Hardware trouble

- “Solder bridge”

Most popular reason. As they are very fine like a web by a spider, it is very hard to find out by naked eyes. Using a magnifier is recommended to check them.

- “Polarity of diodes”

Using the testing software, referencing the schematic, proving the voltage levels, and pursue the troubles.

The testing software must be running correctly to check the voltage in the module.

Trouble by software and PC

- Incorrect COM port number
- The software is only support the “Standard” COM port on Standard I/O board. Input of COM port of PC needs positive and negative Voltage signals. The threshold level of input of COM port of recent PC is the voltage between 1 to 2 Volt. But, OLD one may need over positive 3 Volts and negative 3 Volts, some one makes power supply for the COM port shut down automatically, so the module can not operate with those systems.

Connector and cable, pins assignment

- Four (TX, DTR, RTS and CD) signal and Ground is needed. 7 to 8 cables are recommended to making by yourself. Minimum is 6 wires.
- When using very long cable, you should consider to add a capacitors between signals and Ground to reduce some noises.

Dsub 25 connector of COM port

1	NC		14	NC	
	TX	-Power	15	NC	
3	rx	(No Use)	16	NC	
	RTS	+Power,DIN	17	NC	
5	cts	ext	18	NC	
6	dsr	(No Use)	19	NC	
	GND	GND		DTR	+Power,SCLK
	dcd	DOUT	21	NC	
9	NC		22	ri	(No Use)
10	NC		23	NC	
11	NC		24	NC	
12	NC		25	NC	
13	NC				

Dsub 25 connector of analog input

1	TX	TTL level	14	10V	Ext.Out
2	TX	RS232 level	15	5V	Ext.Out
3	rx	RS232 level	16	-5V	Ext.Out
4	dsr	RS232 level	17	-10V	Ext.Out
5	cts	RS232 level	18	GND	
6	CH7	Analog In	19	GND	
7	CH6	Analog In	20	GND	
8	CH5	Analog In	21	GND	
9	CH4	Analog In	22	GND	
10	CH3	Analog In	23	GND	
11	CH2	Analog In	24	GND	
12	CH1	Analog In	25	GND	
13	CH0	Analog In			

Database service via WWW

We are offering the detail information of the hardware and software. To obtain them, please ask your distributor or M.A.D. We also offer the latest information on the WWW(<http://www.wind.co.jp/mad/>).

Corporations concerned and sponsor

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Date 97/12/13. Sign Hal.T

Mathematical Assist Design Laboratory	Planning and basic design
Kushida Industries Co.	design for manufacturing and procurements
Daiei Dream Co.	R&D assist and Software development support
Gunma Industrial Development Center	Software Co-development, aid,public relations.

### Other kits, Semi finished products.

- GID-ADC semi finished product About Japanese Yen 9,500-
  - Open PCB with Case, D-sub set About Japanese Yen 1,200-
  - Thermal control unit About Japanese Yen 7,500-
- Please ask to confirm the stocks.

### Technical Support

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Technical questions are welcome via Fax, email and snail mail. We can not receive them by phone.

Support Only for research institutes organization and/or development aid only for dedicated business application systems, we can receive those call, as those work are our BUSINESS.

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