# INTMDB-64

**Stand-Alone Driver Controller Board For the METRABUS**

## Functional Description

The INTMDB-64 is an intelligent, stand-alone controller for the METRABUS Series of I/O boards. The board is ideally suited for use as a dedicated low cost controller, or a satellite controller which is monitored/controlled by a larger host computer. Each INTMDB-64 will control up to the full 64-byte METRABUS address space (512 digital I/O points or 256 analog I/O points) and yet still provides an economical control solution for much smaller systems. Up to 16 INTMDB-64s may be connected to a single host computer over an RS-422 serial communication port.

The INTMDB-64 contains a microcomputer with a built-in Basic interpreter, and allows the board to run programs that are stored in either onboard RAM or ROM. The Basic provided is INTEL's MCS Basic-52 which includes many of the features of most standard Basics plus a host of high-level statements that have been added to simplify the interface to the METRABUS I/O boards.
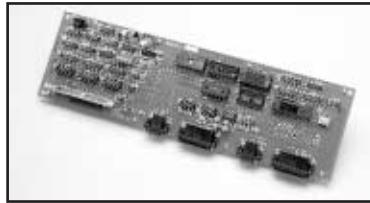
Programs can be generated by connecting either a terminal or a computer to the board via an RS-232 or RS-422 serial port. When using a dumb terminal (or terminal emulation program on a PC) programs are written into local RAM just as any standard Basic program would be. When programming from a host computer, the programs may be written in any text editor desired, and then downloaded to the INTMDB-64. Once the program is resident in INTMDB-64 RAM, the program can be run, tested, and modified. When desired, the INTMDB-64 can be commanded to transfer the program from RAM, into EPROM for nonvolatile storage. The EPROM can hold as many as 255 programs and may use up to 32 Kbytes before having to be erased (with UV Light) or replaced. The INTMDB-64 can run programs stored in RAM or EPROM. Certain EPROM programs can be set to self start on power-on reset.

In addition to the microcomputer and the METRABUS I/O logic, the INTMDB-64 features an auxiliary line printer port (RS-232) and an input for a +12 Volt back-up power supply. The line printer port is very useful for generating system logs, or occurrence/alarm reports. METRABUS power supply monitoring is performed by the INTMDB-64 and current supply status is always available to any host computer that may be supervising the system.

## Software

The INTMDB-64 has been developed with ease in programming in mind. The following program illustrates a simple control program as implemented on the INTMDB-64. The program assumes that an MII-32 digital input board has been set at Board Address 0, that a MTHERM-20 thermocouple board has been set to Board Address 4, and that a MEM-8 electromechanical relay board is at Address 16. The program performs the following control function.

1. Initialize the board, and reset the METRABUS
2. Read Port 0, and Port 1 of the MII-32
3. Logically OR the MII-32 inputs, and write the result to the MEM-8 relay outputs
4. Read MTHERM-20 thermocouple #1
5. If the temperature on Thermocouple is greater than 200 degrees, reset the METRABUS and print an alarm notice on the printer port.
6. If no alarm condition exists, return to step 2 above.

### FEATURES

- Complete stand-alone METRABUS system/cell controller
- Extremely low cost
- Onboard microcontroller with ROM Basic
- Programs can be written onboard, or can be written on another computer & down-loaded over RS-232 or RS-422 link
- Programs developed and debugged in RAM, can then be loaded into ROM with an onboard ROM programming capability
- Up to 16 INTMDB-64s can be linked to a single host computer
- Optional DC/DC converter allows +12V operation
- Enhanced INTEL Basic-52 programming language includes special high-level, METRABUS interface commands
- Onboard watch-dog-timer for fail safe operation
- METRABUS power supply monitor included onboard
- Windows 3.1X/95/NT
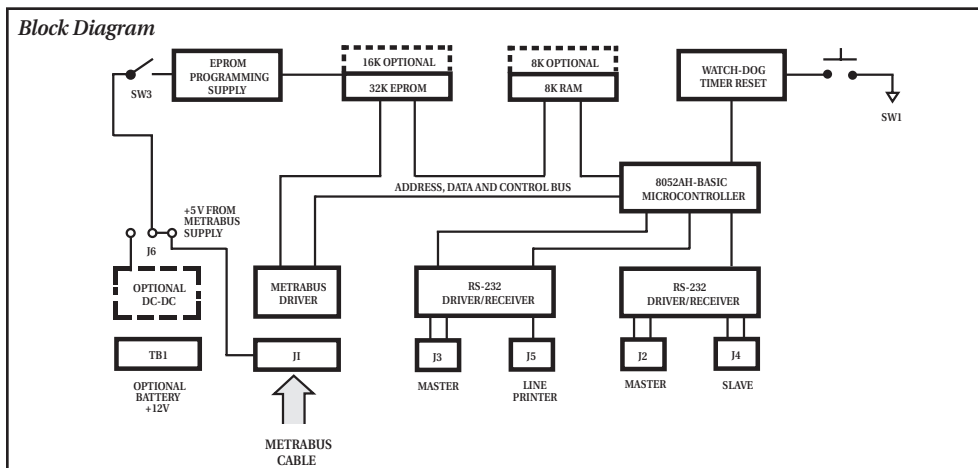
### Block Diagram

**KEITHLEY**

# INTMDB-64

## Example Program

```
10      REM******SET BOARD ADDRESSES******
20      LET MII32=0
30      SET MTHERM=4
40      LET MEM8=16
50      REM******RESET METRABUS AND SET PRINTER BAUD RATE
60      RESET
70      BAUD 2400
80      REM******READ MII-32 PORT 0 AND 1
90      MBIN MII32 : POP P0
100     MBIN MII 32 + 1 : POP P1
110     REM******OR'ED RESET TO MEM-8******
120     LET X = P0, OR P1
130      PUSH X : MBOUT MEM8
140     REM ****** READ AND TEST THERMOCOUPLE #1 ******
150     PUSH 1 : MBOUT MTHERM
160     MBIN MTHERM + 1 : POP T0
170     MBIN MTHERM + 2 : POP T1
180     LET TEMP = (T0 + T1x256)/10
190     IF TEMP > 200 THEN GOTO 500 ELSE GOTO 90
500     RESET
510     PRINT # "ALARM---- TEMPERATURE= ".TEMP
520     STOP
```
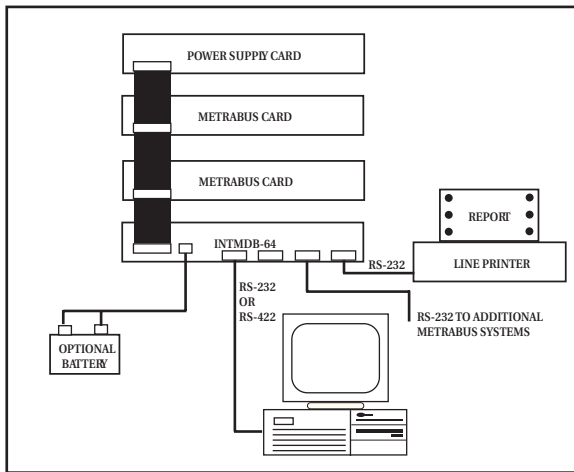


*Single INTMDB-64 Block Diagram*
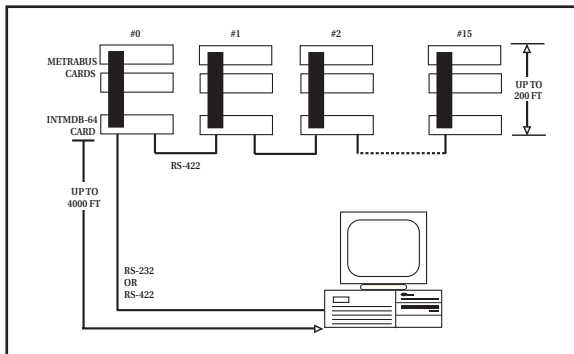


*Single Host Computer with Multiple INTMDB-64 Control Cells*

## SPECIFICATIONS

### METRABUS DRIVER
**METRABUS ADDRESS SPACE:** Provides 64-bit space
**DATA BUS:** 8-bit
**DATA TRANSFER RATE:** 10,000 bytes/s max
**DRIVEABLE CABLE LENGTH:** 100 at full speed
200 ft at reduced speed

### CONTROL SYSTEM
**MICROCONTROLLER:** Intel 8052AH-Basic
**WATCH-DOG TIMER:** 1 or 10 seconds to reset; (Jumper settable) if enabled
**PROGRAMMING LANGUAGE:** Intel Basic-52
**PROGRAM ENHANCEMENTS:** Reset METRABUS
Output/Input METRABUS
Protocol On/Off
Read Port 3
**EPROM:** 16 Kbytes (enhancements)
16 Kbytes (user programs)
Optional 16 Kbytes (user programs)
**RAM:** 8 Kbytes RAM
Optional 8 Kbytes RAM

### CONTROL PORTS
**MASTER CONTROL:** RS-232 and RS-422 ports
**SLAVE PASS-THROUGH:** RS-422 only
**LINE PRINTER:** RS-232
**OPTIONAL INPUT/OUTPUT:** 10-pin ribbon header (user installed)

### POWER REQUIREMENTS
**+5V:**          0.8A (full memory and EPROM programming)
0.6A (with SW-3 off)
**+15V:** Not used
**OPTIONAL BATTERY OPERATION:** (with DUS-1205 installed)
**BATTERY VOLTAGE REQUIRED:** 12V ±10% at 0.5A
**INPUT TERMINALS:** 2 position screw terminal

### ENVIRONMENTAL
**OPERATING TEMP:** 0 to +70°C
**STORAGE TEMP:** –40 to +100°C
**HUMIDITY:** 0 to 95% non-condensing

### PHYSICAL
**DIMENSION:** 16in L × 4.74in W (40.63cm × 12.06cm)

| ORDER | DESCRIPTION |
|---|---|
| INTMDB-64 | Stand-alone METRABUS Controller |
| SLDINTMDB | Source Code Listing |
| DUS-1205 | Optional Converter for 12V battery operation |
| EPROM-27128/12 | Optional and /or replacement 16K EPROM |
| RAM-8192/8 | Optional 8K RAM |
| TESTPOINT | TestPoint Software Package |