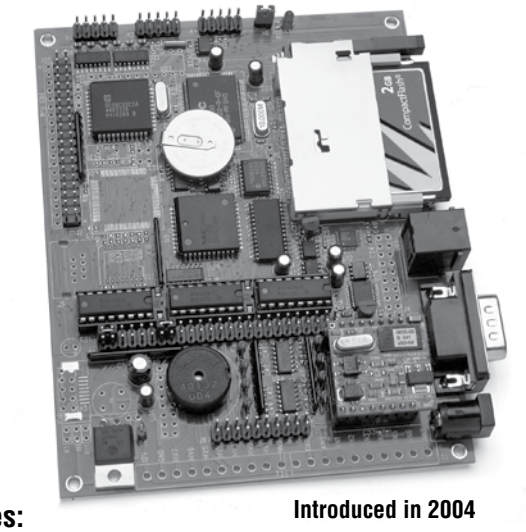
RM™ *Industrial Controller with On-board MODEM and Ethernet 80MHz CPU, high-voltage drivers, RS232/485, ADC/DAC, and CompactFlash storage.*



Introduced in 2004

Features:

- 4.5 x 5.2", -40°C to +80°C
- 50 µA standby, 200/20 mA normal/power-save
- 80 MHz 16-bit x86 CPU, C/C++ programmable
- Ethernet, 3 serial ports, MODEM with DAA, RJ11
- 16 ADC analog inputs, 8 DAC analog outputs
- CompactFlash with FAT16 File system support
- 256KW 16-bit Flash, 256KW 16-bit SRAM
- 40+ TTL I/Os, Real-time clock, 512 bytes EE
- Solenoid drivers, protected high voltage inputs.

Introduction

The ***RM™*** is a variant of TERN's ***R-Drive™(RD)*** controller, customized with additional features to support an industrial OEM customer's specific needs. Measuring 4.5x5.2 inches, the ***RM*** supports an on-board modem, Ethernet, serial ports, CompactFlash, ADCs, DACs, solenoid drivers, DB9, RJ11, and screw terminals. It can be used for precision data acquisition, industrial process control, remote communication logger, or portable test instrument.

The ***RM*** is based on a high performance 80 MHz 186 CPU with a 16-bit external bus supporting fast execution times through 16-bit Flash and SRAM.

Advanced Communication and Storage

A V.92, 56Kbps or a 2400bps modem module with DAA and RJ11 phone jack can be installed, ready to connect to a telephone line. This modem is designed to be used on U.S. and select international telephone systems; it supports caller ID, DTMF tone detection, voice play back, remote recording, ring detection and supports basic AT commands.

A 50-pin CompactFlash interface can be installed to allow access to mass storage CompactFlash cards (up to 2GB). An Ethernet LAN controller (CS8900) with RJ45 connector can be installed to provide 10 Base-T Ethernet network connectivity.

A set of ***TERNDirect™*** network stack libraries allow easy programmatic access to data traffic on an Ethernet link, extending on the protocol stack as low as Ethernet frames or as high as TCP/IP. ***TERNDirect™*** file system libraries support FAT12/16 access to an attached CompactFlash card, meaning that PC-readable data files can be easily created within the user's C/C++ application.

Data Acquisition and Industrial Control

One high-speed 12-bit parallel ADC (AD7852) provides 8 channels of analog input (0-5V), at up to 300K samples per second. A 16-bit ADC (ADS8344, TI) provides 8 single-ended or 4 differential analog inputs (0-5V, or 0-REF) with 65536 counts of resolution at up to 10KHz sample rate. Analog signal conditioning circuits can be installed to support ±10V analog inputs for the 16-bit ADC. A parallel DAC (DA7625, 5 MS, 4 ch, 12-bit, 0-2.5V) and 2 serial DACs (DAC7612, 2 ch, 12-bit, 0-4.095V) can be installed for a total of up to 8 analog outputs.

Three CPU internal timer/counters can be used to count or time external events, or to generate non-repetitive or variable duty-cycle waveforms as PWM outputs. A serial real time clock (DS1337, Dallas) is a low power clock/calendar with two time-of-day alarms. Three RS232 serial ports are available: a Dual UART (SC26C92) and a single CPU internal UART (default as DEBUG port). All UARTs have deep FIFOs to minimize the potential of receiver overrun and to reduce interrupt overhead. One UART can be buffered by RS232 (as default), RS485, or RS422. As many as 40+ TTL I/O lines are free for application use, including 24 bi-directional I/Os from the PPI (82C55), 32 multifunctional CPU internal PIOs, and TTL I/Os from the Dual UARTs (SC26C92).

Three DIP sockets with high voltage sinking drivers (ULN2003A) are installed as default. Each driver is capable of sinking 350 mA at 50V per line. They can directly drive solenoids, relays, or lights. Optional high efficient Switching Regulator (LM2575) supports 8-30V DC power input without generating excessive heat.

Ordering Information

RM $199

Includes: 80MHz CPU, 40+ I/Os, 3 UARTs, 3 timers, 82C55, watchdog timer, EE, 256KW Flash, 64KW SRAM, solenoid drivers.

NOT including add-on options. OEM option discounts available.

Add-on Options:

1) SRAM 256KW $20
2) Real-time clock (RTC1337) and battery $20
3) CompactFlash interface $20
4) 4 ch. 12-bit DAC, 200 KHz (DA7625) $40
5) 2 ch. 12-bit DAC (DAC7612) 2 chips $20x2
6) 8 ch. 12-bit ADC (ADS7852), 300 KHz $20
7) 8 ch. 16-bit ADC (ADS8344) $30
8) Analog signal conditioning for 16-bit ADC $30
9) Switching regulator (SR) $20
10) RS485/422 ..... $10/20
11) Ethernet Interface (CS8900) $30
12) 2400 bps or 56Kbps MODEM $50

TERN INC. 1724 Picasso Avenue, Davis, CA 95616 USA
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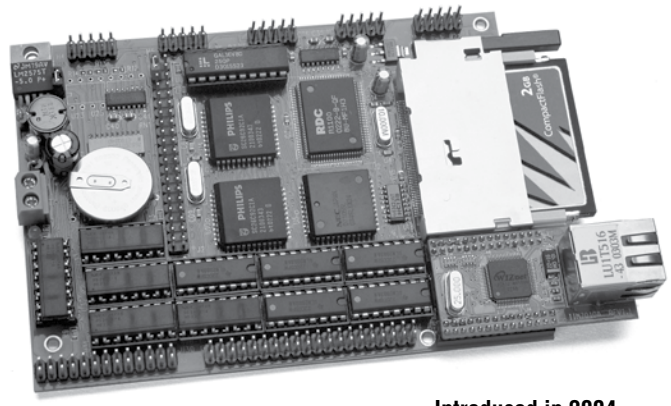
RL™ *Networked Industrial Controller 100 Base-T Ethernet, high-voltage drivers, Opto-couplers, RS232/485, and 2GB CompactFlash.*



Introduced in 2004

Features:

- 4.9 x 3.5", -40°C to +80°C, 50 µA standby, 200 mA normal
- C/C++ programmable, 80 MHz R1100 or 40 MHz Am186ER
- Hardware TCP/IP stack for 100 Base-T Ethernet
- Suitable for protected industrial control applications
- 35 Solenoid Drivers, 20 Opto-coupler inputs
- Flexible hardware-configurable input logic
- Up to 2GB CompactFlash with FAT16 File system support
- 256KW 16-bit Flash, 256KW 16-bit SRAM
- 20+ TTL I/Os, Real-time clock, 512 bytes EE
- 5 RS-232 serial ports, one can be RS485/422

Introduction

The ***RL™*** is a controller designed for industrial machine control applications. This industrial embedded controller integrates 20 isolated opto-coupler inputs, 35 solenoid drivers, 100 Base-T Ethernet connection, 5 RS232/485/422 serial ports, and CompactFlash mass data storage support on a single PCB. It is ideal for industrial process control, high speed LAN, or remote communication machine control applications.

The ***RL*** utilizes a high performance C/C++ programmable 186-generation CPU (80MHz R1100 or 40 MHz AM186ER) with a 16-bit external data bus, supporting fast code execution. It has 256KW 16-bit Flash and 256KW 16-bit battery-backed SRAM. Three CPU internal timer/counters can be used to count or time external events, or to generate non-repetitive or variable duty-cycle waveforms as PWM outputs. A real-time clock (DS1337, Dallas) provides clock/calendar with two time-of-day alarms.

A 50-pin CompactFlash interface allows access to mass storage CompactFlash cards (up to 2 GB). TERN C/C++ programmable software packages with FAT16 file system libraries are available.

High-performance Communications

An i2Chip™ Fast Ethernet Module can be installed to provide **100M Base-T** network connectivity, allowing the RL to work with high-bandwidth modern Ethernet networks. This Module implements TCP/IP, UDP, ICMP and ARP with a combination of hardware/software. It has 16KB internal transmit and receiving buffer which is mapped into host processor's direct memory. The host can access the buffer via high speed DMA transfers. The hardware Ethernet module releases internet connectivity and protocol processing from the host processor. It supports 4 independent stack connections simultaneously at a 4Mbps protocol processing speed. An RJ45 8-pin connector is on-board for connecting to 10/100 Base-T Ethernet network.

Five RS232 serial ports are onboard. The CPU's internal UART is used for remote debugging, but is also available for user application. Two Dual UARTs (SC26C92) provide 4 more UARTs. All UARTs have deep FIFOs to minimize receiver overrun and to reduce interrupt overhead. One RS232 port can be converted to RS485, or RS422.

Protected I/O for Industrial Use

Five power Darlington array chips (ULN2003A) are installed in five DIP sockets, providing a total of ***35 high voltage sinking drivers***. Each driver is capable of sinking 350 mA at 50V per line. They can directly drive solenoids, relays, or lights. In place of the ULN2003As, resistor packs or DAC chips (with modification) can be optionally installed to provide TTL I/O or up to 10 analog outputs. A total of ***20 opto-couplers*** are on-board to provide isolation for high voltage inputs. Furthermore, some control applications need to trigger an event under combined conditions of several sensors/switches. As a result, seven of the 20 opto-couplers are routed to an on-board PAL, allowing flexible hardware-configurable input logic to trigger interrupts. An ***additional 20 TTL I/O lines*** are available on the J2 pin header, including bi-directional I/Os from the PPI (82C55), multifunctional CPU internal PIOs, and TTL I/Os from the Dual UARTs.

Optional high efficient Switching Regulator (LM2575) provides an external control pin to shutdown 5V and enter µA standby mode, waking-up on an active-low signal. The ***RL*** requires 8.5V to 12V DC power supply with default linear regulator, or up to 30V DC power input with switching regulator without generating excessive heat.

Two versions of ***RL*** are available: the ***RL80*** is based on the 80 MHz R1100, and ***RL40*** is based on 40 MHz Am186ER.

Ordering Information

RL80 or RL40 $199/$169/$139/$79 Qty 1/50/100/1K+

Includes: 80/40MHz CPU, 5 RS232, 3 timers, 82C55, watchdog timer, EE, 256KW Flash, 64KW SRAM, 20 TTL I/Os, 35 solenoid drivers, and 20 opto-couplers.

NOT including add-on options. OEM option discounts available.

Add-on Options:

1) SRAM 256KW.....$20
2) Real-time clock (RTC1337) and battery.....$20
3) CompactFlash interface $20
4) Switching regulator (SR).....$20
5) UART driver, a) RS485, b)RS422.....$10/20
6) i2chip 100 Base-T Ethernet Module.....$30

Typical Order Example:

80 MHz RL™, with 4 RS232 and one RS485
RL80 + 5a = $199 + $10 = $209

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