

# LPM-33

## LOW POWER MODEM

### USER MANUAL

# MICRO-AIDE

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## HIGHWAY PRODUCTS

### LOW POWER MODEMS

LIMITED DISTANCE MODEMS

LIGHT OUT DETECTORS

LOCAL CONTROL UNITS

LOAD SWITCHES

CUSTOM ENGINEERING



# LPM-33

## LOW POWER MODEM

### USER MANUAL

*Commercially available modems are generally not suitable for use in roadside applications. The LPM-33, however, operates over a temperature range extending from  $-40^{\circ}\text{C}$  to  $+72^{\circ}\text{C}$ . Its low power design allows it to be powered by typical solar panel systems.*

## Description

This document is intended to provide a detailed description of the use and operation of the MICRO-AIDE LPM-33 Low Power Modem.

The LPM-33 is specifically designed for use in highway applications requiring remote access via standard telephone lines. It will operate in very severe temperature conditions, including those typically associated with roadside facilities. It can be powered by any source in the range from 5 to 36 Vdc. More importantly, it features a low power standby mode that allows it to be battery powered. A solar panel charged battery provides a fully satisfactory method of powering the LPM-33.

Several timers are employed by the LPM-33. The timers are used to reduce net power consumption in typical applications. Sixty seconds after the termination of ringing voltage or 120 seconds after the cessation of DTE data the LPM-33 will automatically revert to its low power standby mode. Standby mode will also be invoked 10 seconds after the loss of carrier is detected. The mode control sequence employed by the LPM-33 is fully depicted in Figure 1.

Baud rates up to 33,600 are supported by the LPM-33. Its high speed makes the LPM-33 ideally suited to weigh-in-motion applications where large amounts of data are typically transferred. CCITT and Bell standard error correction and data compression algorithms are also supported. The LPM-33 will operate in auto-answer and originate modes.

The LPM-33 is housed in a rugged aluminum case. Six front panel mounted LEDs indicate the status of the modem at all times. A standard DB-25 connector

allows the LPM-33 to be easily connected to a variety of roadside data devices.

Figure 1 provides a flow diagram of the modem's standby and active mode control sequences. Figure 2 provides a three-sided, fully dimensioned view of the LPM-33. The last page of this document lists detailed specifications.

## Installation

In its standard configuration the LPM-33 is placed on a shelf or flat horizontal surface. It is equipped with four non-slip rubber feet. Shelf mounting brackets that allow the LPM-33 to be secured to a shelf or backboard are available from MICRO-AIDE upon request. The mounting brackets are attached to the bottom of the LPM-33 by removing the four rubber feet. The vacated screw holes are used to secure the brackets.

A standard 25-pin, RS-232 cable can be used to connect the LPM-33 to the DTE device. The LPM-33 is equipped with a female connector configured for DCE operation. The list of specifications includes each of the RS-232 signals provided by the modem.

The telephone line is attached to the LPM-33 via a standard RJ-11 connector. Dual female jacks are available at the LPM-33 so that a utility phone can be used while the modem is inactive.

A 6 ft. long power cable is shipped with every LPM-33. The cable is terminated with a standard 3.5 mm plug. The plug mates with the power jack located on the rear panel of the LPM-33. The red wire of the cable attaches to the center pin of the jack and must be connected to the positive terminal of the

power source. The black wire must be connected to the negative terminal of the power source.

Alternatively, the LPM-33 can be powered by a nominal 12 Vac source. A Stancor STA-4112A wall mount transformer can be used for this purpose. It connects directly to any 120 Vac outlet. The transformer has a rated output of 12 Vac at 500 mA. Its output cable is terminated with a 3.5 mm plug.

**Note** - Contact MICRO-AIDE if the Stancor wall mount transformer is required.

## Setup and Operation

Except as noted below, after power is applied to the LPM-33 the green “STBY” LED should start to flash immediately. This indicates the modem is in low power standby mode. The LED should turn off when the modem receives DTE data or auto-answers an incoming call.

The standby mode of the LPM-33 can be disabled. This option may be of benefit in applications where the modem is not being powered by a solar panel. Disabling the standby mode of the LPM-33 forces the modem into continuous active mode.

To disable standby mode remove the cover of the LPM-33. Four screws located along the sides of the modem secure the cover in place. Locate the jumper labeled “JP1” on the printed circuit board. Install the shorting jumper so that it bridges both pins of JP1. Reattach the cover. The standby LED will remain off with power applied to the modem.

**Reminder** - For low power standby operation remove the JP1 jumper. To disable standby operation install the JP1 jumper.

The user may be required to install an operational profile into the LPM-33. Modem profiles are determined by the operating aspects of the DTE attached to the LPM-33 and the required application. The LPM-33 conforms to the industry standard set of AT commands. However, several modem characteristics (e.g., error correction control) are not uniformly coded by modem chip manufacturers. A complete list of AT commands used by the LPM-33 is available.

**Note** - Contact MICRO-AIDE if a complete description of the AT command set used by the LPM-33 is needed.

Install and save the required profile by connecting the communications port of a PC directly to the RS-232 connector of the LPM-33. A communications program (e.g., HyperTerminal®) can be used to communicate with the LPM-33.

**Note** - Unless otherwise requested by the user, both profiles used by the LPM-33 are set to the default values established by the modem chip manufacturer.

After the correct profile is programmed into the LPM-33 the modem is ready for use in the intended application.

## Maintenance and Troubleshooting

The LPM-33 is designed to be completely maintenance free. It contains no consumable materials or serviceable components. If the unit fails to power-up (as indicated by the green standby LED not flashing) the unit should be returned to MICRO-AIDE for repair.

The operation of the LPM-33 can be easily tested. Any PC equipped with a modem and a communications program (e.g., HyperTerminal®) can be used to access the LPM-33. A check of the modem’s ability to answer, connect and communicate can be performed very effectively. Remote tests of the LPM-33 can be made by MICRO-AIDE technicians at the request of the user.

MICRO-AIDE provides a limited three-year warranty of the LPM-33. Telephone numbers and a shipping address are listed below.

### MICRO-AIDE CORPORATION

685 Arrow Grand Circle

Covina, CA 91722

Tel: 626-915-5502

Fax: 626-331-9484

E-mail: [support@micro-aide.com](mailto:support@micro-aide.com)

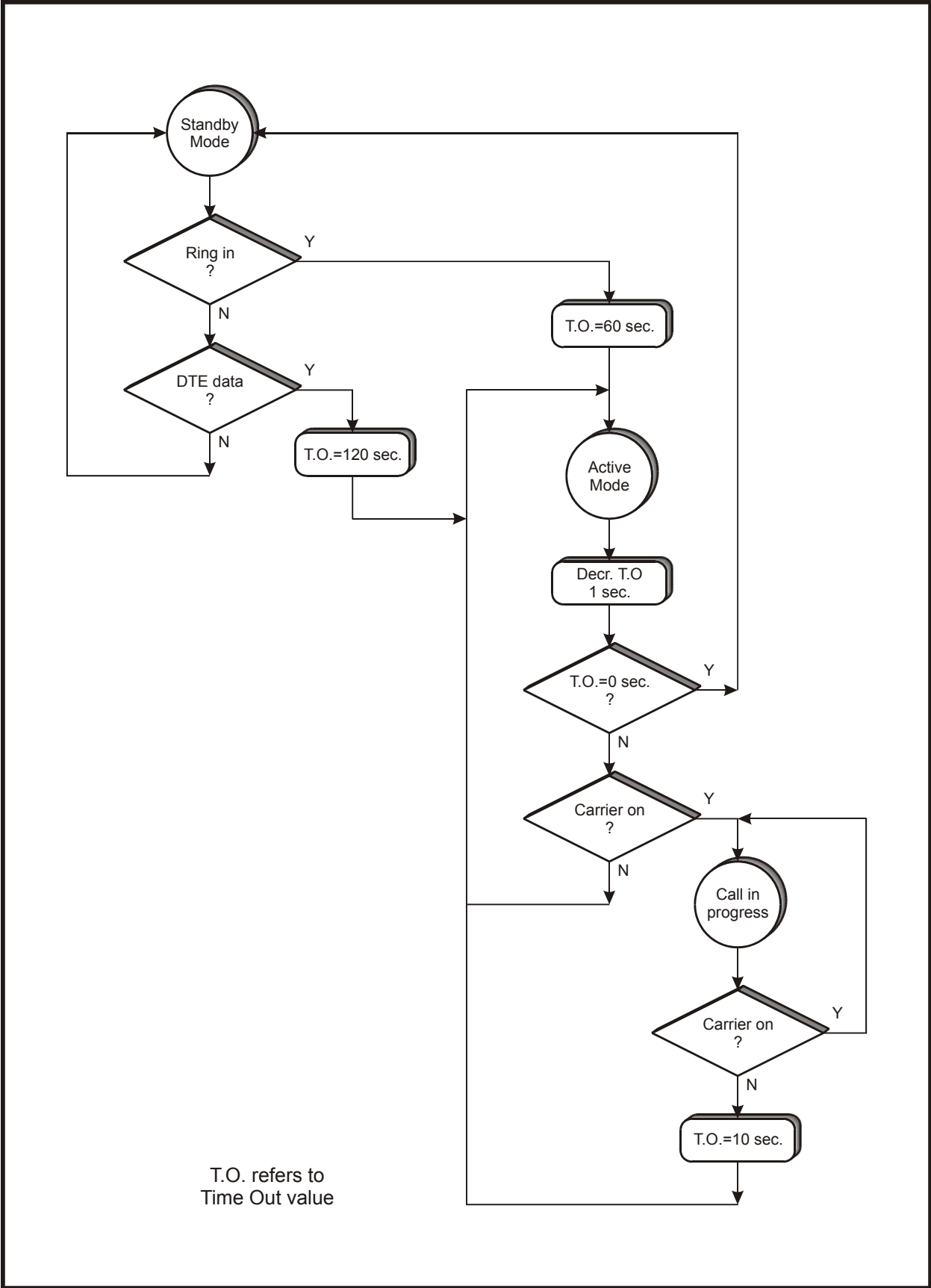


Figure 1 - Mode control flow diagram

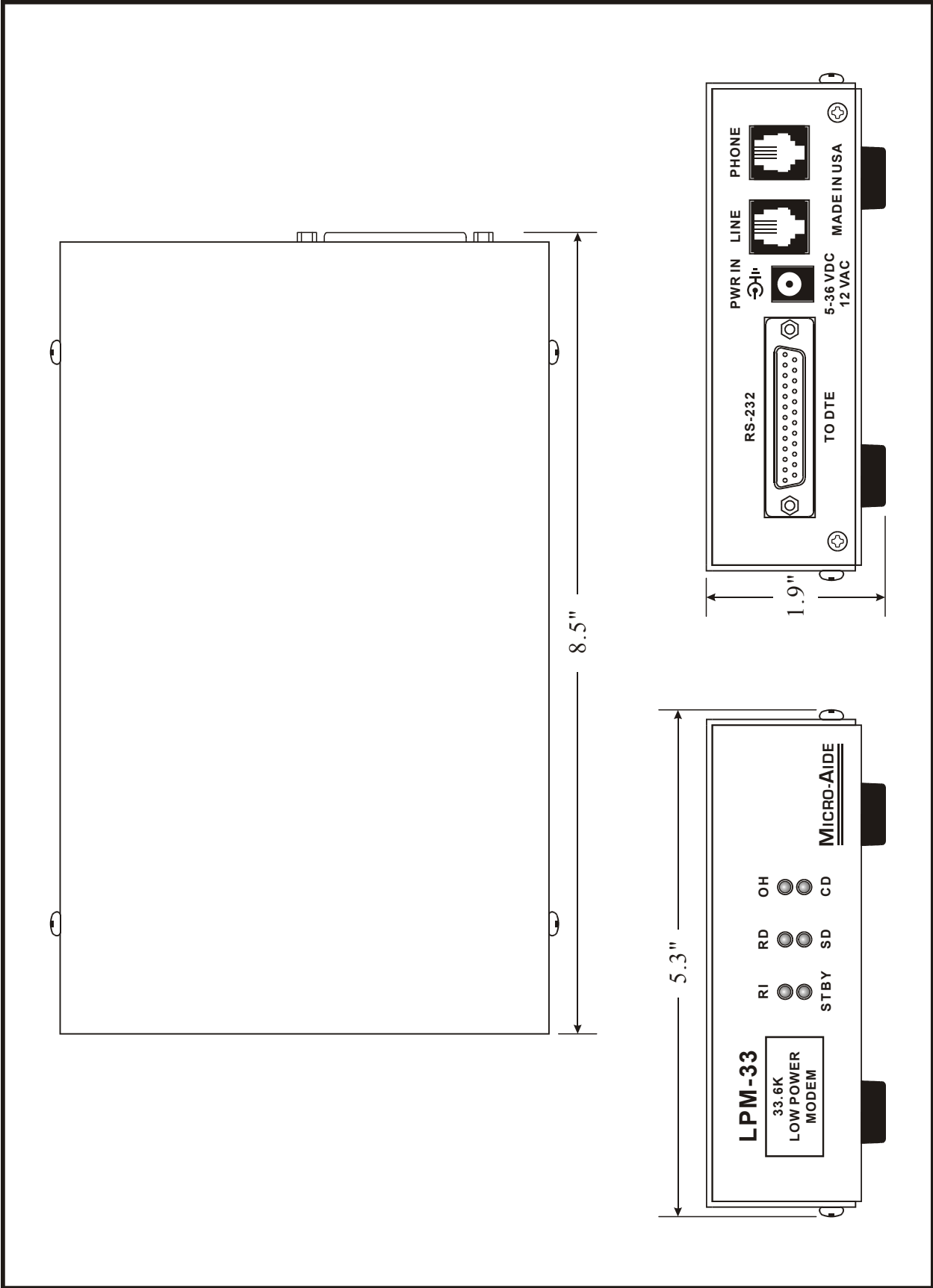


Figure 2 – Three-sided view

# LPM-33

## LOW POWER MODEM

### SPECIFICATIONS

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#### Physical

##### Size

Length: 8.6"

Width: 5.3"

Height: 1.9"

##### Weight

20 oz.

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#### Environmental

##### Storage

Temperature: -40°C to 85°C

Humidity: 0 to 95%, non-condensing

##### Operating

Temperature: -40°C to 72°C

Humidity: 0 to 95%, non-condensing

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#### Mounting

**Standard:** shelf or desk top

**Optional:** mounting brackets available upon request

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#### Construction

##### Housing

Fully enclosed, anodized aluminum

##### Electrical

Components mounted on internal PCB

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#### Power

##### Voltage

5.0 to 36 Vdc, 10 to 15 Vac

##### Consumption

**Standby:** .5 mA at 12 Vdc (maximum)

**Active:** 85 mA at 12 Vdc (typical)

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#### Operation

##### Speed

Baud rates to 33,600

##### Type

Auto-answer and originate

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#### Modem Standards

##### CCITT

V.34, V.32 bis, V.32, V.22 bis, V.22, V.21

##### Bell

103, 212A

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#### Data Compression

MNP 5 and V.42 bis

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#### Error Correction

MNP 2-4 and LAP-M

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#### Control Commands

Hayes AT command set; additional AT commands for data compression, error correction, cellular operation

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#### Profiles

2, set at factory, user definable, stored in non-volatile E<sup>2</sup>PROM

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#### Mode Control

##### Standby

Awaits ringing or DTE data

##### Standby to Active

Within 6 seconds of ringing or 200 msec of DTE data

##### Answer

After transition to active mode answers call in accordance with S0 register setting

##### Disconnect

Loss of carrier, DTR drop or on-hook command

##### Active to Standby

**Active Connection:** 10 seconds after loss of carrier

**No Connection:** 60 seconds after last ring or 120 seconds after last DTE data

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#### DCE - DTE Interface

**Type:** RS-232

**Speed:** auto-detects with AT command, up to 115,200 Baud

**Signaling:** N-8-1

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#### Controls

##### Internal

**Jumper JP1:** disables standby operation if jumper is on

##### External

None

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#### LED Indicators

**Standby:** green

**Ringing:** red

**Send Data:** red

**Receive Data:** red

**Carrier Detect:** red

**Off Hook:** red

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#### Connectors

##### Power

Standard 3.5 mm jack, center positive

##### To DTE

DB-25 female, configured as DCE

**Pin 1:** Protective Ground

**Pin 2:** Send Data

**Pin 3:** Receive Data

**Pin 4:** Request to Send

**Pin 5:** Clear to Send

**Pin 6:** Data Set Ready

**Pin 7:** Signal Ground

**Pin 8:** Carrier Detect

**Pin 20:** Data Terminal Ready

**Pin 22:** Ring In

##### Telephone Line

Dual female RJ-11, wired in parallel

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#### Line Protection

Internal gas tube arrester, 230 Vdc, tip and ring to ground

**Note:** a telco approved external suppressor should be used for added protection

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#### Regulatory

Designed to meet applicable FCC standards