

Michigan State University

Electronic Parachute Deployment System

User Manual

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The Electronic Parachute Deployment (EPD) system is an affordable and stable solution to your rocket recovery needs! The small design can fit in many different payloads of medium and large payloads, yet is light-weight to avoid interference with the trajectory of the rocket's flight. This device is designed to work with deployment charges that rely on some current to deploy the charge.

WARNING!!

Many deployment charges are made with black powder or a black powder substitute. Please use caution when handling the charges. This is especially true when connecting the charges to the EPD system and transporting the charges.

Compatibility

Power Supply:

The power supply suggested for the EPD system is a 9V battery. However, due to the design of the device, the voltage for the supply can be between 7V and 40V. Therefore, modification can be made to use a different battery if necessary. Also, the user can use a 9V battery for many launches before the battery is unusable. It is suggested that the power supply used be above 7.2V to avoid the voltage dropping below the usable range after use. The power supply also needs to be able to supply enough current to the deployment charges (see below for current).

Deployment Charges:

The EPD system is designed primarily to ignite a black powder charge the separate rocket stages. In order to ignite the powder, most igniters rely on a current to ignite. The EPD system connects the igniter to the power supply. In order to trigger the charge, the current provided must be at or above the all-fire current for the igniter.

$$I \approx \frac{V_{power_supply}}{R_{igniter}}$$

Setting up your EPD system

What you will need:

- 9V battery
- Deployment Charges (2)

Setup:

1. Attach the battery to the EPD system. Make sure the LED comes on to indicate it is receiving power.
2. Secure the EPD system and battery inside the rocket's payload section. Failure to do so can cause damage to the EPD system and the rocket. It may also jeopardize the functionality of the EPD system.
3. Place the wires for the deployment charges in the correct position for your rocket.
4. Connect the deployment charges to the proper wires

At this point, the rocket is armed and should be ready for launch. The EPD system has been proven to not misfire on the launch pad or while setting up the rocket. However, caution should be taken around any system that uses explosives and combustible material.

Getting your EPD system

Retrieval:

1. Disconnect the deployment wires if they are connected to some fixture or move them to make removal of the EPD system easier.
2. Remove the EPD system including battery from the payload of the rocket.
3. Listen to the flight data (optional).
4. Remove the battery to turn the system off or press the reset button to prepare the system for another launch.

Flight Data:

The EPD system includes a buzzer to report three heights: the maximum height of the flight, the height the drogue parachute deployed, and the height the main parachute deployed. The heights are in units of feet. The buzzer will continue to report the data until the system is reset or deactivated (by removing the power supply). Before a measurement is announced, the buzzer will make one to three short beeps to signal that it is beginning a new number. The reading itself are the digits of the height, with a series of medium length beeps with short intervals between representing numbers 1-9 and a long beep to denote zero. Slightly long pauses are taken between digits.

Table of buzzer codes

Type of Beep	Diagram	Value/description
1 short beep		Maximum Height
2 short beeps		Drogue parachute deployment height
3 short beeps		Main parachute deployment height
1-9 medium beeps		1-9
1 long beep		0

Example:

A rocket launch has the drogue parachute deployed at 1203 ft. The buzzer output will have pulses of the following form:

