MH EDS Model O$_2$D2
INSTRUCTION MANUAL

6 mm **Blue** outlets connect to cannula or face mask

Power On/Off and **Control** Switch (with read-out window)

4 mm **Red** inlet connects to the regulator

LED indicator for User 1 (Pilot)

6 mm **Blue** outlets connect to cannula or face mask
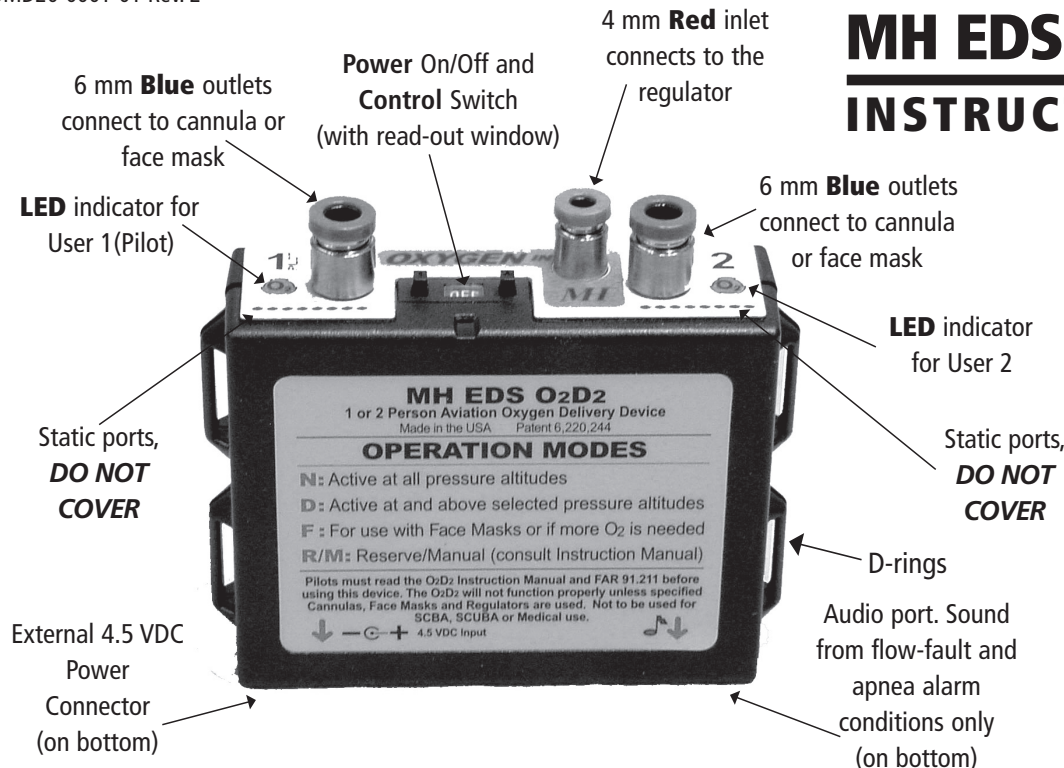
LED indicator for User 2

Static ports, *DO NOT COVER*

Static ports, *DO NOT COVER*

1 or 2 Person Electronic Digital Pulse-Demand™ Aviation Oxygen Delivery System

Patent # 6,220,244
Other Patents Pending

MH EDS O$_2$D2
1 or 2 Person Aviation Oxygen Delivery Device
Made in the USA   Patent 6,220,244

OPERATION MODES

N: Active at all pressure altitudes
D: Active at and above selected pressure altitudes
F : For use with Face Masks or if more O$_2$ is needed
R/M: Reserve/Manual (consult Instruction Manual)

Pilots must read the O$_2$D2 Instruction Manual and FAR 91.211 before using this device. The O$_2$D2 will not function properly unless specified Cannulas, Face Masks and Regulators are used. Not to be used for SCBA, SCUBA or Medical use.

↓ — ⊙ + 4.5 VDC Input

D-rings

Audio port. Sound from flow-fault and apnea alarm conditions only (on bottom)

External 4.5 VDC Power Connector (on bottom)

THANK YOU for purchasing the MH EDS O$_2$D2 Pulse-Demand™ Oxygen Controller. The EDS Pulse-Demand™ O$_2$D2 is patented innovative oxygen control technology that allows you and your co-pilot to fly with safety and comfort, knowing it will automatically give the exact oxygen required at the various altitudes. Although the MH EDS O$_2$D2 is designed for easy operation, PLEASE READ THIS INSTRUCTION MANUAL BEFORE USE.

WARNING: This MH EDS O$_2$D2 is designed to operate with a maximum regulated pressure not to exceed 25 psi. If a regulator beyond this pressure is used, unit will be damaged and your warranty will be void.

CONTENTS

MH
Aviation Oxygen Systems
MOUNTAIN HIGH
Equipment & Supply Company

800-468-8185
541-923-4100
Fax: 541-923-4141
sales@MHoxygen.com
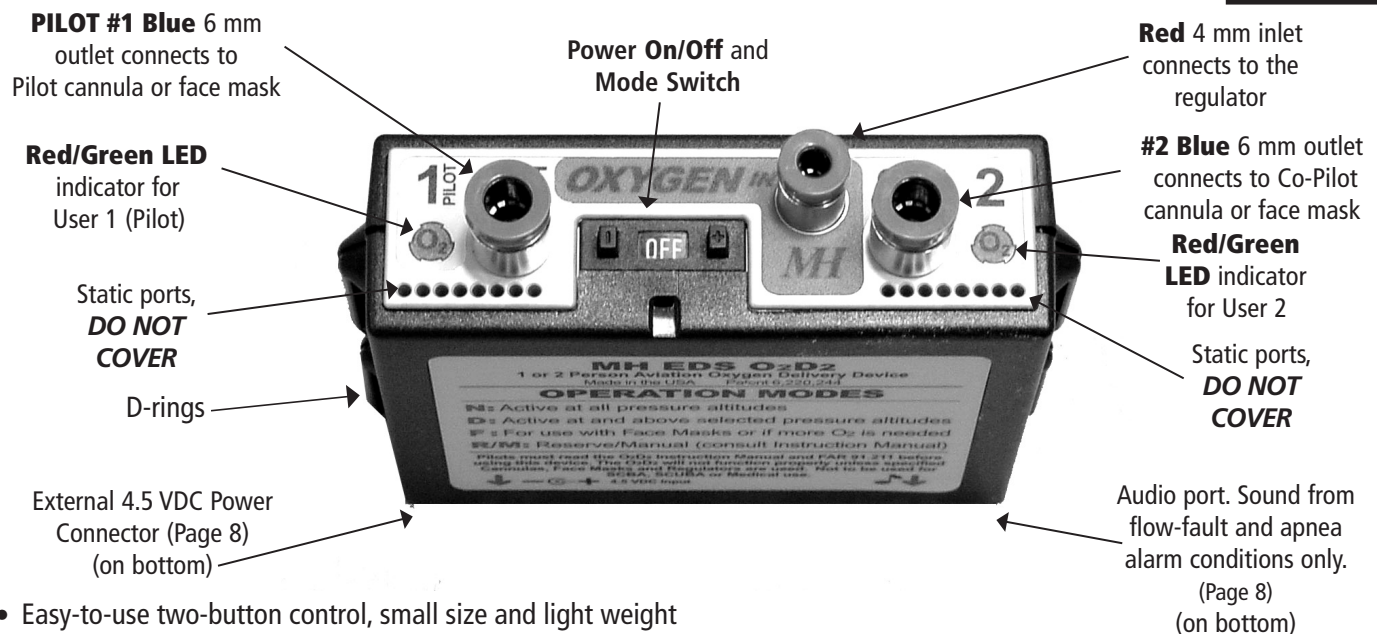www.MHoxygen.com
2244 SE Airport Way, Suite 100
Redmond, OR 97756-7537 U S A

The patented MH EDS-O2D2 is a one or two-user aviation oxygen delivery device. It is designed to deliver aviation oxygen in the most efficient, comfortable and convenient way possible. With its user-selectable settings, apnea alarm and small size, the MH EDS-O2D2 is the most portable and flexible electronic digital oxygen delivery system in the world.

By providing a measured pulse of oxygen every time you breathe in, the MH EDS-O2D2 supplies the oxygen you need to stay alert and comfortable while flying. In contrast to constant flow systems that waste oxygen by supplying more than your body can use, the MH EDS-O2D2 provides a short pulse of oxygen as you inhale, ensuring that your oxygen is used most efficiently. Efficient oxygen delivery means you can fly further on a single oxygen refill or save space and weight with a smaller tank. It also makes it more feasible to enjoy the advantages of oxygen while flying below the altitudes where oxygen is mandated-- that can mean fewer headaches, increased alertness, and feeling less exhausted when you reach your destination. Your actual oxygen usage will be determined by your breathing rate and physiological needs at altitude.

The programmability of the MH EDS-O2D2 means that, unlike constant-flow oxygen systems, you can "set it and forget it". By automatically detecting your pressure altitude, the MH EDS-O2D2 can be set to start providing oxygen immediately or at a specified altitude and will automatically adjust the oxygen flow as your altitude changes. **When you're flying, don't you have more important things to do than adjust your oxygen flow during altitude changes?**

FEATURES

PILOT #1 Blue 6 mm outlet connects to Pilot cannula or face mask

Power On/Off and **Mode Switch**

Red 4 mm inlet connects to the regulator

Red/Green LED indicator for User 1 (Pilot)

#2 Blue 6 mm outlet connects to Co-Pilot cannula or face mask

Red/Green LED indicator for User 2

Static ports, **DO NOT COVER**

Static ports, **DO NOT COVER**

D-rings

External 4.5 VDC Power Connector (Page 8) (on bottom)

Audio port. Sound from flow-fault and apnea alarm conditions only. (Page 8) (on bottom)

- Easy-to-use two-button control, small size and light weight
- Automatically adjusts oxygen flow with altitude
- Provides reduced oxygen consumption through more efficient oxygen delivery than standard constant-flow systems
- Push button control switch allows automatic altitude enable, Night and Day operations and high flow settings
- Green/Red LED's indicate oxygen flow, alarm, and status
- Audible and visible apnea alarm informs user of kinked, pinched, or disconnected oxygen lines, obstructed cannula or mask
- Reduced dry mouth and nose discomfort compared to constant-flow oxygen systems

BASIC SAFETY

Pure oxygen is a highly oxidizing gas and can vigorously accelerate combustion. It can provide a catalyst for spontaneous combustion resulting in personal injury or death if not used properly and with caution. ***DO NOT use any type of oil or grease on any of the fittings, valves or cylinders. DO NOT smoke while in use. DO NOT operate near an open flame.*** *DO NOT use the MH EPS (External Power Supply) with the O2D2 as the voltages are not compatible.*
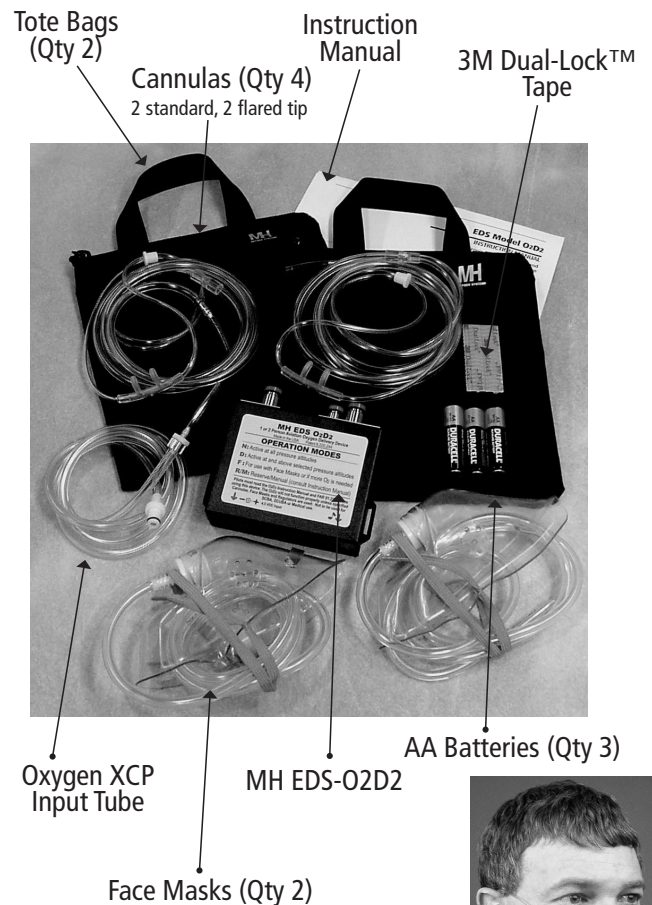
The MH EDS O2D2 is designed to be used with MH Regulators. Pilots who intend to fly with the MH EDS O2D2 are advised to familiarize themselves and their passenger with the system prior to using it. Four cannulas and two face masks are included with the MH EDS O2D2 unit. The cannula may be used for flight operations up to 18,000 ft. Above 18,000 ft., a face mask should be worn. A compatible face mask with a built-in microphone is available from Mountain High. (AMSKM-1100-01)

1. **If** you have not already done so, fill your cylinder with Aviation oxygen. (Many FBOs offer this service.)
2. **Inventory** your system *(see photo)* and read the front label on the unit.
3. **Per** the instructions provided with your cylinder and regulator, attach the regulator to the cylinder and **hand tighten only** *(DO NOT use a wrench or pliers—the "O" ring seals the regulator to the cylinder, over tightening will damage the regulator).*

   NOTE:
   Pressure in the regulator must be released before the regulator can be removed from the cylinder.

4. **Open** the battery cover on the back of the MH EDS-O2D2 unit, install the 3 AA batteries (supplied) and replace the battery cover. *(NOTE: Batteries fit tightly, handle with care.) See next page for detailed instructions.*
5. **If** you are using the MH EDS-O2D2 with a Mountain High four port regulator (FPR), locate the oxygen input tube (clear tube with a short red tube on one end) and insert the *Red* tube into the red "Oxygen In" connector on the MH EDS-O2D2 unit until it stops (approx. 1/8 inch). Then connect the other end of the tube to your regulator. If you are using a MH single port regulator (XCR), use the tube that came with the regulator in place of the tube that came with your MH EDS-O2D2.
6. **Insert** the **Blue** end of the cannula or face mask tubing into the **BLUE #1 Pilot "Out"** connector on the unit. **Always use the #1 connector when only one (1) person will be using the system. For a second user, insert the BLUE end of the cannula or face mask tubing into the BLUE #2 connector.** The Co-Pilot #2 connection becomes active when inhalation is detected after a short period of inhalations.
   CAUTION: DO NOT pinch the Cannula or Facemask tubing when inserting them into the BLUE "Out" connectors). Use only the supplied MH EDS cannula as other cannulas may not work properly with the MH EDS-O2D2. DO NOT lengthen or shorten the cannula tube.
7. **Turn** the cylinder valve on.
8. **Push** the "+" power/control button on the MH EDS-O2D2 unit once. This will turn the unit on and set it to "N" mode. A start-up pulse of oxygen, Red light and beeper test will verify battery power.
9. **Don** the cannula or face mask (make sure the face mask seals against the skin) and take a breath. The bright green LED under the #1 should illuminate, and a pulse of oxygen should be delivered. Refer to the card that comes with the cannula and face mask for donning information.
10. ***You are ready to fly.***

Tote Bags (Qty 2)
Cannulas (Qty 4) 2 standard, 2 flared tip
Instruction Manual
3M Dual-Lock™ Tape
Oxygen XCP Input Tube
Face Masks (Qty 2)
MH EDS-O2D2
AA Batteries (Qty 3)

Comfortable cannula position, looped over ears and the tab pointed down.

O2D2 with cannulas, regulator connection, regulator and cylinder

Note: Passport not included

Remove the battery door by pressing down gently on the battery cover flange then tip the door out and away from the unit. The EDS-O2D2 unit uses 3 standard quality AA DURACELL ULTRA alkaline batteries. Insert the batteries as shown (they will be a tight fit), then replace the door by setting the bottom of the door in place and tipping the top in until it snaps in place. Take care when removing and replacing the batteries to not damage the batteries and/or connectors.
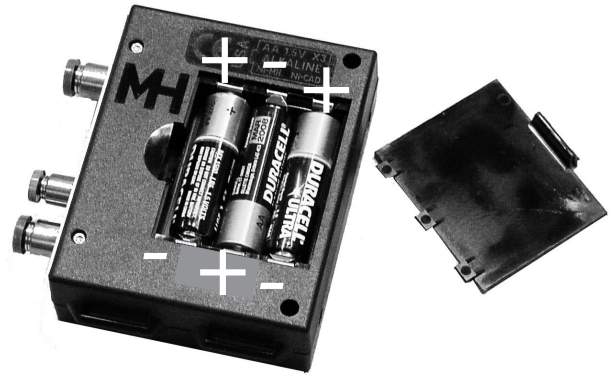
REMOVING THE TUBING

To Remove the tubing, push in slightly on the tubing, then push in the connector collar while you pull gently on the tubing to remove it.

DO NOT pull on the tubing without pushing in the collar; it will damage the connector.

1. Push in the collar

2. Pull the tube straight back while pushing in the collar.
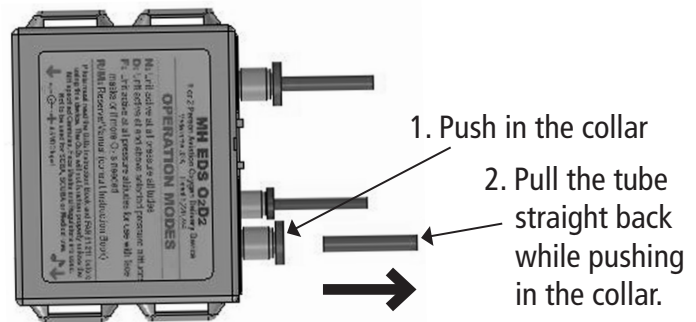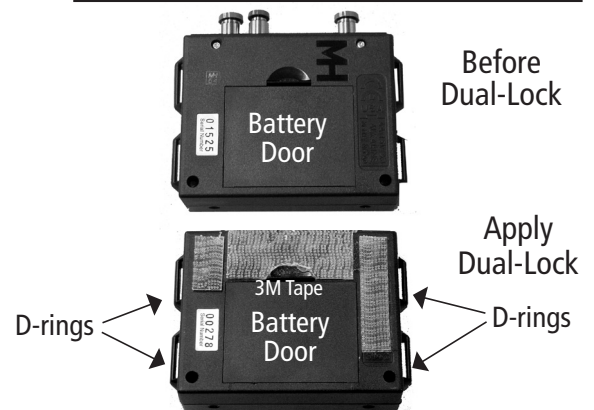
STORING THE MH EDS-O2D2

When not being used, the MH EDS-O2D2 unit, oxygen tubes, cannulas, etc., should be disconnected from the oxygen supply and stored in a secure manner to ensure that dirt and debris do not become lodged in the inlet and outlet tubes. The supplied tote bags or a zip-top plastic bag is a good storage container. *If the unit is not going to be used for 30 days or more, remove the batteries. When using the unit for the first time after storage, check the batteries to ensure proper operation. A set of fresh spare batteries should be part of your pre-flight inventory.*

DO NOT store the EDS unit while the inlet is under pressure. Remove all sources of oxygen pressure and secure the unit to ensure it will not become damaged. If the lines are disconnected they must be covered so that debris, dust or dirt can't get in. If the supply line is left hooked to the system, make sure that it is first purged with clean dry air or oxygen before the EDS unit is connected. *If the lines are disconnected they must be covered so that debris, dust or dirt can't get in.*

MOUNTING THE MH EDS-O2D2

You may mount the MH EDS-O2D2 unit to a suitable place using the supplied piece of 3M DUAL LOCK tape. First, cut the piece of DUAL LOCK tape in half, lengthwise, creating two long rectangles. Peel the protective backing off one of the rectangles to expose the adhesive and apply it to the back of the unit above the thumb indent for the battery door. DO NOT COVER ANY PART OF THE BATTERY DOOR. When a suitable place to mount the unit has been found, peel off the protective adhesive backing and press the adhesive side to the chosen mounting area.

You may also mount the MH EDS-O2D2 by feeding 3/4"- wide straps (not included) through the D-rings molded into the unit.

Before Dual-Lock

Battery Door

Apply Dual-Lock

3M Tape

D-rings

Battery Door

D-rings

MODE CONTROL SWITCH SETTINGS AND MODES OF OPERATION

The MH EDS-O2D2 unit is controlled by two push button control switches. A stop inside the selector switch prevents inadvertently turning the unit off in flight.

The MH EDS-O2D2 has three main modes of user controlled operation:
1. **Fully-Automatic (D5, D10)**
2. **Semi-Automatic (N and F modes)**
3. **Manual (R/M)**

NOTE: The N and D modes are designed to provide the amount of oxygen needed by an average size and healthy person using a cannula at the given altitudes; your needs may be different. To determine whether you are receiving enough oxygen in a particular mode you will need to use a pulse oximeter (available from Mountain High) to determine your blood oxygen saturation (goal is 90-100%) at any given altitude. The selected MH EDS-O2D2 mode applies to both users and should be set to accommodate the user with the highest oxygen need. In all modes except R/M, the O2D2 provides a pulse of oxygen which increases with altitude, I.e., it is altitude compensating.

Control switch settings

Reverse
(-)
Push Button

OFF

Advance
(+)
Push Button

Switch as seen in the "OFF" setting

N MODE: "Night" or "Now"

At this setting the MH EDS-O2D2 will immediately start the standard oxygen flow providing pulses of oxygen appropriate for an average healthy person using a cannula.

Flow start: All altitudes   **Use with:** Cannula
**Flow amount:** Standard Pulse   **Altitude Compensating?**: Yes

N
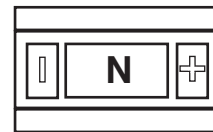
D MODES: "Day" or "Delayed"

The *D5* setting will cause the MH EDS-O2D2 unit to delay oxygen flow until it senses a pressure altitude of 5,000 ft. and above. The *D10* setting delays oxygen flow until 10,000 ft. and above. NOTE: When the barometric pressure is low, it will start operation *at a slightly lower flight altitude* than when the barometric pressure is high.

Flow start: D5--5,000 ft., D10--10,000 ft. **Use with:** Cannula
Flow amount: Standard Pulse   **Altitude Compensating?:** Yes

D10
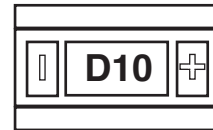
F MODES: "Floor" or "Face Mask"

The *F* mode settings *(F5, F10, F15, and F20)* are called the "*Floor*" or *"Face mask"* settings. They supplement the standard oxygen flow by adding approximately the selected number of feet (in thousands) to the MH EDS-O2D2's perceived altitude.

Flow start: All altitudes   **Use with:** Cannula or face mask
Flow amount: Enriched: **Altitude Compensating?:** Yes
  F5 =Standard+5,000 ft
  F10=Standard+10,000 ft
  F15=Standard+15,000 ft.
  F20=Standard+20,000 ft.

F15

Example: If you are at a pressure altitude of 5,000 ft. and select the F10 setting you will receive the effective flow rate of 5,000 + 10,000 = 15,000 ft. The "F" modes are useful for people for whom the standard oxygen supply does not achieve the desired blood oxygen saturation or for those who prefer to use a face mask rather than a cannula.

R/M: "Reserve/Manual"

This last switch setting, *R/M,* for *"Reserve" or "Manual"* provides the maximum pulsed-oxygen flow regardless of altitude.

Flow start: All altitudes   **Use with:** Cannula or face mask
Flow amount: Maximum Pulse   **Altitude Compensating?**: No

R/M

The MH EDS O2D2 is equiped with AUDIO-VISUAL ALARMS and ALERTS designed to bring to the user's attention to potential malfunctions of the unit. Read the following for specifics.

POWER UP

POWER-UP: Red Light flashing on and off with audio chime for ~ two (2) seconds with each initial power-up with pulse of O2 for about 1/2 second.

O2 DELIVERY or NON-DELIVERY

O2 DELIVERY or NON-DELIVERY: Normally one flash of the LED **Green Light** (~1/4 second minimum) will flash for each pulse of oxygen with a valid inhalation event with properly connected oxygen lines. **NOTE:** The O2D2 **FLOW-FAULT** (see **FLOW-FAULT** below) indicator will not function as an out-of-oxygen warning if the pressure in the oxygen cylinder is 500 psi or less. There may be pressure in the oxygen line but not enough to activate the Pulse-Demand unit, consequently...no FLOW-FAULT warning. Prior to flying, using the cylinder chart, the pilot should estimate his flight altitude and time to determine the amount of oxygen that he or she will need. It is better to have more than your estimated need. If a pilot consistently flies above 18,000 feet, the aircraft should have a supplementary gauge, visible during flight by the pilot, to determine the cylinder oxygen pressure. You should also carry an EOS (Emergency Oxygen System) such as the MH Co-Pilot as a back-up safety feature in case the other system stops working. It is the absolute responsibility of the pilot to determine that there is an adequate amount of oxygen pressure in the oxygen cylinder prior to his flight, as well as an emergency back-up in case of a system failure. **THE OXYGEN SYSTEM MUST BE CHECKED AND TESTED ON THE GROUND BEFORE THE FLIGHT.**

FLOW FAULT EVENT

FLOW-FAULT EVENT: The LED **Red Light** will flash on and off along with a Hi-Lo audio chime for ~ 2 seconds with every event. **NOTE:** The **FLOW-FAULT** is not intended as a low or out-of-oxygen warning. It is only intended to warn the pilot that there is no oxygen flowing to the EDS O2D2 unit. This typically means that the cylinder valve was not opened, or the supply line has been pinched closed, or is plugged up, or has come off, or the valve in the O2D2 has failed to open.

APNEA EVENT

APNEA EVENT: Flash **Amber Light** four (4) discrete times with audio beeps once every four (4) seconds until unit detects a valid inhalation event. Time before Apnea event is ~30 ~35 seconds. This typically occurs for the following reasons: **(1)** The user has quit breathing for 30 - 45 seconds or the cannula/face mask is improperly worn. **(2)** The outlet tube from the MH EDS-O2D2 to the mask or cannula has become disconnected. **(3)** The outlet tubing has become pinched closed or is plugged off. **The apnea alarm can be used as a "put-your-oxygen-on" alarm once you get to the preset D mode altitude (D5 or D10). In this case, the alarm will not sound if you already have the cannula or face mask on properly.**

LOW BATTERY-1 *(First Warning)*

LOW BATTERY -1: Depending on battery condition, one short flash of the **Red Light** once every second, **no sound**. The unit will continue to operate properly for about four hours @ 77°F (25°C) after the indicator starts to flash. The EDS-O2D2 will operate for ~ 100 hours with a fresh set of DURACELL ULTRA alkaline batteries under normal operation.

LOW BATTERY-2 *(Second Warning)*

LOW BATTERY -2: Two short flashes of the **Red Light** once every second, **no sound**.   When this alarm occurs, the unit may operate for about 45 to 60 minutes, then the oxygen flow will stop and may go into the **Bad Battery Mode**. **BATTERIES SHOULD BE REPLACED IMMEDIATELY.** The EDS-O2D2 will operate for ~ 100 hours with a fresh set of DURACELL ULTRA quality alkaline batteries under normal operation.

BAD BATTERY

BAD BATTERY: Flashing **Red Light** on and off at a one (1) second rate with unit locked out, no sound. **BATTERIES SHOULD BE REPLACED IMMEDIATELY!**

USING THE MH EDS-O2D2 WITH A THIRD-PARTY REGULATOR

If the EDS-O2D2 will not be used with a MH Regulator, the alternate regulator must be able to deliver a pressure of between 15 and 25 psi (static).   If the above listed pressure specifications are not met, the EDS-O2D2 may not operate correctly. Lower pressures will result in an inadequate volume of oxygen. Higher pressures will result in a too high volume of oxygen. Excessively high pressures will cause the valve to open spontaneously and leak oxygen.

To use the MH EDS-O2D2 with a third-party regulator or built-in oxygen system with a pressure higher than 25 psi, it is mandatory that you use the MH EDS IN-LINE REGULATOR (00REG-1048-00) to ensure correct flow pressure. The EDS-ILR goes between the third-party regulator or built in system and the MH EDS-O2D2 to reduce the flow pressure to an appropriate level.

- **The O2D2 unit emits no sound or start-up oxygen pulse when turned on:**
    1. Check batteries to make certain they are fresh.
- **Start-up sound is heard, but no start-up oxygen pulse delivered:**
    1. Check oxygen cylinder valve is open.
    2. Check oxygen supply tube for proper connection.
    3. Check oxygen supply tube for obstructions.
    4. Check O2D2 outlet tubing for obstructions.
- **The O2D2 does not trigger:**
    1. Try using the Flared-Tip cannula included with the kit (MH part number 00EDS-1084-01)
- **When using the face mask, no oxygen pulse on inhalation:**
    1. Make sure the face mask is sealed against the skin.
    2. Check for obstructions on the **O2D2** outlet tubing.
    3. Use only face masks provided by Mountain High Equipment & Supply.
        NOTE: EDS face masks DO NOT have a dilution bag attached
- **Oxygen pulses are delivered, but an alarm is heard at the same time:**
    1. Check the battery to make certain it is fresh.
    2. Check for obstructions in the cannula/mask and tubing.
    3. Use only masks and cannulas supplied by Mountain High Equipment & Supply.

WARNING

DO NOT
increase or decrease length of cannula or face mask supply tubing.

DO NOT
use the MH EPS (External Power Supply) with the O2D2 as the voltages are not compatible.

NOTICE OF NON-LIABILITY

This device is classified as, and is only suitable for use as, a supplementary breathing apparatus (SBA) for aviation use. It is intended to help supply the needed amount of oxygen for persons during flight altitudes where supplemental oxygen is needed. This device is not suitable for any type of life support operations. This device is not suitable for SCBA (Self Contained Breathing Apparatus), SCUBA (Self Contained Underwater Breathing Apparatus) or any medical operations.

Before it is put to use, it is the responsibility of any user who will use this device to become familiar with the operation and safety aspects of this device. Using the system improperly could cause failure and lead to possible property damage and/or personal injury.

Mountain High Equipment & Supply Company assumes no responsibility for property damage, accidents, injury or death that may result from the misuse of this device/equipment. This includes any use of this device/equipment outside the scope of common sense, the Instruction Manual, inserts and other related documentation.

LIMITED WARRANTY

Mountain High Equipment & Supply Company warrants your MH EDS-O2D2 unit against defects in materials and workmanship for two (2) years from date of purchase invoice. The warranty is non-transferable. Should any part of the MH EDS-O2D2 become defective within the warranty period return the EDS Unit with a description of what/why it is not functioning and we will repair or replace it, at our discretion, free of charge (you pay only shipping to MH). **Contact www.service@MHoxygen.com for RMA# and Return Form**
Return the Unit to:
Mountain High Equipment and Supply Company
RRO Department
2244 SE Airport Way, Suite 100
Redmond OR 97756-7537
This warranty is non-transferable and only valid if Mountain High Equipment & Supply Company determines that the system and its components have not been damaged due to improper use, been submerged in fluids, dismantled or abused. Mountain High Equipment & Supply Company reserves the right to determine if repairs are to be done under warranty or at a nominal charge. **To activate warranty coverage, you must complete and return your owner's enclosed EDS Registration Card.**

The O2D2 Specifications, performance standards and limits are derived from actual units tested, characterized or calculated. Specifications are subject to change without notice.

Allowable respiration rates: Adaptive: up to 43 bpm. And down to ~ 5 bpm. (two persons independently)

Apnea time-out envelope: Adaptive: ~40 sec Pa. 0-12 K ft., ~30 sec. Pa. 13-18 K ft., 20 Sec. at and above Pa. 18 K ft. Apnea alarm does not respond if in any of the 'D' modes and while below that pressure altitude threshold.

Operating inlet pressures: 15 psig. (1 bar) DYNAMIC (flowing) through cannula and 1.5 meters (5 ft.) of 4 mm. inlet tubing. 25 psig. (1.72 bar) .

Operating & storage temperatures, altitudes, vibration @ humidity, (assumes nominal operating voltage):

Temp range @ ~10% RH: -40° to +60° C. (Storage for complete unit less battery)

Temp range @ ~25% RH: 0° to +60° C. (Operating with std. valve)

Temp range @ ~100% RH NC: +5° to +60° C. (Operating with std. valve) *Unit is not water-proof, keep it dry from spray & rain.*

Altitudes @ up to ~100% RH: -100 to +30 K ft. Pressure Altitude range @ +5° to +60° C. (Operating with std. valve)

Vibration: Random vibration 5 to 500 Hz, (15 minutes per axis @ 2.5 g. (rms) sin wave).

Physical characteristics (EDS-O2D2 unit only):

16 mm

Width @ widest point: 4.21″ (107 mm);

Height, including connectors: 3.73″ (94.75 mm.);

Height, enclosure only: 3.18″ (80.7 mm); Thickness, front to rear: 1.25″ (31.75 mm)

Weight: 11.2 Oz. (0.317 kg.) with batteries

MH EDS O2D2
1 or 2 Person Aviation Oxygen Delivery Device
Made in the USA   Patent 6,220,244
OPERATION MODES
N : Active at all pressure altitudes
D : Active at and above selected pressure altitudes
F : For use with Face Masks if more O₂ is needed
R/M : Reserve/Manual (consult Instruction Manual)
Pilots must read the O₂D₂ Instruction Manual and FAR 91.211 before using this device. The O₂D₂ will not function properly unless specified Cannulas, Face Masks and Regulators are used. Not to be used for SCBA, SCURA or Medical use.

Height

Depth

Width

Operating Voltage & Current @ 25° C. @ ~25% RH.

(Measured in the 'N' mode setting @ 15 RESP/ typical.):

Battery types: 3 ea. Standard 1.5 volt alkaline type 'AA' or equivalent. Use only alkalinetype bat-   teries.

Battery Life: 100 to 150 Hrs. @ ~25° C. @ ~25% R.H. Measured from mean, assuming fresh alkaline batteries operating under normal operating conditions.

Make certain quality alkaline batteries are used. Removed during long-term storage.

External Power: 4.5 VDC external power jack with auto battery disconnect with series diode is provided. No internal regulation or over voltage protection is provided.

External Audio output: 3.5 mm stereo type jack provides audio output at ~40 mv. RMS into 5KΩ L&R independent. Suitable for most aircraft Integrated Communication Systems (ICS).

Nominal battery voltage: ~4.25 VDC @ 4.30 ma. Idle. 220 ma. Peak (~500 ms. max), 3.25 ma. Average.

Min. start-up voltage: ~2.80 VDC ± 0.1VDC.

Low-battery cut-out: < 2.5 VDC ± 0.1VDC. (Red light on steady unit in non-responsive state 'dead')

Very low battery signal: ~3.0 VDC ± 0.1VDC. (Red light winking 2/sec.) ~5 Hrs. of service left.

Low battery signal: ~3.3 VDC ± 0.1VDC. (Red light winking 1/sec.) ~12 Hrs. of service left.

Notes:

The low battery cut-out feature provides a known state of action if the batteries are depleted to the point of inadequate power to operate the unit to any of the declared specifications. In addition, this feature was found to be prudent because, while many of the specifications may stay intact, false triggering of the valve may confuse the operator of a problem other than low batteries. The minimum 'start-up' voltage is where the unit will initiate the built-in test and commence operations. However, it should be noted that, during this operation, if the batteries are then measured to be too low the lock-up feature may then shortly ensue. This should help the operator in determining if the unit is bad or if the batteries are too low. A unit that has low batteries that cause 'lock-up' will most likely initially start-up if left off for some time. Alkaline type batteries have so-called self-rejuvenating properties that may cause the user to stall battery replacement. Obviously, dead batteries will yield no action.