

# Activator 282U Universal Aircraft Battery Maintenance Charger

## Operator Manual

Revision 1.0  
April 2017



This Operator Manual applies to all Activator 282U chargers.

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# Warnings

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## List of Warnings

### **DANGER**

The Activator 282U enclosure does not have electrical interlocks. Contact with the primary power input lines can be lethal. Only qualified electronics technicians should open the enclosure. There are no user-serviceable parts inside.

### **CAUTION**

The Activator 282U charger is intended only for 24 volt lead acid or ni-cad batteries. Use with batteries of other voltage ratings or of different chemistries (such as lithium ion) may result in hazardous conditions.



# Introduction

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## Activator 282U Aircraft Battery Maintenance Charger

### 1. Introduction

The Activator 282U is a compact aircraft battery maintenance charger, intended to be connected to an aircraft battery and left unattended for an extended time. It is lightweight and compact, and connects to the aircraft battery using adapter cables. It uses an IEC60320 power inlet and can operate from any global line/mains AC power source. No other tools or equipment are required to use the Activator 282U.

The unit will charge a 24 Volt lead-acid or nickel-cadmium aircraft battery. DO NOT use it on any other battery voltage or chemistry, such as lithium ion. The Activator 282U displays the battery voltage on its Liquid Crystal Display, and shows its status with three lights on the front panel. The unit charges at about two-three Amperes maximum current, and regulates the battery voltage to prevent overcharge. After the battery is fully charged, a short “topping” charge is applied to reduce sulfation in lead-acid batteries and to equalize cells in nickel-cadmium batteries. Then the unit shuts off all charging and monitors the battery open-circuit voltage. As the battery self-discharges to a low charge level, the Activator 282U starts another charge cycle. All operation is completely automatic and requires no user interaction.

The Activator 282U is intended for sheltered use (no water into the enclosure) at temperatures from -20°C to +50°C.

Items furnished	Note
Activator 282U	
Line cord for North America	Line cords available for other countries – contact distributor or factory.
Storage case	
Operator Manual	
Adapter Cables	The Activator 282U may be ordered with a variety of adapter cables including standard MS3509-compatible connector, ring terminals, or alligator clips

The Activator 282U is warranted against defects in materials and workmanship for one (1) year after purchase.

# Preparation for Use

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## 2. Preparation for use

Inspect the shipping carton for obvious signs of damage or dampness.

Open the shipping carton and remove the contents. Check the contents against the shipping list and be sure all items are included.

When not in use, store the Activator 282U safe from shock, vibration, moisture, and excessive heat.

# Principles of Operation

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## 3. Principles of operation

The Activator 282U plugs into any global power outlet of 100 ~ 240 VAC, 50 ~ 60 Hz. It uses a switching power supply to efficiently convert the line/mains voltage to 24 ~ 32 Volts DC, regulated by its microcontroller.

Voltage limits stated in this section are for a Lead Acid battery. See the table in the section “Activator 282U Charging Cycles” for Nickel Cadmium voltage levels.

When AC line power is applied, the display will light up with a white backlight and all three indicator lights will illuminate for several seconds. The Activator 282U will display the battery voltage for approximately five seconds if one is present, otherwise it will show a low voltage coming from its own power supply. If a battery is connected, the unit will begin charging the battery. If no battery is connected, the unit will display “Er1” and a red FAULT light. The power must be turned off to clear the error message “Er1”.

During charging, a yellow “CHARGING” light is on.

When the battery reaches its nominal charge voltage of 28.2 Volts the Activator 282U continues with a “topping” charge for a short time. Voltage is regulated by the microcontroller to prevent over-charging. Counting from when AC power is first turned on, the first topping charge is about one hour.

After the topping charge is complete or when the battery reaches 28.6 Volts, the Activator 282U turns off the charge current and just monitors the open-circuit battery voltage. The green “READY” light is on. The Activator 282U draws its operating power from the AC, and draws only 125 micro-amps (0.000125 Amps) from the battery while monitoring the self-discharge of the battery. As the battery self-discharges below 25.30 Volts the Activator 282U will automatically begin another charge cycle, lighting the yellow “CHARGING” light. At the end of this second charge cycle, the topping charge time is approximately 30 minutes. The battery is allowed to self-discharge again, and a third charge cycle will occur. The topping charge for third and subsequent charge cycles is only two minutes.

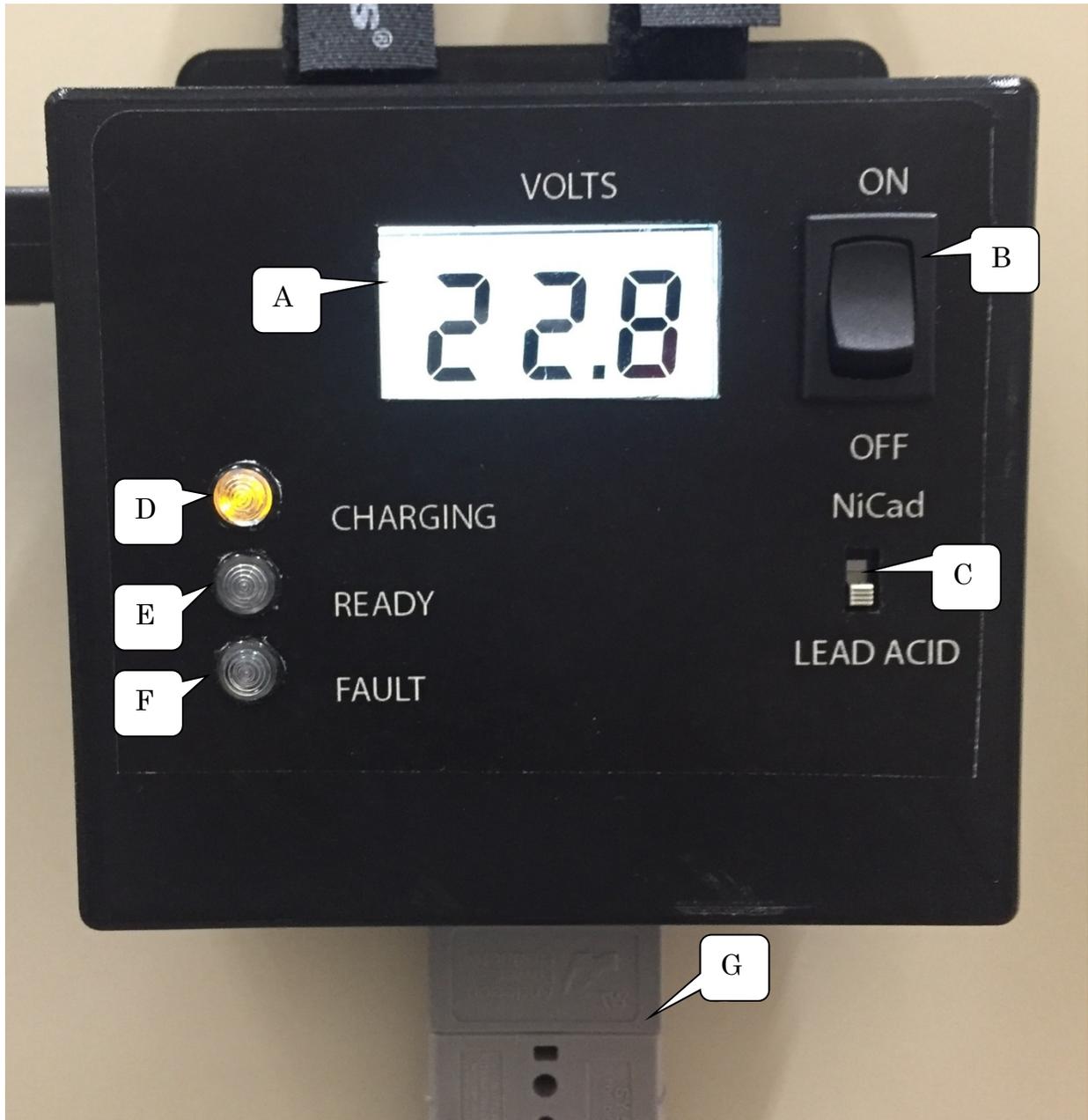
In the event the battery is sulfated or has some other problem, it may heat up even at the modest two- to three-ampere charging rate. This heating is very unusual with a good battery, however, a discharged battery should be monitored during initial charging for excessive temperature. If the battery temperature exceeds approximately 50°C (122°F), the charger should be turned off and charging discontinued until the temperature drops to an acceptable level. A battery which has exhibited overheating tendencies should not be left unattended while charging and the battery condition should be independently tested.

The Activator 282U has an internal timer set for 26 hours. If a battery fails to reach a full charge within 26 hours, the Activator 282U will show a flashing red “FAULT” light and the error message “Er2”. Charging will be suspended. Cycling AC power on the Activator 282U will reset the timer and restart the charge cycle.

# Operating Instructions

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## 4. Operating instructions



Refer to the figure above.

<b>Callout</b>	<b>Description</b>
A	Voltmeter. Displays battery voltage when connected to a battery, or shows “Er1” when powered on but not connected. Shows “Er2” if battery has not completed a charge in 26 hours.
B	Power switch. Turns the AC power on or off.
C	NiCad-Lead Acid switch. Set this recessed switch for the type of 24 Volt aircraft battery to be charged. This switch affects the maximum battery charging voltage.
D	Charging light. Shows yellow when charging is taking place.
E	Ready light. Shows green when the Activator has turned off all charging current and is monitoring the battery open-circuit voltage.
F	Fault light. Flashes red about once per second if the battery has not completed a charge in 26 hours time since power was applied. Cycle power to clear.
G	Connector. Insert the appropriate adapter cable into the Activator 282U to the battery. Connect the other end to the battery terminals. If using ring terminals or alligator clips, ensure the polarity is correct to prevent damage to the 282U

#### **4.1 Charging a Battery**

##### **CAUTION**

**Connect the Activator 282U to the battery before applying AC power, to prevent a spark when connecting to the battery.**

Disconnect any battery connections. Connect the appropriate adapter cable to the Activator 282U. Connect the adapter cable to the battery to be charged observing correct polarity.

##### **CAUTION**

**Observe correct polarity when connecting the adapter cable to the battery. The Red connector must be connected to the positive terminal and the Black connector must be connected to the negative terminal. Reversing these connections may result in damage to the 282U charger.**

# Operating Instructions

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Connect a power cord to the Activator 282U and to a suitable power outlet.

*A suitable power outlet will stay continuously powered for the time that the Activator 282U is in use. It will not be turned off periodically, such as a lighting circuit or a circuit that is shut down every weekend.*

Observe that the voltmeter backlight comes on with all the lights ON and the battery voltage is displayed on the screen, then the yellow “CHARGING” light comes on. The display shows only battery voltage.

A full charge of a healthy but fully discharged battery may take up to 24 hours. Of course, partially charged batteries will finish charging more quickly. When the battery has reached full charge, the Activator 282U will provide a topping charge for a few more minutes, then automatically stop charging and just monitor battery voltage. At this time the green “READY” light will come on and the yellow “CHARGING” light will go off.

## **4.2 Activator 282U Charging Cycles**

The Activator 282U charges a battery to full charge, then disconnects completely to let the battery alone until the battery self-discharges to below 25.3 Volts open circuit. The Activator 282U then wakes up and recharges the battery. The cycles and voltage set points are shown in the following table.

*Note that this sequence restarts every time power is applied or re-applied to the Activator 282U. For example, if the Activator 282U is plugged in to a circuit that gets turned off every night (or every weekend), then when power is re-applied the Activator 282U will start over with a full charge of the battery. This is not the desired protocol, it is better to avoid regularly recharging the battery until it has self-discharged to below 25.3 Volts.*

	<b>Indication</b>	<b>Lead Acid</b>	<b>Nickel Cadmium</b>
<b>First time charging</b>	Yellow "CHARGING"	Charge to 28.20 Volts, then charge for another 60 minutes OR until battery reaches 28.60 Volts. Then shut down.	Charge to 28.50 Volts, then charge for another 60 minutes OR until battery reaches 30.00 Volts. Then shut down.
<b>First Idle Period</b>	Green "READY"	Watch battery self-discharge until it drops below 25.30 Volts.	Watch battery self-discharge until it drops below 25.30 Volts.
<b>Second time charging</b>	Yellow "CHARGING"	Charge to 28.20 Volts, then charge for another 30 minutes OR until battery reaches 28.60 Volts. Then shut down.	Charge to 28.50 Volts, then charge for another 30 minutes OR until battery reaches 30.00 Volts. Then shut down.
<b>Second Idle Period</b>	Green "READY"	Watch battery self-discharge until it drops below 25.30 Volts.	Watch battery self-discharge until it drops below 25.30 Volts.
<b>Third and more times charging</b>	Yellow "CHARGING"	Charge to 28.20 Volts, then charge for another 2 minutes OR until battery reaches 28.60 Volts. Then shut down.	Charge to 28.50 Volts, then charge for another 2 minutes OR until battery reaches 30.00 Volts. Then shut down.
<b>Third and more times Idle</b>	Green "READY"	Watch battery self-discharge until it drops below 25.30 Volts.	Watch battery self-discharge until it drops below 25.30 Volts.

### **4.3 Unexpected Loss of Power**

If the AC power is removed unexpectedly, the Activator 282U draws no current from the battery.

When AC power is re-applied, the Activator 282U will automatically resume the charge cycle, and will reset its internal 26 hour maximum charge timer.

### **4.4 Disconnecting from a Battery**

Turn off the Activator 282U. Remove the power cord from the power outlet.

# Operating Instructions

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Remove the Activator 282U from the battery by disconnecting the adapter cable.

## **4.5 Emergency Shutdown**

Remove AC power either from the power outlet or from the Activator 282U.

# Maintenance and Servicing

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## 5. Maintenance and servicing (preventive and corrective)

### 5.1 Verifying Charge Voltage

Equipment	Example
Calibrated high-impedance digital voltmeter for 30 Volts DC.	Fluke 179, many other meters with 4-1/2 digits or more resolution.

This test is to be done with a battery and with AC power connected. This verification procedure is recommended once per year.

Set the meter to read a DC voltage near 30 Volts. Connect the meter leads to the red (positive) and black (negative) test points on the Activator 282U.

Apply power to the Activator 282U.

Note the voltmeter reading and note the display reading. The display may bounce up and down by a few digits, but the average reading must agree with the voltmeter reading within  $\pm 0.20$  Volts.

The voltage reading that the Activator 282U uses to regulate the battery charge is the same as the displayed voltage. If the voltmeter reading is more than  $\pm 0.20$  Volts different from the display, it may be necessary to calibrate or repair the Activator 282U. This is best done by the distributor or factory.

### 5.2 Verifying Fan Operation

It is recommended this be performed each time the unit is switched on.

It does not matter if the Activator 282U is connected to a battery. Connect AC power and check for air movement through the top fan vent holes. Use a flashlight or strong room light if necessary to verify that the fan is rotating. Listen for any ticking or grinding sounds that indicate a bad fan bearing.

The fan is very small, and the airflow is not strong. That is normal.

A bad fan can be replaced by the distributor or by the factory.

# Preparation for Shipment, Storage, Parts List

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## 6. Preparation for shipment

Place the Activator 282U and power cord into the supplied case, if available.

Place into a plastic bag and seal it to prevent moisture from getting into the Activator 282U.

Place the bagged Activator 282U into a cardboard carton with at least 1" of resilient padding on all sides.

## 7. Storage

Store the Activator 282U sheltered from moisture and from severe shock and vibration, at a temperature of -28°C (-18°F) to +70°C (+158°F). The Activator 282U must be cooled below 45°C (113°F) before use.

## 8. Parts List

### 8.1 Power Cord

The only user-replaceable parts are the power cord and adapter cables. The power cord is a standard cord with IEC60320 type C13 connector on one end and the appropriate country power plug on the other end. The smallest gauge power wire available is adequate, as the Activator 282U draws less than 1 Ampere under all conditions and all AC voltages.

### 8.2 Fan

The internal fan may be replaced by the distributor or the factory. It is an Orion OD4010-24HB (Mouser 670-OD401024HB) with a TE Connectivity 1375820-2 connector and 1375819-2 contacts. The red fan wire (positive) goes to pin 1 of the connector.

The connector from the fan being replaced may be cut off and re-used, with the new fan wires spliced onto the old wires, soldered, and insulated. Match colors to keep the fan polarity correct.

Test the fan for proper rotation after replacing. The fan will not operate on reversed polarity power, but it will not be damaged.

# Troubleshooting

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## 9. Troubleshooting

Symptom	Possible Cause	Action
No backlight or front panel lights when plugged in.	Power cord not fully plugged in.	Check both ends of the power cord to be sure they are securely plugged in.
	Power outlet not energized.	Test outlet with another device.
	Internal power supply fuse blown.	This is not a replaceable fuse. Its failure indicates a serious internal power failure. Contact distributor or factory for repair.
	Output cables shorted together.	Ensure the cables are connected properly.
Displayed voltage is different from an external voltmeter reading.	Tolerance.	Allow a difference of $\pm 0.2$ Volts in voltage comparisons before taking corrective action.
	External voltmeter accuracy	Be sure the voltmeter is calibrated.
	Out of calibration	This should not happen. Return unit to distributor or factory for checking and re-calibration.
Red "Fault" light flashes about once per second and message "Er2" is displayed.	Charging time exceeded 26 Hours (first time)	Battery capacity is larger than 42 Ampere-Hours. Cycle power on the Activator 282U and continue charging.
	Charging time exceeded 26 Hours (second time)	Battery may be defective. Test battery.
Red "Fault" light illuminated and message "Er1" is displayed.	Battery not connected properly.	Check adapter cables for proper connection.
	Battery fuse blown	The adapter cable leads may have been shorted or connected improperly. Replace fuse with the specified fast-acting fuse.

# Specifications

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## 10. Specifications

Input voltage:	100 ~ 240 VAC, $\pm 10\%$ , 50 ~ 60 Hz, 1 Ampere maximum.
Input connector:	IEC60320-C13
Input power:	90 Watts maximum
Battery charge voltage:	28.6 Volts maximum (Lead-Acid) 32.0 Volts maximum (Nickel-Cadmium)
Operating temperature:	-20°C to +50°C (-4°F to +122°F)
Storage range:	-28°C to +70°C (-18°F to +158°F)
Timing accuracy:	$\pm 5\%$ of nominal time
Display accuracy:	$\pm 0.2V$
Battery fuse:	4510-6002; Littelfuse 0225005MXP Fast-Acting
Weight:	Activator 282U and power cord, 2.2 pounds/1.0 kilograms
Size:	Approx. 110mm x 150mm x 95mm (4.33" x 5.9" x 3.8")
Adapter Cables:	9005-2021; Alligator Clips 9005-2022; Mates with MS-3509 quick disconnect 9005-2027; Ring Terminals

# Certification

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## 11. Certificate of Calibration

Lamar Technologies LLC  
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Marysville, WA 98271  
360-651-8869

### CERTIFICATION OF FACTORY CALIBRATION

BATTERY CHARGER – DIRECT CONNECT  
MODEL ACTIVATOR 282U • P/N: 282U

APPLICATION: Automatic charging of 24 volt aircraft batteries – vented Lead Acid, sealed Lead Acid or Nickel Cadmium.

SPECIFICATIONS: •AC input Nominal 115 or 230VAC 50/60Hz – auto ranging  
•On/Off Toggle Switch  
•Lead Acid / NiCad Slide Switch

NOTES:  
A. Unit manufactured and calibrated under MIL-I-45208  
B. Calibrating instruments used:  
•Meter: FLUKE Model 8010A & 73 DC Volts / DC MV (Amperes)  
•Shunt: EMPRO Standard 0.25% 50Amp 50MV.

UNIT: 24 VOLT BATTERY CHARGER  
MODEL: ACTIVATOR 282U  
DATE MANUFACTURED: \_\_\_\_\_  
SERIAL #: \_\_\_\_\_  
PROCEDURE: \_\_\_\_\_  
ENVIRONMENTAL CONDITIONS: NOMINAL 74°F 38% R.H.  
DATE CALIBRATED: \_\_\_\_\_  
CALIBRATED BY: \_\_\_\_\_  
SHIPPED CONDITION: \_\_\_\_\_ CALIBRATED / IN TOLERANCE – PASSED

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Lamar Technologies LLC. certifies that the above listed instrument meets or exceeds all published specifications. It has been calibrated using standards MIL-I-45208 whose accuracies are traceable to the National Institute of Standards and Technology.

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## 12. Warranty

### 1 YEAR WARRANTY

Lamar Technologies LLC. warrants its products to be free from defects in workmanship and material for a one-year period from the date of shipment to the distributor, original equipment manufacturer (OEM), or original end user. If any product shall prove to be defective during the warranty period, Lamar Technologies LLC. will repair or replace such part.

There are no warranties, which extend beyond the description on the face hereof. This warranty is in lieu of all other warranties, express or implied. Lamar Technologies LLC. excludes liability for incidental and consequential damages.

An action for breach of this warranty must be commenced within one year after the breach is or should have been discovered.

Lamar Technologies LLC. specifically disclaims all other representations to the first user/purchaser, and all other obligations or liabilities. No person is authorized to give any other warranties or to assume any liabilities on Lamar Technologies LLC. behalf.



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# Revisions

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## 13. Revisions

Rev. 1.0	26 April, 2017	Original Issue
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