



L-1492E

SlickSTART™

Magneto Start Booster

Part Numbers: SS1001
SS1002

Operation, Maintenance, and Troubleshooting Manual

Technical Aspects

SCOPE

This manual provides complete details about the operation, maintenance, and testing of the SlickSTART™ Magneto Start Booster from Champion Aerospace.

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LOG OF REVISIONS

Rev	Description	Pages Revised	Date
A	Added SS1002 SlickSTART™	All	07/20/98
B	Changed installation procedures. Added ring terminals to installation kit. Changed company name and copyright statement.	All	10/31/99
C	Reissued entire manual due to extensive changes.	All	08/31/01
D	Removed detailed installation information. Modified Shop Test Procedures and added on-aircraft test of SlickSTART™.	All	08/25/06
E	This revision changes company from Unison Industries to Champion Aerospace.	All	03/01/09

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0.0 INTRODUCTION

0.1 Notices

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The accuracy and applicability of this manual has not been verified for any assembly, component, or part not manufactured by Champion Aerospace. Any use of this manual for other than its intended purpose, or for performing any installation, maintenance, replacement, adjustment, inspection, or overhaul of any assembly, component, or part not manufactured by Champion Aerospace is not approved, endorsed, or sanctioned by Champion Aerospace.

When performing installation, maintenance, replacement, adjustment, inspection, or overhaul of any Champion Aerospace assembly, component, or part, it is imperative that the latest revision of the appropriate manual or product support document be referenced. Contact Champion Aerospace to be sure you have the latest manual or support document revision before performing any work.

Use of non-approved repair parts may result in unit malfunction and/or affect equipment safety, and may be considered a violation of FAA repair guidelines.

All reasonable attempts were made to make this manual as complete and accurate as possible. If you have any questions, comments, or corrections, or require clarification of any information contained herein, please write to Piston Product Support at Champion Aerospace LLC, 1230 Old Norris Road, Liberty, SC USA 29657, or e-mail slicksupport@champaero.com.

SlickSTART™ is a trademark of Champion Aerospace LLC. SlickSTART™ embodies innovative designs which are the subject of patents issued to Champion Aerospace by the United States Patent Office.

0.2 How To Use This Manual

This document contains all necessary information relating to the operation and maintenance of Champion Aerospace SlickSTART™ Magneto Start Booster. Section 1 describes the performance of SlickSTART™ and why engine starting characteristics are improved. It also provides SlickSTART™ application information. Section 2 includes reference installation information, and Sections 3 and 4 describe operation and maintenance procedures respectively. Section 5 describes the procedures used to verify the SlickSTART™ is operating normally and Section 6 describes the SlickSTART™ warranty and procedures.

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1.0 TECHNICAL REFERENCES

1.1 Applicable Documents

SB1-06 Unison Service Bulletin for SlickSTART™ Model SS1001, dated 7/15/06.

SL2-96 Unison Service Letter for Application and Installation of SlickSTART™, Revision F or later.

1.2 Application Information

NOTE: This manual incorporates the technical recommendations made in Unison Service Bulletin SB1-06, dated 7/15/06. This bulletin describes a design modification and updated installation information for SlickSTART™ Model SS1001.

SlickSTART™ is designed to replace most Bendix/TCM starting vibrators used in conjunction with Champion Aerospace Slick magnetos. SlickSTART™ is also approved for use with Slick impulse coupled magnetos to enhance engine starting performance. See Table 1. The Supplemental Type Certificate Number SA593CH included as a part of SL2-96 provides a listing of the airframes in which SlickSTART™ may be installed. In addition, SlickSTART™ may be installed in experimental aircraft in accordance with this manual.

CAUTION: INSTALLATION OF SlickSTART™ PART NUMBER SS1001 WITH BENDIX/TCM MAGNETOS MAY RESULT IN MAGNETO DAMAGE AND ENGINE STOPPAGE.

CAUTION: ELECTRONIC TACHOMETERS UTILIZING A MAGNETO PICKUP ARE NOT COMPATIBLE WITH SlickSTART™. THE TACHOMETER SENSOR SHOULD BE RELOCATED TO THE RIGHT HAND MAGNETO.

CAUTION: IT IS THE RESPONSIBILITY OF THE INSTALLER TO DETERMINE THE COMPATIBILITY OF OTHER SUPPLIER'S STC PRODUCTS WHEN INSTALLED IN CONJUNCTION WITH STC APPROVED CHAMPION AEROSPACE PRODUCTS.

CAUTION: SlickSTART™ MODEL SS1001 IS NOT INTENDED TO REPLACE EXISTING STARTING VIBRATORS WHICH INCLUDE A RELAY, UNLESS IT IS VERIFIED THE NON-BOOSTED MAGNETO IS GROUNDED WHEN THE IGNITION SWITCH IS IN THE START POSITION.

NOTE: Aircraft may be converted from Impulse Coupled Magnetos to Retard Breaker Magnetos and SlickSTART™ booster unit. Refer to the applicable manufacturer's service instructions to complete the conversion. Then install SlickSTART™ per latest revision of Unison Service Letter SL2-96.

Table 1

SlickSTART™ P/N	Application
SS1001	Must Be Used With Slick 4200, 6200, 4300, 6300 Series Magnetos
SS1002	Designed Only For Use With TCM/Bendix S-20, S-200, S-1200 Series Magnetos

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2.0 INSTALLATION

Refer to Unison Service Letter SL2-96, Revision f or later for STC/PMA approved application information and for detailed instructions for installing the SlickSTART™.

Refer to OEM manufacturer's maintenance manuals for applications where SlickSTART™ is installed as original aircraft equipment.

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3.0 OPERATION

SlickSTART™ has been designed and tested to work in conjunction with conventional magneto systems. SlickSTART™ does not affect procedures or intervals for inspection, maintenance or overhaul of the magnetos and harnesses with which it interfaces. The aircraft owner may notice a reduction in maintenance costs associated with starter motors and batteries as SlickSTART™ can reduce duty cycles and electrical stresses of these components during engine starting. However, all normal engine accessory maintenance and inspection procedures and intervals should be accomplished.

3.1 Starting

SlickSTART™ receives input power from the switched positive terminal of the starter motor, and should be activated only when the starter motor is engaged. During engine start, SlickSTART™ draws a maximum of 5 amperes at 6 to 25 volts (P/N SS1001) and delivers a series of fast rising 375 volt maximum pulses to the primary of the magneto coil. This voltage is stepped up in the secondary of the coil, and is impressed across the spark plug electrodes through the magneto distributor and the high voltage harness. As a result, each plug fires with a very high energy, multi-strike spark as described in Section 1. Proper ignition timing is achieved through the normal operation of the impulse coupling or retard breakers.

As the engine starts, and the ignition switch transitions from the 'Start' position to the 'Both' position, SlickSTART™ is deactivated when input power to the starter motor is terminated. SlickSTART™ is not contributing to the conventional engine ignition system after the engine has started.

3.2 Piloting

With the exception of a noticeable improvement in engine starting, SlickSTART™ operation is transparent to the pilot. No modifications to the aircraft flight manual or engine starting procedures are required.

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4.0 MAINTENANCE

SlickSTART™ is a completely sealed, solid state device which requires no internal maintenance. Repair, overhaul and/or disassembly of SlickSTART™ is not authorized by Champion Aerospace.

NOTE: Any attempt to disassemble SlickSTART™ will void the product warranty and cause the unit to no longer conform to airworthiness standards, which can result in equipment damage, personal loss, bodily injury, or death.

4.1 500 Hour Inspection

The following is a complete list of suggested inspections which may be accomplished at 500 hour engine operating intervals.

- A. Inspect all connections and wires for corrosion, contamination, or arcing. The terminals must be proper alignment.
- B. Inspect physical and electrical security of all connections and wiring.
- C. Inspect security of SlickSTART™ mounting.

4.2 Cleaning

- A. SlickSTART™ may be cleaned using a mild detergent and water solution, and dried with a soft cloth.
- B. Avoid contact of the SlickSTART™ labels with solvents.
- C. Minor corrosion of the SlickSTART™ spade terminals may be removed with a fine grit emery cloth.

4.3 Modification of SlickSTART™ Model SS1001

- A. Examine the SlickSTART™ for compliance with Unison Service Bulletin SB1-06. If SlickSTART™ Model SS1001 pin #2 has not been removed, remove that pin as follows:
 1. If installed, remove and discard the associated wire that connects the #2 pin to the P-lead on the right magneto.

WARNING: WEAR APPROPRIATE EYE PROTECTION WHEN CUTTING THE PIN.

2. If the SlickSTART™ unit is accessible, cut of the #2 pin as short as possible to prevent future use of this pin. See Figure 2. If necessary, remove the SS1001 from the firewall to complete this operation then re-install it.

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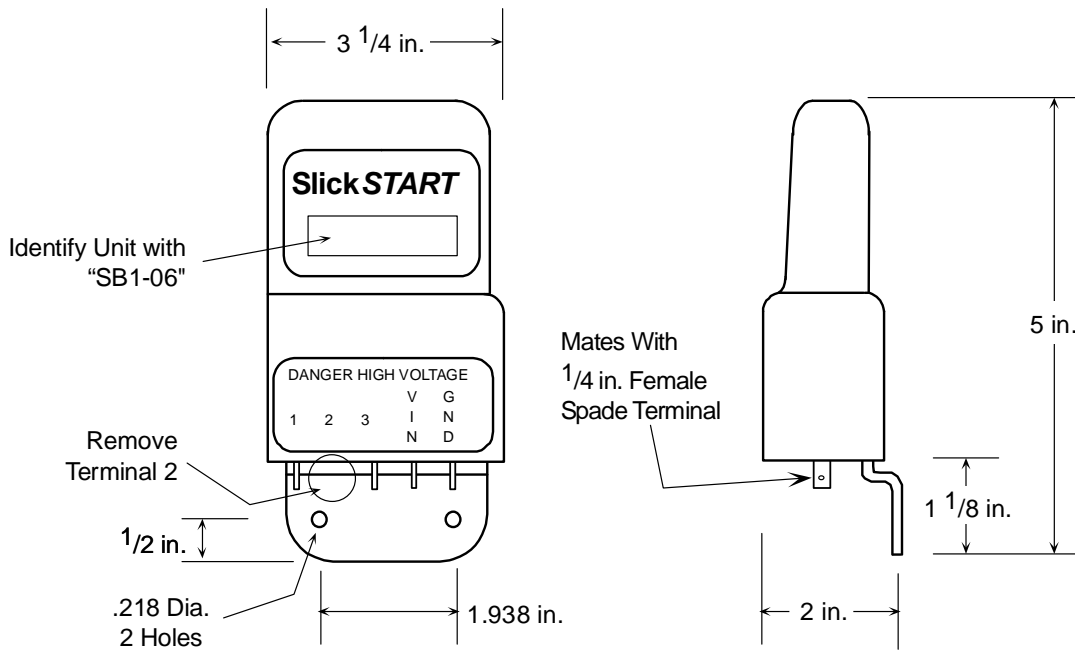


Figure 1

3. If the #2 pin was connected to the right magneto P-lead, an alternative method of grounding the right magneto P-lead during starting is provided below.

CAUTION: ON ENGINES WITH ONE RETARD BREAKER MAGNETO OR ONE IMPULSE COUPLING MAGNETO INSTALLED, FAILURE TO GROUND THE RIGHT MAGNETO DURING START WILL RESULT IN ENGINE KICKBACK AND POSSIBLE DAMAGE TO THE STARTER AND ASSOCIATED ACCESSORY GEAR TRAIN.

- (a) In most applications, the right magneto can be grounded during start by the ignition switch. If the wiring connections on the back of the ignition switch are similar to those shown in Figure 2, a jumper can be added to the two terminals shown to provide a ground path during start.

Verify that this jumper is installed if your aircraft is equipped with this type of switch.

These diagrams show the most common switches. Refer to the switch manufacturer's installation instructions for your switch.

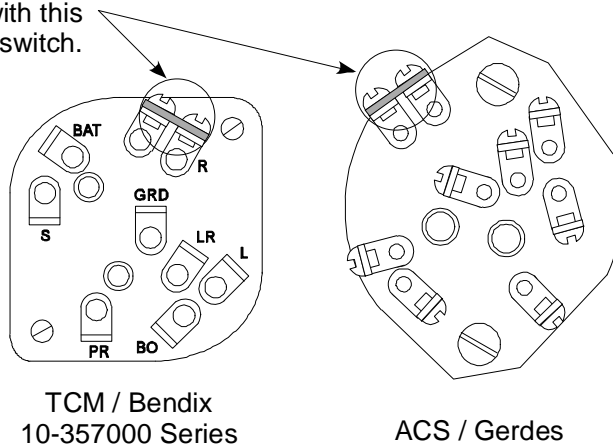


Figure 2

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- B. Some aircraft have individual magneto switches installed. In this circumstance, verify that the "pilot operating handbook" allows the right magneto switch to remain off during start, and placard the right magneto switch to remain off during start. If this method is not allowed by the aircraft manufacturer, a combination ignition / start switch shown must be installed to ground the right magneto during start.
- C. If any other type of start switch is installed that does not ground the right magneto during start, it must be replaced with a combination ignition / start switch that provides this function, or the SlickSTART™ booster must be removed from the aircraft.
4. Following removal of the #2 pin from the SlickSTART™, print using a permanent marker on the white portion of the unit's label "SB1-06". This marking will provide further indication that this Service Bulletin has been complied with.

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5.0 OPERATIONAL VERIFICATION

5.1 Required Equipment for Test Procedures

TEST EQUIPMENT

APPLICATION

GB Instruments GET-213HV or equivalent

On-Aircraft Test Procedures

Tektronix TDS360 Oscilloscope or equivalent,
and 100:1 Probe rated to 4,000 volts.

Shop Test Procedures

Hi Pot tester capable of maintaining 400 VDC while
supplying 100 microamperes of current.

Shop Test Procedures

Hewlett Packard HP6012A DC Power Supply or equivalent.

Shop Test Procedures

Wavetek DM27XT Multimeter.

Shop Test Procedures

Slick Magneto Coil P/N M-3975.

Shop Test Procedures

750 ohm, 10 watt Resistor.

Shop Test Procedures

10 ohm, 10 watt Resistor.

Shop Test Procedures

5-2 On-Aircraft Test Procedures

WARNING:

HIGH VOLTAGE.

- DO NOT TOUCH EXPOSED LEADS OR COMPONENTS WHILE SlickSTART™ IS ENERGIZED.
- THE OUTPUT OF SlickSTART™ CAN GIVE A DANGEROUS ELECTRICAL SHOCK.

A. Operational Verification. The following steps MUST be accomplished in order.

1. Remove all aircraft electrical connections to the SlickSTART™.
2. Attach a 120/240 VAC neon light type Voltage Tester. Digital multimeters will not work for this test.
3. Momentarily attach a 12 volt power source to the SlickSTART™ as shown in Figure 3.
4. If the AC voltage tester light illuminates, the SlickSTART™ is functioning properly.
5. When test is complete, reattach all electrical connections to the SlickSTART™.

B. Troubleshooting High Magneto Drop (approx 500 rpm)

1. If a high magneto drop is discovered during engine run up, the condition could be caused by a stuck relay in the SlickSTART™.
2. This condition can be verified by disconnecting the wires from terminal 1 and terminal 3 on the SlickSTART™. If these two terminals have continuity between them, the relay is stuck closed and the SlickSTART™ unit should be replaced under warranty.
3. If an open circuit exists between terminal 1 and terminal 3, the SlickSTART™ relay is working normally.

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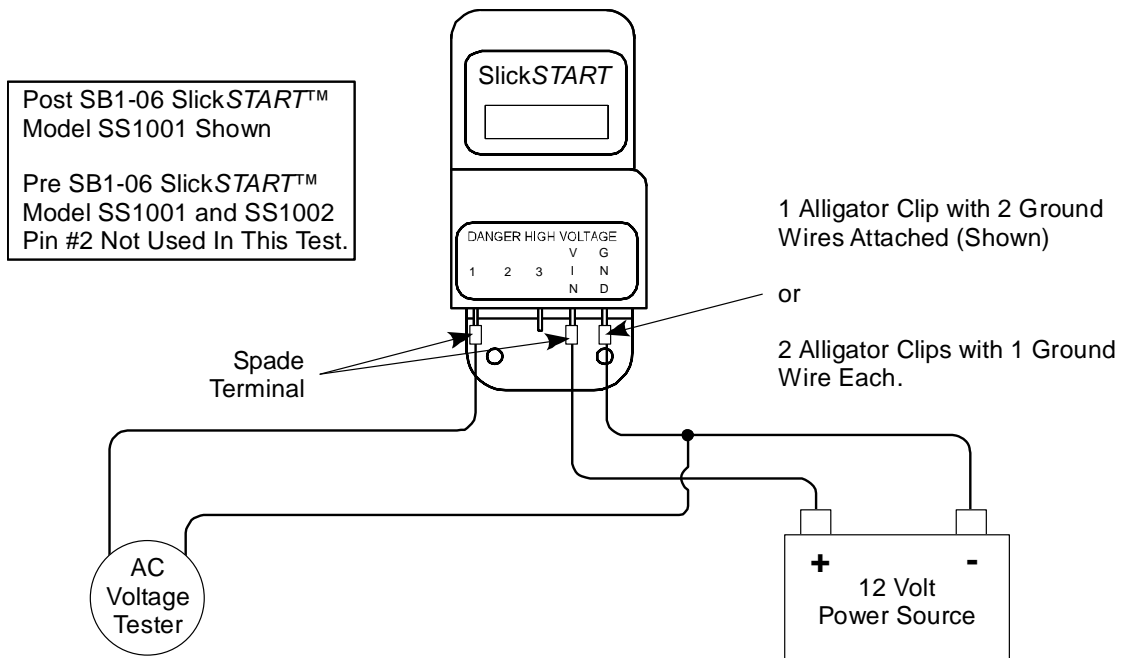


Figure 3

5.3 Shop Test Procedures

WARNING: SlickSTART™ DELIVERS HIGH VOLTAGE OUTPUT DURING OPERATION. AVOID SlickSTART™ TERMINALS AND WIRING WHEN INPUT POWER IS APPLIED. USE STANDARD HIGH VOLTAGE SAFETY PRECAUTIONS WHEN WORKING WITH SlickSTART™.

NOTE: All voltage measurements must be made at the SlickSTART™ terminals. Use proper mating connectors to prevent damage to the SlickSTART™ terminals.

A. Peak Output Voltage Test

1. Connect a 750 ohm, 10 watt resistor between terminal “1” and “GND”.

WARNING: MAKE SURE DC POWER SUPPLY IS TURNED OFF BEFORE CONNECTING LEADS.

2. Connect the DC power supply positive lead to the SlickSTART™ “VIN” terminal. Connect the power supply negative lead to the “GND” terminal.
3. Connect the oscilloscope ground lead to “GND”. Connect the probe between the oscilloscope and terminal “1”.
4. Set the DC power supply to 8 VDC. Turn power supply ON.

CAUTION: MEASURE VOLTAGE QUICKLY. THE 750 OHM RESISTOR GETS VERY HOT DURING TESTING.

5. Use the oscilloscope to measure the peak to peak voltage. The voltage must be -340 to -410 volts for part number SS1001 and -265 to -335 volts for part number SS1002.
6. Turn the DC power supply OFF.

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B. Discharge Rate Test

WARNING: MAKE SURE DC POWER SUPPLY IS TURNED OFF BEFORE CONNECTING LEADS.

1. Connect the DC power supply positive lead to the SlickSTART™ “VIN” terminal. Connect the power supply negative lead to the “GND” terminal.
2. Connect the oscilloscope ground lead to “GND”. Connect the probe between the oscilloscope and terminal “1”.
3. Connect M-3975 ignition coil to the SlickSTART™ as a load. Connect the coil green lead and high voltage tab to “GND” and the white lead to terminal “1”.
4. Set the DC power supply to 8 VDC. Turn power supply ON.
5. Use the oscilloscope to measure the discharge rate of the SlickSTART™ into the ignition coil. The discharge rate must be greater than 50 discharges per second for part number SS1001 and 70 discharges per second for part number SS1002.
6. Turn the DC power supply OFF.

C. Voltage Drop Test

WARNING: MAKE SURE DC POWER SUPPLY IS TURNED OFF BEFORE CONNECTING LEADS.

1. Connect the DC power supply positive lead to the SlickSTART™ “VIN” terminal. Connect the power supply negative lead to the “GND” terminal.
2. Connect the oscilloscope ground lead to “GND”. Connect the probe between the oscilloscope and terminal “1”.
3. Connect M-3975 ignition coil to the SlickSTART™ as a load. Connect the coil green lead and high voltage tab to “GND” and the white lead to terminal “1”.
4. **SS1002 ONLY:** Connect a 10 ohm, 10 watt resistor between SlickSTART™ terminal “2” and “VIN”.
5. **SS1002 ONLY:** Set the DC power supply to 8 VDC. Turn power supply ON. Use a multimeter to measure the voltage between terminal “2” and “GND”. The voltage must be less than .2 volts.
6. Turn the DC power supply OFF.

D. Hi-Pot Test

WARNING: MAKE SURE THE HI-POT TESTER IS TURNED OFF BEFORE CONNECTING LEADS.

1. Connect the leads of the hi-pot tester to SlickSTART™ terminals “1” and “3”. A multimeter should be inserted in the ungrounded Hi-Pot lead if a meter is not part of the equipment.
2. Set the hi-pot tester to 400 volts. Turn the tester ON.
 - a. Use the multimeter to measure the current flow. The current must be less than 100 microamperes.
 - b. Turn the hi-pot tester OFF.
3. **SS1002 ONLY:** Disconnect the hi-pot tester lead from terminal “3” and connect it to terminal “2”. Repeat step 2 above.

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6.0 WARRANTY

6.1 Warranty Period

SlickSTART™ is warranted against defects in materials and workmanship for a period of three years from the date of manufacture, or one year from the date of installation, whichever occurs first, with unlimited hours of operation.

Any attempt to disassemble SlickSTART™, or application of improper electrical input to SlickSTART™ will void the product warranty and cause the unit to no longer conform to airworthiness standards, which can result in equipment damage, personal loss, bodily injury or death.

6.2 Warranty Procedures

Request for warranty consideration must be made on Slick Warranty Form L-1506, within 60 days of the date the SlickSTART™ became inoperative. The defective unit and the completed Slick Form L-1506 must be returned to Champion Aerospace through an authorized distributor with freight prepaid.

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