

Installation Instructions

for

**Model No. BC320-1, -2, or -3  
Starter**

Replacement of existing pull-cable starter

on

Continental C-75, C-85, C-90, C-145, O-200, O-240, O-300 and GO-300 series engines

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## RECORD OF REVISIONS

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Revision	Description of Change	Date
A	Original Issue .....	11 Mar 94
B	Added O-240 and GO-300 engines .....	22 Dec 00
C	Added battery disconnect instruction on page .. 4; added step between Step 18 and 19 to reconnect battery.	5 July 01
D	Changed NOTE page 4 to remove Stanley p/n... and add abrasive and break-through note.	14 May 02
E	Added Continental gasket P/N 653673 and B&C 320-342 as alternate gaskets	19 Feb 03

## INTRODUCTION

This kit is applicable to any aircraft currently fitted with a mechanically engaged, pull-cable starter on the following: C75-12, C85-12, C85-14F, C90-12, C90-14F, all C145 series, all O-200 series, all IO-240 series, O-300A,B, & C, and GO-300A, B, & C engines.

### DESCRIPTION OF INSTALLATION

- (1) Remove engine cowl and disconnect aircraft battery.
- (2) Remove existing starter.
- (3) Remove mags, oil tank, accessory case and crankcase cluster gear.
- (4) Cut off old starter pinion support shaft.
- (5) Replace crankcase cluster gear, accessory case, oil tank, and mags.
- (6) Install new starter.
- (7) Install new starter contactor on firewall.
- (8) Install new start push-button on instrument panel.
- (9) Replace cowl and reconnect battery.
- (10) Update ship's weight and balance, pilot operating handbook and maintenance records.

### PARTS LIST

The following parts are needed but **not** supplied with this installation kit:

Qty.	Part No.	Description
1	BC320-1, -2 or -3	Starter

The following parts **are** supplied with this kit:

Qty.	Part No.	Description
1	FK501-3	Field Kit Instruction Manual
1	352179 or 653673 or B&C 320-342	Gasket
2	S813-5C28	Bolt
2	AN960-516L	Washer
2	MS35337-45	Lockwashers
3	MS25171-2S	Nipple, Terminal Cover
2	AN960-10	Washer
2	AN3-4A	Bolt
1	S814R10	Terminal
1	S814R6	Terminal
2	MS21047L3	Nutplate
4	CCR264SS3-4	Rivet
1	S812-8-5	Terminal
1	S812-4-5	Terminal
1	S811-1	Contactor
1	501-201-1	Wire Assy.

1	501-200-1	Push-button Switch Assy.
1	501-400-1	Placard

## CHANGE IN WEIGHT AND BALANCE

Installation of this kit will decrease aircraft weight by approximately 4.5 pounds. Variations in airframe station references for all aircraft affected by this kit prevent including precalculated weight and balance data in these instructions.

## INSTALLATION INSTRUCTIONS

### Preparation

- Step 1. Refer to applicable service manual instructions; remove and retain upper and lower engine cowl. Disconnect ship's battery, Negative (-) terminal first.
- Step 2. Refer to applicable service manual instruction; remove existing starter motor. Retain all existing attach hardware except top bolts which will be replaced.
- Step 3. Refer to applicable service manual instructions; remove magnetos, oil tank and accessory gear case. Remove crank-shaft cluster gear.

### -----CAUTION-----

The following steps will use a saw to remove the old starter pinion support shaft. Use care to prevent engine contamination by saw chips.

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- Step 4. Clean rear crankcase surfaces of oil. Tape a plastic apron to crankcase under the pinion support shaft which protrudes from the crankcase just above the crankshaft.

### -----NOTE-----

The following step is easily accomplished using a hacksaw. Do not use an abrasive wheel. If cutting off the pinion shaft opens a hole through to the engine case, abrasives may be introduced into the engine through the hole.

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- Step 5. Saw off pinion support shaft as close as possible to rear surface of crankcase. Clean stub of any burrs. Measure the distance from the surface of the starter mounting pad to the end of the stub. This distance should be a minimum of 2.50 inches to allow adequate clearance for the pinion gear of the new starter.
- Step 6. Remove chip apron and clean back of crankcase.
- Step 7. Refer to applicable service manual and replace crankcase cluster gear.
- Step 8. Refer to applicable service manual and replace accessory gear case, oil tank and magnetos.

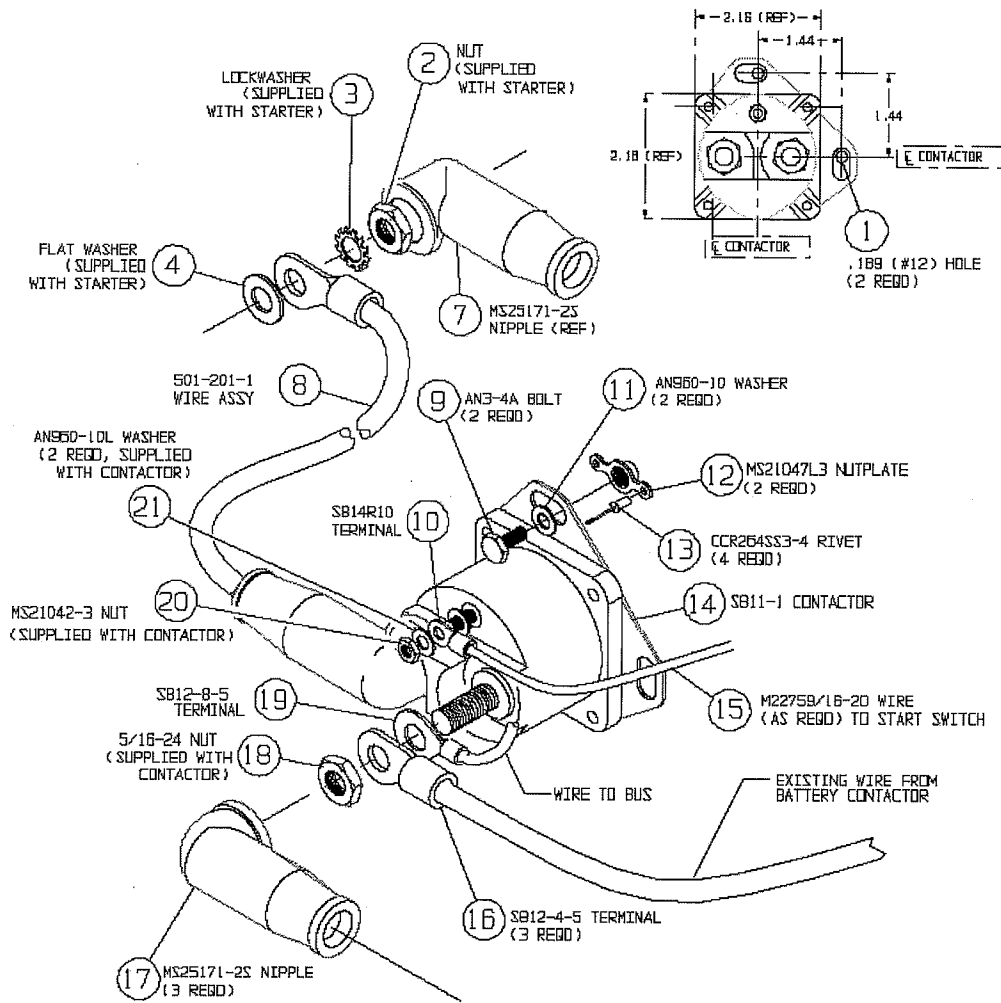


Figure 1

### **Starter Installation**

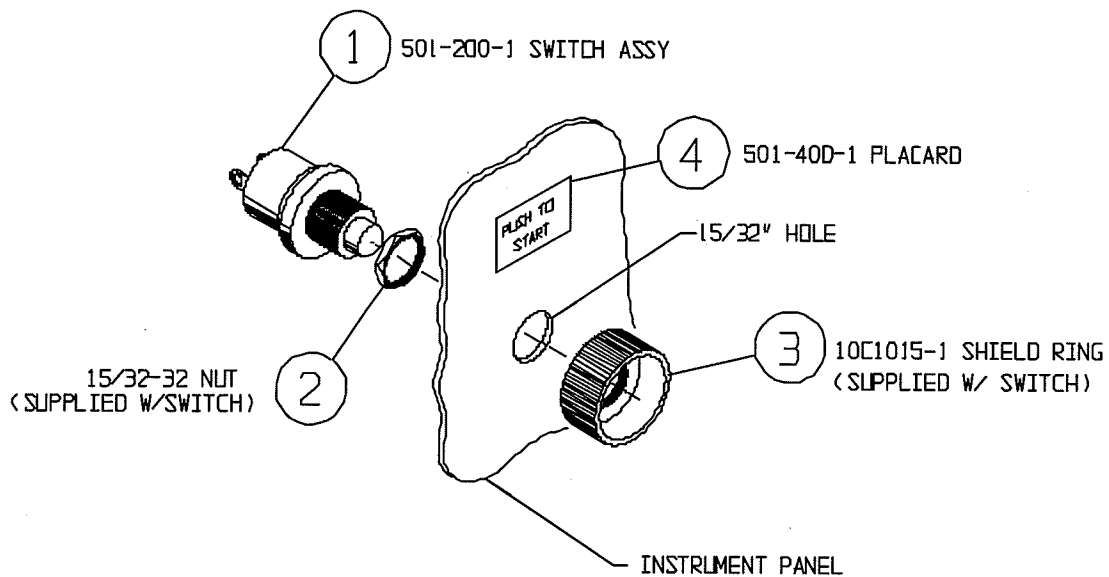
- Step 9. Before installing new starter, five 5/16" cap-head bolts must be removed from the new starter. These bolts are useful during assembly and shipping but must be removed before the installation. The two 6-32 cap-head screws will clear the accessory case and SHOULD NOT be removed. Remove old gasket Refer to applicable service manual instructions; Install new starter using new gasket (352179). Original attach hardware is used except for top bolts. New, longer bolts (S813-5C28), flat washers (AN960-516L) and lockwashers (MS35337-45) are supplied with kit.
- Step 10. Referring to Figure 1, select location on firewall for new starter contactor (14). The new contactor mounts on nut plates. Location selection should be within wiring range of existing starter wire from battery contactor. In addition, the location needs to be within wiring range of the supplied wire assembly (8) which carries current from contactor to starter. Check cockpit side of selected location for clearance to existing wire bundles, plumbing or other obstructions.

-----CAUTION-----

Take care when drilling holes to install nut plates to insure that drills do not penetrate firewall and damage equipment in the cabin.

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- Step 11. Locate mounting centers for nut plates (12) and drill two holes (1) in firewall. Install nut plates (12) using blind rivets (13).
- Step 12. Mount contactor (14) using bolts (9) and flat washers (11).
- Step 13. If battery contactor wire requires shortening, trim wire to length and install new terminal (16). Slide insulating nipple (17) over end of wire from battery contactor. Attach contactor wire and main bus feedwire (*IF PRESENT*) to either of the large terminal posts on contactor (14) using nut (18). Cover joint with nipple (17).
- Step 14. Slide insulating nipple (7) over one end of wire assembly (8). Attach wire assembly (8) to remaining large terminal post of contactor (14) using nut (18). Cover joint with nipple.
- Step 15. Slide insulating nipple (7) over free end of wire assembly (8). Attach wire assembly to starter using lockwasher (3), flatwasher (4) and nut (2). Cover joint with nipple.



**Figure 2**

### **Starter Push Button Installation**

-----**NOTE**-----

If the aircraft being modified is already fitted with a keyed magneto switch, you have the option of replacing it with a 5-position, key switch such as an ACS p/n A-510-2 (Aircraft Spruce) or equal (not supplied) and wiring per Figure 4. If existing magneto switching is to be retained, then a starter control push-button assembly (supplied) is installed in a location convenient to the pilot as described below.

Step 16. Referring to Figure 2, determine suitable location for start push-button and drill 15/32" hole. Install push button assembly (1) with supplied nut (2) and shield ring (3). Install placard (4) above pushbutton.

Step 17. Referring to Figure 3, attach one push button leadwire to an existing fuse or circuit breaker rated at 5 amps. Alternatively, an additional 5-amp fuse or breaker (not supplied) should be installed and labeled STARTER.

Step 18. Referring to Figure 1, route remaining push-button lead wire to the starter contactor location on firewall. Cut to length and install terminal (10). Attach wire to contactor using nut (20) and washers (21).

Step 19. Reconnect the ship's battery. **Use caution to clear propeller area and make sure the Magneto Switch is in the OFF position during this step. A wiring error could result in unexpected engine rotation and possible damage or personal injury.**

#### **Test, Closure and Documentation**

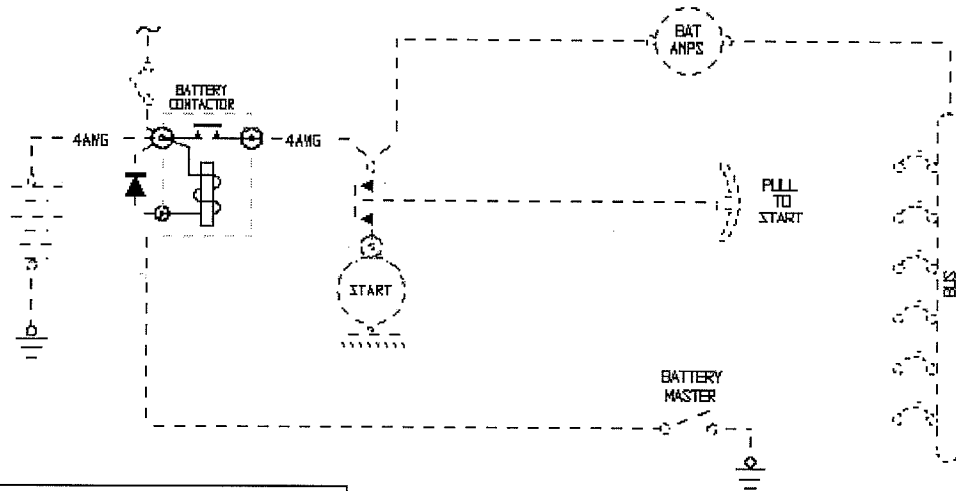
Step 20. Test starter for proper operation.

Step 21. Refer to applicable service manual instructions; replace cowl.

Step 22. Update ships's maintenance and weight and balance records to reflect this installation.



TYPICAL WIRING FOR ORIGINAL PULL-CABLE STARTER



RECOMMENDED REWIRING FOR PUSH-BUTTON STARTER OPERATION

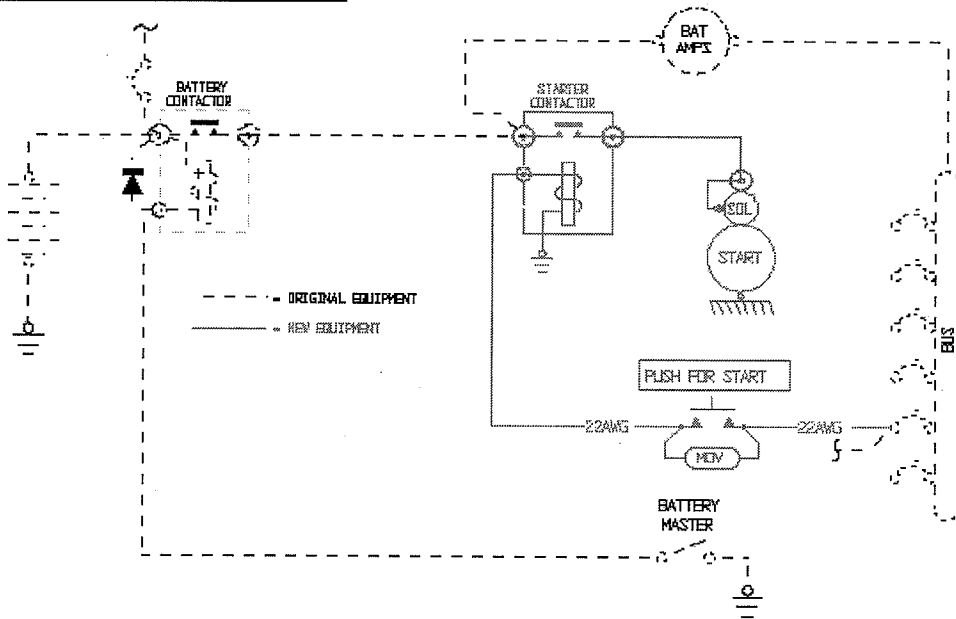
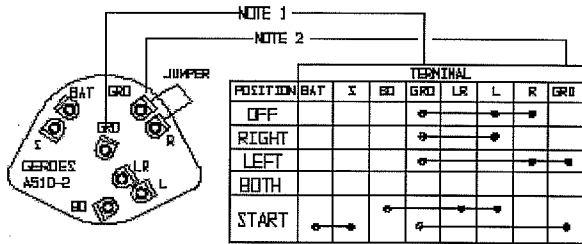


Figure 3. Push-Button Wiring

GERDES/AIRCRAFT SPRUCE KEYLOCK MAGSWITCH SWITCHING FUNCTION



NOTES

1. "GRD" TERMINAL NEAR CENTER OF SWITCH IS USED TO TERMINATE SHIELD GROUNDS FOR P-LEAD WIRES. DO NOT CONNECT THIS TO ANY OTHER CONDUCTORS BEHIND PANEL.
2. "GRD" ADJACENT TO "R" TERMINAL BECOMES CONNECTED TO THE CENTER "GRD" TERMINAL DURING ENGINE CRANKING. BY INSTALLING A JUMPER BETWEEN THIS "GRD" TERMINAL AND "R" TERMINAL, THE RIGHT MAGNETO IS DISABLED DURING ENGINE CRANKING. IF THE RIGHT MAG IS FITTED WITH AN IMPULSE COUPLER, THE JUMPER IS NOT USED.

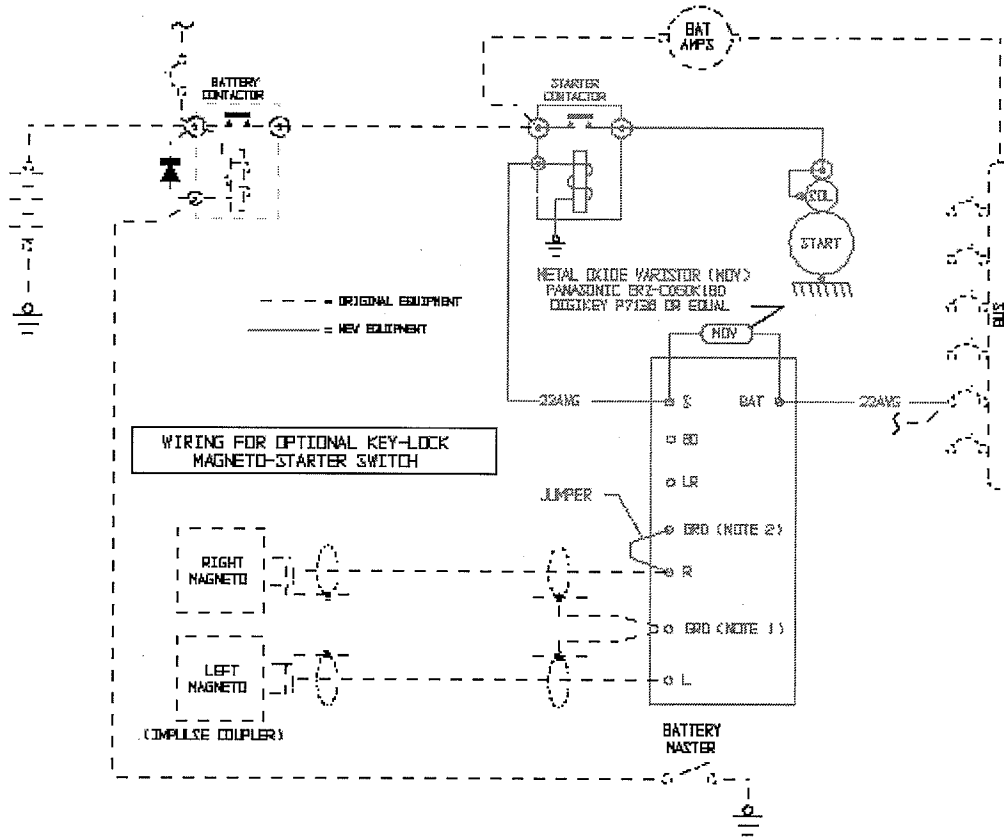


Figure 4. 5-position Key Switch Wiring