

Eclipse

E-80

F-141

Y-150

E-160

Service

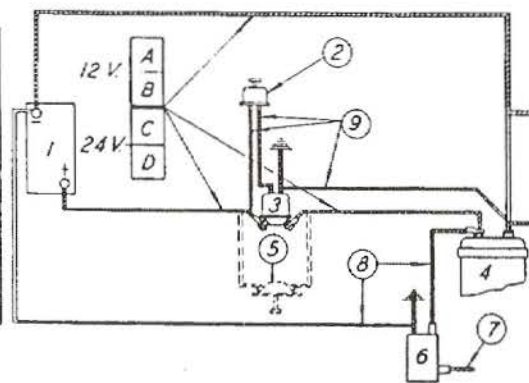
&

Installation Manual

| 12 VOLT SYSTEM                            |           |               |                                  | 24 VOLT SYSTEM                            |           |               |                                  |
|---|-----------|---------------|----------------------------------|---|-----------|---------------|----------------------------------|
| TABLE BASED ON 2 V CABLE DROP AT 500 AMPS |           |               |                                  | TABLE BASED ON 4 V CABLE DROP AT 300 AMPS |           |               |                                  |
| LET.                                      | WIRE SIZE | CIR. MIL AREA | TOTAL CABLE LENGTH NOT TO EXCEED | LET.                                      | WIRE SIZE | CIR. MIL AREA | TOTAL CABLE LENGTH NOT TO EXCEED |
| A   | # 0       | 105,500       | 40 FEET                          | C   | # 6       | 26,250        | 33 FEET                          |
| B   | # 2       | 66,370        | 25 FEET                          | D   | # 8       | 16,510        | 21 FEET                          |

| REV. | BY | DATE | REVISION | DATE | REV. |
|------|----|------|----------|------|------|
|      |    |      |          |      |      |

- 1 BATTERY
- 2 PUSH SWITCH
- 3 SOLENOID STARTING SWITCH
- 4 STARTER MOTOR
- 5 FOOT SWITCH-SOLENOID STARTING SW ELIMINATED
- 6 BOOSTER COIL
- 7 TO DISTRIBUTOR
- 8 NO.16 CAMBRIC INSUL. CABLE
- 9 NO.14 CAMBRIC INSUL. CABLE



MOTORS FITTED WITH TWO TERMINALS MAY BE CONVERTED TO ONE WIRE GROUNDED SYSTEMS BY REPLACING THE INSULATING WASHER ON EITHER TERMINAL POST WITH A GROUNDING BUSHING.

TWO WIRE SOLENOID SWITCHES MAY BE CONVERTED TO ONE WIRE GROUNDED SYSTEMS BY REPLACING EITHER TERMINAL INSULATING BUSHING WITH A GROUNDING BUSHING.

TO CONVERT ONE WIRE GROUNDED BOOSTER COIL FOR TWO WIRE UNGROUNDED OPERATION REMOVE THE GROUNDING WASHERS AND INSULATE THE PRIMARY TERMINAL POST.

MOUNT ALL BOOSTER COILS ON A GROUNDING BASE AS THE SECONDARY WINDING IS GROUNDED INTERNALLY FOR BOTH ONE AND TWO WIRE SYSTEMS. THE GROUNDING BASE MUST BE GROUNDED TO THE ENGINE.

NOTE. FOR ONE WIRE GROUNDED SYSTEMS USE SECTIONED LINES ONLY FOR TWO WIRE UNGROUNDED SYSTEMS DISCONNECT ALL GROUND WIRES AND USE FULL LINES IN ADDITION TO SECTIONED LINES.

# 14 SOLENOID SWITCH WIRE - MAX. PERMISSABLE LENGTH 33 FT.

# 16 BOOSTER COIL WIRE - MAX. PERMISSABLE LENGTH 50 FT.

WIRING DIAGRAM FOR DIRECT ELECTRIC STARTER COMPLETE WITH BOOSTER COIL, SOLENOID STARTING SWITCH AND PUSH SWITCH SHOWING ONE AND TWO WIRE SYSTEMS

ECLIPSE AVIATION CORPORATION

STARTERS DIRECT CRANKING

|         |    |    |      |      |    |      |     |          |      |    |     |          |      |    |     |          |      |    |     |          |  |
|---------|----|----|------|------|----|------|-----|----------|------|----|-----|----------|------|----|-----|----------|------|----|-----|----------|--|
| DATE    | BY | TO | CHK. | APP. | BY | DATE | NO. | REVISION | DATE | BY | NO. | REVISION | DATE | BY | NO. | REVISION | DATE | BY | NO. | REVISION |  |
| 8-20-50 |    |    |      |      |    |      |     |          |      |    |     |          |      |    |     |          |      |    |     |          |  |

TELEPHONE 400-1111

ECLIPSE AVIATION CORP. EAST ORANGE, N. J. O-K-14797

DIAGRAM WIRING

ROUTINE INSTALLATION AND SERVICE INSTRUCTIONS  
DIRECT CRANKING ELECTRIC STARTERS

IDENTIFICATION: These instruction sheets are applicable to the Types E-80, F-141, Y-150 and E-160 direct cranking electric starters. The starters are of the same basic construction, differing only in the size of mounting flange (5" or 6" SAE), gear ratio and torque output, and are designed for either 1 or 2 wire, 12 volt operation with exception of certain Type E-160 models which are designed for either 1 or 2 wire, 24 volt operation. (See nameplate data). Shielded starters are normally provided with 1-3/16"-18 threaded spouts for the attachment of 3/4" shielding conduit.

INSTALLATION: The following procedure should be strictly adhered to in order to insure proper operation of the equipment.

STARTER: (NOTE) Prior to installing starters which have been in storage for periods of more than six (6) months, they should be forwarded to a service station, overhaul base or returned to the factory for cleaning, relubrication and clutch adjustment. Starters which have been in storage for less than six (6) months may be placed in immediate service.

Before mounting the starter on the engine, remove the cover over the starter jaw. (NOTE - This cover is provided for shipping and storage purposes only). To install the starter, remove the engine crankcase plate and gasket covering the starter drive and mounting flange. Wipe the mounting flange clean and replace the gasket. Examine the end of the engine crankshaft and ascertain if the engine jaw and starter jaw are of the same type and are of the correct rotation for proper engagement. With the engine gasket in place, the distance from the mounting flange to the outermost part of the engine jaw must be 1-11/16" plus or minus 1/32". The clearance between the engine jaw and starter jaw must be 3/32" plus or minus 1/32" when the latter is fully retracted.

When installing the Type Y-150 starter on Warner, American Cirrus, or Le Blond engines, refer to the particular engine manufacturer for special adapting parts.

HAND CRANK (Type E-160 Starters): The hand crank extension should be of sufficient length when installed to assure proper cranking. Before assembling and installing the crank extension, check rotation and location as being correct for the particular model starter. Determine the length of extension assembly desired and cut the extension rod accordingly, allowing for the fact that the rod must be inserted a distance of 1-1/4" in the sleeve. Assemble the sleeve on the shaft and, using the hole already drilled in one side of sleeve, drill through and ream to a dimension of .250" plus .001" minus .000". Insert pin flush with O. D. of sleeve.

To install the extension assembly place the tapered end of the shaft in the tapered socket of the starter crankshaft and secure in place with the 1/4" bolt, nut and cotter pin provided. It is necessary when installing the crank extension to provide an externally mounted support bearing. For rigidly mounted engines, a rigidly mounted self-aligning ball bearing mounted on the side of the fuselage and applied to the outer end of the large diameter sleeve with provisions for lubrication, is strongly recommended. If a plain bronze bearing is utilized for supporting the hand crank extensions, it is recommended that the bearing surface be kept as short as possible and that a clearance of .005" be maintained between the O. D. of the extension sleeve and the I.D. of the bearing. Care should be taken that the alignment of the extension shaft is as accurate as possible in order to prevent undue strain on the starter housing during hand crank operation.

For shock mounted engines, it is necessary that the crank extension external bearing support be attached directly to the engine in order that the starter and

extension may be free to move as a unit. However, should the installation be such that this is not practicable, it is recommended that either the external bearing support be shock mounted or a universal joint be provided between the bearing support and the crankshaft of the starter.

ACCESSORIES: Two methods of control may be utilized in the operation of direct cranking types of electric starters. A direct starting switch of the foot type or a remotely controlled solenoid switch may be employed. Details regarding the installation of the above control switches and the booster coil, if used, should be obtained from the Instruction Sheets covering the individual units. Refer to typical wiring diagram for all wire sizes and connections. When installing grounded systems on airplanes incorporating shock mounted engines, be sure engines are securely grounded to the airplane structure.

OPERATION: For best results in starting, prepare engine in accordance with the engine manufacturer's instructions and operate starter either by pressing the foot switch or by operating the push switch controlling the solenoid switch, depending upon the method employed. Engagement and release of the starter jaw are automatic and require no attention. CAUTION: Should the engine fail to start readily, the cause should be ascertained immediately to avoid running down the storage battery. If it is necessary to unload the priming charge from the cylinders, the propeller should be turned by hand  $1/3$  to  $1/2$  of a revolution in its normal direction (SWITCH OFF) so as to disengage the starter. When released, the propeller may be turned in the opposite direction as required and the engine primed again for a new start.

SERVICE MAINTENANCE: When properly installed and operated the starters should not require any attention between major overhaul periods other than that outlined below. Starters are properly lubricated prior to shipment from the factory and should not require lubrication except at overhaul.

STARTER INSPECTION: After every 150 hours of engine operation remove the window strap and examine for dirty or loose connections and worn or binding brushes. Clean and tighten all connections. Replace all defective wiring. Brushes should be a free fit in the brush boxes without excessive side play. Binding brushes and brush boxes should be wiped clean with a gasoline moistened cloth. Worn brushes should be replaced before their maximum wear limit is reached to insure proper operation between inspection periods. The maximum permissible brush wear for the various types of starters is as follows: Type E-80 -  $5/32$ " from a new length of  $1/2$ ", Type F-141 -  $1/4$ " from a new length of  $17/32$ " (useful length), Type Y-150 -  $3/16$ " from a new length of  $9/32$ " (useful length) and Type E-160 -  $5/32$ " from a new length of  $1/2$ ". When replacing a worn brush, the new brush should be seated properly by inserting a strip of #000 sandpaper between the brush and the commutator sanded side next to the brush, and pulling in the direction of rotation. Repeat until brush is fully seated. CAUTION: DO NOT USE COARSE SANDPAPER OR EMERY CLOTH. REMOVE SAND OR METAL PARTICLES WITH COMPRESSED AIR. NOTE: When ordering routine service parts for the Type E-160 starter, be sure to specify any change letter or letters stamped on upper left hand corner of the nameplate above the model number.

SERVICE TROUBLES: In order to assure satisfactory operation of the starter, the battery should be kept fully charged and the battery terminals should be kept clean and tight. In the event of improper operation of the starter, examine all wiring carefully and check charge of battery. If the starter operates, but does not engage with the jaw, or, if insufficient torque is developed to start the engine, the indications are that the jaw spring ring is weak and that the clutch is slipping due to worn or scored discs. Leakage of engine oil into the starter interior due to a worn baffle plate oil seal will also cause the

clutch to slip. If the starter does not operate when the switch is closed, and if the circuit connections are found to be in order, the trouble is probably caused by a grounded or shorted armature or field coil. In the event that any of the above troubles are experienced, the starter should be forwarded to a service station or returned to the manufacturer for inspection and test.

MAJOR OVERHAUL: At every major engine overhaul the starter should be removed from the airplane and forwarded to an authorized service station, overhaul base, or returned to the factory for overhauling. This procedure constitutes a complete disassembly of the unit and involves the use of special tools and equipment available only at the above place.

STORAGE: No special preparation is required prior to placing starters in storage except that they be individually wrapped in water-proofed paper.