

**80**

**STARTING**



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**STARTING**

**DESCRIPTION AND OPERATION**

**1. GENERAL (Figures 1 and 1A)**

The starting system is the system which starts the engine.

The engine starting is performed either with the on-board battery or with an external electrical power source, if the aircraft is equipped with a ground power receptacle.

The engine start-up is performed using an electric starter.

The starting system consists of :

- the starter,
- the starter relay,
- the magneto selector - refer to 74-10-00,

28-Volt aircraft

- the starting indicator light (option) on advisory panel - refer to 31-50-00.

**2. LOCATION (Figures 2, 2A and 2B)**

COMPONENT	QTY	AREA	ACCESS DOOR	REFERENCE
Starter	1	130	131	80-00-01
Starter relay	1	120	121	80-00-00
Magneto selector	1	254L	/	74-10-00
Advisory panel	1	251L	/	31-50-00

**3. DESCRIPTION**

**A. Magneto selector**

The magneto selector is located on the lower part of the L.H. instrument panel. It applies the contact of the magnetos and controls the starter relay.

**B. Starter**

The starter is secured to the L.H. front lower part of the engine. It drives the engine through the ring gear.

The gearing of the driving gear and the ring gear is ensured by the helical groove of the starter shaft. After starting, the driving gear comes back to its initial position by means of a return spring.

**C. Starter relay**

The starter relay is secured to the firewall and is accessible through the engine upper cowling. It ensures the electrical continuity, necessary for starter operation, between the starter and the battery or the ground power unit.

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Page 1  
SEP 04

S / N 1 - 180

S / N 370 - 560 with Night and Day IFR equipment or Night VFR equipment

The starter relay is electrically supplied by "BUS 1" bar and protected by a circuit-breaker located on PL1 panel.

S / N 181 - 369

S / N 370 - 560 without Night and Day IFR equipment or Night VFR equipment

S / N 561 - 822, 850 - 887, 889 - 947

The starter relay is electrically supplied by "BUS 3" bar and protected by a circuit-breaker located on PL1 panel.

S / N 823 - 849, 888, 948 - 9999

The starter relay is electrically supplied by "BUS 2" bar and protected by a fuse located on PL3 panel.

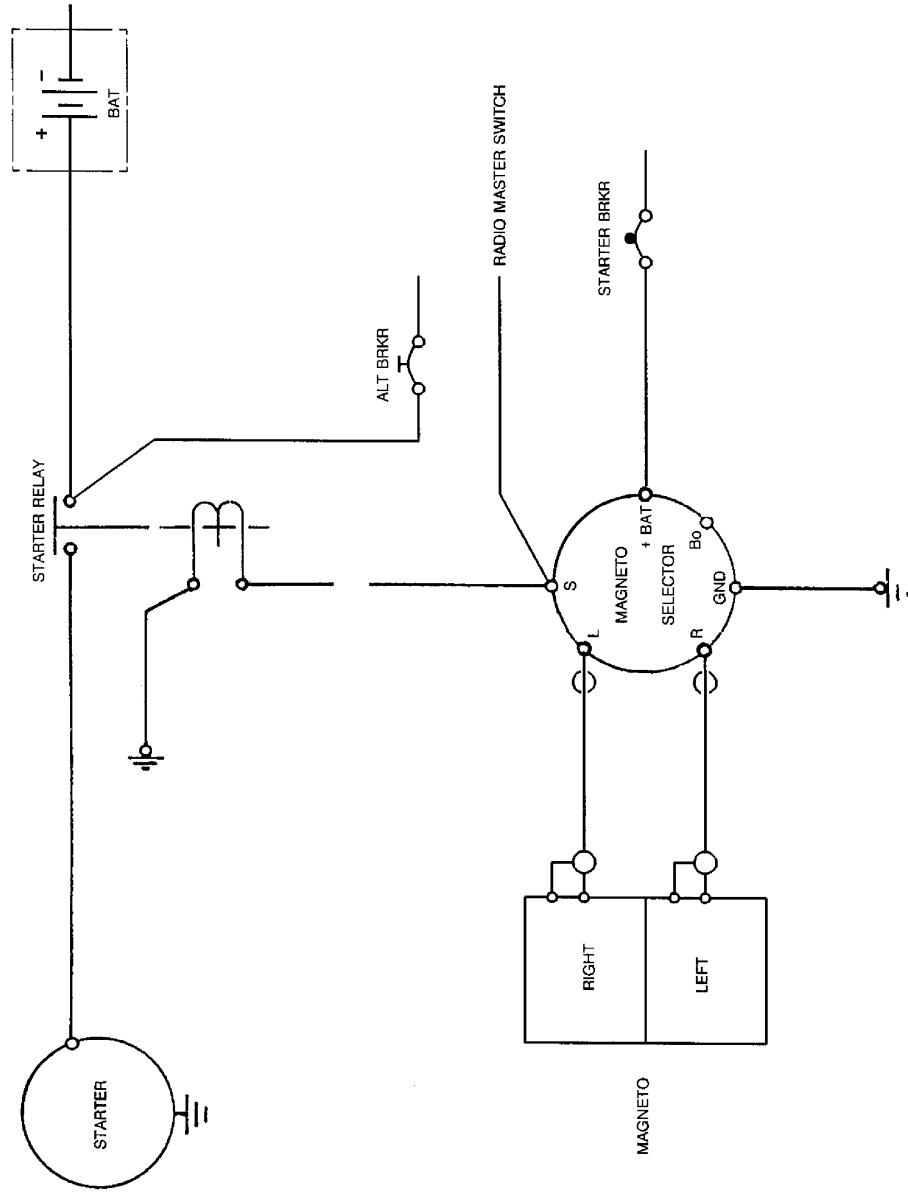
#### **D. Starting indicator light (option)**

28-Volt aircraft

The starting indicator light is located on the advisory panel. During engine starting, its illumination indicates to the pilot that the starter is energized.

#### **4. OPERATION**

When set to "START PUSH" position, the magneto selector controls the starter relay. Electrical power supply is applied to the starter via the relay.



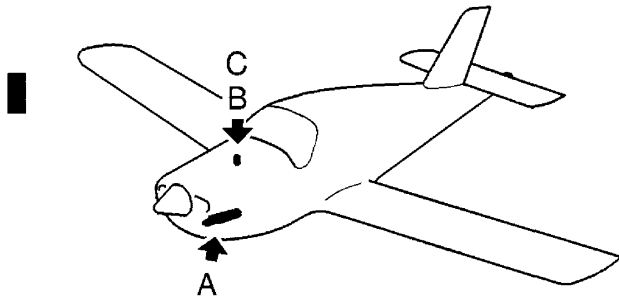
14800000AAA1WZ4000

Starting - Electrical schematic  
Figure 1 - 14-Volt aircraft

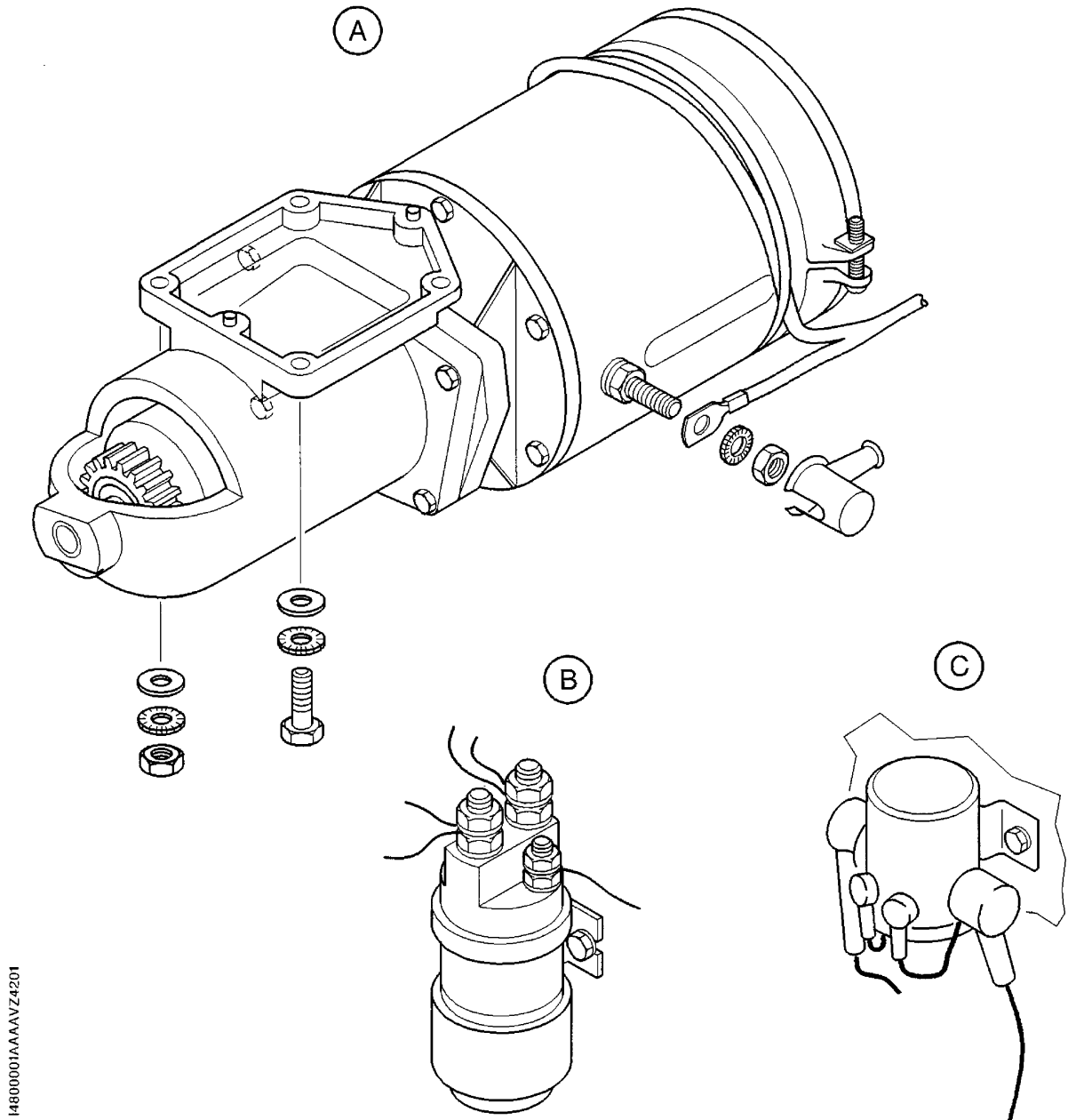
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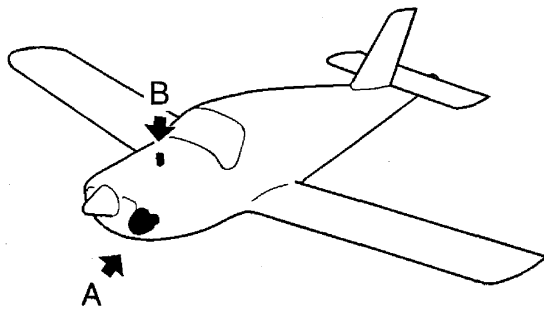
- A - "PRESTOLITE" or "ELECTROSYSTEMS MHB - 4016" starter
- B - Starter relay 28 Volts
- C - Starter relay 14 Volts



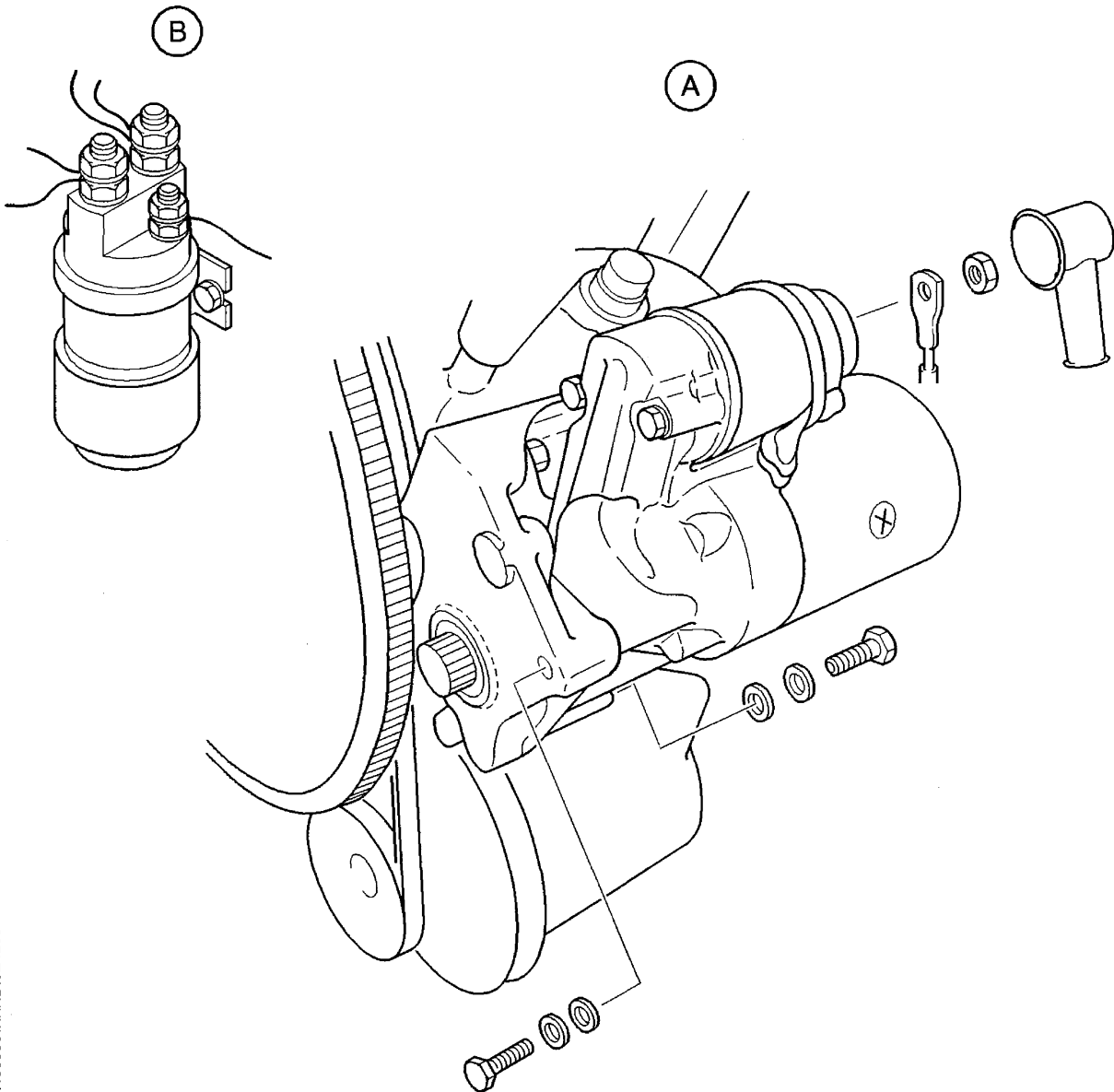
14800001AAAAVZ4201

Starting - Identification and location of components  
Figure 2

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A - "LYCOMING" starter  
B - Starter relay



1480001AAAABWZ4200

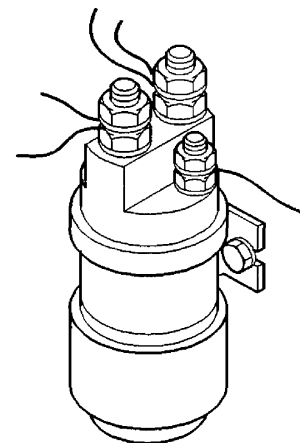
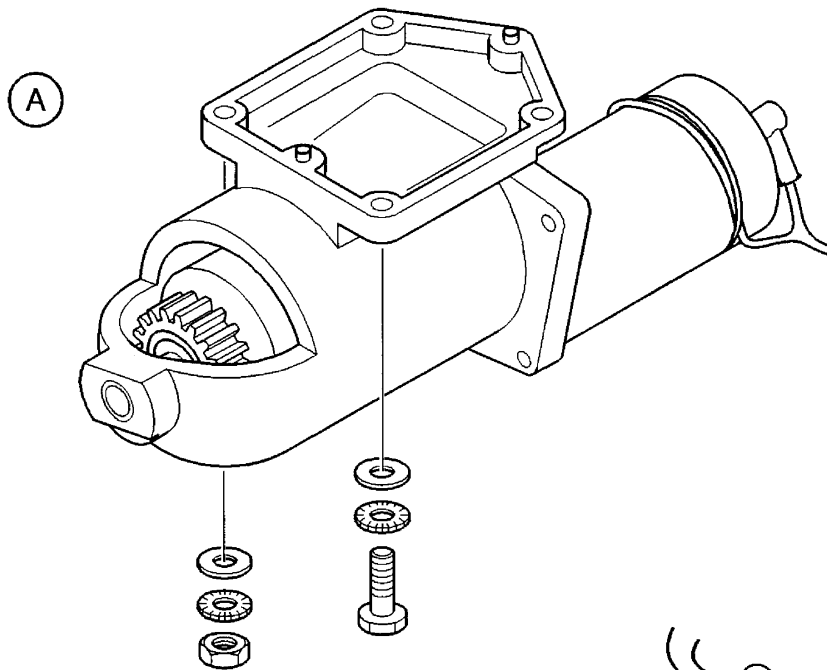
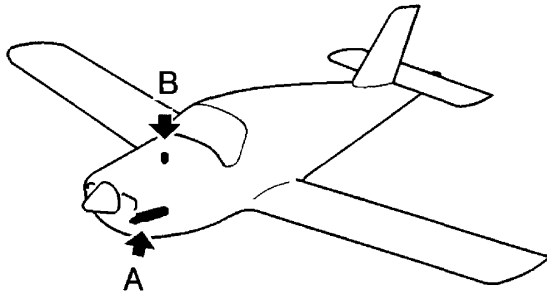
Starting - Identification and location of components  
Figure 2A

AAAA  
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- A - "ELECTROSYSTEMS MHB - 6016" starter
- B - Starter relay



14800001AAA BWZ14000

Starting - Identification and location of components  
Figure 2B

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## STARTER

### REMOVAL / INSTALLATION

**CAUTION** : WHEN REPLACING A "PRESTOLITE" OR "ELECTROSYSTEMS MHB - 4016" STARTER WITH AN "ELECTROSYSTEMS MHB - 6016" STARTER, UPDATE WEIGHING REPORT.

#### 1. REMOVAL OF STARTER (Figures 401 and 402)

##### A. Tools and consumable materials

None

##### B. Procedure

**WARNING** : PRIOR TO ANY OPERATION, ENSURE THAT THE ENGINE, EXHAUST PIPE AND MANIFOLDS ARE COLD. IF NOT, TAKE NECESSARY PRECAUTIONS TO AVOID SEVERE BURNS.

**WARNING** : PRIOR TO ANY OPERATION, ENSURE THAT THE KEY IS REMOVED FROM MAGNETO SELECTOR AND THAT "MAIN SWITCH" IS OFF.

- 1) Remove the engine cowlings - refer to 71-10-01.
- 2) Remove the L.H. front engine bulkhead and, if necessary, the R.H. front engine bulkhead - refer to 71-10-02.
- 3) Cut off and discard tie-wrap (19).
- 4) Disconnect power supply cable (4), retain nut (2) and discard lockwasher (1).
- 5) Cut off and discard the lockwire, remove bolt (12) and washer (11).
- 6) Remove bolt (8), washer (6) and lockwasher (7). Discard lockwasher (7).
- 7) Hold starter (17), remove nuts (9), washers (6) and lockwashers (7). Discard lockwashers (7).
- 8) Remove starter (17).

#### 2. INSTALLATION OF STARTER (Figures 401 and 402)

##### A. Tools and consumable materials

- Stainless steel lockwire, dia. 0.032 in (0.8 mm)
- Tie-wrap
- Torque wrench 0 - 265 lbf.in (0 - 30 N.m)

AAAA

Validity : "PRESTOLITE" starter  
"ELECTROSYSTEMS MHB - 4016" starter

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- 1 - Lockwasher
- 2 - Nut
- 3 - Boot
- 4 - Power supply cable
- 5 - Evacuation hole
- 6 - Washer
- 7 - Lockwasher
- 8 - Bolt
- 9 - Nut
- 10 - Ring
- 11 - Washer
- 12 - Bolt
- 13 - Drive shaft
- 14 - Alternator link rod
- 15 - Driving gear
- 16 - Drive
- 17 - Starter
- 18 - Alternator wiring
- 19 - Tie-wrap
- 20 - Nut
- 21 - Washer
- 22 - Washer
- 23 - L.H. front engine bulkhead
- 24 - Bolt

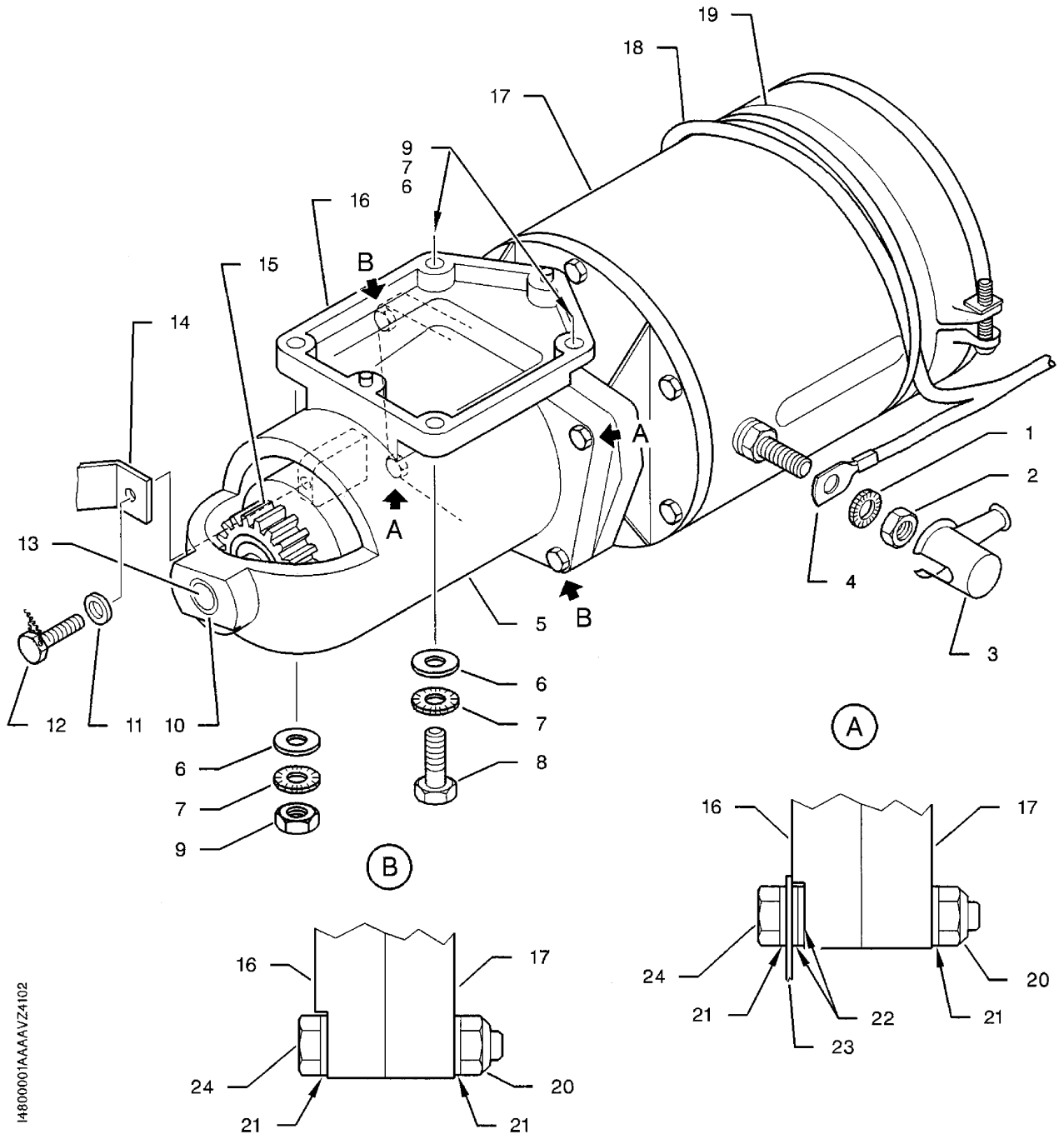
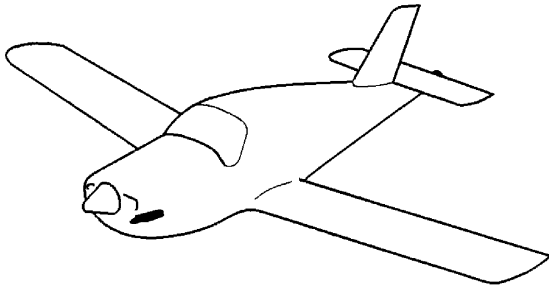
Starter - Removal / Installation  
Key to Figure 401

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Validity : "PRESTOLITE" starter  
"ELECTROSYSTEMS MHB - 4016" starter

**80-00-01** (BA)

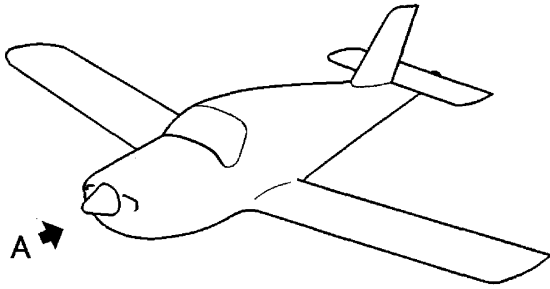
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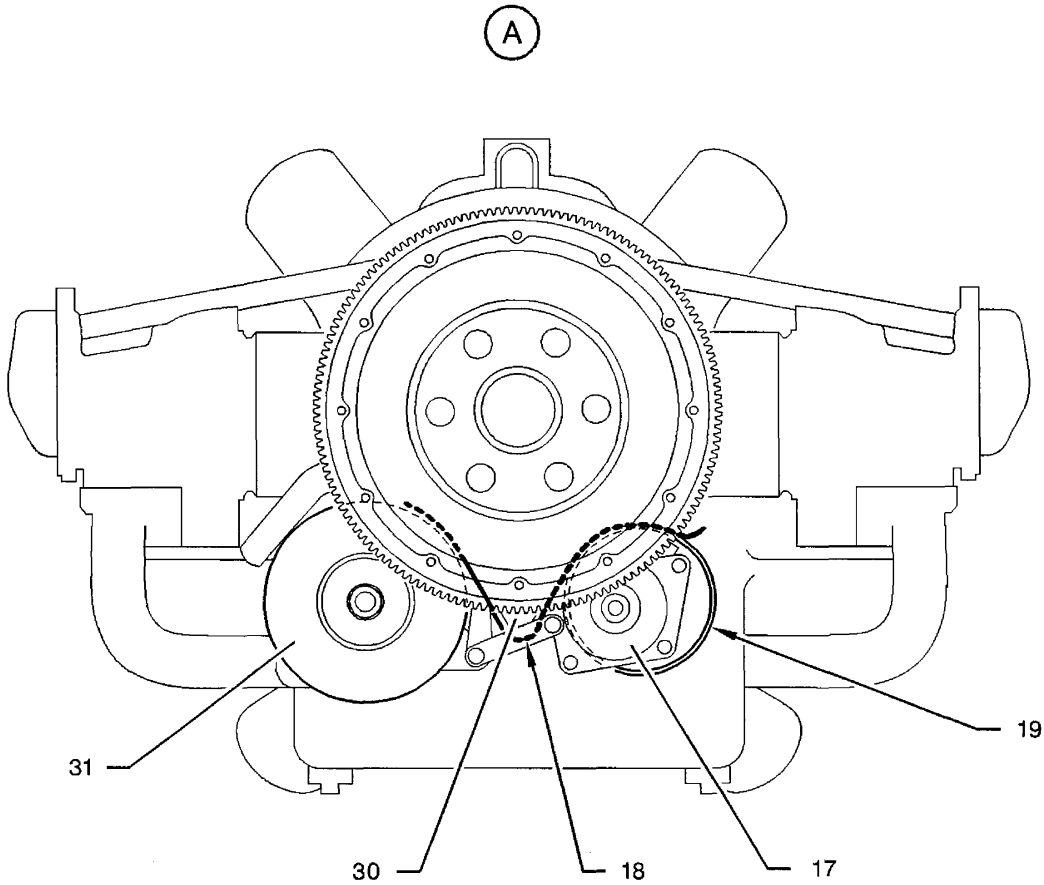
Starter - Removal / Installation  
Figure 401

14800001AAAAVZ4102

AAAA  
Validity : "PRESTOLITE" starter  
"ELECTROSYSTEMS MHB - 4016" starter



- 17 - Starter
- 18 - Alternator wiring
- 19 - Tie-wrap
- 30 - Engine
- 31 - Alternator



1480001AAAAVZ24101

Starter - Removal / Installation  
Figure 402

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Validity : "PRESTOLITE" starter  
"ELECTROSYSTEMS MHB - 4016" starter

80-00-01 (BA)

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**B. Procedure**

**WARNING : PRIOR TO ANY OPERATION, ENSURE THAT THE ENGINE, EXHAUST PIPE AND MANIFOLDS ARE COLD. IF NOT, TAKE NECESSARY PRECAUTIONS TO AVOID SEVERE BURNS.**

**WARNING : PRIOR TO ANY OPERATION, ENSURE THAT THE KEY IS REMOVED FROM MAGNETO SELECTOR AND THAT "MAIN SWITCH" IS OFF.**

**NOTE 1 : When replacing a "PRESTOLITE" starter with a new "PRESTOLITE" or "ELECTROSYSTEMS MHB - 4016" starter, replace the original attachment assembly of drive (16) / starter (17) coupling with bolts (24), nuts (20) and washers (21) and (22) - refer to Illustrated Parts Catalog.**

**NOTE 2 : When replacing a "LYCOMING" starter with a "PRESTOLITE" or "ELECTROSYSTEMS MHB - 4016" starter, replace the original attachment assembly of drive (16) / starter (17) coupling with bolts (24), nuts (20) and washers (21) and (22). Replace L.H. front engine bulkhead (23) as well - refer to Illustrated Parts Catalog.**

- 1) Check ring (10) and drive shaft (13) for condition and play.
- 2) If necessary, unblock evacuation hole (5) located beneath drive (16) section.
- 3) Check the attachments of drive (16) / starter (17) coupling for correct tightening - see Detail B.
- 4) Lubricate drive shaft (13) and driving gear (15) - refer to 12-21-01.
- 5) Check boot (3) for correct condition. Replace if necessary.
- 6) Install and secure starter (17) with washers (6), new lockwashers (7) and nuts (9).
- 7) Install washer (6), new lockwasher (7) and bolt (8).
- 8) Torque nuts (9) and bolt (8) - refer to 20-00-01.
- 9) Secure alternator link rod (14) with bolt (12) and washer (11). Lockwire bolt (12).
- 10) Connect power supply cable (4) with a new lockwasher (1) and nut (2). Torque - refer to 20-00-01.
- 11) Protect the connection with boot (3).
- 12) Make sure alternator wiring (18) does not touch engine (30) between alternator (31) and starter (17).
- 13) Secure alternator wiring (18) on the body of starter (17) with a new tie-wrap (19).
- 14) Install L.H. front engine bulkhead (23) - refer to 71-10-02. Secure the bulkhead on starter (17) with bolts (24), washers (21) and (22), new nuts (20) - see Detail A.
- 15) If removed, install the R.H. front engine bulkhead - refer to 71-10-02.
- 16) Make sure all the tools and materials are removed and the work area is clean and free from debris.
- 17) Install the engine cowlings - refer to 71-10-01.
- 18) Perform a test run-up - refer to 05-30-02.

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Validity : "PRESTOLITE" starter  
"ELECTROSYSTEMS MHB - 4016" starter

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AAAA  
Validity : "PRESTOLITE" starter  
"ELECTROSYSTEMS MHB - 4016" starter

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## STARTER

### REMOVAL / INSTALLATION

**CAUTION** : WHEN REPLACING "ELECTROSYSTEMS MHB - 6016" STARTER WITH A "LYCOMING" OR "PRESTOLITE" OR "ELECTROSYSTEMS MHB - 4016" STARTER, UPDATE WEIGHING REPORT.

#### 1. REMOVAL OF STARTER (Figures 401 and 402)

##### A. Tools and consumable materials

None

##### B. Procedure

**WARNING** : PRIOR TO ANY OPERATION, ENSURE THAT THE ENGINE, EXHAUST PIPE AND MANIFOLDS ARE COLD. IF NOT, TAKE NECESSARY PRECAUTIONS TO AVOID SEVERE BURNS.

**WARNING** : PRIOR TO ANY OPERATION, ENSURE THAT THE KEY IS REMOVED FROM MAGNETO SELECTOR AND THAT "MAIN SWITCH" IS OFF.

- 1) Remove the engine cowlings - refer to 71-10-01.
- 2) Remove the L.H. front engine bulkhead and, if necessary, the R.H. front engine bulkhead - refer to 71-10-02.
- 3) Cut off and discard tie-wrap (19).
- 4) Disconnect power supply cable (1), retain nut (3) and discard lockwasher (2).
- 5) Cut off and discard the lockwire, remove bolt (12) and washer (11).
- 6) Remove bolt (8), washer (6) and lockwasher (7). Discard lockwasher (7).
- 7) Hold starter (17), remove nuts (9), washers (6) and lockwashers (7). Discard lockwashers (7).
- 8) Remove starter (17).

#### 2. INSTALLATION OF STARTER (Figures 401 and 402)

##### A. Tools and consumable materials

- Stainless steel lockwire, dia. 0.032 in (0.8 mm)
- Tie-wrap
- Torque wrench 0 - 265 lbf.in (0 - 30 N.m)

- 1 - Power supply cable
- 2 - Lockwasher
- 3 - Nut
- 4 - Boot
- 5 - Evacuation hole
- 6 - Washer
- 7 - Lockwasher
- 8 - Bolt
- 9 - Nut
- 10 - Ring
- 11 - Washer
- 12 - Bolt
- 13 - Drive shaft
- 14 - Alternator link rod
- 15 - Driving gear
- 16 - Drive
- 17 - Starter
- 18 - Alternator wiring
- 19 - Tie-wrap
- 20 - Nut
- 21 - Washer
- 22 - Washer
- 23 - L.H. front engine bulkhead
- 24 - Bolt

Starter - Removal / Installation  
Key to Figure 401

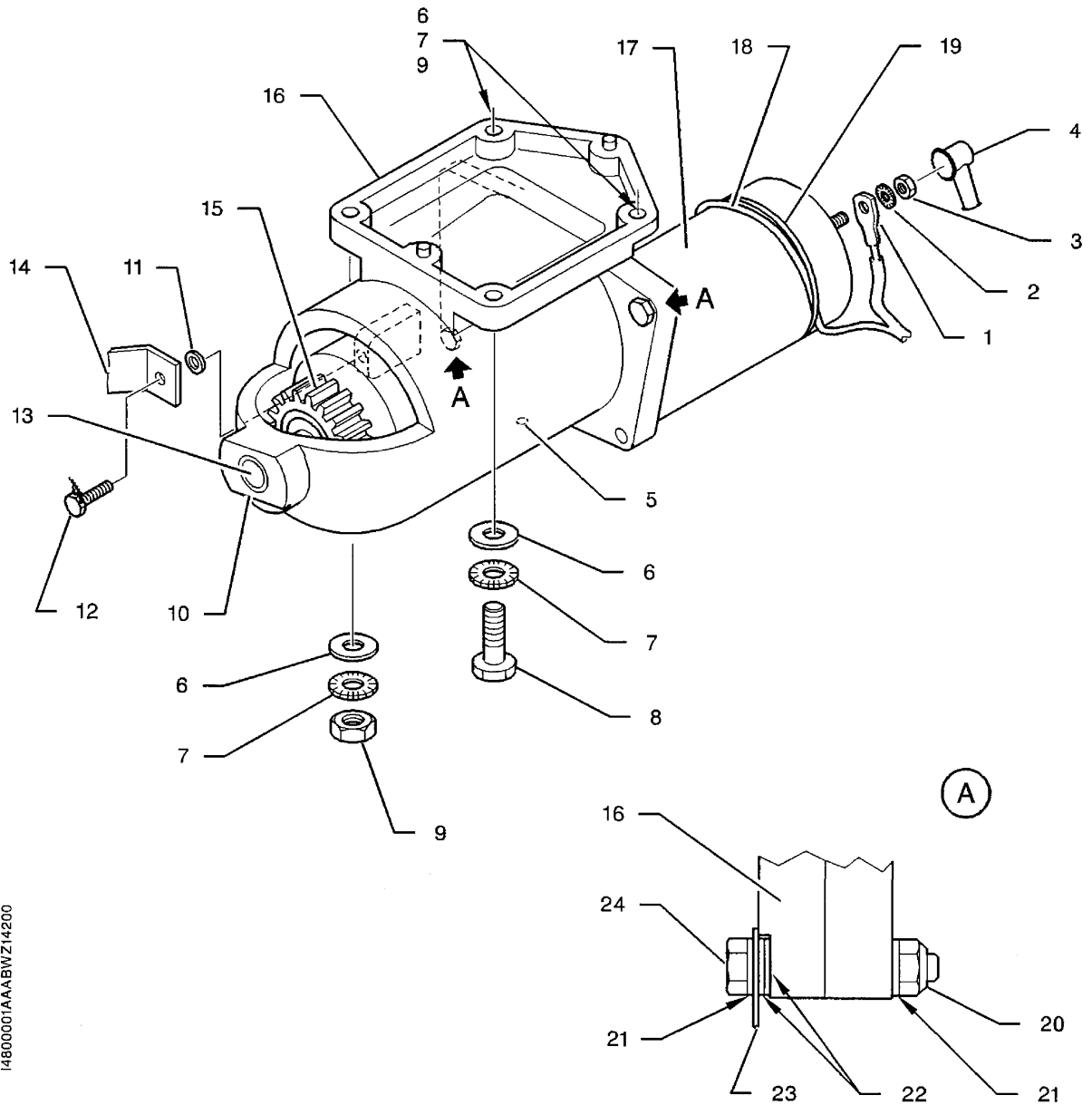
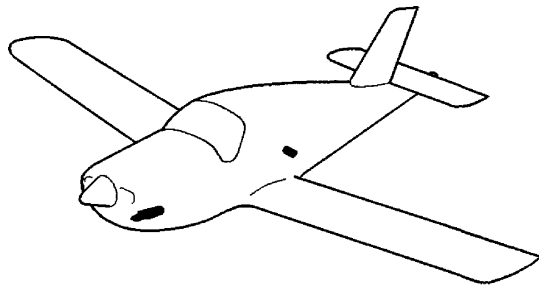
ADAC

Validity : "ELECTROSYSTEMS MHB - 6016" starter

**80-00-01**

(BG)

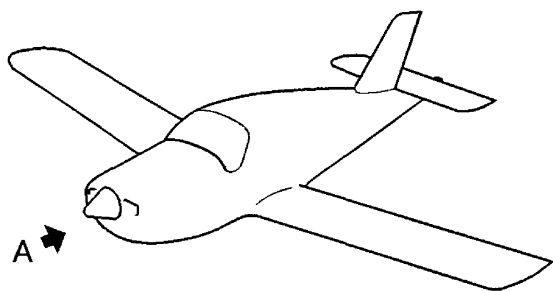
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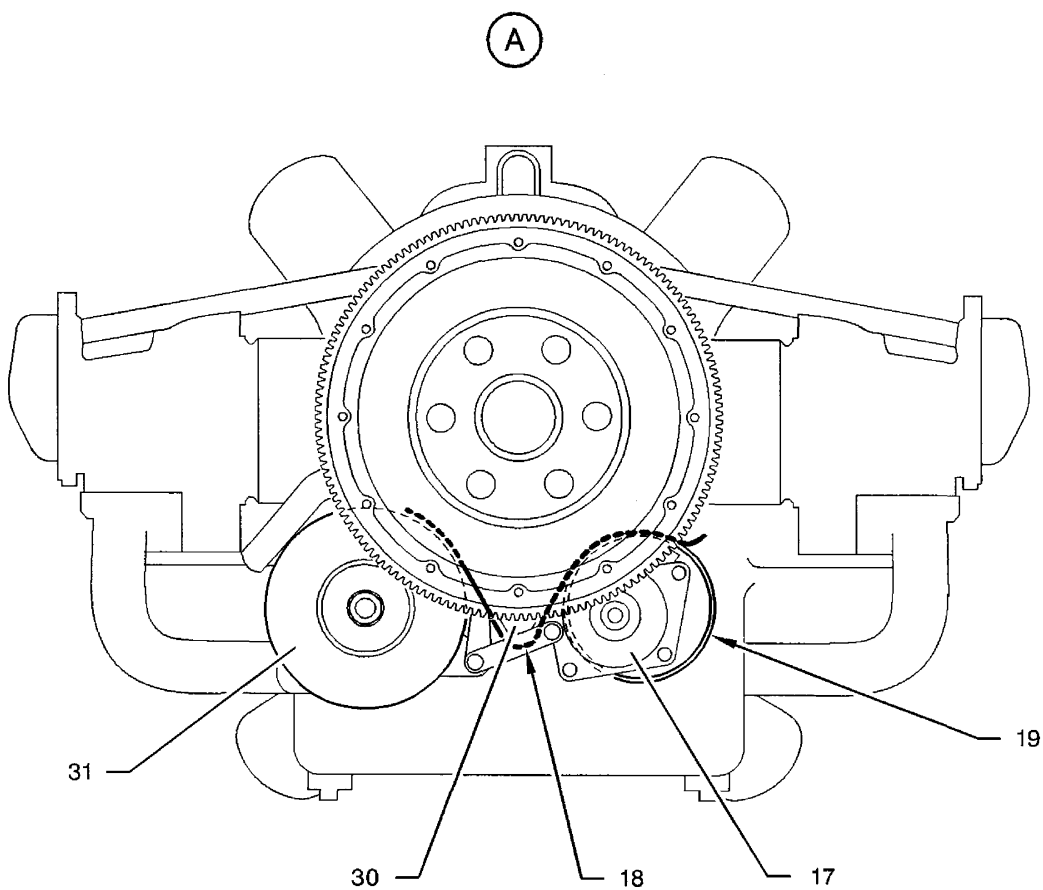
Starter - Removal / Installation  
Figure 401

14800001AAA.BWZI4200

ADAC  
Validity : "ELECTROSYSTEMS MHB - 6016" starter



- 17 - Starter
- 18 - Alternator wiring
- 19 - Tie-wrap
- 30 - Engine
- 31 - Alternator



Starter - Removal / Installation  
Figure 402

14800001AAAAVZ24101

ADAC

Validity : "ELECTROSYSTEMS MHB - 6016" starter

80-00-01 (BG)

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**B. Procedure**

**WARNING :** PRIOR TO ANY OPERATION, ENSURE THAT THE ENGINE, EXHAUST PIPE AND MANIFOLDS ARE COLD. IF NOT, TAKE NECESSARY PRECAUTIONS TO AVOID SEVERE BURNS.

**WARNING :** PRIOR TO ANY OPERATION, ENSURE THAT THE KEY IS REMOVED FROM MAGNETO SELECTOR AND THAT "MAIN SWITCH" IS OFF.

**NOTE 1 :** When replacing a "PRESTOLITE" or "ELECTROSYSTEMS MHB - 4016" starter with an "ELECTROSYSTEMS MHB - 6016" starter, order the parts required to attach L.H. front engine bulkhead to starter - refer to Illustrated Parts Catalog.

**NOTE 2 :** When replacing a "LYCOMING" starter with an "ELECTROSYSTEMS MHB - 6016" starter, order the parts required to attach L.H. front engine bulkhead to starter as well as L.H. front engine bulkhead - refer to Illustrated Parts Catalog.

- 1) Check ring (10) and drive shaft (13) for condition and play.
- 2) If necessary, unblock evacuation hole (5) located beneath drive (16) section.
- 3) Lubricate drive shaft (13) and driving gear (15) - refer to 12-21-01.
- 4) Check boot (4) for correct condition. Replace if necessary.
- 5) Install and secure starter (17) with washers (6), new lockwashers (7) and nuts (9).
- 6) Install washer (6), new lockwasher (7) and bolt (8).
- 7) Torque nuts (9) and bolt (8) - refer to 20-00-01.
- 8) Secure alternator link rod (14) with bolt (12) and washer (11). Lockwire bolt (12).
- 9) Connect power supply cable (1) with a new lockwasher (2) and nut (3). Torque - refer to 20-00-01.
- 10) Protect the connection with boot (4).
- 11) Make sure alternator wiring (18) does not touch engine (30) between alternator (31) and starter (17).
- 12) Secure alternator wiring (18) on the body of starter (17) with a new tie-wrap (19).
- 13) Install L.H. front engine bulkhead (23) - refer to 71-10-02. Secure the bulkhead on starter (17) with bolts (24), washers (21), washers (22) if installed and new nuts (20) - see Detail A.
- 14) If removed, install the R.H. front engine bulkhead - refer to 71-10-02.
- 15) Make sure all the tools and materials are removed and the work area is clean and free from debris.
- 16) Install the engine cowlings - refer to 71-10-01.
- 17) Perform a test run-up - refer to 05-30-02.

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## STARTER

### REMOVAL / INSTALLATION

**CAUTION** : WHEN REPLACING A "LYCOMING" STARTER WITH AN "ELECTROSYSTEMS MHB - 6016" STARTER, UPDATE WEIGHING REPORT.

#### 1. REMOVAL OF STARTER (Figure 401)

##### A. Tools and consumable materials

None

##### B. Procedure

**WARNING** : PRIOR TO ANY OPERATION, ENSURE THAT THE ENGINE, EXHAUST PIPE AND MANIFOLDS ARE COLD. IF NOT, TAKE NECESSARY PRECAUTIONS TO AVOID SEVERE BURNS.

**WARNING** : PRIOR TO ANY OPERATION, ENSURE THAT THE KEY IS REMOVED FROM MAGNETO SELECTOR AND THAT "MAIN SWITCH" IS OFF.

IF AIRCRAFT IS EQUIPPED WITH DISCONNECT PLUG ON FIREWALL, DISCONNECT "MAGNETO DISCONNECT" PLUG AND CONNECT IT TO "GROUND MAGNETO FOR SERVICING" PLUG.

- 1) Remove the engine cowlings - refer to 71-10-01.
- 2) Disconnect power supply cable (5), retain nut (6).
- 3) Cut off and discard the lockwire, remove bolt (13) and washer (12).
- 4) Remove bolt (9), washer (2) and lockwasher (3). Discard lockwasher (3).
- 5) Hold starter (8), remove nuts (4), washers (2) and lockwashers (3). Discard lockwashers (3).
- 6) Remove starter (8) and retain spacer (1), if installed.

#### 2. INSTALLATION OF STARTER (Figure 401)

##### A. Tools and consumable materials

- Stainless steel lockwire, dia. 0.032 in (0.8 mm)
- Torque wrench 0 - 265 lbf.in (0 - 30 N.m)

##### B. Procedure

**WARNING** : PRIOR TO ANY OPERATION, ENSURE THAT THE ENGINE, EXHAUST PIPE AND MANIFOLDS ARE COLD. IF NOT, TAKE NECESSARY PRECAUTIONS TO AVOID SEVERE BURNS.

**WARNING** : PRIOR TO ANY OPERATION, ENSURE THAT THE KEY IS REMOVED FROM MAGNETO SELECTOR AND THAT "MAIN SWITCH" IS OFF.

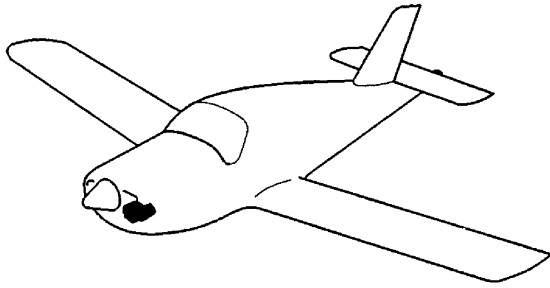
IF AIRCRAFT IS EQUIPPED WITH DISCONNECT PLUG ON FIREWALL, DISCONNECT "MAGNETO DISCONNECT" PLUG AND CONNECT IT TO "GROUND MAGNETO FOR SERVICING" PLUG.

- 1) Lubricate driving gear (10) - refer to 12-21-01.

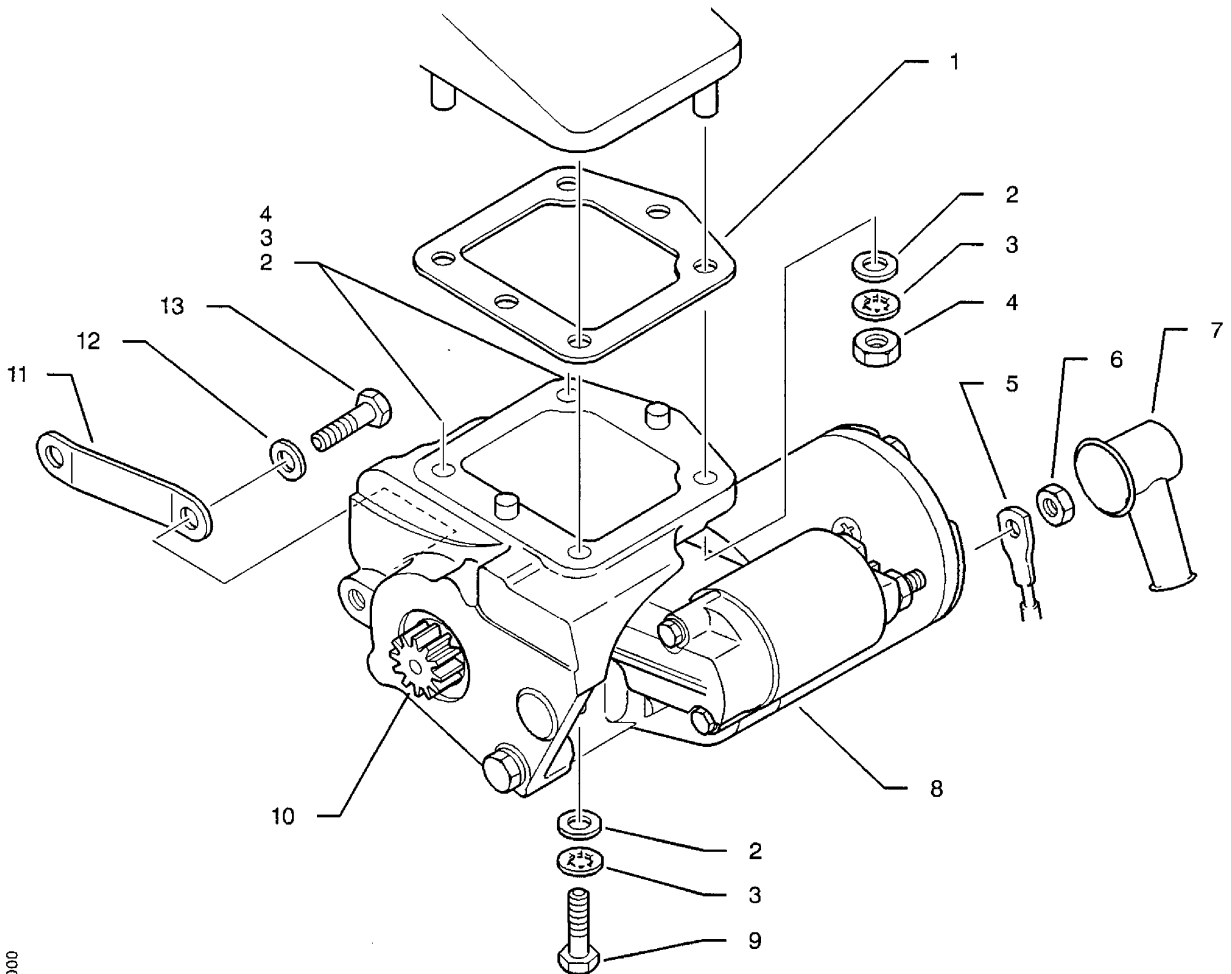
ACAB

Validity : "LYCOMING" starter

- 2) Check boot (7) for correct condition. Replace if necessary.
- 3) Install and secure starter (8) with washers (2), new lockwashers (3) and nuts (4).
- 4) If necessary, check and adjust the gap between the starting ring gear and driving gear (10) - refer to TEXTRON LYCOMING Service Instruction No. 1447 at the latest edition.
- 5) Install washer (2), a new lockwasher (3) and bolt (9).
- 6) Torque nuts (4) and bolt (9) - refer to 20-00-01.
- 7) Secure alternator link rod (11) with bolt (13) and washer (12). Lockwire bolt (13).
- 8) Connect power supply cable (5) with nut (6). Torque - refer to 20-00-01.
- 9) Protect the connection with boot (7).
- 10) Make sure all the tools and materials are removed and the work area is clean and free from debris.
- 11) Install the engine cowlings - refer to 71-10-01.
- 12) Perform a test run-up - refer to 05-30-02.



- 1 - Spacer
- 2 - Washer
- 3 - Lockwasher
- 4 - Nut
- 5 - Power supply cable
- 6 - Nut
- 7 - Boot
- 8 - Starter
- 9 - Bolt
- 10 - Driving gear
- 11 - Alternator link rod
- 12 - Washer
- 13 - Bolt



14800000AAAAYZ4000

Starter - Removal / Installation  
Figure 401

ACAB  
Validity : "LYCOMING" starter

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