SECTION 1

INTRODUCTION

95-AMPERE CHARGING SYSTEM

The order in which the materials are arranged in this publication is meant to familiarize you with a 95-ampere aircraft alternator charging system.

This manual will introduce you to the subject of an alternator charging system and then point out the approximate location of each component in the alternator. It will also familiarize you with the parts names and relative position of each part in an alternator assembly and regulator assembly. It will provide you with those details of component design which might be of importance to a service technician on the job.

The concluding portions of the text cover diagnosis, testing, overhaul and adjustment procedures.

The theory portion of the text makes no attempt to fully cover basic subjects such as induced voltage, inductive reactance, wave rectification, etc. An effort has been made, however, to handle the applicable portions of these subjects in a manner which will minimize the need for additional background research on the part of the reader.

WHY AN ALTERNATOR

Today's aircraft are being equipped with electrical accessories that place additional demands on the charging system. These demands are especially critical at low engine speeds. As a result, the generator is a thing of the past, since it is not economically feasible to manufacture a generator that is capable of producing sufficient output at low speeds. The alternator which can produce a usuable output at low speed, has been the solution for meeting these additional demands.

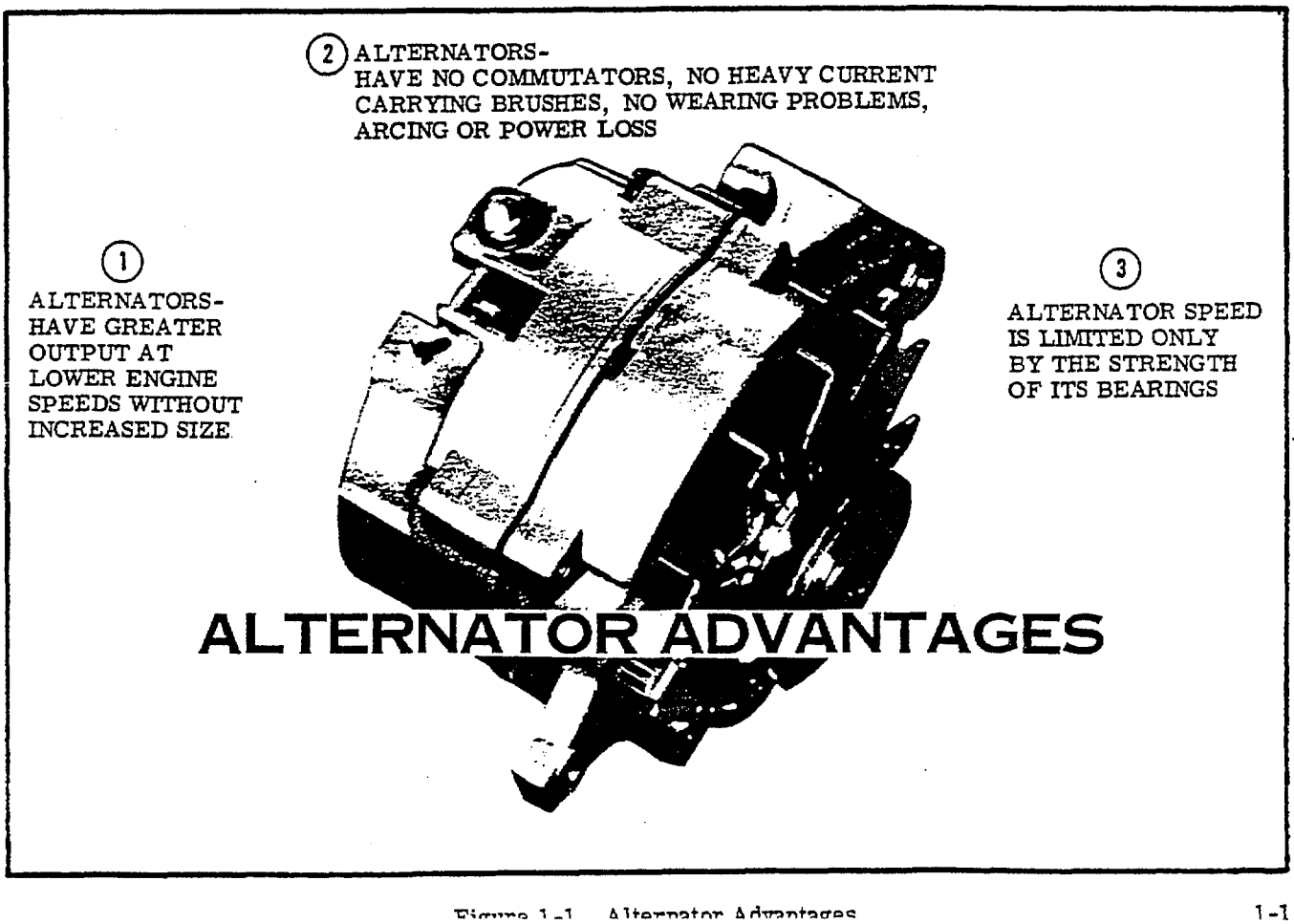

Figure 1-1. Alternator Advantages

Briefly, some of the main differences between the generator and alternator charging system include the following:

For operation at high RPM, the lighter weight of the alternator rotor and coil assembly is favorable over the heavier weight of the generator armature and commutator assembly.

Generators use commutator for rectification . . . this alternator uses silicon rectifiers (diodes).

Generator speed is limited to approximately 10,000 RPM . . . alternator speed is limited only by bearing life and physical factors such as centrifical force. The alternator can, therefore, operate at speeds up to 15,000 RPM. This permits the use of higher pulley ratios which result in higher output at engine idle.

Generator brushes carry full load current . . . alternators are multi-pole.

Most generators are two-pole machine . . . alternators are multi-pole.

The field is stationary in generators . . . it rotates in alternators.

We have pointed out in figure 1-1 the merit of an alternator and some of the basic differences between the generator and alternator charging systems to acquaint you with the characteristics of an alternator. These characteristics will be covered in detail in the "Principles of Operation" (Section 3). Now let's turn our attention to a typical system using the 95-ampere alternator.

TYPICAL 95-AMPERE ALTERNATOR CHARGING SYSTEM.

A optional 95-ampere alternator system installed on T182, R182, TR182, 188, U206, 207, 210 and P210 series model airplanes, consists of the alternator, voltage regulator system or alternator control unit, battery solenoid, alternator belt, indicator light or ammeter, master/alternator switch and wire harness. All 1982 and on T303 model airplanes are equipped with a dual 28-volt alternator system. The system consists of two 95-amp, belt driven alternators, two alternator control units (ACU's), a battery and two alternator switches, a volt meter and selector switch, two alternator contactors, two alternator shunts, a low voltage warning light and left and right alternator off lights. All 208, 208A and 208B airplanes may be equipped with an optional stanby electrical system designed to automatically supply power to the main buses if the system voltage drops below a preset level. The standby electrical system consists of a belt-driven 95-amp alternator, operated at 75-amp capacity mounted at the rear of the engine using a rear engine accessory pad to drive the alternator. An alternator control unit mounted forward of the left-hand circuit breaker panel, controls the system. The system also includes a standby alternator relay assembly mounted on the upper left forward side of the firewall and two switches installed on the left sidewall switch panel. The switches are two-position toggle switches, labeled ON/OFF/STBY PWR, and a guarded two-position toggle type breaker/switch, labeled AVIONICS STBY PWR. The guard covering the avionics standby power switch must be lifted to select the ON position. Circuit protection and isolation are provided by two circuit breakers, labeled STBY PWR, located on the left sidewall circuit breaker panel. Field excitation to the alternator control unit is supplied through diode logic from a circuit breaker in the standby alternator relay assembly or the "KEEP ALIVE" No. 2 circuit breaker on the electrical power relay box. System operation is monitored by two amber lights labeled STBY ELECT PWR ON AND STBY ELECT PWR INOP, located in the annunciator panel. Total amperage supplied from the standby electrical system can be monitored on the airplane volt-ammeter with the selector switch in the "ALT" position. To operate the standby electrical system, follow the starting procedures in the POH to start engine then place the ON/OFF STBY PWR switch to ON position. The system is now engaged to automatically supply the electrical load if the bus voltage drops below a preset level. Anytime the STBY ELECT PWR ON light in the annunciator panel illuminates, the standby electrical system is supplying power to the main busses. If the drop in voltage is temporary, such as just after engine start, the STBY ELECT PWR ON light will go out indicating that system voltage is normal and the main generating system is carrying all the load. If the STBY ELECT PWR ON light illuminates continuously it would indicate a malfunction in the main generating system has occurred and steps should be initiated to isolate the problem. If the STBY ELECT PWR INOP light illuminates, the standby alternator is inoperative.

For a complete description of the 95-amp alternator system, removal replacement, trouble shooting and wiring diagrams not covered in this manual refer to the appropriate Service Manual.

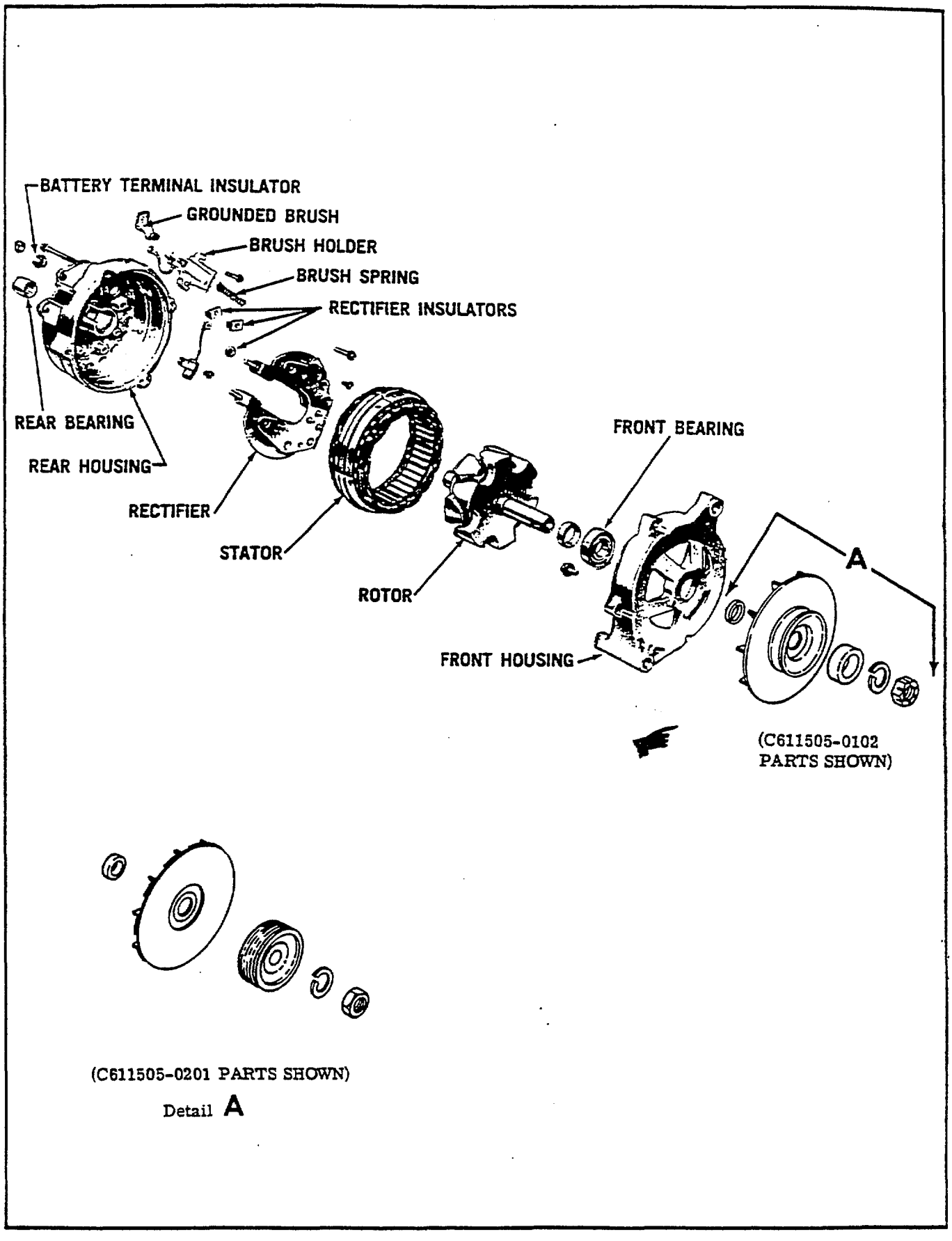

Figure 1-2. Alternator exploded View