

ROYAL CANADIAN AIR FORCE



**HANDBOOK
WITH
PART LIST**

**ENGINE STARTER RELAY
TYPE B-8**

(JACK & HEINTZ)

This EO replaces Interim Publications

ISSUED ON AUTHORITY OF THE CHIEF OF THE AIR STAFF

LIST OF RCAF REVISIONS

Date

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PART 1

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OPERATION

PRINCIPLES OF OPERATION

1 Application of a minimum of six volts closes the contact points and spring action opens them when the voltage is cut off. The relay is designed to operate on 24 volts.

(a) The contact surfaces are constructed of a special alloy which aids in preventing a welding tendency which would result in pitting and projections on the surfaces. "Make and break" action is accomplished by use of a solenoid. The solenoid consists of a suitable coil wound around a tube in which is inserted a movable core or plunger. The plunger is

attached to the movable contact. When a voltage as low as six volts is applied to the coil it "snaps" the plunger contact against the fixed contact in an instantaneous and positive manner. Spring action forces a quick break when voltage is cut off.

OPERATING INSTRUCTIONS

2 The relay is operated by closing the energizing switch. The closing of the switch actuates the relay coil, thus closing the main motor circuit. Do not operate the relay longer than is required to start the engine.

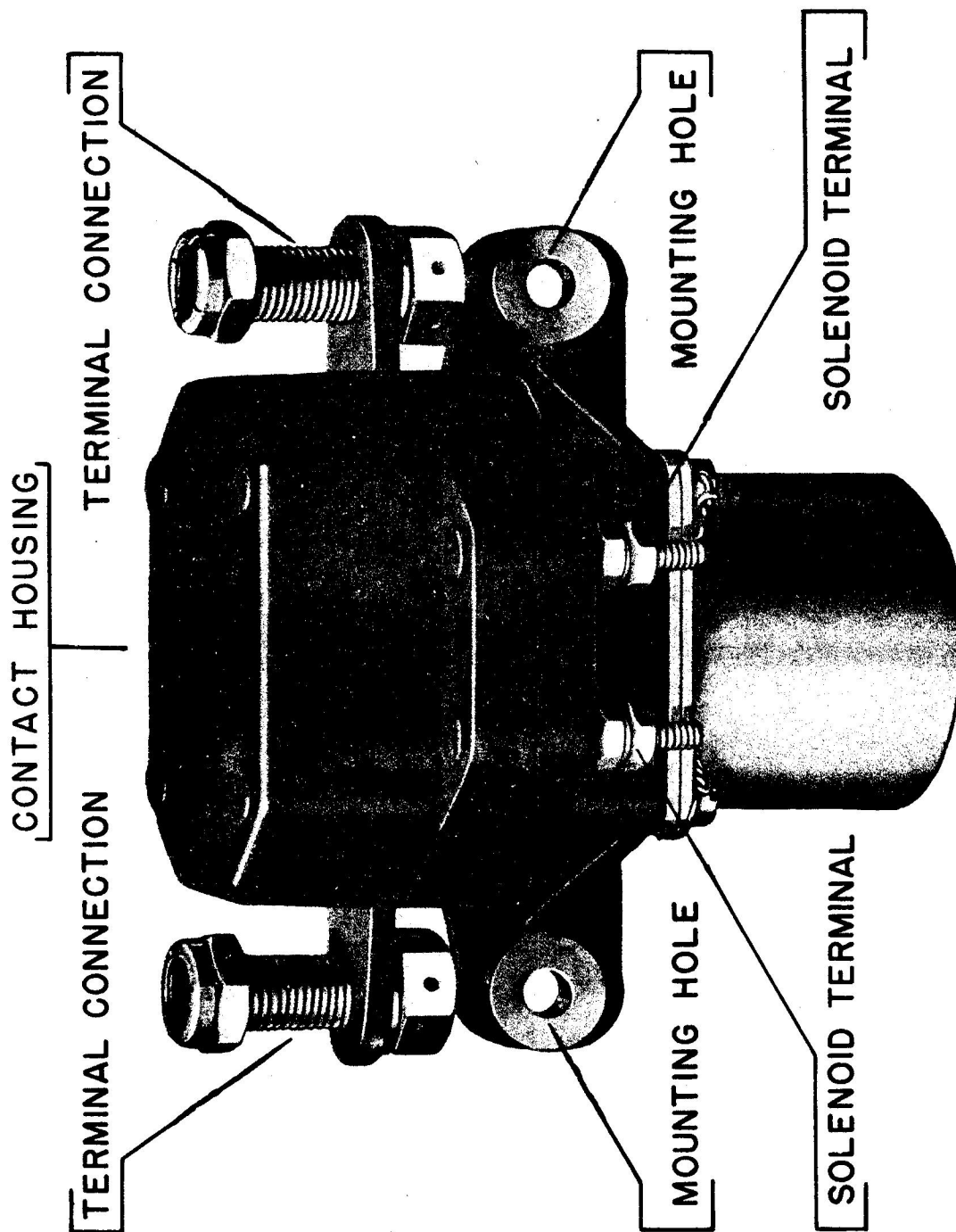


Figure 1 - B-8 Relay

PART 2

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DESCRIPTION, INSTALLATION & MAINTENANCE

DESCRIPTION

GENERAL DESCRIPTION

1 The Type B-8 Relay has been developed to control heavy current from a remote position thus eliminating the necessity of making long and heavy cable installations. The use of such cable installations causes a drop in voltage. The relay provides instantaneous "make and break" action which prevents arcing and welding of contacts due to heavy currents. The relay may be mounted in any position, and its continued operation is unaffected by vibration or acceleration.

DETAILED DESCRIPTION

2 Detailed Description is as follows:

(a) The Relay base which is constructed of high strength die cast aluminum alloy is provided with two suitable mounting holes. The contact housing is made of special plastic composition selected for arc resisting qualities combined with safe operating temperature and high impact strength. All metal parts of the unit have been treated for corrosion resistance.

(b) Mechanically it is of sturdy and compact construction with large surface contacts, one of which is free to rotate and self align under a coil spring control in addition to main spring action. The other contacts are mounted on the base.

(c) Contact surfaces will "make and break" more than 800 amperes of direct current at 24 volts for 50 operations at the rate of one second on, four seconds off without welding. With 200 amperes at 24 volts the drop across the contacts is less than .06 volts after 50,000 operations at one second intervals. The holding coil consumes 3.5 amperes direct current at 24 volts, and on intermittent operation at 25° C (77° F) the maximum temperature rise is within 70° C (158° F).

(d) The specifications for the Type B-8 Relay -

Coil Rating (Intermittent Duty)	24 Volts
Coil Resistance at 65° F	7 Ohms
Minimum Closing Voltage	6 Volts

Specifications for the Type B-8 Relay (cont'd)

Maximum Release Voltage	2 Volts
Contact Rating at 24 Volts	200 Amperes continuous
Contact Voltage Drop at 200 Amps.	0.10 Volts Maximum
Safe Surge Current at 24 Volts	1000 Amperes
Weight	2 Pounds
Mounting Position	As desired
Shock or Acceleration Re- sistance in any direction, normal operation retained	12 Gravity Units

INSTALLATION

PROCEDURE

3 Mount the relay in a suitable location near the electric starter by means of the mounting bracket which is provided with two .257-inch holes. Secure the unit in position with two 1/4 inch bolts and install the electric cables (see fig. 2).

PRECAUTIONS IN INSTALLATION

4 Make certain that cable and wire connections are secure. Be sure that the position selected for mounting is such that no loose wires or other metal parts can come in contact with the exposed terminals on the relay housing.

NECESSARY ADJUSTMENTS

5 Adjustments are automatically spring controlled. Replace springs if action becomes weak. Make certain that base contacts seat perfectly on the housing.

SERVICE TOOLS

6 There are no special tools required for the servicing of the Type B-8 Relay.

INSPECTION

7 If the solenoid will not operate, inspect the solenoid leads for breaks or poor terminal connections. Inspect the solenoid for grounds. If arcing occurs, inspect the contact surfaces for pittings.

50-HOUR INSPECTION

8 At the 50-hour inspection period, check the relay for cracked housing or mounting bracket and loose or faulty electrical connections.

ENGINE OVERHAUL

9 At every engine overhaul period, the relay should be removed from the aircraft and disassembled and thoroughly inspected for pitted or rough contacts, weak springs, and for cracks in the mounting bracket due to vibration.

MAINTENANCE

10 Replace burned contacts as well as springs that may have been weakened. Contacts should always be kept clean. Replace the coil if leads are broken or coil is shorted or grounded.

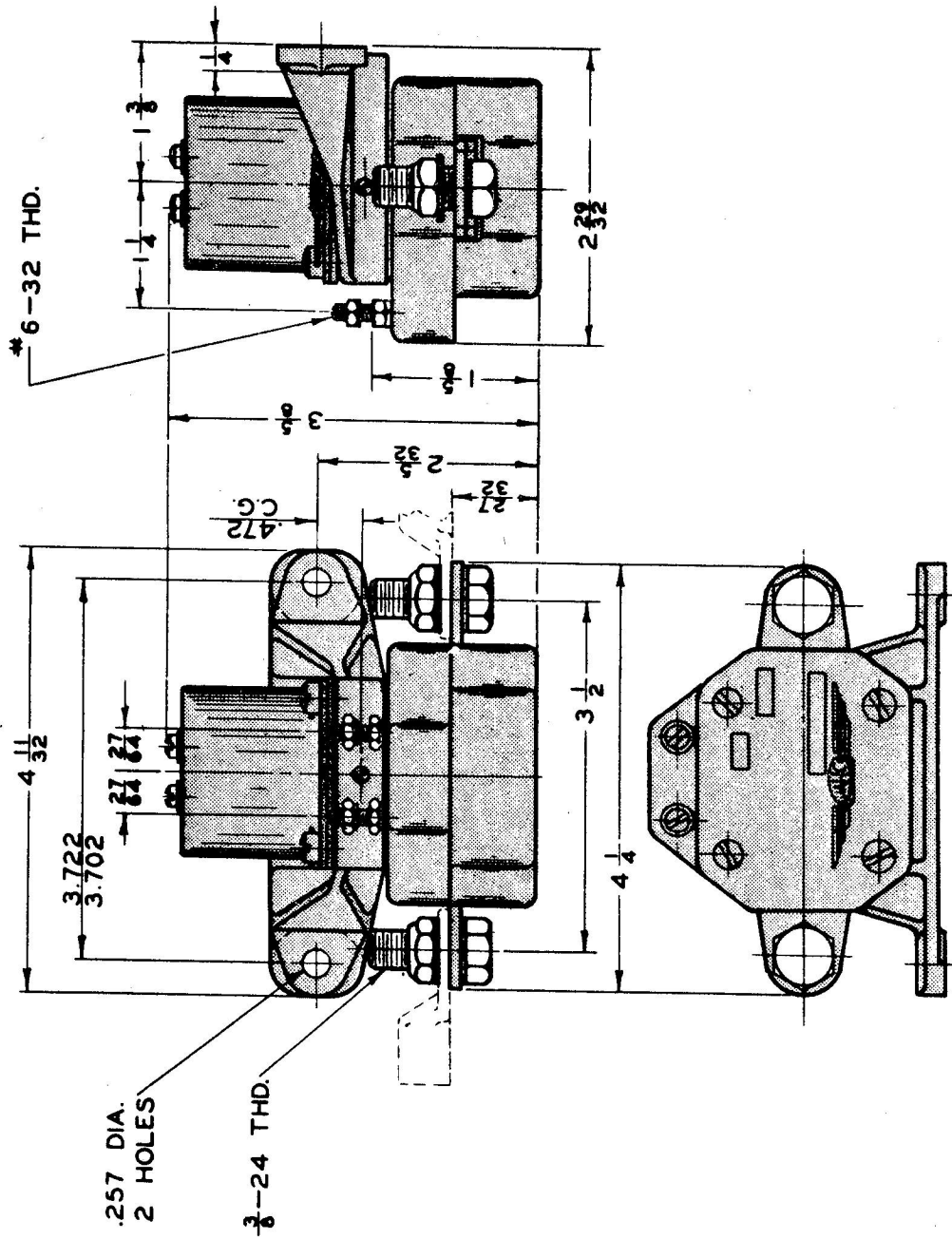


Figure 2 - Outline Drawing

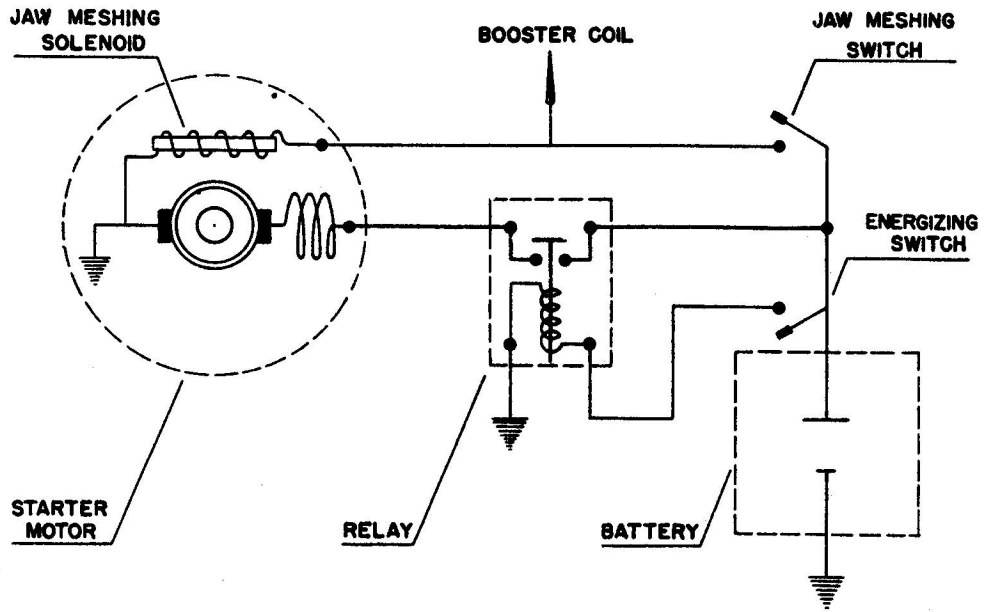


Figure 3 - Wiring Diagram

PART 3

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OVERHAUL

OVERHAUL TOOLS REQUIRED

1 There are no special tools required to disassemble the Type B-8 Relay.

DISASSEMBLY (see fig. 4 of Parts List)

2 Disassembly is as follows:

(a) Remove the sealing wax covering the four screws (24) which hold down the relay contact cover (23) and remove the screws and cover.

(b) The sliding core (15) and the spring (20) may then be removed from the solenoid coil assembly (2).

(c) The sliding core (15) has a moving contact (16) mounted on one end which can be removed by compressing the coil spring (18) holding it in place and slipping off the spring retainer (19) and the seat (17).

(d) Remove safety wire and four screws (21) holding the clamps (22) and the plate assembly (14) to the bakelite base (1). Uniform upward pressure on both ends of the plate assembly (14) should be applied so as not to damage the dowel pins which hold the contact plates in place.

(e) Remove two hex nuts (11) and lock-washers from the solenoid terminals (10) and

tap the end of the terminals to break the seal covering lug connections on the opposite end. The solenoid terminals (10) may then be removed.

(f) Remove the safety wire and the four screws (9) holding the shell (5) to the mounting bracket (3). The shell (5) bakelite base (1) and mounting bracket (3) may then be separated.

(g) Remove safety wire and the four small screws in the end of the solenoid shell (7) thus permitting the removal of the solenoid coil (2).

CLEANING, INSPECTION, TESTING AND REPAIR

3 Cleaning, Inspection, Testing and Repair are as follows:

(a) CLEANING - All Relay parts should be free from oil or grease and where a cleaning agent is necessary a greaseless cleaning fluid shall be used.

WARNING

No cleaning agent of any kind should be used on the solenoid coil as damage to the insulation may result.

(b) INSPECTION - Where burned contacts, weak springs, or excessive wear is found upon inspection, the parts affected should be replaced.

(c) COIL TESTING - The solenoid coil should be tested for correct resistance and grounds as follows:

(1) Check the coil resistance with an Ohmmeter. The readings should not exceed 7.7 Ohms or be less than 6 Ohms.

(2) Check ground in the coil from the coil terminals to the metal bobbin using a test light of 220-volt ac or dc maximum.

(3) The solenoid spring (20) when compressed to an overall length of 2-1/16 inches, should require a load of 2-1/4 pounds. The contact spring (18) when compressed to an overall length of 3/16 inches, should require a load of 4-pounds 2-ounces.

REASSEMBLY

4 Reassembly is as follows:

(a) Reassemble the solenoid coil (2) and the solenoid shell assemblies (4-5) on to the mounting bracket (3).

(b) Install the base contact plate (1) to the mounting bracket (3).

NOTE

Note, however, that care should be taken to thread the wire leads of the solenoid coil through the bakelite contact plate before the two terminal lugs (6) are staked and soldered to the wire leads.

(c) Install the plate assembly (14) on the mounting bracket (3) by means of the four screws (21) and secure thereon with safety wire.

(d) Assemble the core assemblies (15-16-17-18) and secure them with the spring retainer (19).

(e) Insert the solenoid spring (20) and the core assembly into position and secure therein by means of the contact cover (23) and four screws (24).

(f) Tighten all screws and secure them with safety wire.

TEST PROCEDURE

5 The Test Procedure is as follows:

(a) The contacts should close firmly at six volts and snap open at two volts.

(b) The maximum current should not exceed four amperes at 24 volts.

(c) As a final test, check both circuits of the relay for grounds with a 220 or 110 volt dc or ac lamp circuit.

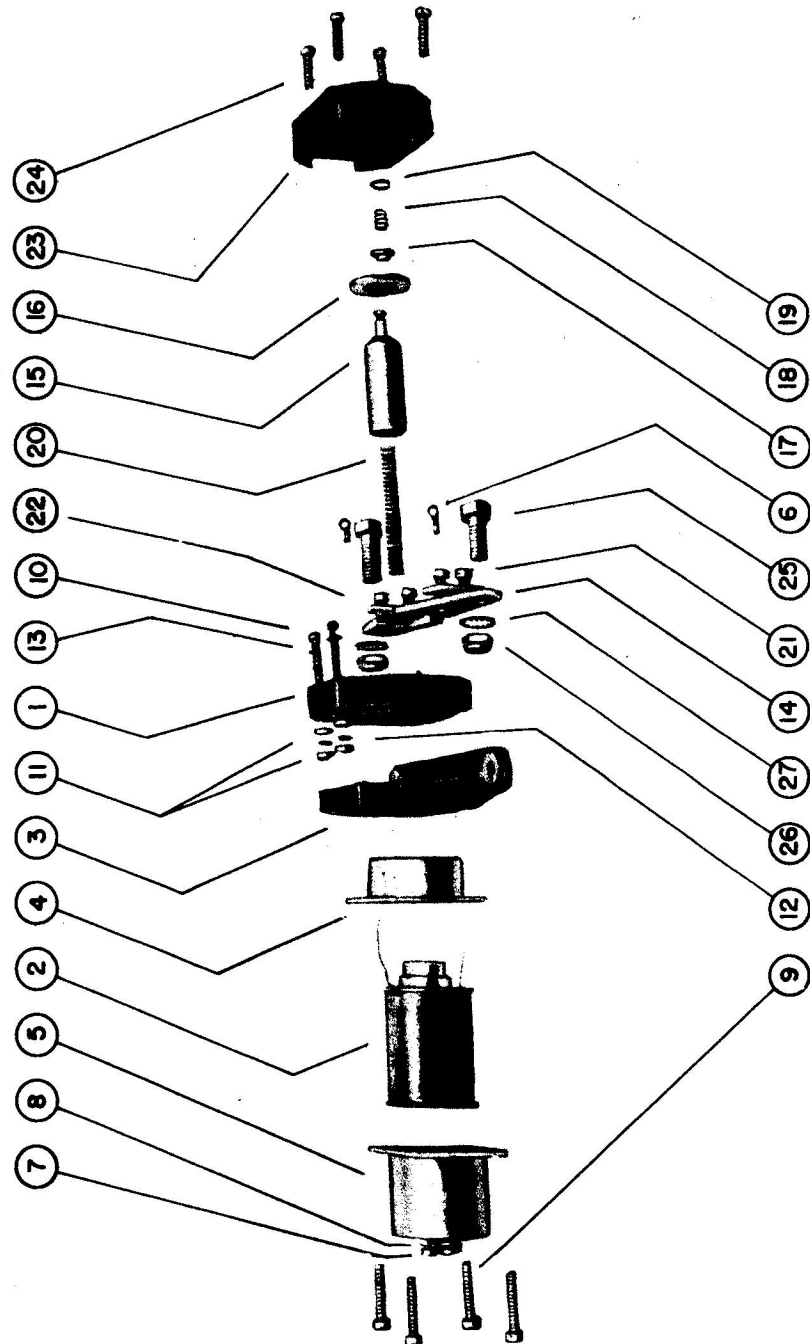


Figure 4 - B-8 Relay Explosion View

GROUP ASSEMBLY PART LIST

MAJOR ITEM

ASSEMBLY UNIT

FIG. & INDEX NO	PART NUMBER	NOMENCLATURE							USAGE CODE	UNITS PER ASS'Y
		1	2	3	4	5	6	7		
4	2700	B-8								1
	2701									1
1	2702									1
2	2202									1
3	2709									1
4	929-1									1
5	2197-1									1
6	*A33									2
7	Com'l									4
8	AN936A6									4
9	AN502-10-16									4
10	AN503-6-16									2
11	AN340-6									4
12	AN935-6									4
13	638-14									2
14	2707									2
15	2194									1
16	940									1
17	1691									1
18	936									1
19	937									1
20	2203									1
21	AN502-10-8									4
22	2705									2
23	2708									1
24	AN502-10-12									4
25	AN76-7									2
26	AN364-624									2
27	Com'l									2