CONTACTORS, KS-15514

1. GENERAL

1.01 This section covers contactors, KS-15514 which are used in the J86021 control cabinet associated with the 900-type engine alternator plants. The contactors are designed to operate in ambient temperatures between -29C and +50C (-20 and 122F).

1.02 This section is reissued to change some contactor designations and to add adjustment procedures. Changes are marked with arrows.

1.03 Reference shall be made to Section A400.001 covering General Requirements and Definitions for additional information necessary for the proper application of the requirements listed herein.

1.04 Requirements and associated procedures marked with a number sign (#) need not be checked by the installer unless it is thought that the requirement is not being met or performance indicates that such a check is advisable.

1.05 Requirements and associated procedures marked with an asterisk (*) need not be checked during maintenance unless the apparatus or part is made accessible for other reasons, or performance indicates that such a check is advisable.

1.06 Before doing any work on this apparatus see that the service is maintained and disconnect the apparatus from the power supply.

2. REQUIREMENTS

2.01 Mounting: The contactor shall be fastened securely to its mounting. The component parts shall be held together securely. Gauge by feel.

2.02 Contact surfaces shall be clean and free from build-ups which might interfere with reliable contact. Gauge by eye.

2.03 Contact alignment shall be such that, when the contacts are completely closed, the centers of the contact surfaces shall coincide within the limits specified below.

Contacts	Max.
Main	1/8"
Auxiliary	1/32"

Gauge by eye.

2.04 Contact Sequence: The laminated brush main contacts shall break first, the arc tip contacts second, and the graphalloy arcing contacts, if provided, third. They shall make in the reverse order. All like contacts of a multipole contactor shall make simultaneously. Gauge by eye.

2.05 Contact Gap

(a) The stationary auxiliary contacts shall be adjusted to break when the plunger is at the distance from its top position shown in the table below.

Ampere Capacity	Distance From Top Position
100	7/32"
150	9/32"
200 and 300	11/32"

Use scale and 81A test set.

2.06 Contact Pressure and Follow

(a) The pressure of auxiliary contacts, when closed, shall be

Minimum 40 grams

Use 70D gauge.

(b) There shall be follow and adequate pressure in the main contacts. Gauge by eye.

2.07 The operating mechanism shall move freely, without binding. Gauge by feel.

2.08 Electrical Requirements

(a) The contactor shall meet the electrical requirements specified in the Circuit Requirements Table or other job information.

(b) Where electrical requirements are not specified in the Circuit Requirements Table, operation of the contactor shall be checked at the minimum coil voltage specified on the nameplate.

(c) Check of electrical requirements may be at the temperature at which the relay is found, unless H (hot) or C (cold) is specified in the Circuit Requirements Table.

(d) Where H is specified in the Circuit Requirements Table without heating instructions, the operating coil shall be energized for at least one hour prior to the test.

kk

(e) Where C is specified in the Circuit Requirements Table without cooling instructions, the operating coil shall be de-energized for at least 2 hours prior to the test.

*#2.09 Temperatures: The temperature shall not exceed:

	Maximum
Coils	95C (203F)
Contacts	105C (221F)

If the temperature is thought to be excessive, measure with the thermometer.

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges, Materials, and Test Apparatus (Equivalents may be Substituted)

Tools

Burnisher, No. 265C
Pliers, P-long nose, 6-1/2"
Screwdriver, cabinet, 3"
Screwdriver, regular, 4"
Stick, orange, KS-6320
Test Set, 81A
Wrench, adjustable, single end, 6", R-1542
Wrench, open-end, 3/8" opening, No. 417A

Gauges

Gauge, gram, No. 70D, 50-0-50 grams
Scale, steel, 6", R8550
Thermometer, 0-200C, R1032
Voltmeter, a-c, Weston Model 528, ranges 300-150

Materials (See Sections A710.011 and A710.012)

Cloth, abrasive, 150 grade
Cloth, cleaning, twill jean, D-98063
Grease, 200-300P
Oil, mineral, light
Pad, felt
Spirits, petroleum
Wood block

Test Apparatus

Enclosed safety switch, 30 amperes, 220 volts, double pole, double throw (Bull Dog Electric Products, Detroit, Mich., or Square D Co., Milwaukee, Wis., suggested)
Wire, as specified

3.002 General Procedure

(1) It is recommended that requirements be checked and any required adjustments be made in the order outlined in the following paragraphs.

Caution: See that this apparatus is disconnected from both sources of power before handling.

3.01 Mounting (Rq. 2.01)

(1) Tighten loose screws with a screw driver and loose terminal nuts with the single-end wrench.

3.02 Contact Surfaces (Rq. 2.02)

(1) The purpose of cleaning contacts is to remove any gummy or dirty substance that would interfere with reliable contact. It is not necessary or desirable to keep contacts polished or shining. Clean contacts by wiping with a cloth moistened with petroleum spirits, followed by a dry cloth. The contacts should be disconnected from the power supply during the cleaning operation.

(2) There shall be as little smoothing of contacts as is consistent with satisfactory operation. Contacts should be smoothed while closed. To close the contacts, operate the contactor manually to the desired position. Insert a strip of abrasive cloth, between the contacts to be smoothed, and draw it back and forth until the build-ups are reduced sufficiently to insure reliable contact. Then clean the contacts as outlined above. A burnishing tool should be used on auxiliary contacts and on butt-type main contacts.

(3) Replace contacts which are badly worn. When replacing worn movable auxiliary contacts, install a complete contact spring.

3.03 Contact Alignment (Rq. 2.03)

(1) Shape, with the pliers, an auxiliary contact spring that is slightly bent or out of alignment. Any contact spring that becomes badly bent out of shape should be removed and reshaped or replace with a new contact spring.

(2) In the case of main contacts, correct misalignment by loosening the movable contact arm at the point of attachment to the shaft. Adjust as required, and retighten.

3.04 Contact Sequence (Rq. 2.04)

(1) Remove dirt or other obstructions from graphalloy arcing contacts of the type shown in Fig. 1 or replace springs, as required.

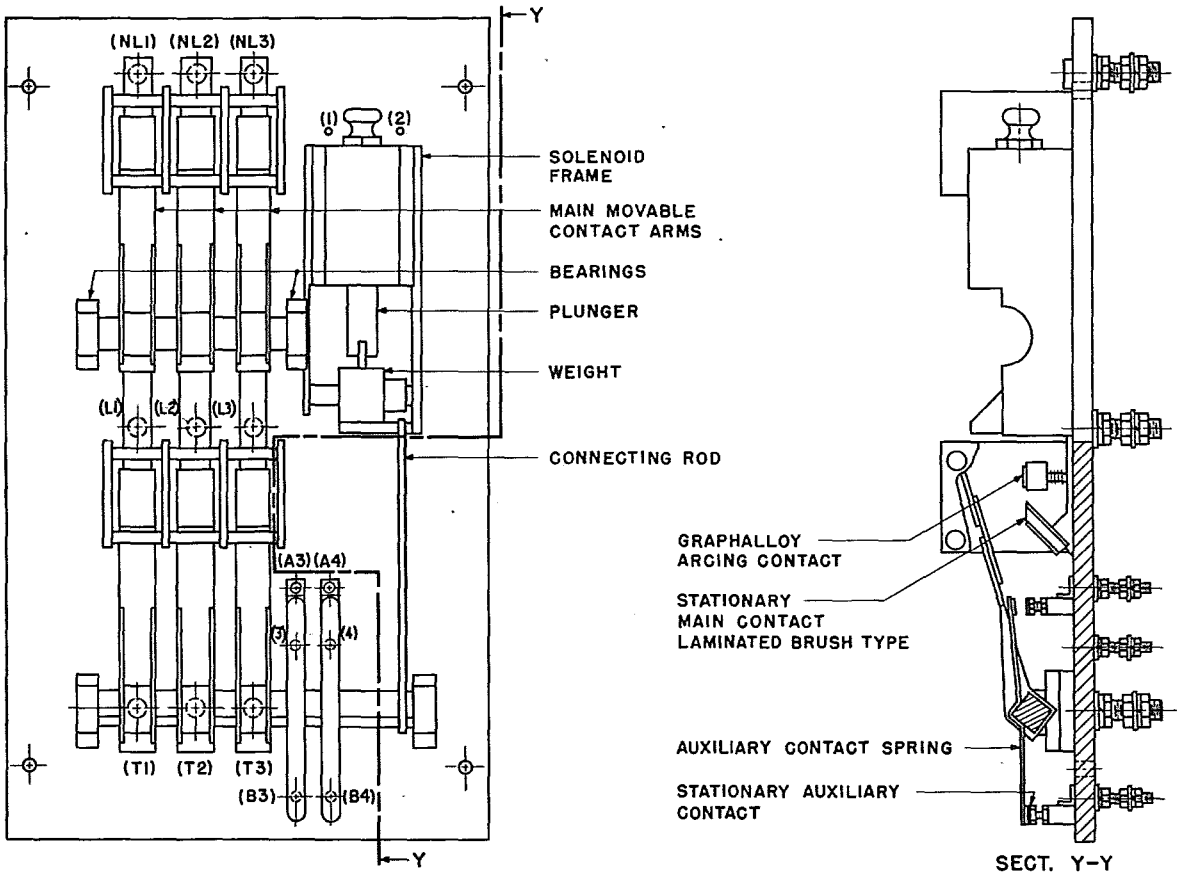

Fig. 1 - Contactor With Laminated Brush-type Main Contacts

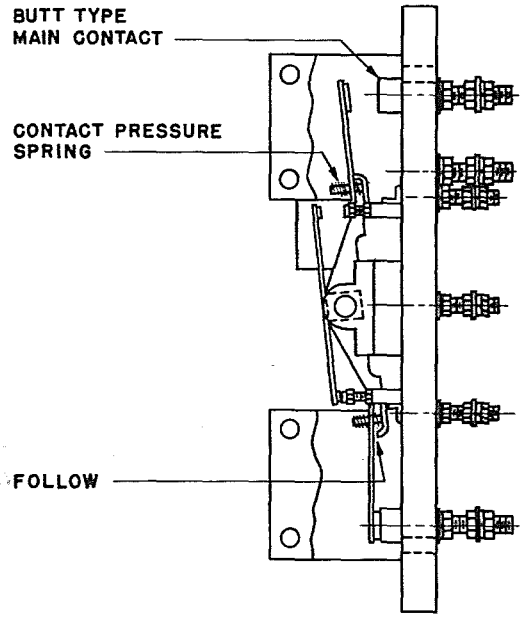

Fig. 2 - Contactor With Butt-type Main Contacts

(2) The arcing tips of the 150-ampere contactor should be shaped with pliers, or replaced, when required.

3.05 Contact Gap (Rq. 2.05)

(1) To adjust the auxiliary contacts, pull the solenoid plunger to its extreme upward position and, with a sharp lead pencil, scribe a mark on it at the bottom of the solenoid frame. Release the plunger and scribe a second mark at a distance above the first one, equal to the dimension given in the requirement. Under the leather washer which normally rests on the top of the solenoid, insert a wooden block cut to such dimension as to hold the plunger so that the second mark is at the bottom of the solenoid frame. Manually operate the weight to the back and, bringing the weight forward, adjust the lower auxiliary contacts to break at the blocked position of the plunger. Similarly bring the weight to the front and adjust the other pair of contacts to break at the blocked position of the plunger as the weight is being carried to the back. Remove the block and recheck, operating the weight manually, as before. Use should be made of an 81A test set to indicate the moment at which the contacts break. Adjustment of the contacts is made by raising or lowering

the stationary contact, as required, by rotating it on its supporting stud. Use the 417A tool for loosening the locking nut before adjusting and for tightening it after the adjustment is completed.

3.06 Contact Pressure and Follow (Rq.2.06)

(1) To measure contact pressure of auxiliary contacts, operate the contactor manually to the desired position. Place the gauge against the contact spring as near to the moving contact as possible and exert a pressure with the gauge away from the stationary contact. Observe the gauge as the moving contact leaves the stationary contact. Replace contact springs which have low contact pressure.

**(2) On contactors having laminated brush main contacts of the type shown on Fig. 4, first adjust the graphalloy arcing contacts, if any, in accordance with (a) below and then adjust the laminated brush contact in accordance with (b), (c), (d), and (e). On multipole contactors do each step on all like contacts before proceeding to next step.

(a) By means of the graphalloy holder guide screws, adjust the graphalloy arcing contact so that it springs out 1/4 inch when the contact arm is opened but is parallel with the graphalloy contact plate when the contact arm is closed.

(b) Loosen the C and D bushings shown on Fig. 4 until the brush contact plate is stopped up against the underside of the contact arm.

(c) With the contact arm closed, advance the C and D bushings until point B is in contact and point A is not in contact by 1/16 to 3/32 inch.

(d) Further advance the C and D bushing equal amounts until point A is also in contact and deflected 1/64 to 1/32 inch away from the brush side plate.

(e) Tighten all locknuts, operate the contactor manually several times, and check all adjustments and the sequence of operation per 2.04. The arcing tip contacts may be shaped with pliers if necessary. These adjustments are critical as insufficient contact pressure will result in overheating or excessive contact pressure will not allow the contactor to lock in when operated. Replace as necessary.

(3) Observe the butt-type main contacts of the 100-ampere contactor to see that there is follow, as shown, for the lower contact, in Fig. 2. Replace contact pressure springs or worn contacts, as required. The contact pressure shall be considered to be adequate if they carry their load without overheating or requiring excessive smoothing.

3.07 Operating Mechanism (Rq. 2.07)

(1) Operate the contactor manually. If friction or binding is observed in the joints in the linkage, remove dirt with a cleaning cloth moistened with petroleum spirits as required, and apply light mineral oil sparingly. Apply one or two drops of light mineral oil at the bearings which support the weight, if the action appears to be sluggish.

(2) Remove dirt from the surface of the plunger or the brass sleeve in which it operates. Rub with a cleaning cloth moistened with petroleum spirits, if necessary. Avoid the use of oil.

(3) If poor operation is traced to the ball bearings which support the shaft carrying the main movable contact arms, remove the caps which cover them. Pick away old grease with the orange stick and wipe with a cleaning cloth. Apply one or two drops of light mineral oil and operate the contactor several times to assist the oil to work its way into the bearing. Apply grease, filling the space between the inner and outer ball rings nearly full. Replace the caps.

3.08 Electrical Requirements (Rq. 2.08)

(1) When checking for the electrical requirements the contactor should be disconnected from the working circuit. This can usually be accomplished by operating a switch. Disconnect and tape the leads at terminals B3, B4, A3, and A4. Set up the checking circuit shown in Fig. 3, using wire of the size specified below. The operating coil is designed for momentary duty only and for that reason the contactor should not be operated more often than once per minute.

Capacity of Contactor	Wire Size
Amperes	Minimum
100	#14
150	#12
200 and 300	# 8

Use the engine-alternator under manual control as the source of voltage. If the contactor fails to operate as required, recheck the auxiliary contacts under 2.02, 2.03, 2.05, and 2.06. Check 2.07.

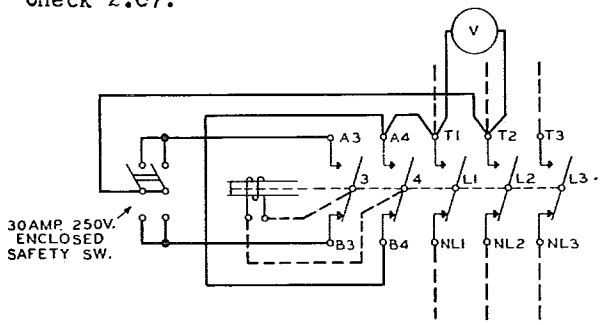

Fig. 3 - Checking Circuit ←

*#3.09 Temperature (Rq. 2.09)

(1) Hold the bulb of the thermometer against the hottest spot in question, covering that part of the bulb not in contact with the contactor with a piece of felt or the equivalent.

(2) If the temperature exceeds the specified limit, see that 2.02, 2.03, 2.06, and 2.07 are met. If these requirements are met and the temperature is above the specified limit, refer the matter to the supervisor as the coil or the contacts may have to be replaced.

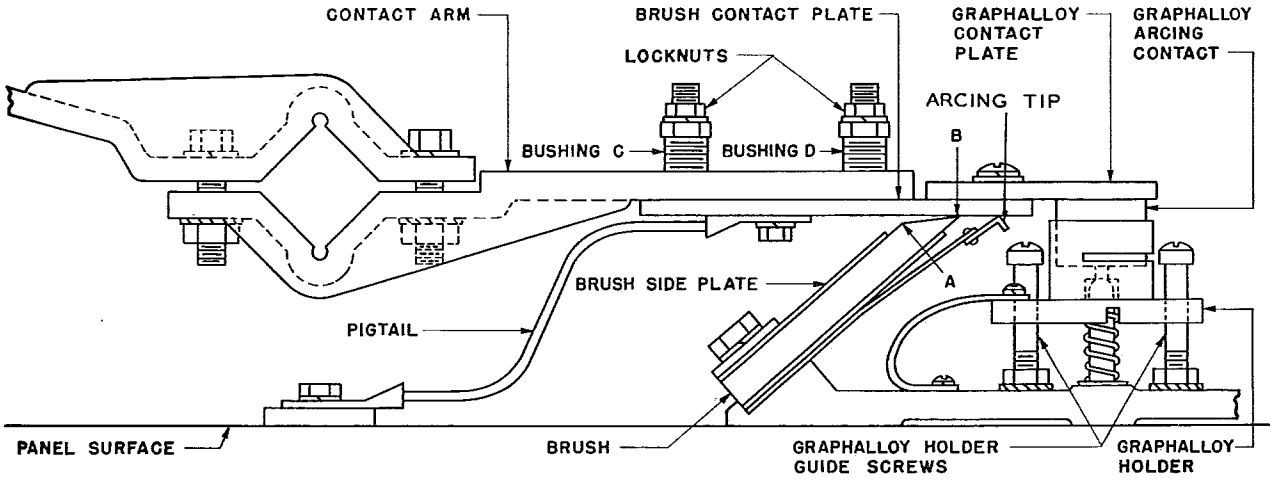

Fig. 4 - Contact Adjustment for Laminated-type Contacts and Graphalloy Arcing Contacts

Bell Telephone Laboratories, Inc.