

EMERGENCY CELL SWITCHES MOTOR DRIVEN ROTARY TYPE REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers KS-5452 emergency cell switches.

1.02 Reference shall be made to Section 020-010-711 covering General Requirements and Definitions for additional information necessary for the proper application of the requirements listed herein.

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

1.04 Requirements and 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 Before disconnecting the motor for a maintenance adjustment, the switch should be centered on one of the main contacts unless the entire switch is disconnected; otherwise the current-limiting resistances may have to carry current for a sufficient period to cause them to overheat.

1.06 When this switch is connected in the circuit the frame is "alive". This should be considered when performing maintenance operations.

1.07 Successful commutation for the purpose of this section may be said to have been obtained if neither the brushes nor the commutator is injured in an acceptance test or in normal service to the extent that abnormal maintenance is required. The presence of some visible sparking is not necessarily evidence of unsuccessful commutation.

2. REQUIREMENTS

2.01 Lubrication

(a) All oil cups shall receive 2 to 4 drops monthly of 130-190 S 100 oil.

#(b) Waste packed bearings shall be lubricated with sufficient 130-190 S 100 oil every 6 months to insure saturation of waste with a minimum of excess.

(c) The direction control ring should receive one drop of 130-190 S 100 oil monthly applied at several places on the ring.

(d) The direction control mechanism should be wiped monthly with a rag moistened with 130-190 S 100 oil.

(e) The worm case shall be filled approximately half full with 130-170 S 210 oil. This shall be removed, the worm and worm gear cleaned and fresh oil added once a year. The amount of oil shall not be sufficient to pile up and run over the edge of the case during operation. It is particularly necessary that no oil be thrown onto the brake or brake drum; any such oil, if not removed, will interfere with proper brake operation.

(f) The universal joint between the motor shaft and worm shaft shall be lubricated monthly with 130-170 S 210 oil.

(g) The front and back contact surfaces of the upper and lower main contacts should be cleaned and wiped monthly with a thin film of petrolatum.

(h) Excess lubricants should be wiped off.

(i) Lubrication amounts and intervals for oil cups and waste packed bearings may be changed as experience indicates.

#*2.02 Voltage and Current of Motor: The total ampere input to the motor shall not exceed the value marked on the motor nameplate by more than 50% when the voltage is within the allowable nameplate limits.

#2.03 The bearing condition shall be such as to allow the motor to operate satisfactorily under all conditions of normal load. If requirements 2.08 and 2.09 are met the bearings shall be considered in a satisfactory condition.

2.04 Brushes shall be free in their holders and shall fit so as to insure successful commutation. Gauge by eye and feel.

#*2.05 Motor Torque: The motor shall develop sufficient torque to start and move the brush arm from any main contact position.

#*2.06 Motor Commutator Surface shall be clean and free from scores, pits or other deformation of the surface or structure save that caused by normal wear.

2.07 Commutation: The motor shall commute successfully.

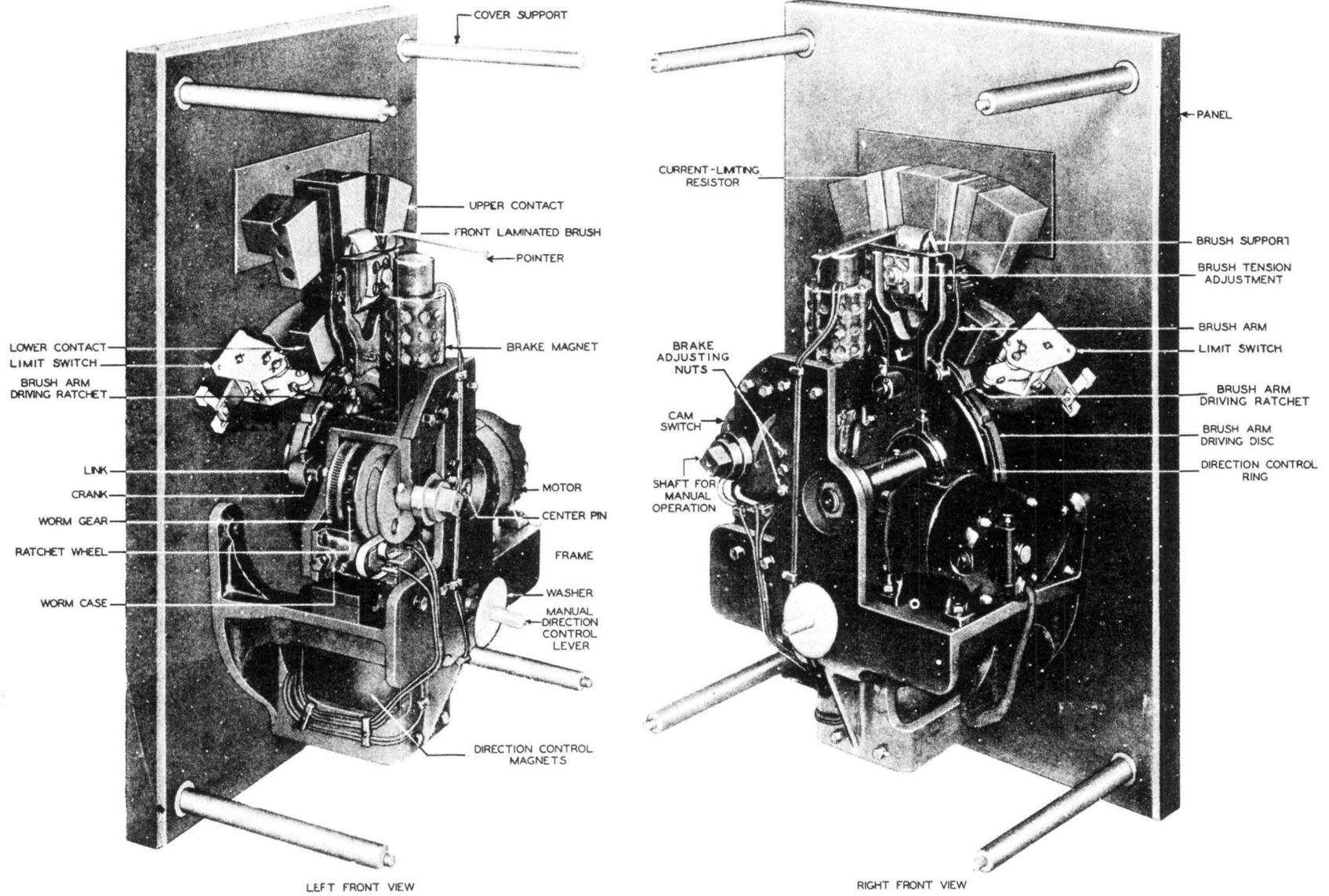


Fig. 1 - KS-5452 Emergency Cell Switch

2.08 Noise and Vibration of the motor and mechanism under any normal operating condition shall not be excessive. Gauge by sound and feel.

2.09 Temperature

(a) When in operation within normal voltage and current limits the temperature of any part as measured by feel shall not be excessive. If the fingers can be held on the bearing housing, frame, or part under discussion, the machine temperatures may be assumed to be within specified limits.

*(b) If the temperature is thought to be excessive, measure by thermometer. It should not exceed the following:

	<u>Maximum</u>
Motor commutator	105C (221F)
Motor bearings	80C (176F)
Motor windings, frames, core and any other parts in contact with insulation	90C (194F)
Terminal studs	70C (158F)
Magnet coils	105C (221F)
Main contacts and laminated brushes	70C (158F)

2.10 Cam Switch

(a) The stationary contact springs shall rest in the insulated depression of the cam switch drum when the laminated brush is centered on a main contact.

Note: The cam switch operates an external control relay which establishes a maintaining circuit to the motor whenever the crank shaft moves to an off-normal position, and maintains this circuit until the laminated brushes are centered on the next contact. The position of the cam switch drum on the shaft is not adjustable in the field.

(b) The pressure of the stationary contact springs on the cam switch drum need not be measured but should be positive and be maintained by a spring-like action.

(c) With the stationary contact springs resting in the insulated depression on the cam switch drum, the auxiliary stationary contact spring shall be closed and remain closed until the contact springs ride out of the depression and onto the cam contact.

2.11 Limit Switches

(a) When the laminated brush is 1/8" to 1/16" short of being centered on the end contacts, the contacts of the limit switch shall just begin to open.

(b) When the laminated brush is centered on the end contact, there shall be 1/16" to 1/32" movement in the limit switch operating arm before striking the associated stop. Gauge by sight.

2.12 Main Contacts and Laminated Brushes

(a) Contact surfaces shall be kept clean and lubricated.

(b) The brush pressure shall be sufficient to insure good electrical contact with the contacts but not sufficient to cause the brushes to bind or prevent the brush arm from moving positively and without chatter.

2.13 Centering of Laminated Brush on Contacts: The brush arm driving disc shall be adjusted so that the laminated brush stops in the approximate center of a main contact.

2.14 The direction control magnets shall operate the associated mechanism completely and without hesitation on the minimum nameplate voltage with the brush arm in any position. The armature travel shall be such that the centering pin on the lower part of the driving disc will enter the associated depressions on the directional control mechanism.

2.15 The brake magnet shall release the brake from the motor shaft extension when the coil is energized at minimum nameplate voltage. When the coil is deenergized, the brake shall be applied to the motor shaft extension.

2.16 Worm and Worm Gear: The worm shaft and the worm gear shaft shall have an end play of 1/64" min., 1/32" max. (Gauge by feel.)

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges and Materials (Equivalents may be substituted if desired)

Tools

Pliers, P-Long Nose, 6-1/2"
Screwdriver, 3 Inch, Cabinet
Screwdriver, 4 Inch (regular)
Wrench, Adjustable, Single End, 8",
R-2512

Gauges

Ammeter, D.C., Weston Model 280, Scale
1.5-3-30
Scale, Steel, 6 Inch, R-8550
Thermometer, -5 to 400C, Eimer and Amend
Co. No. 32149
Voltmeter, D.C., Weston Model 280, Scale
150-60-3

3.001 (Continued)

Materials

Cloth, Cleaning, Twill Jean, D-98063
Felt Pad
Kerosene, Commercial
Oil, 130-190 S 100
Oil, 130-170 S 210
Petrolatum
Sandpaper 4/0

3.01 Lubrication (Rq.2.01)

(1) To lubricate waste packed bearings having an overflow hole in the lower part of the bearing housing, add sufficient oil in the top of the bearing so that a trace of oil will come from the overflow hole some time before the next scheduled oiling. Any excess will probably appear within a day after oiling. Since the amount of oil necessary to accomplish this result varies with local conditions, such as the length of time a machine is in operation, temperature, etc., it is necessary to determine by experience the amount of lubricant required in each case. As a trial, it is suggested that about 3 drops be added initially.

(2) To drain the worm case, remove the drain plug in the bottom and flush out several times with kerosene. Use a small stick and cloth as required.

#*3.02 Voltage and Current of Motor (Rq.2.02)

(1) There are no procedures other than the simple insertion of a D.C. ammeter capable of reading 150% of the rated full load motor current. Before reporting a motor for high current at the proper voltage, be sure that requirement 2.03 is met.

#3.03 Bearing (Rq.2.03)

(1) Replace any worn bearings.

3.04 Brushes (Rq.2.04)

(1) If a brush binds remove the brush from its holder and clean the brush and brush holder with a cloth wet with kerosene. Any rough projection may be removed with 4/0 sandpaper before wiping.

(2) In replacing the brushes, see that they are put back in the same holder and in the same position in which they were originally. Be careful that the pigtail does not protrude between the coils of the spring and catch on the threads in the brush holder preventing the brush from seating properly. Tighten the brush holder screw cap firmly with a screwdriver. Brushes which are

too loose in their holders shall be renewed.

#*3.05 Motor Torque (Rq.2.05)

(1) Before reporting a motor for lack of torque, be sure requirement 2.03 is met.

#*3.06 Motor Commutator Surface (Rq.2.06)

(1) The commutator may be cleaned of dust by turning the armature slowly by hand while directing compressed air through one of the brush holders from which the brush has been removed. If necessary dismantle the machine and clean the commutator with a cloth moistened with kerosene.

(2) If the commutator surface becomes sufficiently roughened or pitted to cause poor commutation it will be necessary to remove the armature and have the commutator refaced in a lathe.

3.07 Commutation (Rq.2.07)

(1) Before reporting the motor armature for poor commutation be sure that requirements 2.02-2.06, inclusive, are met.

3.08 Noise and Vibration (Rq.2.08)

(1) See that all bolts, nuts and screws are firm. Examine for chattering brushes. Examine for alignment of motor and worm shaft. This may be corrected by the use of shims. If the noise and vibration continue, the trouble may be due to worn bearings, which should be replaced or the matter referred to the supervisor.

#*3.09 Temperature (Rq.2.09)

(1) The temperature of any part should be measured by placing a thermometer on the part and covering the exposed portion of the bulb with a piece of felt if possible.

(2) To measure the temperature of the bearing, hold the bulb of the thermometer, with the machine running, against the outside of the bearing housing as near as possible to where the bearing is located, covering with a piece of felt that part of the bulb which does not touch the bearing housing.

(3) If the temperature exceeds the specified limits and requirements 2.01 to 2.07 are met, replace the machine or refer the matter to the supervisor.

3.10 Cam Switch (Rq.2.10)

(1) The contact springs may be bent with pliers or with the fingers. There

3.10 (Continued)

should be a distinct flexing of the spring when it makes contact with the low point of the cam switch drum.

3.11 Limit Switches (Rq.2.11)

(1) The point of contact of brush arm with limit switch is adjustable by means of an adjusting screw on the operating lever of the limit switch.

(2) The point of contact of limit switch operating arm with the stop is adjustable by means of an adjusting screw on the limit switch frame.

#3.12 Main Contacts and Laminated Brushes (Rq.2.12)

(1) When necessary clean and lubricate in accordance with the standard instructions covering Cleaning and Lubricating Stud Type Rotary Switches.

(2) Brush pressure may be adjusted by brush tension adjustment bolt through the center of the front and rear laminated brushes. Do not tighten sufficiently to cause excessive wear on the contact surfaces.

(3) Slight pitting of contact surfaces at edge of current limiting resistances is not an indication of unsatisfactory operation.

3.13 Centering of Laminated Brush on Contacts (Rq.2.13)

(1) Adjustment of the brush centering may be made by changing the length

of the link between the crank on the worm gear shaft and the brush arm driving disc. This length may be changed by means of the turn-buckle on the link.

3.14 Direction Control Magnets (Rq.2.14)

(1) Adjustment of the armature travel may be made with the adjusting screws and locknuts on the end of the direction control magnet armatures located beneath the motor shaft at the left of the motor. After adjustment it is important to see that the locknuts are tightened firmly.

3.15 Brake Magnet (Rq.2.15)

(1) The brake tension may be adjusted by means of the brake adjusting nut directly at the right of the shaft for manual operation. The tension should be sufficient to stop the motor before the cam switch stationary springs ride out of the insulated depression on the cam switch drum but when the brake is released it shall not bind and interfere with the motor operation.

3.16 Worm and Worm Gear (Rq.2.16)

(1) The worm shaft end play may be adjusted by means of the adjusting screw and locknut in the end of the worm case. To determine the amount of end play remove the cover on top of the brake magnet and push down on the magnet armature, thus releasing the brake. At the same time take hold of the brake drum on the worm shaft and slide it back and forth to determine the end play.