BROWN INDICATING CONTROLLER
KS-6835
REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers the Brown Indicating Controller per KS-6835.

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 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.

1.04 Part 1 "General" and Part 2 "Requirements" form part of the Western Electric Company, Inc. Installation Department Handbook.

1.05 The fully depressed position of the depressor bar is that position in which the stop screw attached to the depressor bar is against its stop. This position can be obtained only when the galvanometer pointer is in the space between the L and the H tables.

1.06 The fully elevated position of the depressor bar is that position in which the lift rod is in its lowest position. This is most accurately observed by noting the position of the cam which operates the lift rod.

1.07 One drop of oil for the purpose of this section is the amount of oil released from a piece of No. 22 bare tinned copper wire after it has been dipped 1/4" into the oil and slowly removed.

1.08 When this controller is used with the 2-A carrier pilot channel it will be necessary to observe certain precautions before attempting to check for the requirements listed or make any adjustments.

(a) The carrier pilot channel should be changed over from automatic control to manual control. A key designated "CONTROL" is provided for this purpose.

(b) A dummy plug should be inserted in the BCO jack of the indicator panel before removing the top cover of the instrument. When removing this cover it should be pulled outward with a slight upward lift so that it does not strike against the depressor bar. When replacing this cover similar precautions should be taken.

(c) In order that the depressor bar may be free, it will be necessary to block the (M) relay associated with the controller magnet circuit, non-operated to deenergize the magnet. To avoid possible damage to the pointer, this should be done when the depressor bar is in its fully elevated position.

1.09 Starting or stopping the motor as desired for convenience in checking certain requirements and in making adjustments is accomplished by connecting or disconnecting the motor cord plug at the receptacle located at the rear of the bay.

1.10 The trigger contact supplied in this instrument may be one of two types; in the earlier instruments a hammer type as shown in Figure 6; and in the later instruments a direct cam type as shown in Figure 5.

2. REQUIREMENTS

2.01 Cleaning

(a) The contacts shall be cleaned when necessary in accordance with the section covering cleaning of relay contacts.

(b) The contacts and contact springs of the direct cam type of trigger contact shall be thoroughly cleaned of all traces of oil once every 3 months.

(c) The trigger hammer, the outer edge of the support (outside the slot) and the bakelite block of the hammer type trigger contact assembly shall be thoroughly cleaned of all traces of oil once every 3 months.

(d) The lift rod and the lift rod guides shall be wiped clean every 3 months preceding lubrication.

2.02 Lubrication

(a) The controller shall be adequately lubricated with KS-6232 oil. When lubrication is necessary one drop of oil shall be applied to each of the following points:

Pivot bearings of depressor bar, Fig. 7 and 9. Lift rod guides, Fig. 4.

(b) After turnover, it is recommended that the above mentioned parts be lubricated at intervals of 3 months.

2.03 Record of Lubrication During the period of installation a record shall be kept, by date, of the lubrication of the

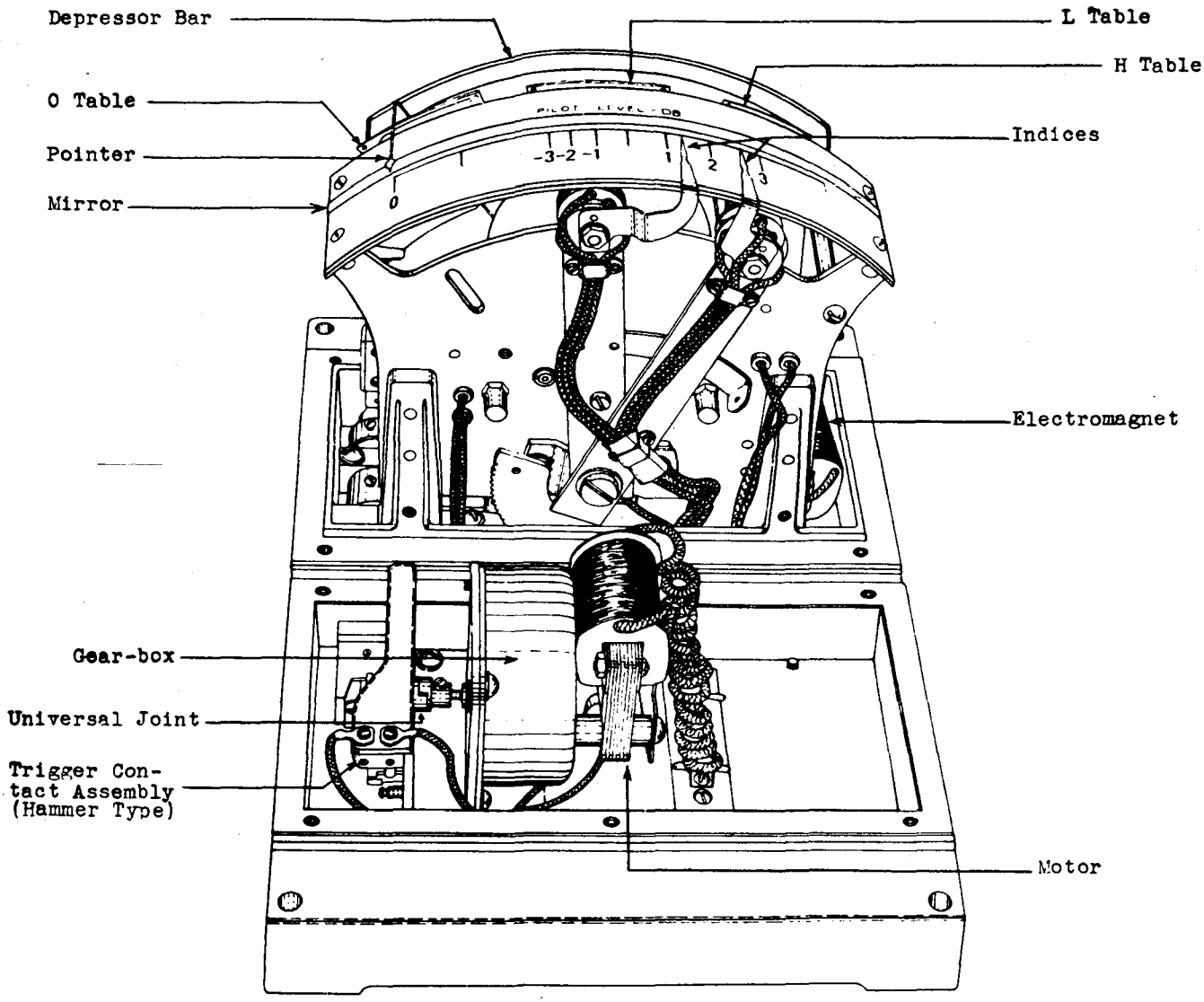

Fig. 1

controller and this record shall be turned over to the Telephone Company with the equipment. If no lubrication has been done the record shall so state.

2.04 Galvanometer - Fig. 1 and 7

(a) That part of the galvanometer pointer which is in front of the scale shall be vertical looking from the front when the pointer is at the center point of the scale. Gauge by eye.

(b) With no current flowing through the galvanometer the pointer shall indicate zero. Gauge by eye.

(c) The pointer shall not touch the mirror or the scale when the depressor bar is in its fully depressed position. Gauge by eye.

(d) The pointer shall clear the table indices in all positions. Gauge by eye.

(e) The pointer hammer shall be vertical. Gauge by eye.

(f) The stop pin attached to the H table shall be in a vertical position. Gauge by eye.

(g) The pointer hammer when depressed shall clear the rivets on all contact tables. Gauge by eye.

(h) The pointer shall not stick to the depressor bar, the table tops or to the stop pin attached to the H table. Gauge by eye.

(i) The distance of the pointer hammer above the 0 table when the depressor bar is in its fully elevated position shall be approximately 1/8". Gauge by eye.

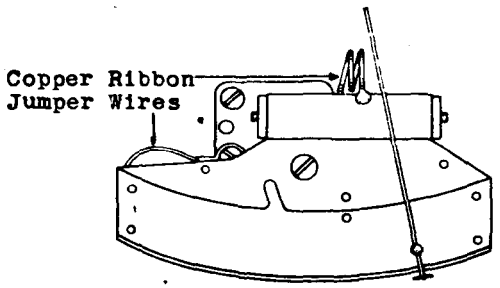

Fig. 2 Contact Table - Top

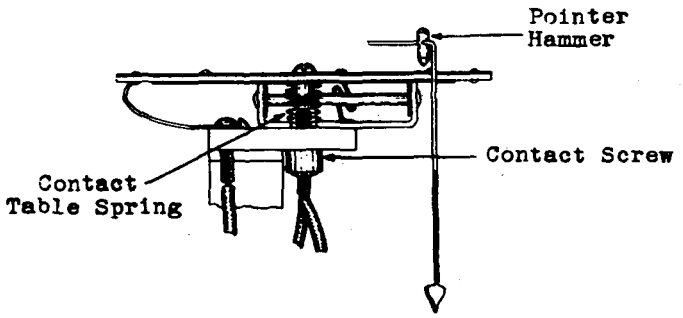

Fig. 3 Contact Table - Front

2.05 Contact Tables - Fig. 2 and 3

(a) Contact separation for the 0, L and H tables shall be 0.010" ± 0.002". Use the No. 74-D gauge.

(b) The make pressure for each table contact shall be minimum 9 grams. This shall be measured with the depressor bar causing the pointer hammer to depress the table and with the pointer hammer resting exactly above the contact. Use the 70-F gauge and apply it close to the side of the contact underneath the table.

(c) The break pressure for each table contact shall be minimum 6 grams. Use the No. 70-F gauge applied on top of table exactly above the contact.

(d) The contacts shall line up so that the point of contact falls wholly within the circumference of the opposing contact discs. Gauge by eye.

(e) The L table index shall be in line with the right-hand edge of the L table. The H table index shall be in line with the left-hand edge of the H table. To check for this, move the galvanometer pointer over until the vertical part of it shows whether the line-up of the index with the table edge is correct or not.

(f) The top of the 0 table shall be approximately 1/8" higher than the top of the L table when the two tables are in their non-depressed position. Gauge by eye.

(g) The two copper ribbon jumper wires connecting to the tables shall be in place as shown in Figures 2 and 3.

2.06 Depressor Bar - Fig. 7

(a) The depressor bar shall move freely in its bearings without excessive sideplay. Gauge by feel. A sideplay of approximately .005" is considered satisfactory.

(b) The front top edge of the depressor bar when it is in its fully elevated position shall be not less than 15/16" from the top of the scale fixture. Measure with ruler.

(c) With the depressor bar in its fully elevated position there shall be a clearance between the top of the pointer hammer and the depressor bar of minimum 1/16" when the pointer is at zero. Gauge by eye. The clearance between the hammer and the depressor bar shall be approximately equal to the clearance between the hammer and the top of the 0 table. Gauge by eye.

(d) There shall be a clearance gap of .010" ± .005" between the stop screw and the stop when the L or H table contact is closed by the depressor bar resting on the pointer hammer. Use the No. 74-D gauge.

(e) The depressor bar when fully depressed shall not touch the top of the 0 table. Gauge by eye.

(f) The fork of the depressor bar shall not touch the collar at the top of the lift rod when the depressor bar is in its fully depressed position and the lift rod is in its highest position. Gauge by eye.

(g) When the depressor bar is in its fully elevated position there shall be a slight clearance (approximately .005") between the stop pins on the magnet core and the armature on the depressor bar. Gauge by eye. (This is most easily observed by noting the movement of the depressor bar when the armature is manually depressed to take up the clearance.)

(h) The force causing the depressor bar to move upward shall be minimum 6 grams. When measuring this the motor should be stopped so that the lift rod is at the lowest point of its travel. Use No. 70-F gauge and measure at outer edge of depressor bar above center point of galvanometer scale.

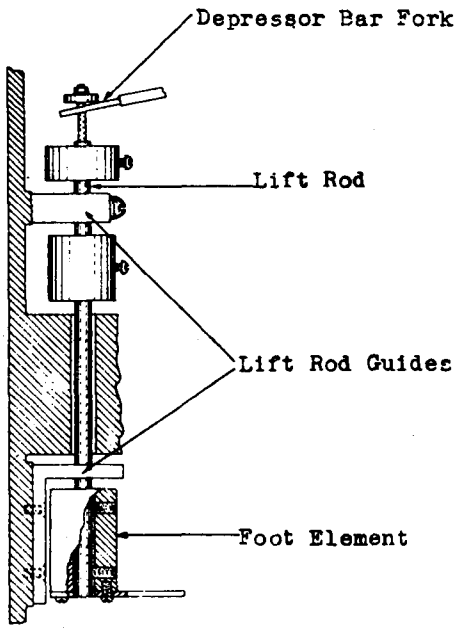

Fig. 4 Lift Rod

2.07 Lift Rod - Fig. 4

(a) The lift rod shall move freely in its guides without binding. Gauge by feel.

(b) The lift rod shall not scrape on the sides of the depressor bar fork. Gauge by eye.

2.08 Cams The cams shall be tight on the shaft. Gauge by feel.

2.09 Trigger Contact

(a) Direct Cam Type - Fig. 5

1. The pressure of each flexible contact spring against its stop spring shall be minimum 20 grams, maximum 50 grams. Use 70-D gauge and apply gauge at the righthand side of the spring at the contact.

2. The gap between the flat part of the cam disc and the nearest part of the adjacent contact spring shall be minimum .004". Use 74-D gauge and measure at the flat part of the disc making 2 measurements approximately 180° apart.

3. The contact gap shall be minimum .010", maximum .015". Use No. 74-D gauge.

4. The left contact spring shall be lifted off the end of its stop spring by minimum .003" when the springs have been deflected to the maximum. Gauge by eye.

5. Each flexible contact spring shall rest on the associated stop spring at least on the end of the stop spring that is nearest the contact. Gauge by eye.

(b) Hammer Type - Fig. 6

1. The contact spring shall be approximately 5/32" away from the bakelite block. Remove the bakelite block and measure with ruler at the place where the contact is fastened to the spring.

2. The contact gap shall be .010" ± .005". Use No. 74-D gauge.

3. The break pressure for the trigger contact spring shall be minimum 6 grams. Use No. 70-F gauge.

4. The make pressure for the trigger contact spring shall be minimum 15 grams. Use No. 79-C Gauge. For this measurement the motor shall be stopped just at the moment of trigger contact closure. Push the gauge in a horizontal position against the trigger hammer at the left side of the trigger contact spring (looking at the front of the controller) so that the trigger contact is broken. Then allow the contact to make and read the gauge just before the contact closes. Listening for the relay operation caused by the closure of the trigger contact is a convenient way of determining just when the closure takes place.

2.10 Motor

(a) The motor and gear box assembly shall be held firmly in place by means of its mounting screws.

(b) The motor shall operate on the 110 volt 60 cycle alternating current supply.

(c) The universal joint shall turn without binding. Check by observing the line up of shaft when the motor is running.

(d) With maximum separation of the two sides of the universal joint there shall be no possibility of the square nut between these two sides falling out. Check by pushing the two sides of the joint apart while the motor is stopped.

2.11 Electromagnet The electromagnet shall meet the electrical requirements specified in the circuit requirements table.

2.12 Timing

(a) The time required for one complete cycle of operations, i.e., between two successive closures of the trigger contacts shall be 15 ± 1 seconds.

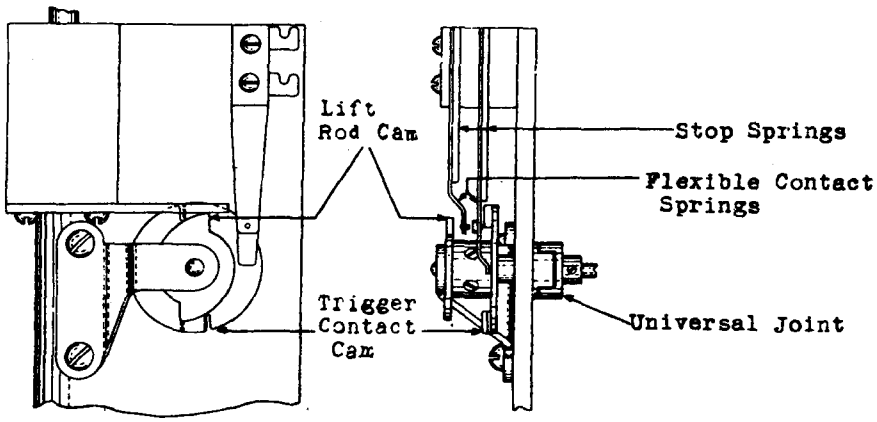

Fig. 5 Trigger Contact - Direct Cam Type

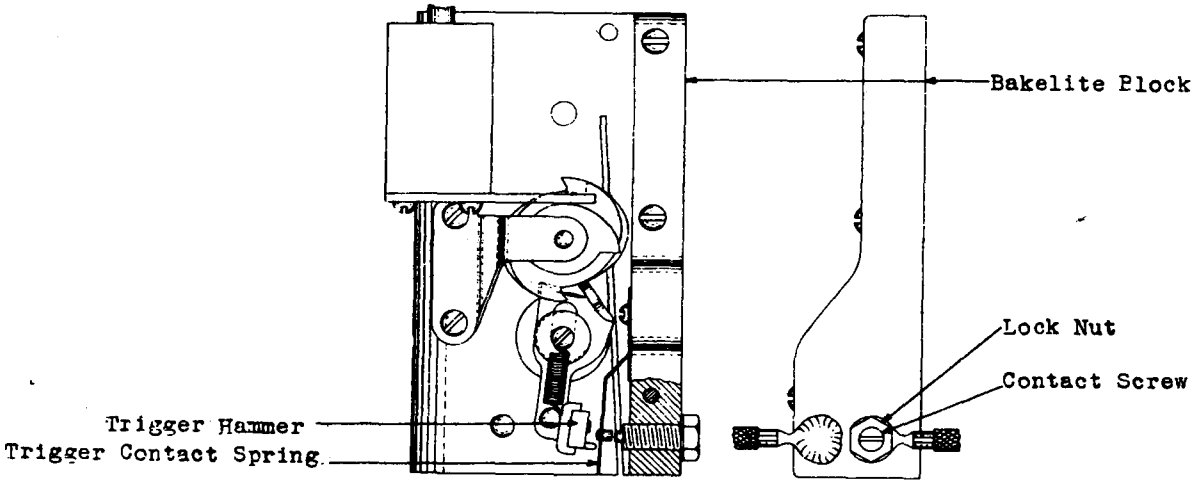

Fig. 6 Trigger Contact - Hammer Type

(b) The time interval from the make of the L table contact to the make of the trigger contact shall be 9 to 12 seconds.

(c) The time interval during which a table contact remains closed shall be between 1/2 and 6 seconds.

The timing requirements may be checked with an ordinary time piece.

2.13 Covers

(a) The glass windows in the covers shall be held firmly in place. Gauge by feel.

(b) The covers shall be securely mounted. Gauge by feel.

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges and Materials

Code No.	Description
Tools	
147	Screw-driver - 3-1/8"
207	Offset Screw-driver
265-B	Contact Burnisher
KS-6015	Duck-bill Pliers
-	Pliers - Side Cutting
Gauges	
70-D	50-0-50 Gram Gauge
70-F	10-0-10 Gram Gauge
74-D	Thickness Gauge Nest
79-C	0-200 Gram Push-Pull Tension Gauge
Materials	
KS-8372	Trichloroethylene
KS-2423	Cleaning Cloth
KS-6232	Oil
-	Toothpicks - Hardwood Flat at One End and Pointed at the Other
-	No. 22 Bare Tinned Copper Wire

3.01 Cleaning (Rq. 2.01)

M-1 For cleaning the controller use a dry clean cloth per KS-2423. When cleaning the hammer type trigger contact assembly wipe off any excess oil from the trigger contact cam. Remove the bakelite block by removing the three screws which hold it in place using the 147 screwdriver. Where two controllers are mounted side by side use the 207 offset screwdriver. Wipe off all traces of oil from the bakelite block, the trigger hammer, and the support for the bakelite block. Then clean them with KS-8372 trichloroethylene. Replace the bakelite block and then burnish the contact.

M-2 Wipe off any oil on the contacts and contact springs of the direct cam type of trigger contact using a small piece of KS-2423 cloth wrapped or twisted around the end of a toothpick. Then clean the contact with a clean 265-B burnisher, rubbing the burnisher back and forth several times.

M-3 Wipe off with a dry clean cloth per KS-2423 any dirt and oil on the lift rod and lift rod guides and also at the pivot bearings of the depressor bar. If necessary flush the guide bearings with KS-6232 oil and carefully wipe off surplus. Do not use trichlorethylene on bearing surfaces.

3.02 Lubrication (Rq. 2.02)

M-1 Lubricate the pivot bearings of the depressor bar and the lift rod guides with KS-6232 oil in accordance with the requirement. Apply the drop of oil by means of a piece of No. 22 bare tinned copper wire. Move the lift rod and the depressor bar up and down a few times to allow the oil to work in.

3.03 Record of Lubrication (Rq. 2.03)

(No procedure).

3.04 Galvanometer (Rq. 2.04)

M-1 If that part of the galvanometer pointer which is in front of the scale is not vertical the pointer should be twisted back carefully to its correct position. To do this move the pointer to the center of the scale. Resting the thumb and forefinger of the left hand on top of the galvanometer magnet and holding the horizontal part of the pointer steady between them, with the right hand twist the vertical part of the pointer to the left or right. Care should be exercised that the vertical part is not bent out of its shape.

M-2 To center the galvanometer pointer on zero turn the screw at the top of the instrument marked ZERO ADJUSTER to the left or right as necessary using the 147 screw-driver.

M-3 If the pointer touches the mirror or the scale when the depressor bar is fully depressed this can be overcome by bending the pointer outward away from the scale. While doing this the pointer may be held steady as described in M-1.

M-4 If the pointer touches the table indices this may be corrected by bending the pointer inward slightly or by bending the indices outward. When bending the pointer it should be held steady as described in M-1. Use the duck-bill pliers to bend the indices.

M-5 If the pointer hammer is not vertical this may tend to cause the pointer to be distorted from its correct position when the depressor bar moves down and rests on it. Bend the hammer into its correct position with the fingers taking care not to damage the pointer.

M-6 The stop pin attached to the H table may be made to assume its correct position by bending it with the fingers.

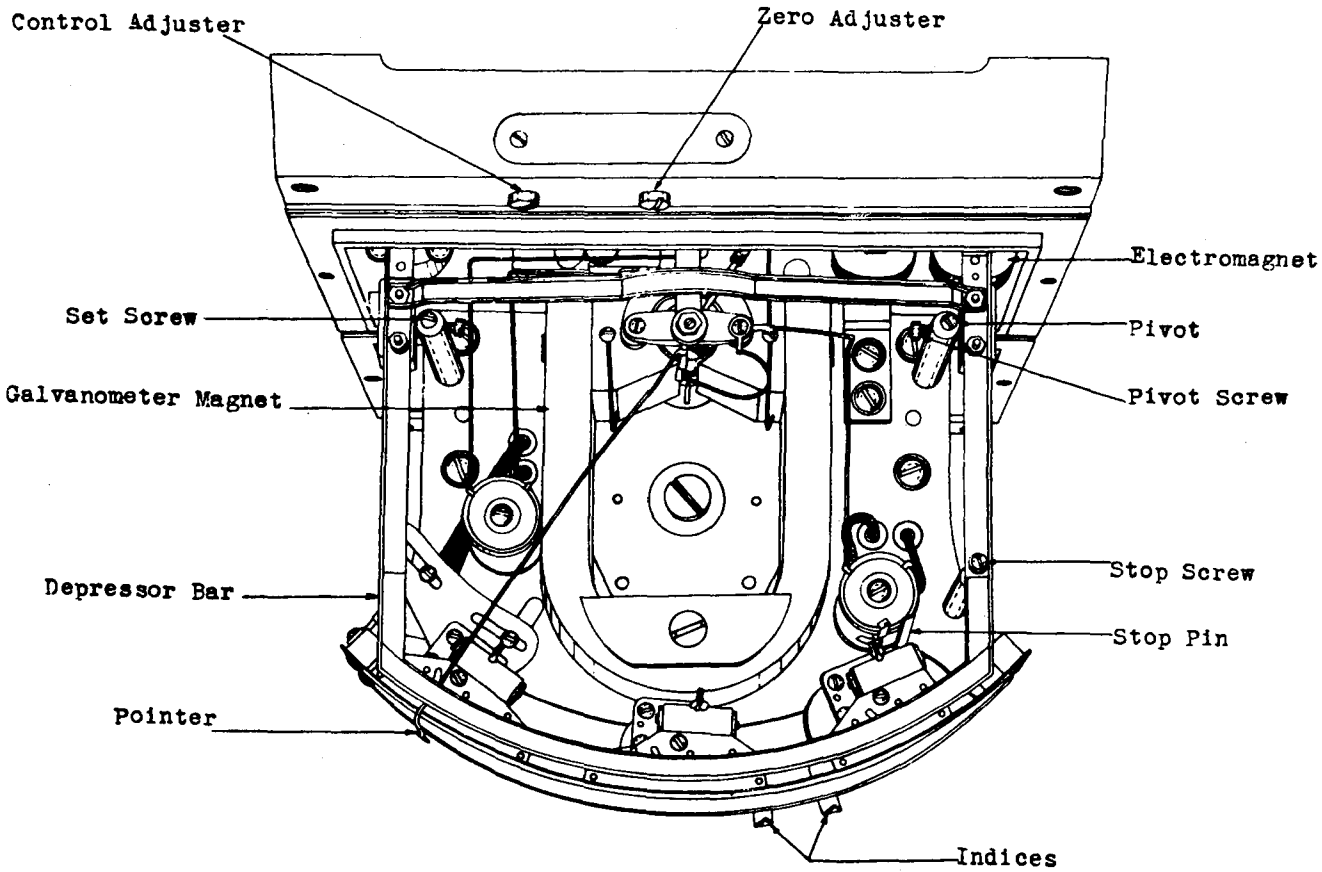

Fig. 7 Top View of Controller

M-7 Should the pointer hammer not clear the rivets on the contact tables it will be necessary to shift the position of the table slightly. Loosen the nut at the bottom of the contact table post and this will permit shifting the contact table about a vertical axis sufficiently to cause the hammer to clear the rivet in question. Then tighten the nut in place.

M-8 In case the pointer sticks to the stop pin on the H table, to the table tops, or to the depressor bar, clean the part of the pointer that sticks to the stop pin, the tops of the tables, the under surface of the depressor bar, and the top and bottom of the hammer with KS-8372 trichloroethylene. To clean the under surface of the depressor bar and the table tops use a small piece of KS-2423 cloth wrapped or twisted around the end of a toothpick and moistened with the trichloroethylene. To clean the top and bottom of the hammer or that part of the pointer which comes in contact with the stop pin apply a drop of the trichloroethylene using a clean toothpick. Rub the flat end of the toothpick back and forth two or three times on the surface being cleaned. The liquid will soften any deposit that may have collected on top of the hammer and the rubbing will remove it. Exercise care to keep the trichloroethylene from coming in contact with the insulation of the leads to the table contacts.

M-9 To adjust the distance of the pointer hammer above the 0 table, carefully bend the horizontal part of the pointer upward or downward until the correct distance is obtained. Take care that the pointer is not distorted or twisted out of shape while doing this.

3.05 Contact Tables (Rq. 2.05)

M-1 The contact separation may be adjusted by means of the lower contact screw. Use the No. 147 screw-driver and back off or advance the screw until the correct separation is obtained. It is also possible to change the contact separation by means of the screw whose head appears on the top of the table. Only a limited amount of adjustment is possible by this means as the screw is intended to keep the contact table spring in position.

M-2 To adjust the contact pressures it

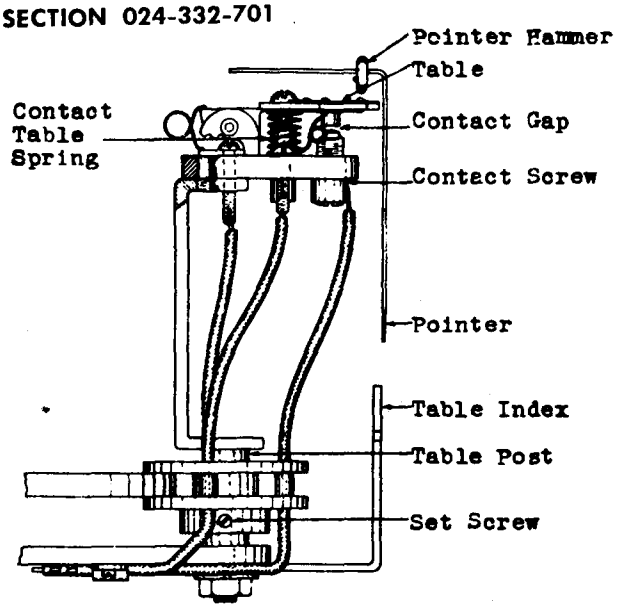

Fig. 8 Contact Table - Side

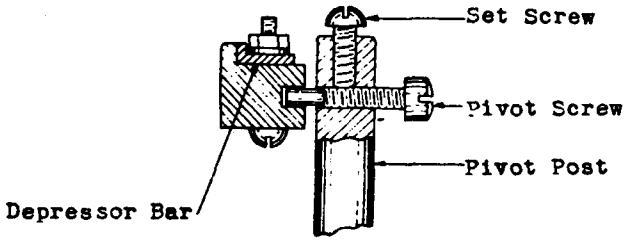

Fig. 9 Depressor Bar Pivot

will be necessary to remove the screw which holds the contact table spring in place. The table top can then be swung far enough upward on its hinges to remove the spring. If the break contact pressure is less than the minimum the spring should be stretched. Exercise care when doing this so that the spring is not stretched an excessive amount or ruined. If the make contact pressure is less than the minimum the spring needs to be shortened. When doing this shorten the spring a small amount at a time cutting off the end of the spring with the side cutting pliers. After thus adjusting the spring replace it and its screw and check the pressures again. More than one trial may be necessary before the correct spring adjustment is obtained. Take care when obtaining the correct make and break contact pressures that the contact separation does not get outside its limits.

M-3 No adjustment is provided for the alignment of the table contacts. The table construction is such that the contact alignment is secured at the time the controller is manufactured and with ordinary use should not change.

M-4 If a table index is not in line with the edge of its associated table the index should be aligned by twisting the horizontal lower part of the index using a pair of duck-bill pliers. Only a slight twist should be necessary to move the tip of the index either to left or right a sufficient amount to meet the requirement.

M-5 If the tops of the O and L tables are not the correct distance from each other the L table must be lowered or raised. There is no arrangement for lowering or raising the O table. By means of the No. 147 screw-driver loosen the two screws which hold the table in position on the table post. The screws can be seen just below the level of the bottom edge of the scale. After these screws are loosened it is possible to raise or lower the table support along the table post. When the table top is finally located at its correct level tighten the screws.

3.06 Depressor Bar (Rq.2.06)

M-1 If the depressor bar is too loose or if it does not move up and down freely the pivot bearings need adjustment. Only one of them should be adjusted unless there is a great amount of side play. Loosen the set screw which holds the pivot screw in position and then adjust the pivot screw. Care must be exercised that the position of the depressor bar is not changed too much to the left or to the right so as to cause the fork of the depressor bar to scrape against the side of the lift rod.

M-2 If the front edge of the depressor bar is too low or too high above the top edge of the scale when the depressor bar is in its fully elevated position this can be overcome by changing the position of the foot element located at the bottom of the lift rod. To do this first loosen the two screws holding the foot element in place. To bring the front of the depressor bar higher move the foot element upward on the lift rod. Moving the foot element downward will bring the depressor bar lower.

M-3 If the galvanometer pointer hammer is too close to the depressor bar when the latter is fully elevated change the vertical position of the pointer until

the proper clearance is obtained. To do this use the fingers to change the bend at that end of the pointer's longest horizontal section which is nearest the galvanometer coil.

M-4 The stop screw determines the limit for the downward movement of the depressor bar. If the requirement for the clearance gap between the stop screw and its stop is not met loosen the locknut on the screw and adjust the screw to obtain the proper clearance. Make certain that the locknut is tightened after the adjustment is made.

M-5 If the depressor bar when fully depressed touches the top of the O table raise both the L and H tables as described in M-5 of 3.05. After this has been done it will be necessary to again adjust the stop screw clearance gap as described above in M-4.

M-6 If the fork of the depressor bar touches the lift rod top when the depressor bar is fully depressed change the position of the foot element of the lift rod downward. Loosen the two screws that hold the foot element in place on the lift rod and then move the foot element downward a very small amount until the clearance is obtained at the top between the lift rod and the fork. Tighten the screws. Check that requirement 2.06 (b), is met.

M-7 The clearance between the stop pins of the magnet core and armature on the depressor bar may be adjusted by bending the armature with a pair of pliers while holding the depressor bar steady with one hand.

M-8 If the force causing the depressor bar to move upward is less than 6 grams this may be due to excessive friction in the pivot bearings or the lift rod may be binding in its guides. If the trouble is due to the pivot bearings these should be adjusted as described in M-1. If the trouble is caused by the lift rod this should be taken care of as covered under 3.07.

3.07 Lift Rod (Rq. 2.07)

M-1 If the lift rod binds in its guides this may be due to dust or dirt clogging in the guides. Apply a drop or two of oil to the guides and move the lift rod up and down to work the oil in and to loosen the rod in the guides.

M-2 If the lift rod scrapes against the sides of the depressor bar fork this may be corrected by shifting the position of the depressor bar either to the left or right as the case may be. It will be necessary to loosen the pivot bearings and then adjust them in the desired position as described in M-1 of 3.06.

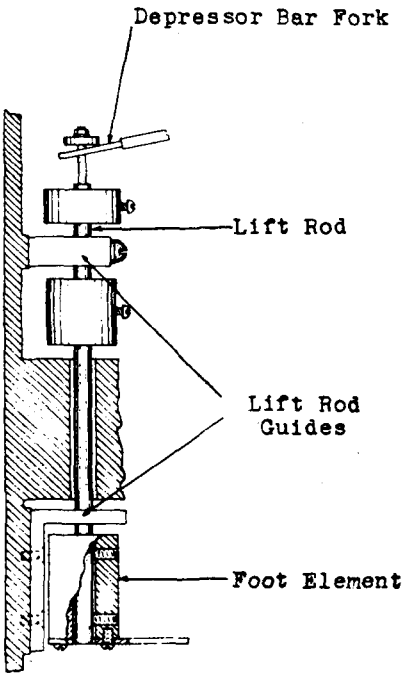

Fig. 10 Lift Rod

3.08 Cams (Rq. 2.08)

M-1 If the cams are loose on the shaft tighten the two screws holding them on the shaft.

3.09 Trigger Contact (Rq. 2.09)

(a) Direct Cam Type

M-1 If the pressure of a contact spring against its stop spring needs to be increased use the duck-bill pliers to bend the contact spring. The pressure can be decreased by pushing the end of the contact spring away from the stop spring.

M-2 If it is necessary to adjust the gap between the flat part of the cam disc and the nearest part of the adjacent contact spring this can be accomplished by bending the stop spring and contact spring (both together) by means of the duck-bill pliers.

M-3 If the contact gap needs adjustment bend the left contact spring and stop spring (both together) sufficiently to meet the requirement.

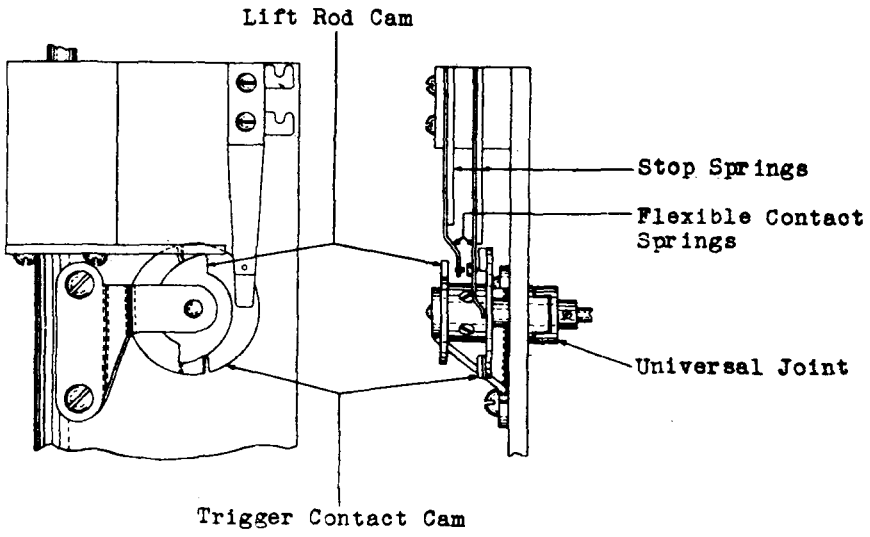

Fig. 11 Trigger Contact - Direct Cam Type

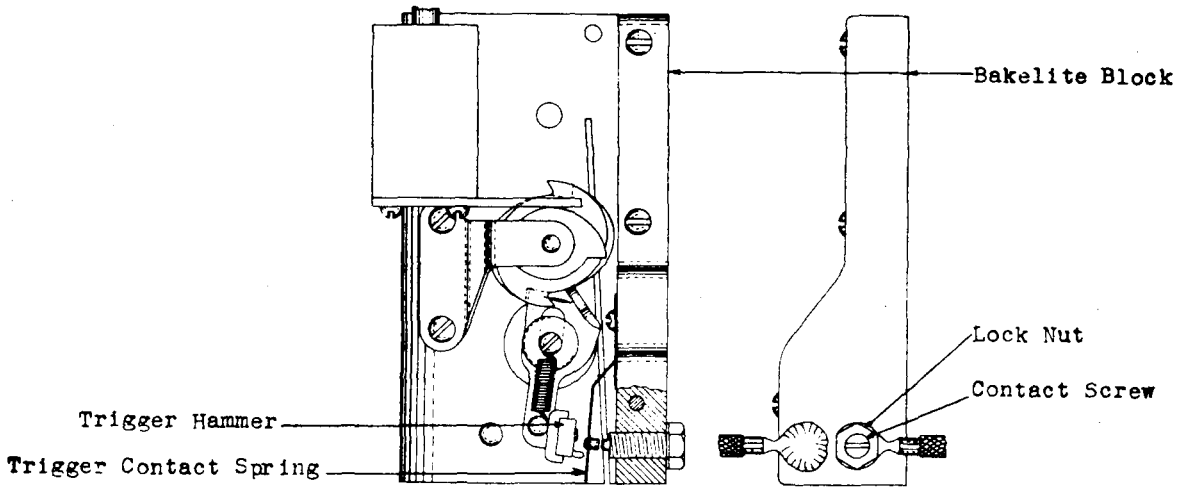

Fig. 12 Trigger Contact - Hammer Type

(b) Hammer Type

M-1 To adjust the contact spring for the proper distance from the bakelite block use the duck-bill pliers to bend the spring.

M-2 To change the contact gap, loosen the lock nut of the contact screw and then turn the screw in a clockwise direction to decrease the gap or counter clockwise to increase it. When the desired adjustment is obtained tighten the lock nut securely taking care that this does not change the adjustment.

M-4 To obtain sufficient contact follow the left contact spring and stop spring (both together) should be bent to the right. After this adjustment check the contact gap and readjust if necessary.

M-5 If the contact spring does not rest on its stop spring, bend the contact spring until the requirement is met using the duck-bill pliers. If this adjustment is made check that this type of trigger contact meets all of the previous requirements.

M-3 If the break contact pressure is less than 6 grams increase the contact gap as described in M-2 or by means of the duck-bill pliers bend the contact spring farther away from the bakelite block.

M-4 If the make contact pressure is too weak decrease the contact gap slightly.

3.10 Motor (Rq. 2.10)

M-1 If the motor is not mounted securely tighten the screws which hold it in place. If the position of the motor has changed or shifted it will be necessary to loosen the motor mounting screws and to shift the motor back to its normal position being careful that the shaft alignment does not cause binding of the universal joint after the mounting screws are tightened. Observe the action of the universal joint while the motor is in operation.

M-2 If the motor does not operate check that the universal joint is not causing the trouble by binding. If this is the cause it may be corrected as described in M-1 above.

M-3 Binding of the universal joint may be caused by the motor having shifted out of its normal position. This can be corrected as described in M-1 above.

M-4 To bring the two sides of the universal joint closer to each other push the motor shaft (with motor stopped) toward the motor to take up the end play. Loosen the set screw holding the right half of the universal joint in place on the shaft and move this half toward the left. Then tighten the set screw. Start the motor and watch the joint while the shaft is turning to check its operation.

3.11 Electromagnet (Rq. 2.11)

M-1 If the electromagnet does not meet its operate requirement reduce the clearance between the stop pins on the magnet core and the armature of the depressor bar to a minimum by bending the armature with a pair of pliers while holding the depressor bar steady.

3.12 Timing (Rq. 2.12)

No Procedure.

3.13 Covers (Rq. 2.13)

M-1 If the glass windows in the covers are loose tighten the nut which holds the retaining clip in position over the glass at the inside corners of the covers.

M-2 The screws holding the covers in place should be tightened if the covers are loose.