REEL-C 2463

A.T.I 48300

INSTRUCTION MANUAL FOR INSTALLATION OF CHIKSAN TOOL COMPANY. 1 5/8 INCHES REVOLVING JOINT

(DRAWING "61DIC ON RADIATION LABORATORY TYPES B-1 AND B-2 CABLES (ARMY-NAVY TYPES RG-27/U AND RG-28/U)

REPORT

M-154

RADIATION LABORATORY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASSACHUSETTS

NDRC
Div. 14
OEMsr-262

Radiation Laboratory

Report M-154 January 22, 1944

Inetruction Manual

for

INSTALLATION OF CHIKSAN TOOL COMPANY, 1 5/8" REVOLVING JOINT (DRAWING # 61D1C) ON RADIATION LABORATORY TYPES B-1 & B-2 CABLE (ARMY-NAVY TYPES RG-27/U & RG-28/U)

Abstract

When installing the Chiksan Revolving Joint on a high voltage cable, a definite procedure should be followed to insure satisfactory results. The various operations of stripping the cable, installing the joint, filling with a dielectric, and final testing, together with maintenance information, are described in this manual.

R. R. Steinke

Approved by: H. D. Doolittle
Chairman, Group B1

W. L. White
Division Head

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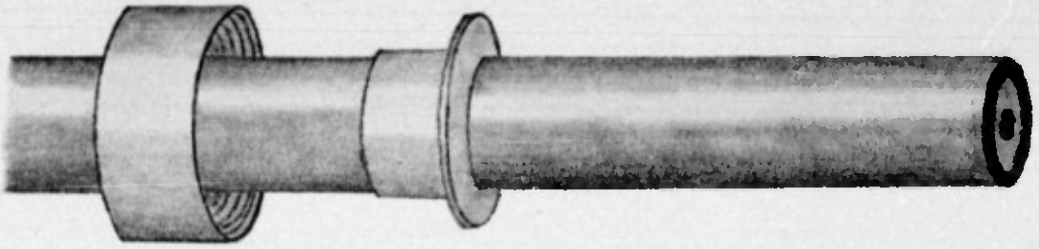
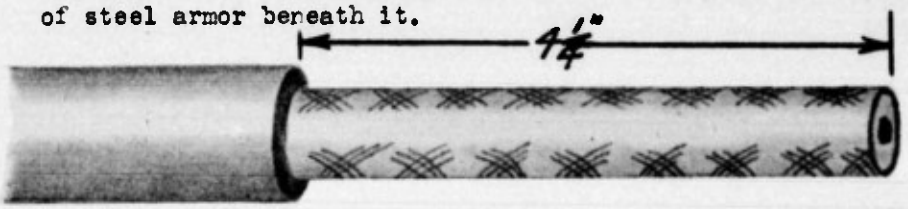
The description given below is for the Radiation Laboratory Type B-2 cable (Army-Navy Type RG-28/U), and a short description is given at the end for installing the Type B-1 cable on this revolving joint. The installation in both cases is practically the same.

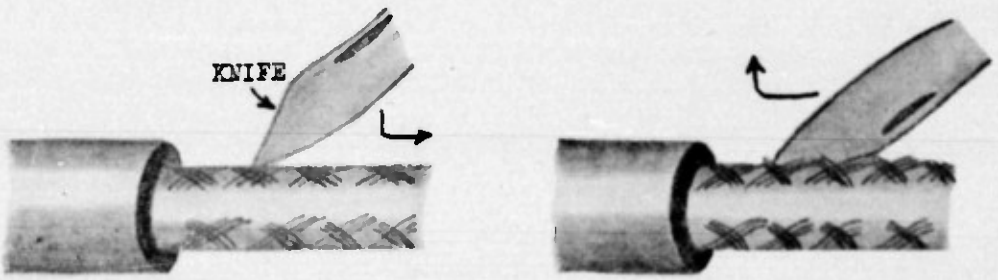
1. Slip the clamping nut and cable bushing over the cable as shown.



2. Remove the outer neoprene sheath for a distance of 4¼" from the end of the cable, being careful not to injure the layer of steel armor beneath it.



Note: In removing any layer it is very important not to injure the layer underneath. If a knife is used, always cut away from the cable, never down on it. A pair of scissors is useful in removing the shielding.



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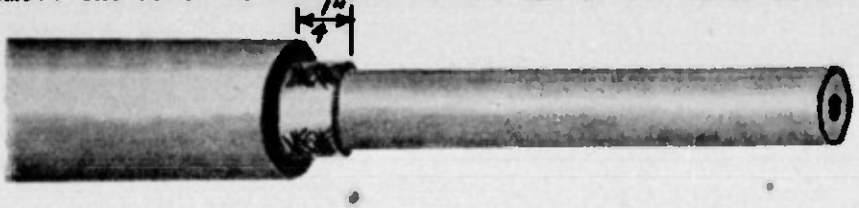
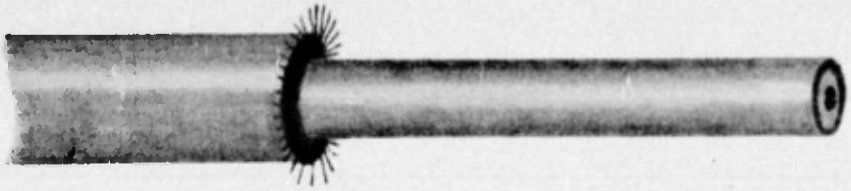
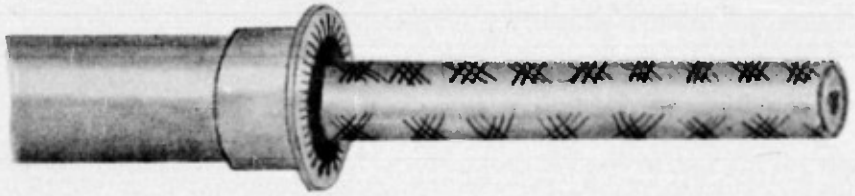
3. Remove the armor to within $\frac{1}{4}$" of the end of the outer sheath.



4. Unweave the armor down to the end of the outside sheath, and bend it out at right angles as shown.

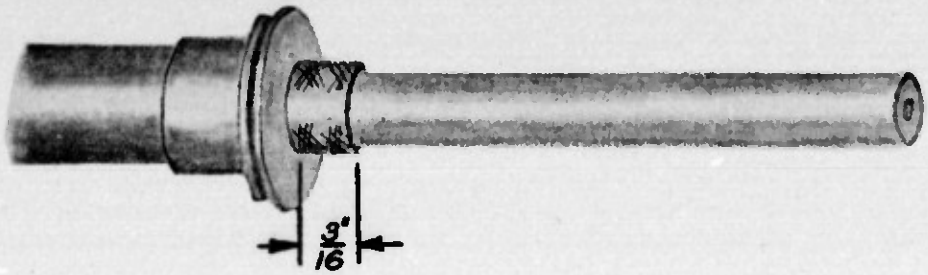


5. Slide the cable bushing into position against the armor, and trim off the strands of the armor 1/16" below the outer diameter of the flange on the bushing. Remove the cloth covering over the copper braid down to the point where the armor stops.

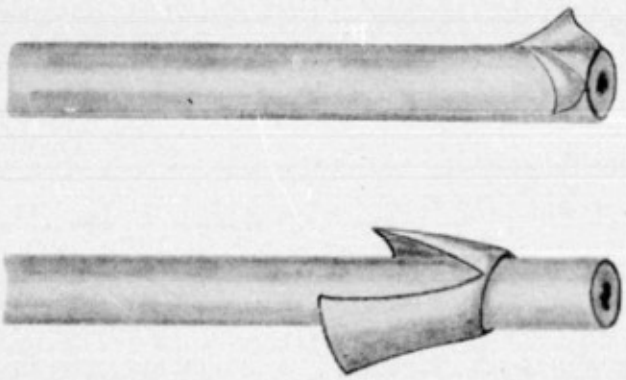


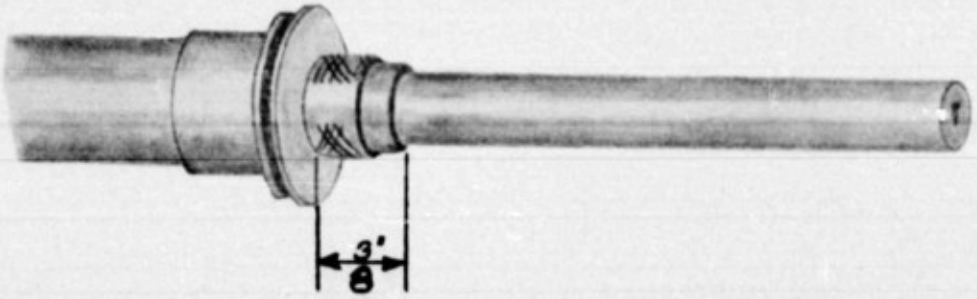
6. Slide the brass washer over the copper braid and down to the point where the armor terminates.

7. Remove the tinned copper braid to a distance of 3/16" from the brass washer.

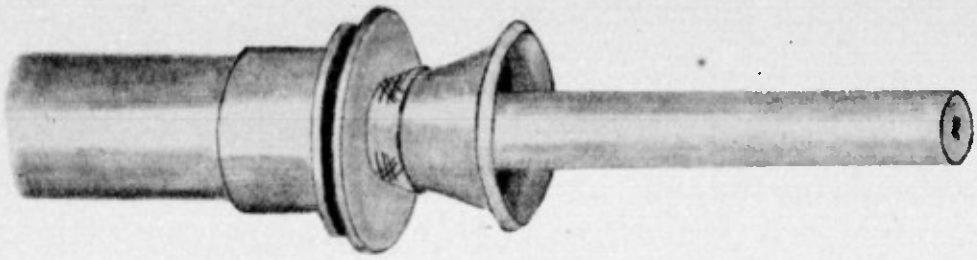


8. Remove the conducting rubber layer to a distance of 3/8" from the brass washer. The conducting rubber layer is quite thin, and is best removed with a sharp pointed tool or knife in the manner shown. The primary insulating rubber must be scraped well to remove the residue of the conducting rubber.



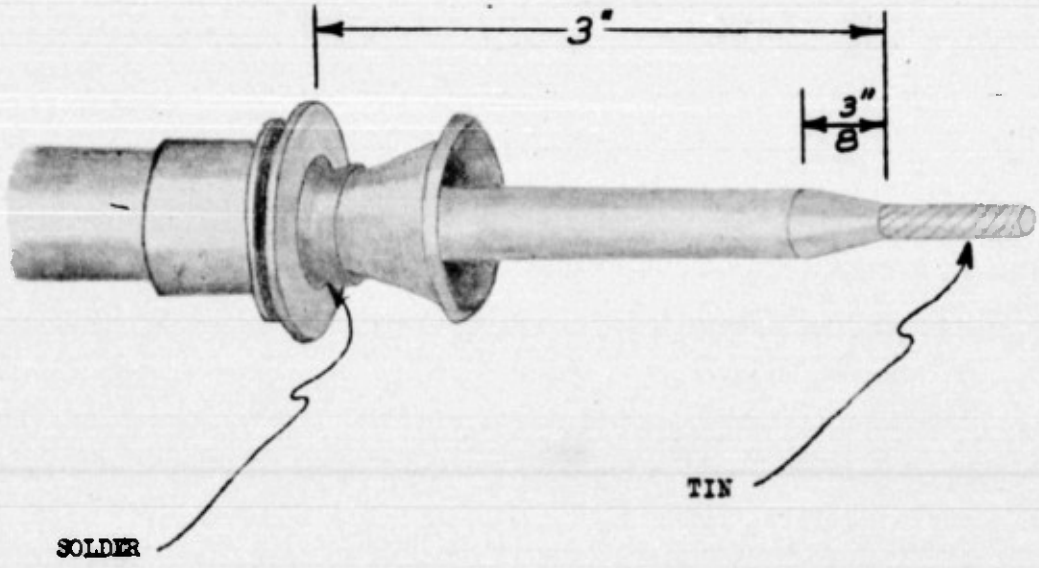


9. Slide the brass cone over the conducting rubber, and underneath the copper braid. The straight part on the small end of the cone should slide about 1/16" into the hole in the washer.



10. Wrap the shielding with fine tinned copper wire to hold it in position for soldering. Solder the shielding both to the cone and to the washer. A fairly large iron, from 150 to 200 watts, is required for this operation. Be careful not to hold the iron on too long as the rubber will be burned.

Remove the insulating rubber to a distance of 3" from the brass washer, and taper the end as shown on the following sketch. Tin the exposed length of center conductor.

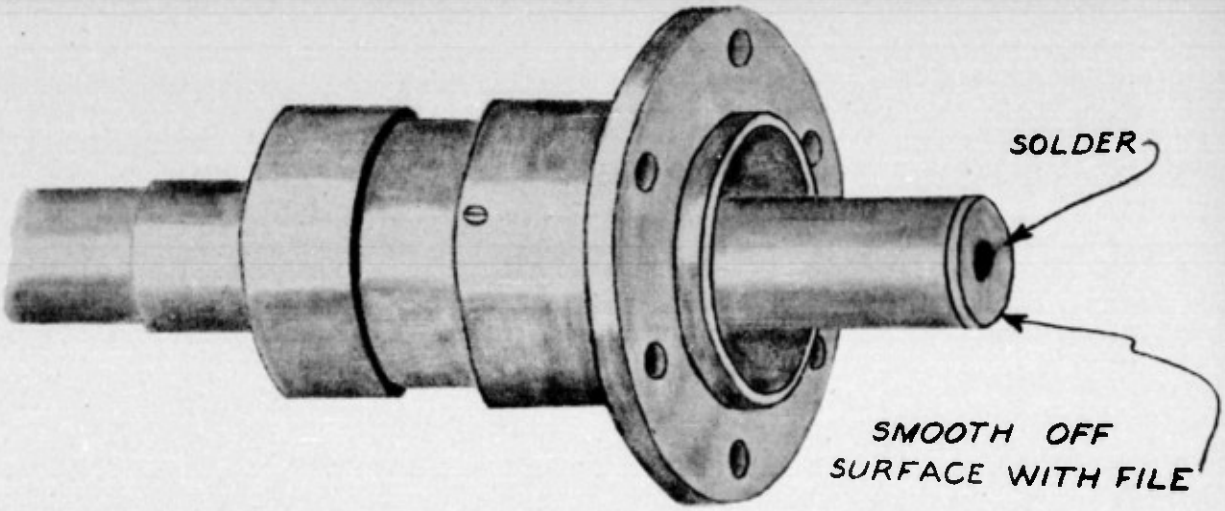


11. The end of tho rotating joint to which the cable is attached is removable by taking out the eix ecrewe on the flange at the top of the body. There is a neoprene gasket under the flange which must not be damaged.

The center contact of the rotating joint to which the center conductor of the cable is soldered, is made of stainlees steel because of corroeion difficulties. Stainless steel cannot be eoldered with roein core eolder and ae this manual is being written, work is being done in an effort to develop a method of either pre-tinning or plating this piece, to enable it to be eoldered with roein core eolder.

If the center contact is not already either tinned or plated it will be neceseary to pre-tin this part. This is accompliehed ueing acid flux end solid wire solder. Particular attention ehould be paid to tinning the chamfer on the center hole and ae far ineide the hole as poesible. After tinning, the inside and outside of the porcelain should be waehed out thoroughly with water to remove the acid. Before attempting to assemble the cable on to the joint be eure that the part that has been washed out with water is well dried or trouble will be experienced when it is assembled to the cable. For this reason the part should be dried in an oven at a temperature of around 120°-150° F. for 3 or 4 hours to remove all the water. If a number of rotating joints have to be assembled to cables, the center contacts should be tinned first, and they can then be drying while the cables are being prepared.

With the cable prepared as shown in step 10, insert it into the back of the rotating joint, making sure all the strands of the center conductor come through the hole in the center contact. Screw the back nut up tightly using a spanner wrench, and be sure that it clamps the steel armor tightly eo that the cable cannot twist. Cut off the center conductor level with the contact on the porcelain and using rosin core eolder, solder it into the hole. The solder should be confined to the hole, leaving a little of it projecting above the surface of the contact. A fairly large iron, around 200 watts, will be needed for this operation. When the solder has cooled, smooth it down with a flat mill file so as to leave the surface of the contact smooth. When this operation is completed, no solder should bè exposed except that which is in the center hole, the rest of the surface of the contact should be free of any solder or plating, so that the brush will make contact with a etainless steel surface.



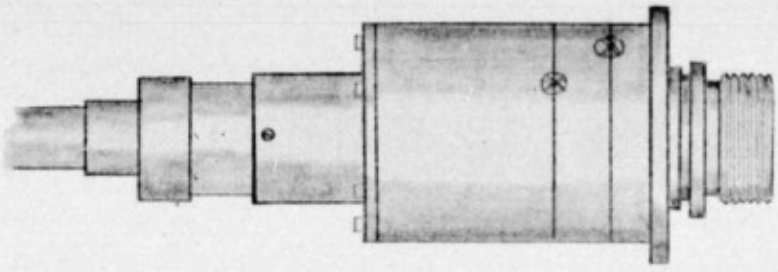
12. With the cable now installed, it ie necessary to fill up the space inside the porcelain insulator and aesociated hardware with a dielectric to eliminate air spaces which would otherwise allow corona to exist and deetroy the cable insulation. The dielectric used is Dow Corning #4 Ignition Sealing Compound, which ie a non-organic material looking eomething like vaseline. It has the property of neither liquefying nor solidifying, and maintains a practically constant viscosity over a very wide range of temperatures.

Dow Corning #4 Ignition Sealing Compound comes in three ways; an 8 oz. lead tube, or a cylindrical plastic container of either 4 oz. or 8 oz. size. The two plastic tubes are designed for use with special grease guns manufactured by Alemite. The tube is inserted in the appropriate size grease gun and the back part of the gun ie screwed on. Twisting the handle causes a knife built into the gun to cut out the top of the tube while a sharp projection on the other end of the gun pierces the bottom of the tube. The gun is then used in the normal manner. If one of the special grease guns is not available, an ordinary grease gun can readily be ueed, and it can be filled manually using the compound from a lead tube. Caution: Do not get any of the compound near the eyes as it will cause considereble irritation.

The end of the grease gun will have to be provided with a fitting so it can be screwed into the 10-32 tapped hole in the roteting joint. Remove one of the 10-32 set screve, and screv in the grease gun. Inject the compound until a sudden resistance to its turning indicates that the fitting is filled. Back off on

the handle a turn or two to prevent the compound from epurting out of the hole. Remove the grease gun and replace the 10-32 set ecrew.

13. Reaeeemble the rotating joint, being careful to eee that the brush ie properly located in ite holder. Tighten the 6 ecrews on the flange.



14. Testing

The aesembled joint ehould be teeted by applying 25 KV, 60 ~ a-c peak, for a period of ten minutes. The cable coming out of the joint will normally terminate in a plug, and an air to air socket should be put over the plug to keep it from flashing over. The socket end of the joint may also flash over at 25 KV under eome conditions. An insulating tube may be slipped in this end between the porcelain and the shell to lengthen the leakage path enough to prevent this, or a regular plug and cable aseembly may be used for the same purpose. The rotating joint is designed to work at 12-15 KV, so this method applies approximately double its working voltage.

15. Maintenance

The rotating joint is greased when assembled at the factory, and eince in normal operation, the rotational speed is low, no further greasing should be required. If trouble should develop in the joint, however, and it becomes hard to turn, it should be removed from the unit, and can be disassembled by removing the two lock wires that prevent the bearing plugs from turning, and unscrewing the bearing plugs. The ball bearings will then drop out of the two holes. When all the balls have been removed, the inner part of the joint will elide out. The ball races should be washed off with kerosene or gasoline to remove the dried grease, and then regreased with light cup grease, and the unit reassembled. In putting back the bearing plugs be sure they are not in too tight and cause the bearing to bind.

The brushes normally should experience small wear, but should be examined if the joint is taken apart for any reason. The center

brush is a 5/16" square carbon brush, and under the flange at the top of the joint are two screws which when removed will permit the removal of 2 - 3/16" diameter round carbon brushes which are used to bypass the grounded side of the joint around the ball bearings. The purpose of these two brushes is to prevent pitting the ball races which would result if they were carrying current. The rotating joint should never be operated without these brushes, as the high voltage thus developed across the textolite used to insulate the bearings will probably be punctured.

INSTRUCTIONS FOR INSTALLATION OF ROTATING JOINT

ON RADIATION LABORATORY TYPE B-1 CABLE

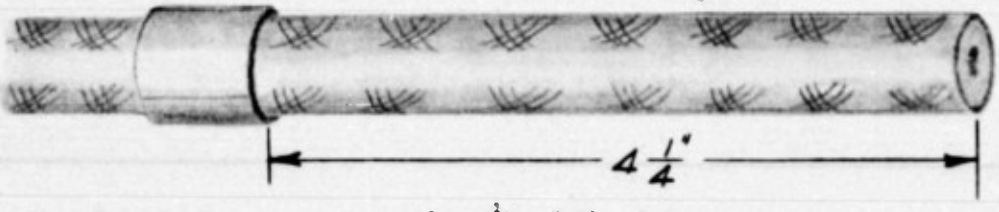
(ARMY-NAVY TYPE RG-27/U)

Type B-1 cable differs from B-2 cable in that it has a steel armor on the outside over the neoprene sheath instead of a neoprene sheath over the armor. To install this cable proceed as follows:

1. Slip the clamping nut and cable bushing over the cable the same as for B-2 cable.

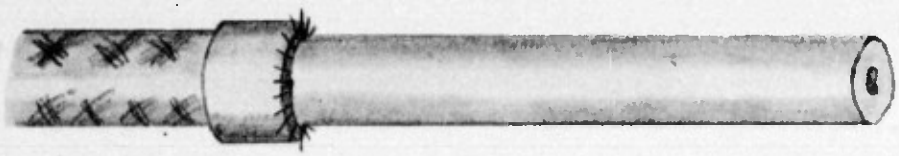
Note: The cable bushing has a smaller bore to fit smaller diameter of this cable.

2. Wrap a piece of friction tape around the cable 4¼" from the end.



3. Remove the armor to within ¼" of the tape.

4. Unweave the armor down to the tape which will prevent it from unweaving further, and bend it out at right angles as shown.



5. Remove the neoprene layer down to the point where the armor stops. From this point, start with step 5 and proceed the same as for B-2 cable.

R. R. Steinke
January 22, 1944

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ABSTRACT:

The installation of Chiksan Tool Co., 1 5/8" revolving joint on Radiation Laboratory types B-1 and B-2 cable is described. A definite procedure is followed when installing the Chiksan Revolving joint on a high voltage cable to insure satisfactory results. The various operations of stripping the cable, installing the joint, filling with a dielectric, and final testing are described.

* Types RG-27/U and RG-28/U

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