

5-16. ANTENNA TRUNKS.—Unless otherwise specified antenna trunks are used as feeders from shipboard radio transmitters to antennas. An antenna trunk consists of a thin-walled shell of rectangular or circular cross section that contains a relatively small inner conductor (antenna bus), centered as nearly as practicable within the shell. A typical shipboard antenna trunk installation is shown in figure 16-1. The antenna bus is supported within the shell by standoff insulators. The antenna end is ended with an entrance insulator. If a bulkhead is to be passed through, a feed-through insulator is utilized. Insulators are explained in detail later in this section. Within the antenna trunk is also an antenna switch. This switch is mounted between the transmitter and antenna, being as near as practicable to the antenna. Antenna switches are explained in detail later in this section.

The shell of the antenna trunk is for shielding purposes, mechanical protection, and also to prevent accidental contact with the bus by personnel. In exposed locations the antenna trunk shall be installed so as not to be a hazard to personnel. (Figure 16-2 illustrates these clearances.)

a. **ANTENNA TRUNK SIZES.**—Antenna trunks are constructed in various sizes to accommodate radio transmitters having different frequency ranges and power outputs. A list of trunk sizes and fittings used with some shipboard installations is given in table 16-1. The following trunks are also commonly used in shipboard installations:

(1) Six by eight inches for transmitters having a frequency range of two to 30 MC and an output of less than 100 watts.

(2) Nine by eleven inches for transmitters having a frequency range of 0.175 to 30 MC and an output of 100 to 500 watts.

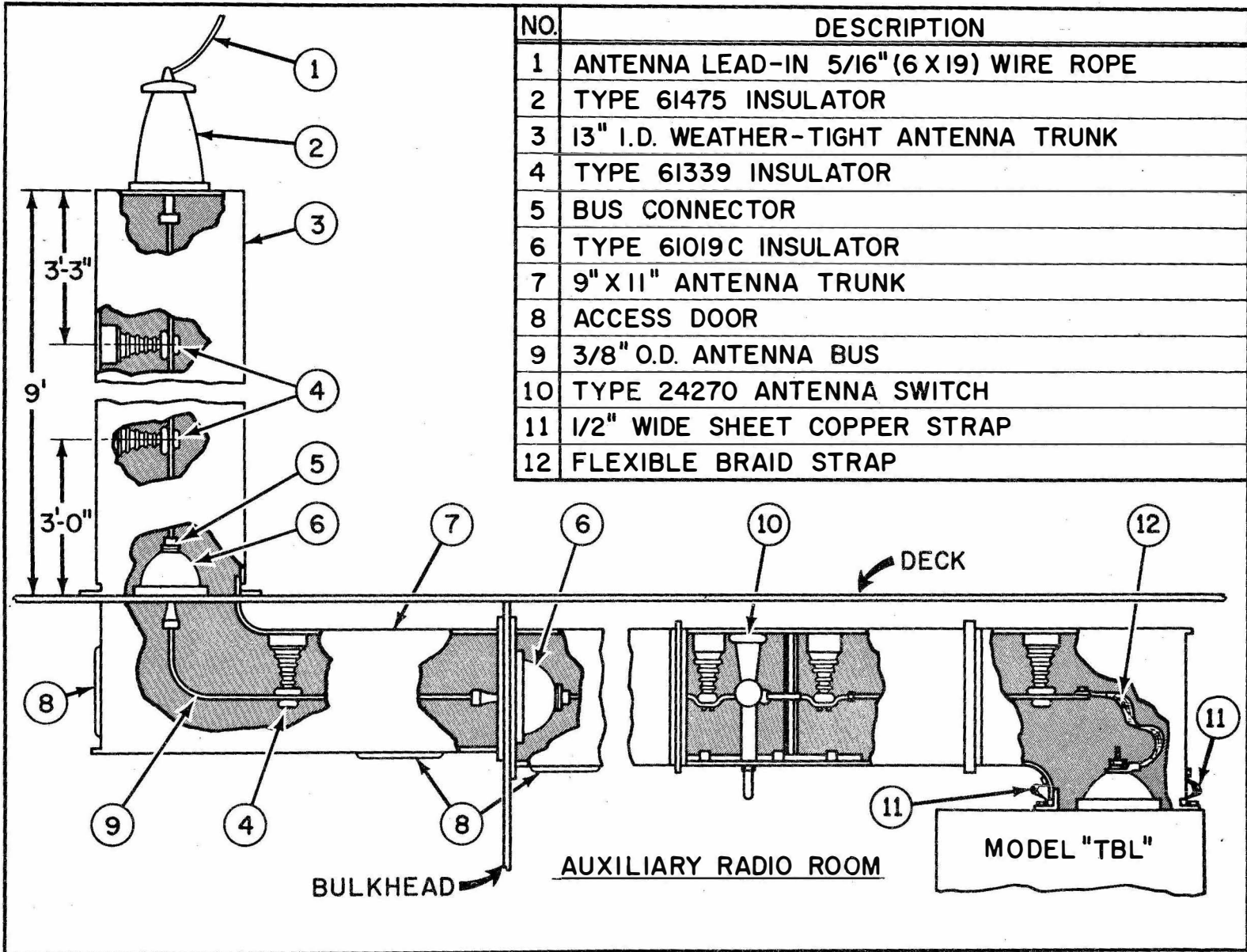
(3) Eighteen by twenty inches for transmitters having a frequency range of 175 to 600 KC and an output of no greater than 500 watts.

b. **MATERIAL SPECIFICATIONS.**—The shell of antenna trunks shall be fabricated of sheet steel conforming with Military Specification MIL-S-16113, Grade M, Type I, of a minimum thickness of 0.094 inch with a copper cladding of not less than 0.008 inch on the inside of the finished shell.

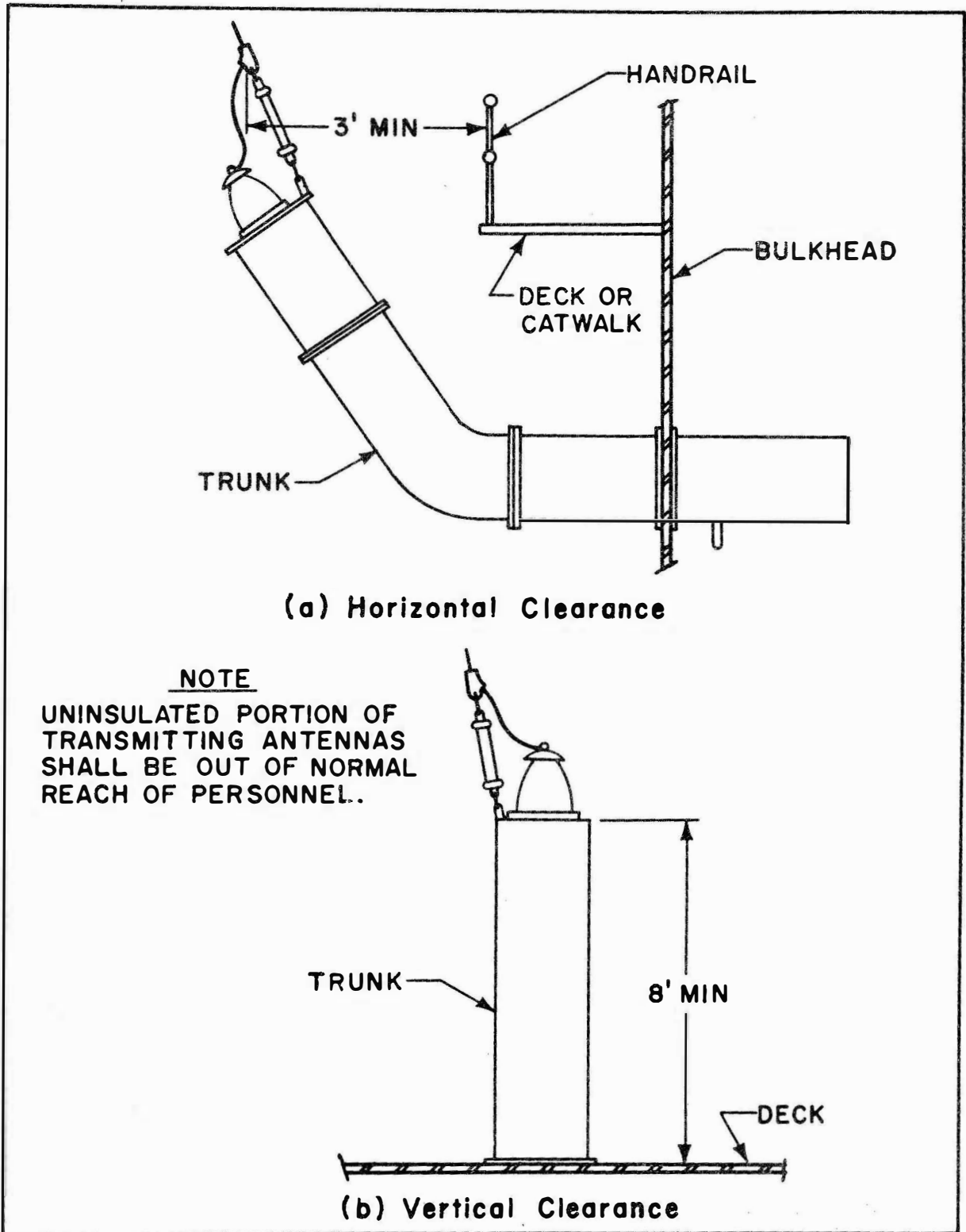
For applications requiring aluminum shells for antenna trunks, such as in mine sweepers where the magnetic signature must be kept low, the aluminum should be 61-ST-6, in accordance with Federal Specification QQ-A-327, with a minimum thickness of 0.125 inch. After fabrication, and before installation, the aluminum shell shall be anodized by an electrolytic chromic acid process, Military Specification MIL-A-8625, or a chemical process MIL-C-5541.

TABLE 16-1. TYPICAL SHIPBOARD RADIO TRANSMITTING ANTENNA TRUNKS.

XMTR (MOD)	ANT BUS (OD)	STANDOFF INS		TRUNK DIM. (IN.)	DISC. DEVICE	BHD/DK INS (INSIDE)	ENT INS (OUTSIDE)
		TYPE	APPROX SP				
TAD	3/8"	61339	36"	9 x 11	24270	61019C	61475
TAJ	3/8"	61339	48"	9 x 11	24270	61019C	61475
TAQ	3/4"	61338	60"	18 x 20	RE66F 312	61475	61475
TBA	3/8"	61339	36"	9 x 11	24270	61019C	61475
TBK	3/8"	61339	36"	9 x 11	24270	61019C	61475
TBL	3/8"	61339	48"	9 x 11	24270	61019C	61475
TBM	3/8"	61339	36"	9 x 11	24270	61019C	61475
TBN	3/8"	61339	36"	9 x 11	24270	61019C	61475
TBU	3/4"	61338	60"	18 x 20	RE66F 312	61475	61475
TCE	3/8"	61175A	48"	6 x 8	24206	61019C	61475
TCH	3/8"	61175A	48"	6 x 8	24206	61471	61019C
TCJ	3/8"	61339	48"	9 x 11	24270	61019C	61475
TCK	3/8"	61339	36"	9 x 11	24270	61019C	61475
TCO	3/8"	61175A	48"	6 x 8	24206	61471	61471
TCP	3/8"	61175A	48"	6 x 8	24206	61471	61019C
TCQ	3/8"	61175A	48"	6 x 8	24206	61471	61471
TCS	3/8"	61175A	48"	6 x 8	24206	61471	61471
TCU	3/8"	61175A	48"	6 x 8	24206	61019C	61019C
TCX	3/8"	61175A	48"	6 x 8	24206	61471	61471
TCZ	3/8"	61175A	48"	6 x 8	24206	61019C	61019C
TDA	3/8"	61339	48"	9 x 11	24270	61019C	61019C
TDB	3/8"	61339	36"	9 x 11	24270	61019C	61019C
TDE	3/8"	61775A	48"	6 x 8	24206	61019C	61019C
TDJ	3/8"	61339	36"	9 x 11	24270	61019C	61019C



ORIGINAL



The antenna bus shall be copper tubing in accordance with Federal Specification, WW-T-799. Refer to table 16-1 for outside diameter of copper tubing to be used.

c. INSULATORS. — The types of insulators used with the various sizes of antenna trunks are shown in table 16-1. All insulators shall be mounted with bolts, studs, or screws: brazing or welding is not acceptable.

(1) STANDOFF INSULATORS.—The Standoff or pedestal type insulators are used to support antennas or open-wire transmission lines away from the ship's structure. These insulators have found general application as an antenna bus insulator in trunk lines between the transmitter and the antenna. These insulators are mounted on soft rubber pads, 1/4 inch thick and of the same diameter as the insulator base. Pads are fabricated of rubber conforming to Military Specifications MIL-R-880 or MIL-R-900. The different types of standoff insulators are illustrated in figures 16-3, 16-4, and 16-5. Descriptions and specifications are included in the applicable figures.

(2) ENTRANCE INSULATORS.—This type insulator is mounted on the terminating (antenna) end of an antenna trunk. An insulator of this type consists of various parts. These parts are listed in table 16-2 with materials and specifications. Installation of this type insulator shall include a corona shield, and an approved type of water proof gaskets. Refer to figures 16-6, 16-7 and 16-8 for illustrations of this type insulator. Description and specifications are included in applicable figures.

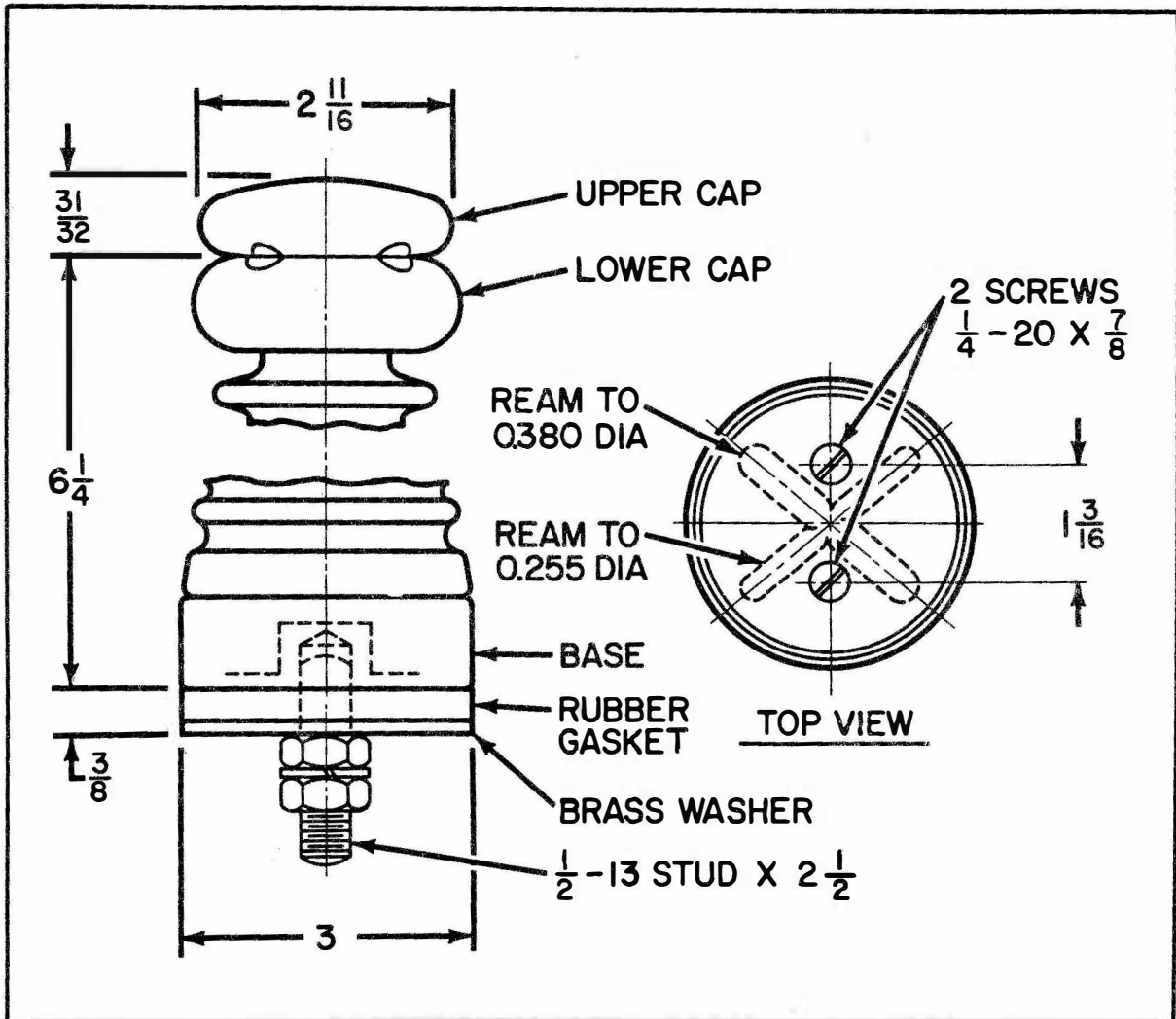
(3) FEED THROUGH OR (BULKHEAD) INSULATORS.—This type insulator is identical to the entrance insulator. When this insulator is installed in an antenna trunk it need not be provided with the corona shield. This insulator finds general application in isolating the antenna feed line as it passes through a structural part of the ship.

d. ANTENNA SWITCHES.—Antenna switches are used in shipboard installations to provide a means of either disconnecting the antenna from the radio transmitter or grounding the antenna. Antenna switches shall be of the type specified, or fabricated in accordance with the BuShips plans. The types of switches used in shipboard trunk installations are as follows:

(1) NAVY TYPE 24270.—Antenna Disconnect switch Navy Type 24270 is shown in figure 16-9. This disconnect switch is essentially a section of the antenna trunk containing a single-pole, three-position knife switch. The three positions are marked on the cover: "GROUND", "CLOSED", and "OPEN". This switch has a shield or blanking off plate, which is inserted into the trunk section of the switch between the switch mechanism and the bus leading to the transmitter. An interlock prevents the shield from being inserted into the slide except when the switch is in the grounded position. After the shield has been inserted into the slide, it locks the operating handle in the grounded position. This prevents closing the switch again before the shield has been removed. The trunk section of the switch is fabricated of copper-clad steel (copper cladding 0.008 inch thick inside only). See table 16-3 for specifications.

TABLE 16-2. INSULATOR PARTS.

NO. REQ'D	DESCRIPTION	MATERIAL	SPECIFICATION
4	Gasket	Neoprene	N. D. Spec. 33R1 Class 1 or 2
1	Insulator Bowl	Ceramic	JAN-1-10 Grade L-2
6	Pin 1/8" DIA x 13/16" long	Stainless Steel	
1	Shield	Brass	N. D. Spec. 46B6
6	1/2" 13 N. C. HEX. NUT	Brass or Bronze	N. D. Spec. 46B6 if machined 46B8 or 46B23 if cast.
7	Lockwasher 1/2" x 13/16" x 1/8"	Phospor Bronze	
6	1/2" - 13 N. C. STUD	Brass	N. D. Spec. 46B6
1	Flange Ring	Brass or Bronze	N. D. Spec. 46B6 if machined 46B8 or 46B23 if cast.
1	Clamping Ring	Brass or Bronze	N. D. Spec. 46B6 if machined 46B8 or 46B23 if cast.
7	1/2" - 13 N. C. Acorn Nut	Brass or Bronze	N. D. Spec. 46B6 if machined 46B8 or 46B23 if cast.
1	Terminal	Brass or Bronze	N. D. Spec. 46B6 or 46B23
1	Spacer	Brass	N. D. Spec. 46B6 (Type 61019C only)
1	Special HEX. Nut	Brass or Bronze	N. D. Spec. 46B6 if machined 46B8 or 46B23 if cast.
1	Conductor Rod	Bronze	N. D. Spec. 49B3 (Type 6019C)
1	Conductor Rod	Bronze	N. D. Spec. 46B6 (Type 61475)

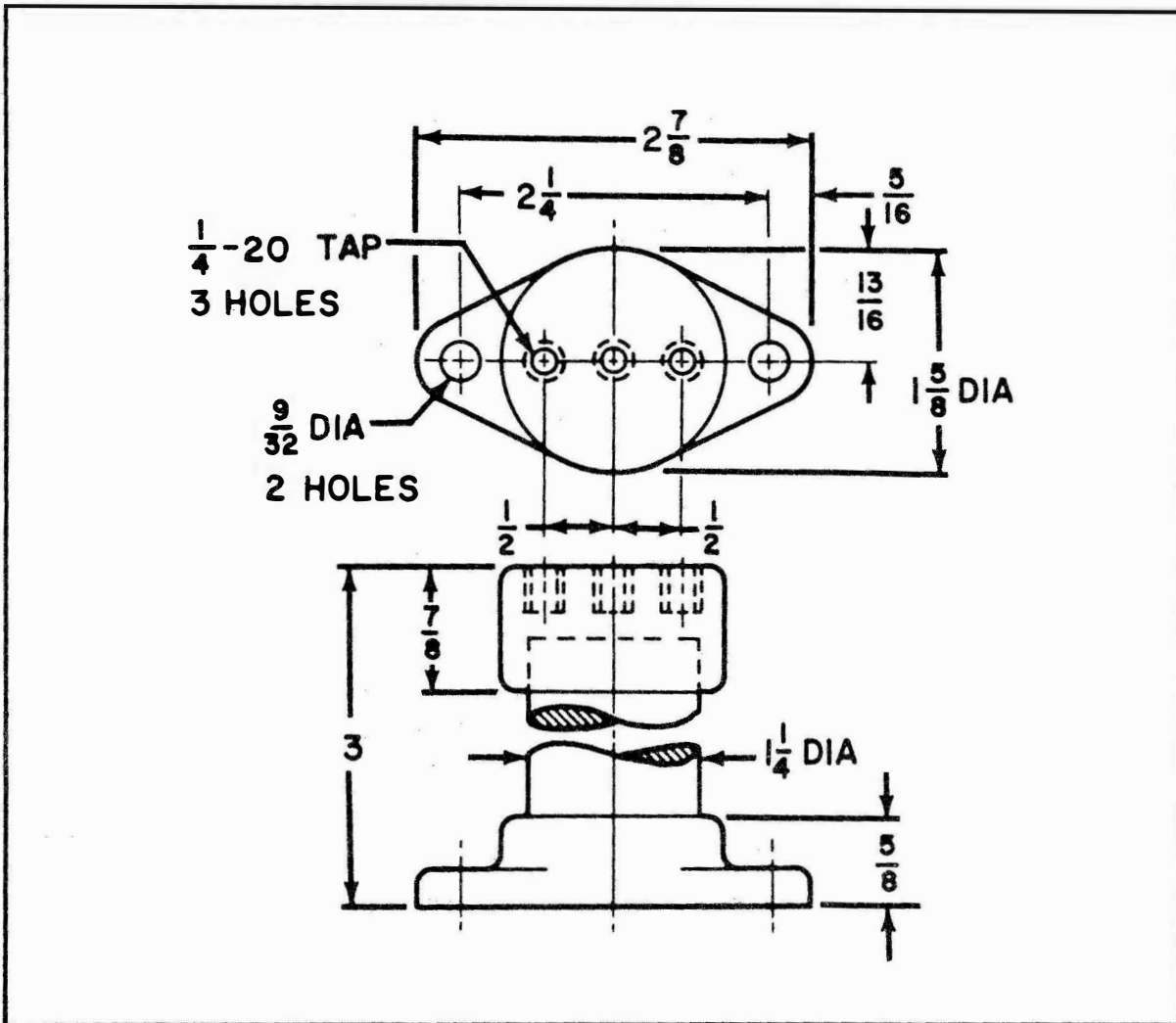


DESCRIPTION. - Standoff Insulator, Navy Type 61339, may be used to support a 1/4 inch or a 3/8 inch conductor.

MATERIAL:

BODY.....	Brown Glazed Porcelain, Grade L2
BASE AND CAPS	Brass or Bronze
DRY VOLTAGE BREAKDOWN	40 KV
ULTIMATE TENSILE STRENGTH	1800 LB
ULTIMATE COMPRESSION LOAD	12,500 LB
CANTILEVER STRENGTH:	
MINIMUM.....	200 LB
ULTIMATE.....	400 LB
CONTINUOUS WORKING.....	120 LB
APPROXIMATE WEIGHT	7-3/4 LB
FEDERAL STOCK NUMBER.....	N5970-117-4944
REFERENCE.....	BUSHIPS DWG RE-61F-262

Figure 16-3. Standoff Insulator Type 61339



DESCRIPTION. - Standoff Insulator, Navy Type 61174B, consists of a cylindrical ceramic body with a metal base and cap.

MATERIAL:

BODY Ceramic, Brown, Glazed
 BASE AND CAP Brass

TENSILE STRENGTH:

MINIMUM 650 LB
 ULTIMATE 900 LB

CANTILEVER STRENGTH:

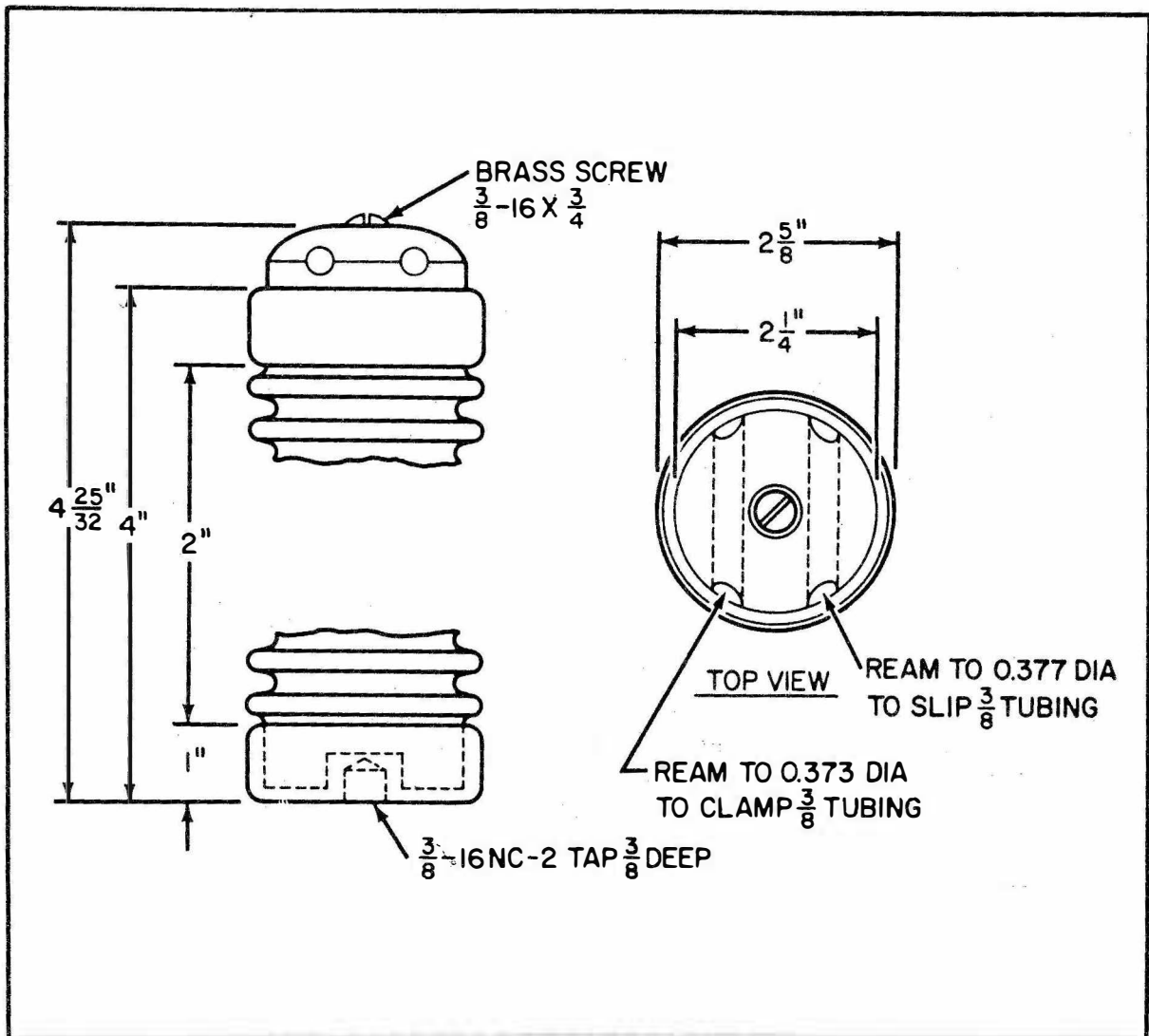
MINIMUM 170 LB
 ULTIMATE 240 LB
 CONTINUOUS WORKING 120 LB

APPROXIMATE WEIGHT 1-1/2 LB

FEDERAL STOCK NUMBER N5970-175-2870

REFERENCE BUSHIPS DWG RE-61A-247

Figure 16-4. Standoff Insulator Type 61174B



DESCRIPTION. - Standoff Insulator, Navy Type 61175A, may be used to support a 3/8 inch conductor.

MATERIAL:

BODY Porcelain Grade L2
 BASE AND CAP Brass
 COLOR Brown Glazed

TENSILE STRENGTH:

MINIMUM 1,000 LB
 ULTIMATE 2,000 LB

CANTILEVER STRENGTH:

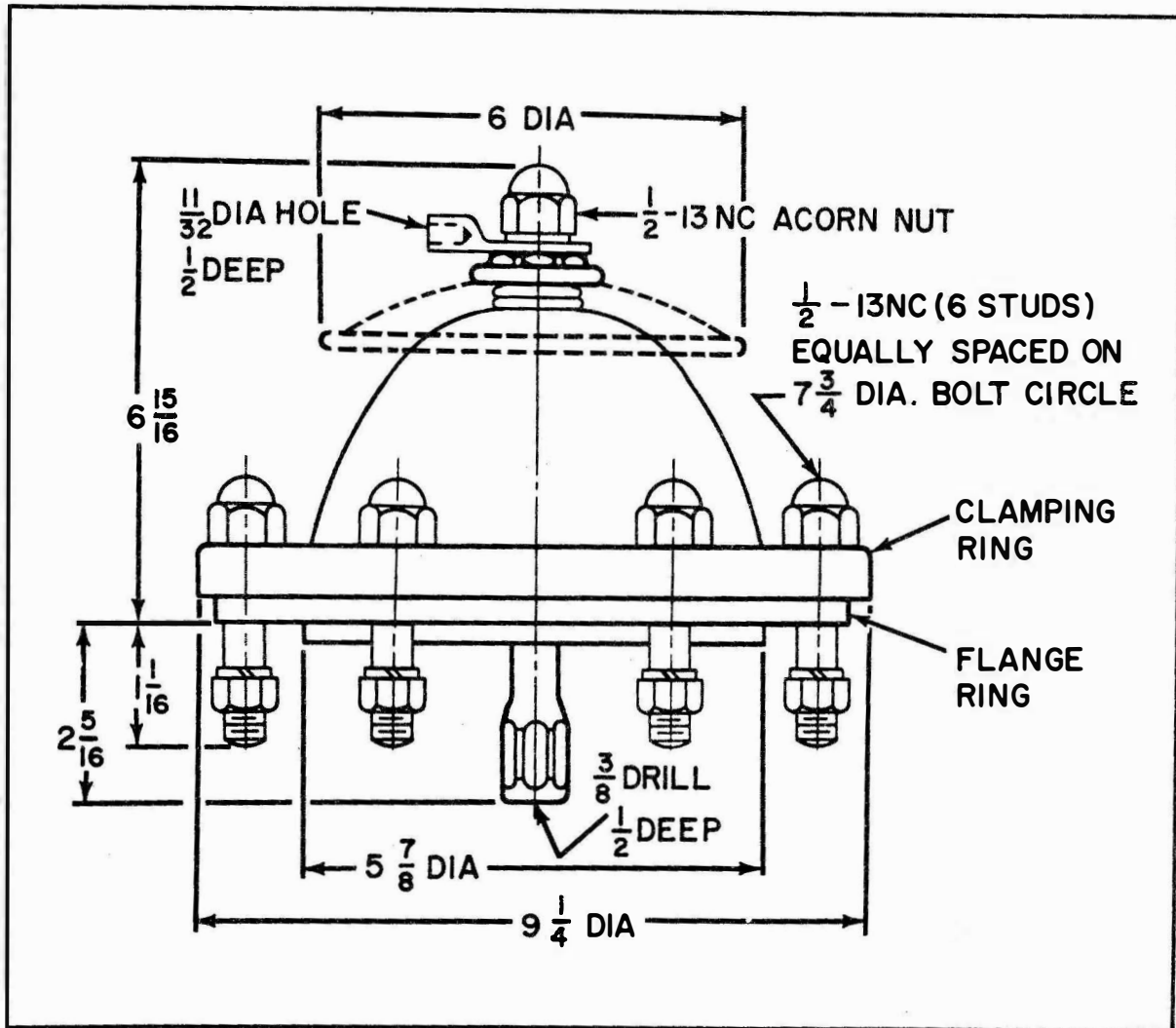
MINIMUM 525 LB
 ULTIMATE 750 LB

APPROXIMATE WEIGHT 3-3/4 LB

FEDERAL STOCK NUMBER N5970-284-4296

REFERENCE BUSHIPS DWG RE-61AA-249

Figure 16-5. Standoff Insulator Type 61175A



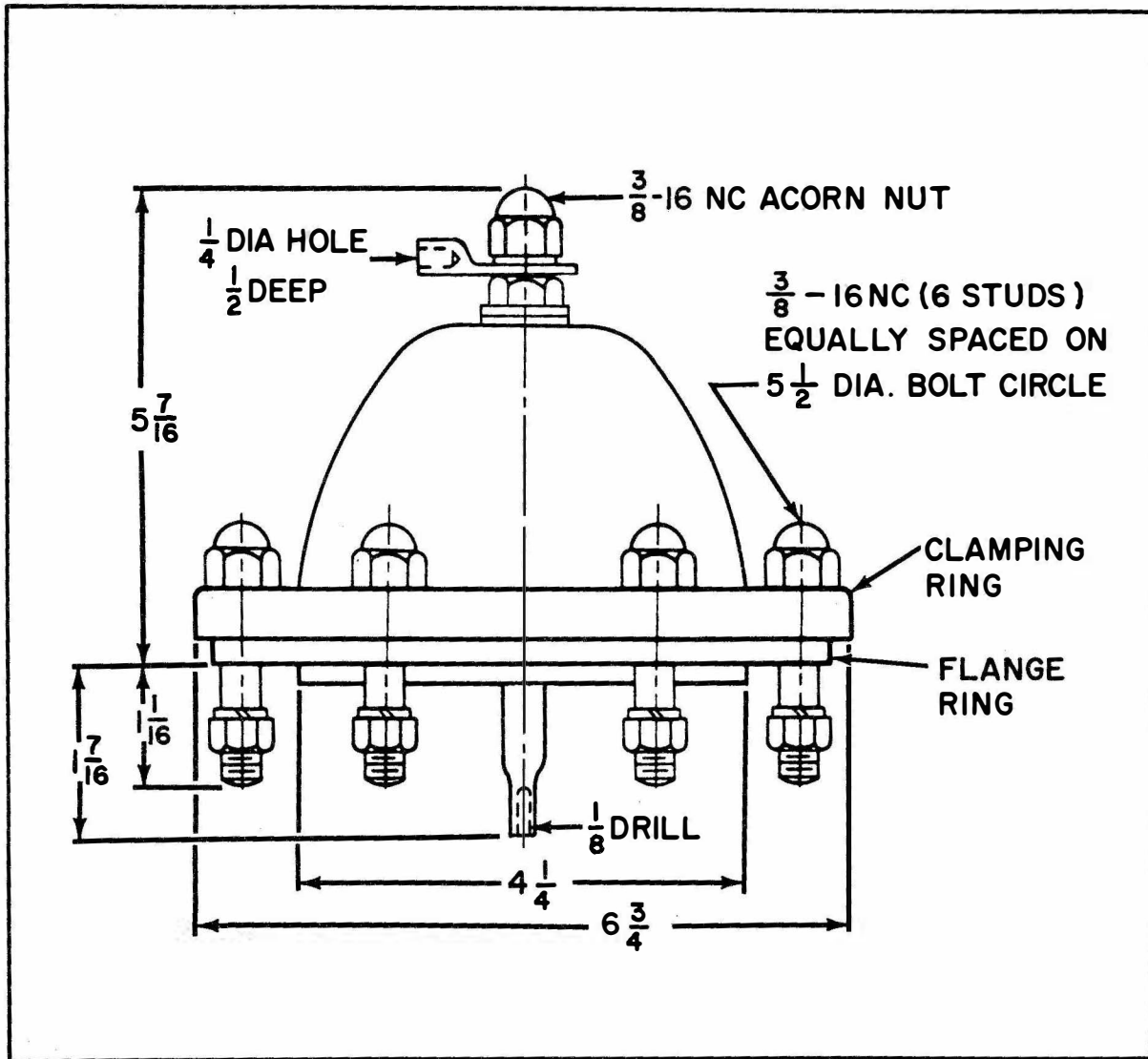
DESCRIPTION. - Entrance Insulator, Navy Type 61019C, consists of a bell shaped bowl (JAN Type NP2B4701), conductor rod, flange ring, clamping ring, corona shield, and necessary gaskets, washers, spacers, studs, nuts, pins, and a lug terminal. When the bowl is shipped separately, four neoprene gaskets are shipped with it.

MATERIAL:

BOWL	Brown Glazed Ceramic, Grade L2
CONDUCTOR ROD	Bronze
FLANGE RING	Brass or Bronze
CLAMPING RING	Brass or Bronze
CORONA SHIELD	Bronze

DRY FLASHOVER TEST	50 KV Peak
APPROXIMATE WEIGHT	16-1/2 LB
FEDERAL STOCK NUMBER	N5970-665-0490
REFERENCE	BUSHIPS DWG RE-61F-203

Figure 16-6. Entrance Insulator Type 61019C

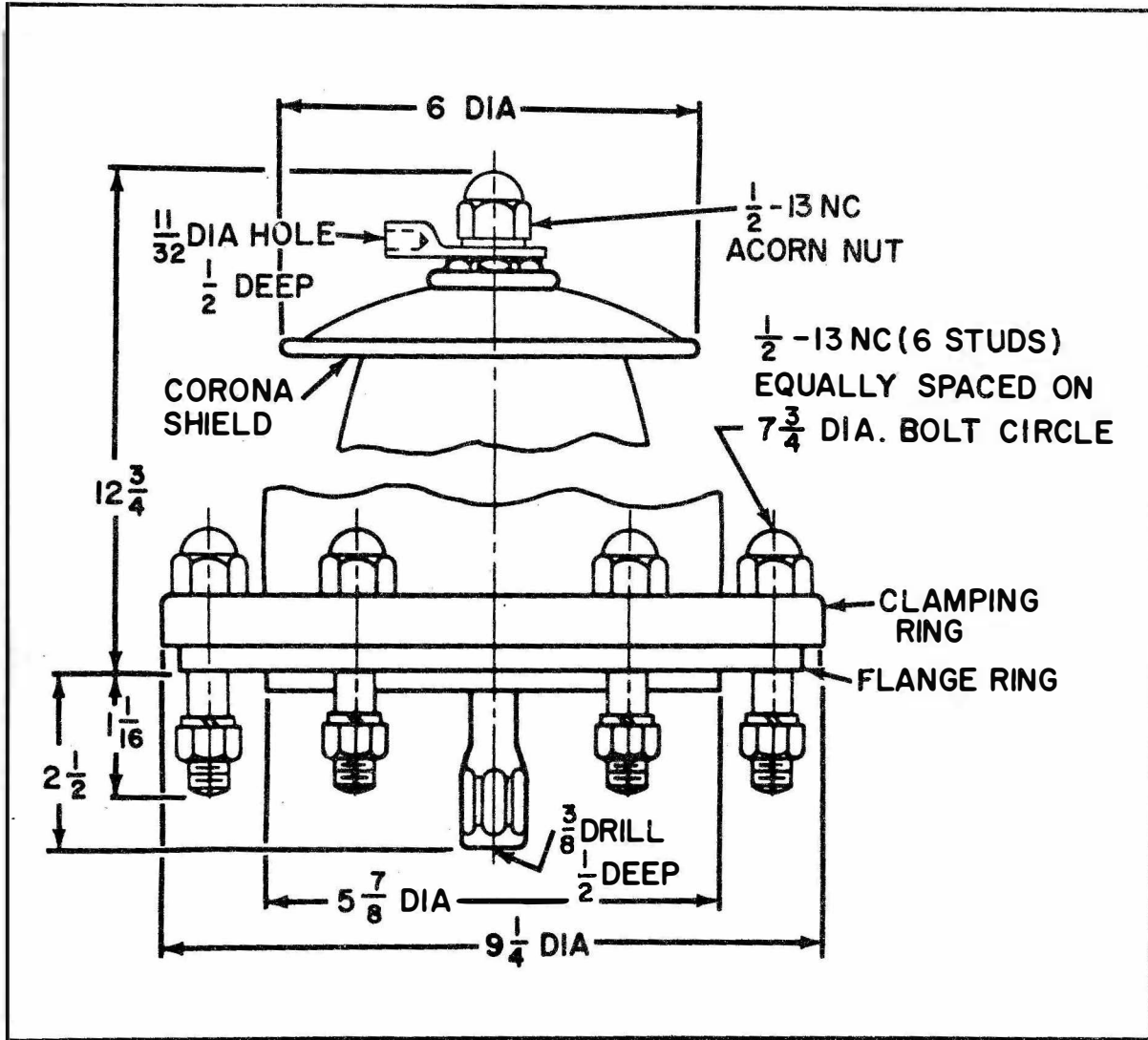


DESCRIPTION. - Entrance Insulator, Navy Type 61471, consists of a bowl (Navy Type 61470), conductor rod, flange ring, clamping ring, and necessary gaskets, washers, studs, nuts, and lug terminal. When the bowl is shipped separately, four neoprene gaskets are shipped with it.

MATERIAL:

BOWL	Brown Glazed Ceramic, Grade L2
CONDUCTOR ROD	Bronze
FLANGE RING	Brass or Bronze
CLAMPING RING	Brass
DRY FLASHOVER TEST	20 KV Peak
APPROXIMATE WEIGHT	6-1/2 LB
FEDERAL STOCK NUMBER	N5970-117-4973
REFERENCE	BUSHIPS DWG RE-61F-293

Figure 16-7. Entrance Insulator Type 61471



DESCRIPTION. - Entrance Insulator, Navy Type 61475, consists of a dome shaped bowl (Navy Type 61476), conductor rod, clamping ring, flange ring, corona shield, and necessary washers, gaskets, bolts, nuts, and lug terminal.

MATERIAL:

BOWL	Brown Glazed Porcelain, Grade L2
CONDUCTOR ROD	Bronze
FLANGE RING	Brass or Bronze
CLAMPING RING	Brass or Bronze
CORONA SHIELD	Brass

DRY FLASHOVER TEST	50 KV Peak
APPROXIMATE WEIGHT	24 LB
FEDERAL STOCK NUMBER	N5970-280-9948
REFERENCE	BUSHIPS DWG RE-61F-298

Figure 16-8. Entrance Insulator Type 61475

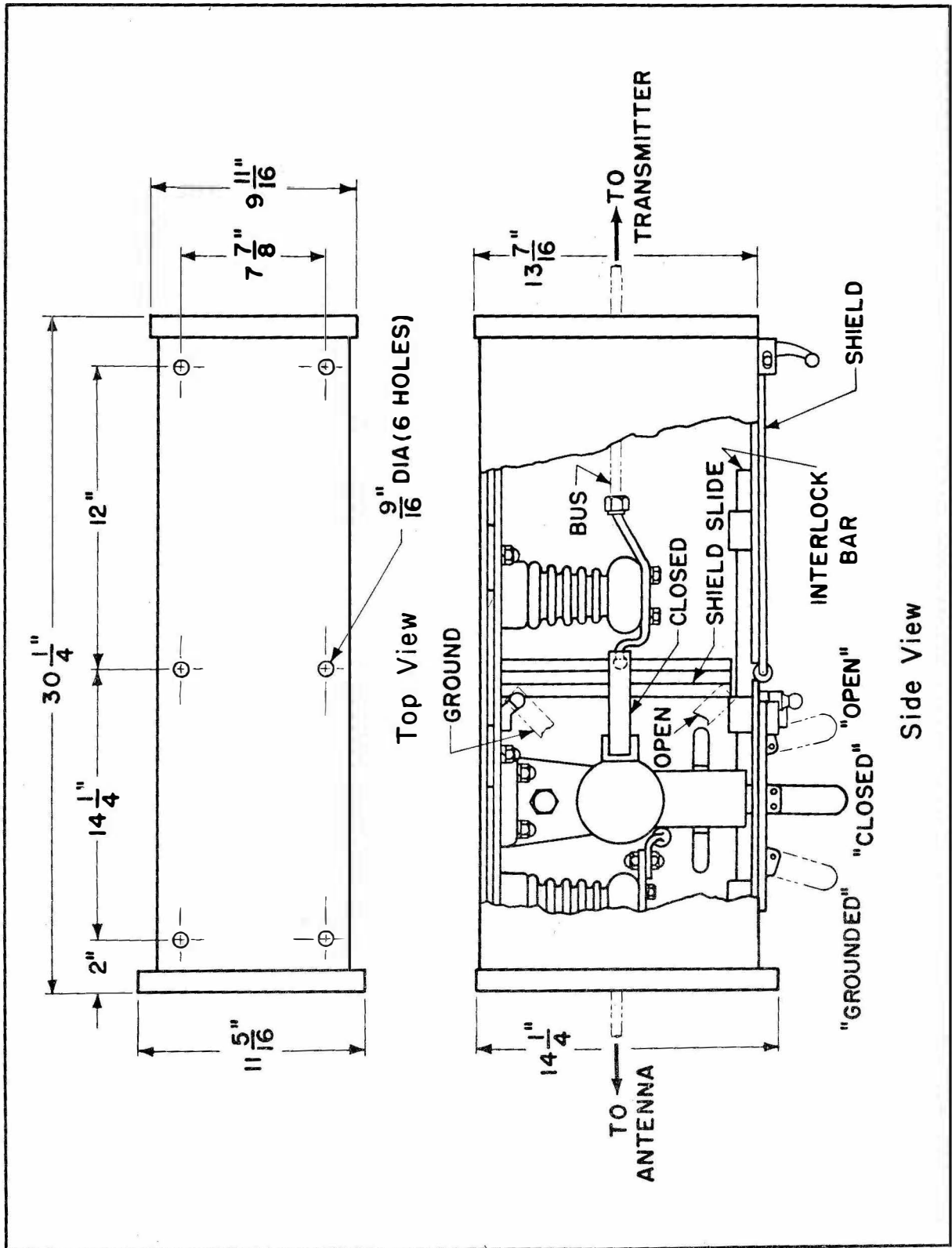


Figure 16-9. Antenna Disconnect Switch Type 24270

(2) **NAVY TYPE 24206.**—Antenna disconnect switch Navy Type 24206 is shown in figure 16-10. This disconnect switch is a single-pole, double-throw knife switch. It has two positions: "CLOSED" and "GROUNDED". In the "CLOSED" position the radio transmitter is connected to the antenna. In the "GROUNDED" position the antenna is grounded and the transmitter is disconnected from the antenna. The switch contains two Navy Type 61175A insulators as supports. It has two compression type terminals for clamping on a 3/8 inch OD copper antenna bus (see table 16-3 for specifications).

(3) **NAVY TYPE 24223.**—Antenna disconnect switch Navy Type 24223 is shown in figure 16-11. This disconnect switch is a single-pole, double-throw knife switch. It has two positions: "CLOSED" and "GROUNDED". In the "CLOSED" position the radio transmitter is connected to the antenna. In the "GROUNDED" position the antenna is grounded and the transmitter is disconnected from the antenna. It has a bus bar clamp type terminal in the ends for clamping on a 3/8 inch OD copper antenna bus. The switch is supported by two Navy Type 61174B insulators (see table 16-3 for specifications).

TABLE 16-3. ANTENNA DISCONNECT SWITCHES

TYPE	AMPERAGE	VOLTAGE	FIN	RG DWG NO.
24270	200	15000	N5930-412-1056	24J161A
24206	200	7500	N5930-472-1631	24F146
24233	100	2500	N5930-412-1058	24F147

e. **INSTALLATION.**—Antenna trunks shall be continuous both mechanically and electrically from the transmitter to the antenna end of the trunk.

(1) **LENGTH.**—They shall be as short and as free from bends as practicable. The inside corner of all trunk bends shall have a minimum radius of three inches.

(2) **ACCESS.**—Access doors or removable sections shall be provided to permit inspection and maintenance of all pedestal and feed through insulators enclosed in the trunk.

(3) **SEAMS.**—Each seam and joint in which continuity of shielding or electrical conductivity must be maintained shall be welded.

(4) **INTERIOR.**—The inside of the trunk shall be free of dirt, scale, oil, water, or oxidation. All plane surfaces shall be smooth; screws, bolts, burrs or sharp edges shall not protrude from the inside surface of trunks. All joints shall be free of rough or jagged edges or slag resulting from welding.

(5) **INNER CONDUCTOR.**—The inner conductor shall be free of kinks, dents, rough spots, or other deformations. When necessary to join inner conductors to form a continuous length, a copper sleeve shall be fitted over the ends of the inner conductor and soldered. The inner conductors are supported by means of standoff insulators of the type described in paragraph 16-1c.(1) of this section.

CAUTION

Paint, varnish, shellac, grease or any form of coating shall not be applied to the inner conductor, to any metallic portion of any insulator in contact with the inner conductor, nor to any portion of ceramic or phenolic insulating materials forming a part of the antenna system.

(6) **BONDING.**—The transmitter end of the trunk shall be bonded to the transmitter by at least two straps in accordance with BUSHIPS drawing RE-66-D-2071. The straps shall be sheet copper or brass not less than 0.020 inch thick by 1/2 inch wide.

(7) **PAINTING.**—The inside and outside of trunk shells shall be painted in accordance with section S19-1 of the BUSHIPS Manual.

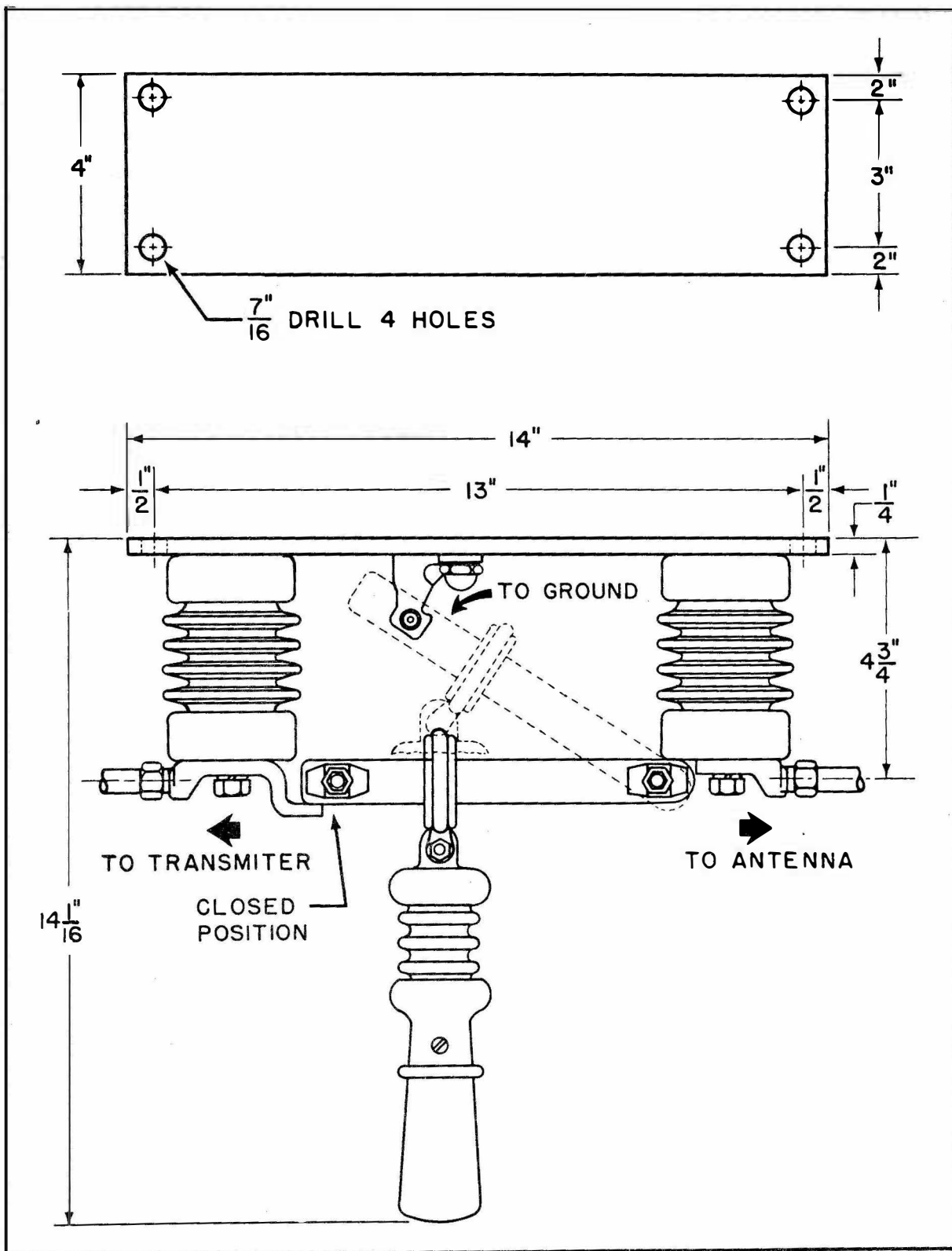


Figure 16-10. Antenna Disconnect Switch Type 24206

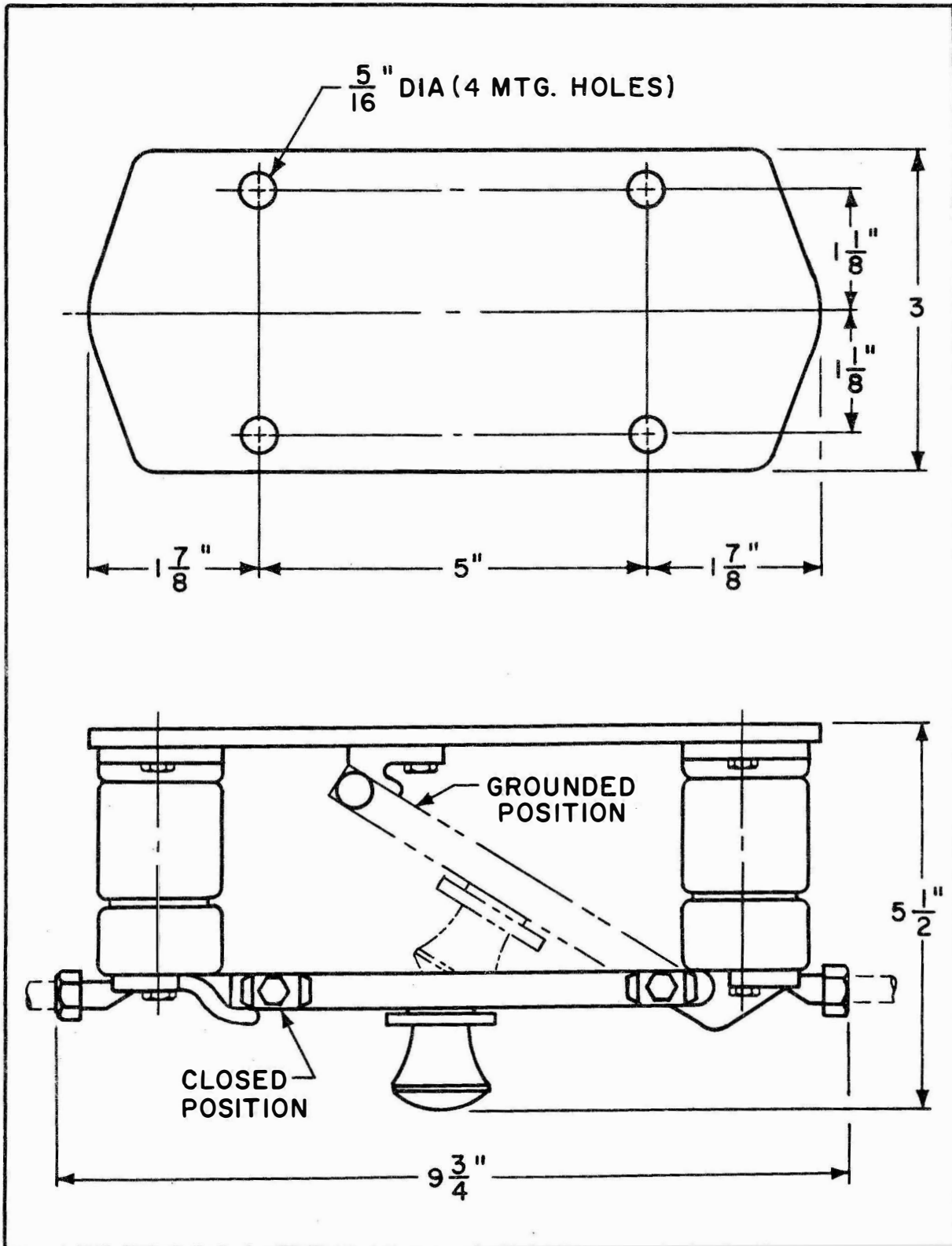


Figure 16-11. Antenna Disconnect Switch Type 24223