THE NATIONAL ELECTRICAL CODE (NFPA 70) AS IT APPLIES TO AMATEUR RADIO STATIONS.

FIGURES FOR THE ARTICLE.

1 Appendix of Useful Tidbits of Miscellaneous Information

The following pages contain diagrams, figures, and other sorts of information that might be useful in your setting up of an amateur radio station to meet the National Electrical Code. These tidbits of information have been excerpted from various sources, as noted.

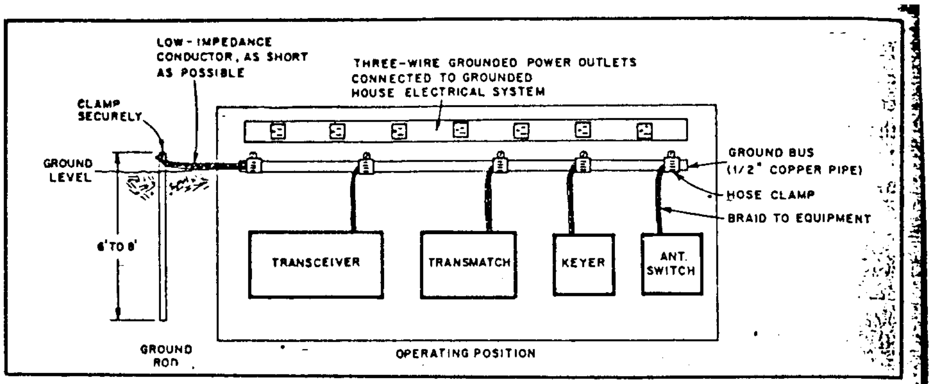

Fig. 6 — An effective station ground bonds the chassis of all equipment together with low-impedance conductors and ties into a good earth ground.

Figure 1: ARRL suggested station grounding system (from the ARRL 1990 Radio Amateur Handbook). Note the use of *very heavy* conductors for low impedance.

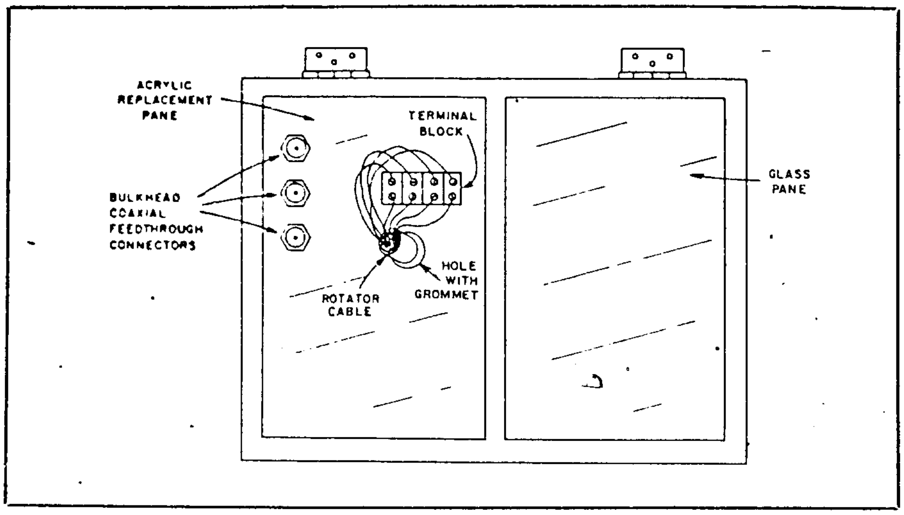

Fig. 39 — A window pane may be replaced with an acrylic sheet and then drilled to pass cables.

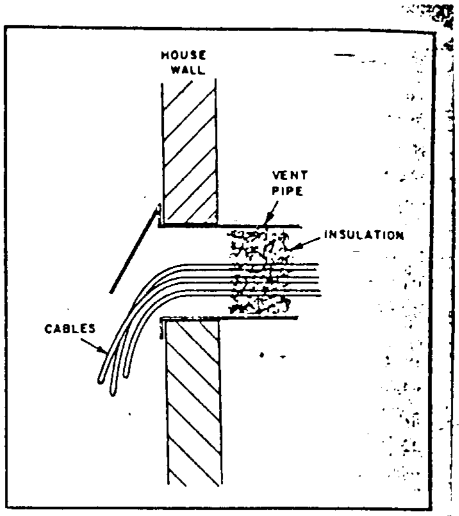

Fig. 40 — An ordinary dryer vent pipe will pass a large number of cables.

Figure 2: ARRL suggested window or wall cable entry for low impedance coaxial, *insulated* twinlead, or antenna rotor cable (from the ARRL 1990 Radio Amateur Handbook).

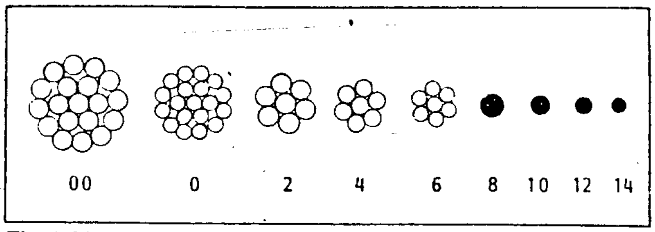

Fig 1-31. AWG wire sizes.
AWG = American Wire Gage.
Diameters of typical wires without insulation. Note that the larger the gage number, the smaller the diameter.

Table 1-15. Ampacity of copper wire.
Column A = **TW** and **RUW** wire and **UF**, and **NM-B** cable.
Column B = **THW**, **THWN**, **RHW**, and **XHHW** wire and **USE** cable.
AWG 14-CU wire is only used for some equipment—not for branch circuits.
Based on *NEC Table 310-16*.

Wire size AWG-CU	Ampacity amperes A	B
14	15	15
12	20	20
10	30	30
8	40	50
6	55	65
4	70	85
3	85	100
2	95	115
1	110	130
0	125	150
00	145	175
000	165	200
0000	195	230

Figure 3: Relative sizes and ampacity of wire — AWG American Wire Guage (from MWPS-28, Farm Building Wiring Handbook, 1986, Iowa State University, Ames).

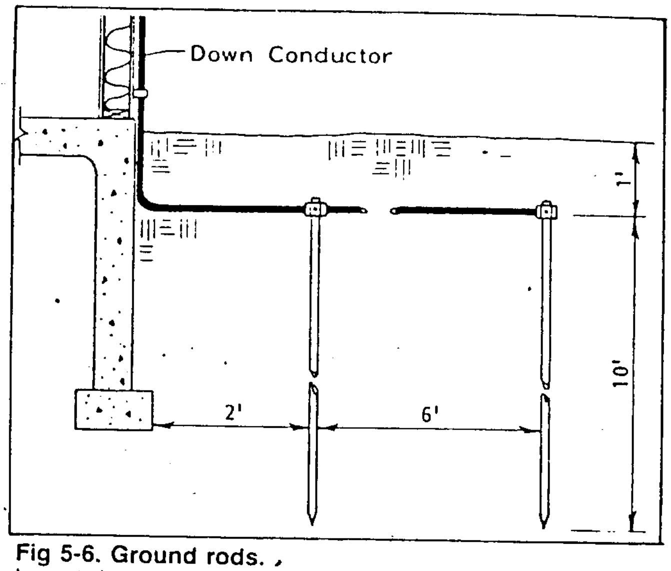

Fig 5-6. Ground rods.
In most clay soils, grounding is accomplished by clamping the conductor cable to a ground rod driven at least 10' into the ground. For sandy soils, connect 2 or 3 ground rods in parallel. Space them at least 6' apart and drive them 10' deep. Make connections between ground rods and conducting cables at least 2' from the foundation wall and 1' below ground level. This prevents damage to the foundation from pressures created by lightning dissipation in the ground.

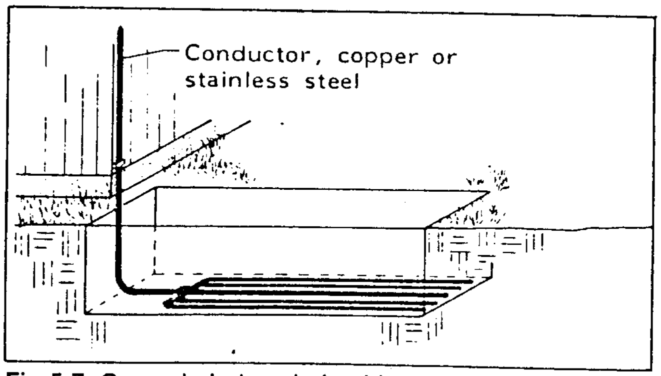

Fig 5-7. Grounded stranded cables.
Grounding in shallow topsoil can be done by stranding the copper or stainless steel conductor and burying it in a trench extending away from the building. Trenches 12' long and 1'-2' deep are used in clay soils. In sandy soils, trenches must be at least 24' long. When a 24' trench is not practical, attach a copper ground plate at least 0.032" thick with an area of 2 ft² to the cable at the end of the trench.

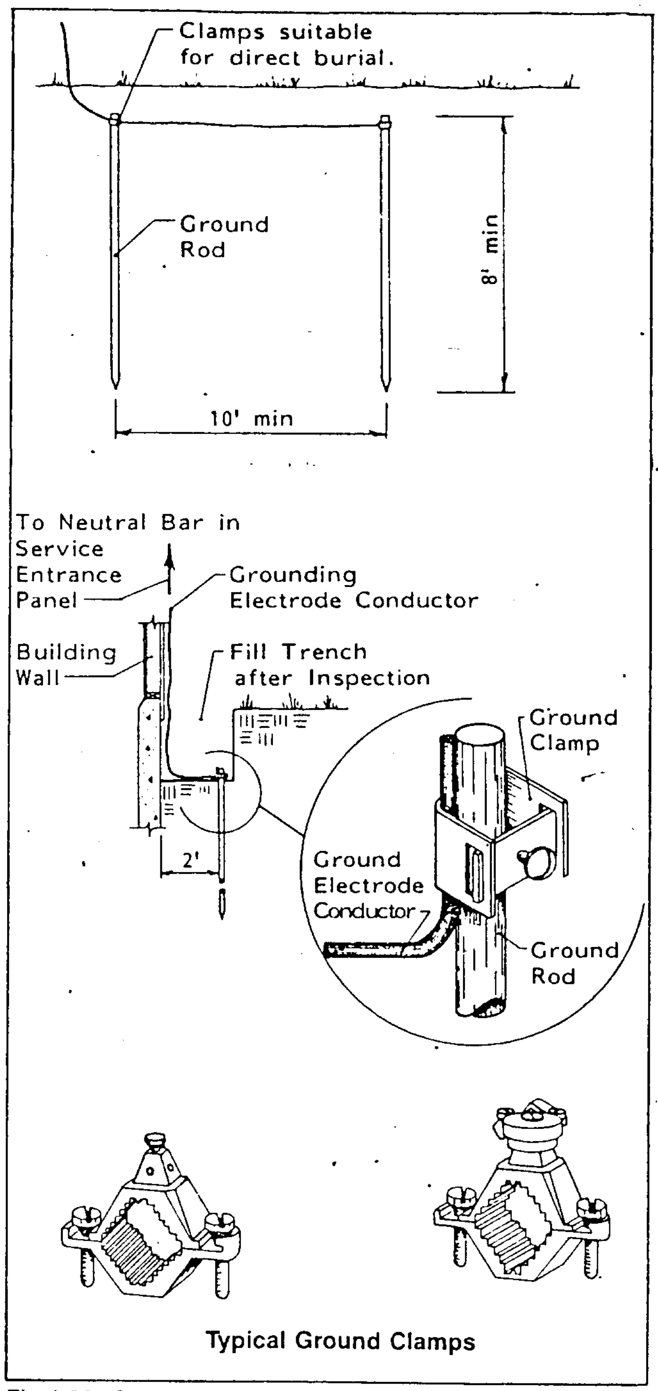

Fig 1-39. Ground rod installation.

Figure 4: Example ground systems (from MWPS-28, Farm Building Wiring Handbook, 1986, Iowa State University, Ames). Note: the NEC only requires 6 foot spacing between electrodes of the same or different systems.

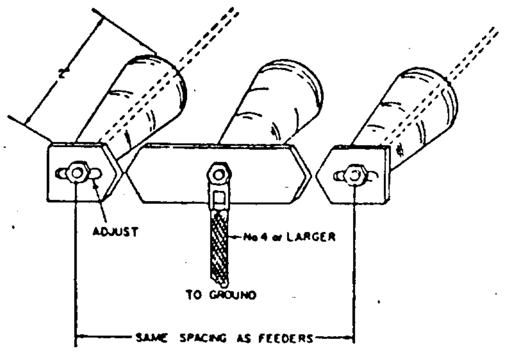

Fig. 23-3 – A simple lightning arrester made from three stand-off or feedthrough insulators and sections of a 1/8 × 1/2-inch brass or copper strap. It should be installed in the open-wire or Twin-Lead line at the point where it is nearest the ground outside the house. The heavy ground lead should be as short and direct as possible. Gap setting should be minimum for transmitter power.

Figure 5: ARRL suggested antenna discharge unit (lightning arrester) for use with high impedance fed antennas (from the ARRL 1978 Radio Amateur Handbook).

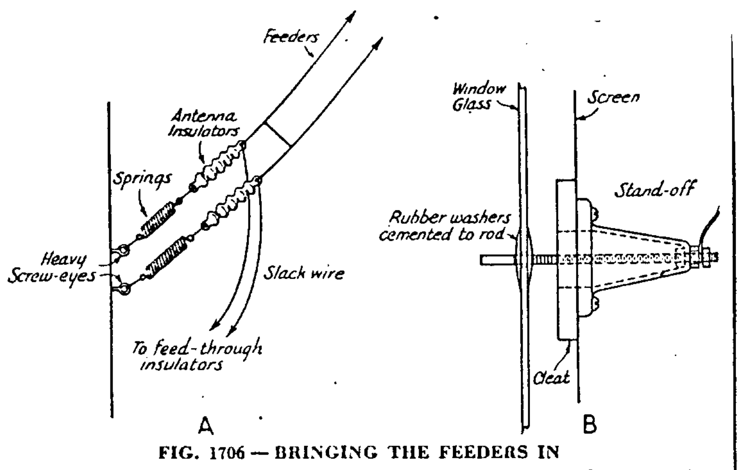

FIG. 1706 — BRINGING THE FEEDERS IN

A — Anchoring feeders to take strain from feed-through insulators or window glass. B — Going through a full-length screen. The cleat is fastened to frame of screen on inside of screen. Clearance holes are cut in the cleat and also in the screen. The rubber washers keep the weather out.

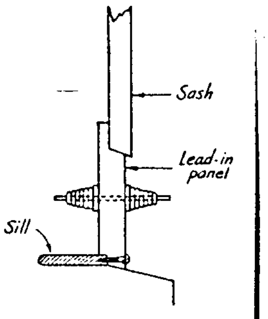

FIG. 1707 — ANTENNA LEAD-IN PANEL

It may be placed over the top sash or under the lower sash of window. The overlapping joint makes it weather-proof. The single thick board may be replaced by two thinner boards fastened together.

Figure 6: ARRL suggested antenna feedline entry methods for use with high impedance fed antennas (from the ARRL 1938 Radio Amateur Handbook).

Figure 7: General schematic representation summary of amateur radio requirements of the NEC (from Kenneth L. Gebert, National Electrical Code Blueprint Reading, 10th ed., 1986, American Techinical Publishing Co.).

Figure 8: The following pages contain examples illustrating various types of antenna stand-offs, feed-throughs, insulators, etc., that might be sought at hamfests for use in an amateur radio station to meet compliance with the NEC.

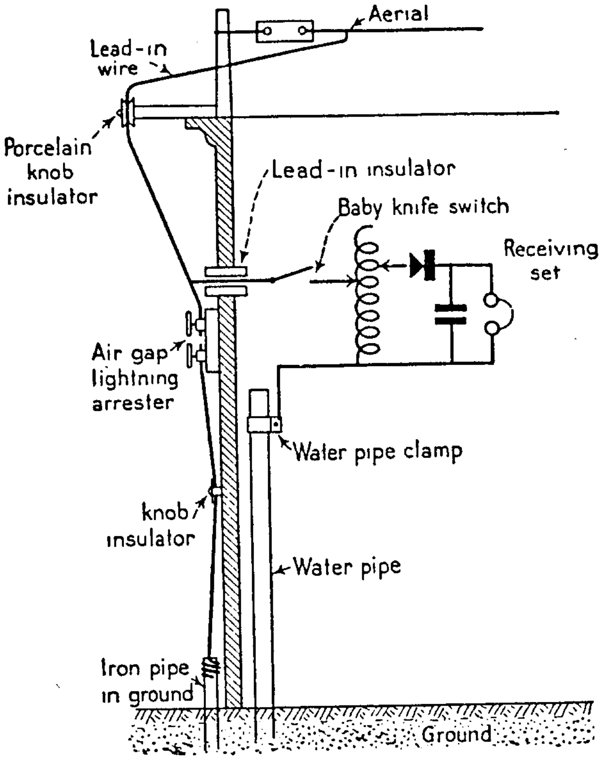

FIG. 8.—Aerial installation showing air-gap lightning arrester.

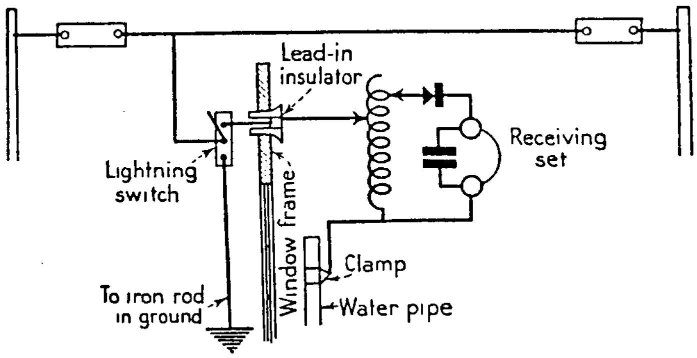

FIG. 9.—Aerial for receiving, using lightning switch instead of arrester.

they have a little daylight every noon. Soon their days will be as long as their nights, and in a few months more they will be having almost all daylight and the chief difficulty will be to get the traffic off during darkness. Then when the ice breaks up in midsummer the little "Bowdoin" will turn her nose towards home, expecting to return to Main in September. That means that you fellows who want the fun of working WNP had better try hard right now.

January reports on WNP follow; unless otherwise shown, calls listed report hearing WNP.

Jan. 1, 9CDO-6BUH; Jan. 2, 1ER, c9BP sent 18 msgs., 9ASC, 9AFM; Jan. 4, c9BP sent 11 msgs., 6ALO, 9DKB; Jan. 6, c9BP sent 7 and recd. 6 msgs., 9DKB; Jan. 7, c9BP sent 13 msgs., 7MN; Jan. 8, c9BP sent 4 and recd. 14 msgs., 6CBL, 6XAD and 9DKB both worked WNP and sent press and one message; Jan. 9, c9BP recd. 9 msgs., 7MN, 5ML, 6CBL, 9CNS, 9CCK; Jan. 10, 9EFH, 6CBL, 9DKB; Jan. 11, c9BP sent 8 and recd. 2 msgs., 9DKB sent 3 msgs., 7MN, 9EFH; Jan. 12, 7CO recd. 1 msg., 6CBL, 9DKB, 6XAD sent 300 wds. press; Jan. 13, 6CBL; Jan. 14, c4HH sent 11 and recd. 1 msg., 7OM worked WNP, 9DKB; Jan. 15, 7CO recd. 2 msgs., 1CMP, 9DKB; Jan. 16, c4HH; Jan. 17, 9DKB sent 2 and recd. 11 msgs., 6CBL; Jan. 19, 7RD, c4FV, 9BSM, 9DGC; Jan. 20, 9DKB sent 1 and recd. 4 msgs., 6CDV; Jan. 21, 1AJF, 6CJQ; Jan. 24, 9EFO.

—*K.B.W.*

Some Good Lead-In Insulators

By S. Kruse, Technical Editor

WHEN we used spark sets a lead-in bushing had to be large—if it wasn't the thing would flash over every time the key was touched. When tubes came in, the antenna voltages dropped and everyone seems to have decided that any old lead-in would answer. This is not correct.

What a C.W. Bushing Must Do

In tube work it is perfectly possible for a poor lead-in bushing to decrease the range of a station 25% altho it does not show any sign of sparks or brush discharges. This was not so with the spark and it is interesting to think over the reasons.

With the spark the bushing needed to resist flashover; that was about all. The peak voltages were terrible (often 100,000) but lasted such a short time that they caused no losses to speak of unless actual fireworks took place—and even they were seldom serious. With the tube set the voltages are much less (seldom over 5,000 volts) but they "hang on" as long as the key is down and as a result the losses *inside of the insulator* may run quite high. As a result we must use a bushing of material that acts well at radio frequencies (see the article "Some tests of Amateur Antenna Insulators" on page 24, May *QST**) and also the bushing must be so built that the leakage paths are "long and skinny". Finally it is necessary, for best results, to arrange even these "long and skinny" leakage paths in such a fashion that the tendency is for the electric strains to pass thru air instead.

THREE LEAD-INS SUITABLE FOR AMATEUR USE.
A— Type JD7 Telefunken Lead-In. Cast iron clamping ring and rubber gaskets shown alongside.
B—Electrose Lead-In. Type 8357-B.
C—Pyrex Glass Bowl, to be used in Lead-Ins.

*Can be obtained from the *QST* Circulation Dept. at the regular price.