**Question:** I am installing a Satellite TV system (18" DSS). It will be installed very near the electrical service. Is it okay to ground the dish mast and the coax grounding blocks to the same grounding rod for the electrical service or do I have to install a new 8 foot grounding rod for the dish mast as the instructions say?

**Mike Holt’s Answer:** No do not install a separate ground rod as the instructions say, because they are wrong!

The following is extracted from Mike’s *NEC Guide to Low-Voltage and Limited-Energy Systems*, [http://www.mikeholt.com/low/low.htm](http://www.mikeholt.com/low/low.htm).

Earth grounding is the intentional connection to earth through a ground connection or connections of sufficiently low impedance to prevent the destruction of electrical components, as well as electric shock that can occur from superimposed voltage from lightning, voltage transients, and contact with higher voltage systems. In addition, earth grounding helps prevent the build-up of static charges on equipment and material as well as establishing a zero voltage reference point to ensure the proper performance of sensitive electronic and communications systems equipment.

**Author's Comment:** Failure to properly earth ground communications systems has led to $500 million dollars of property or equipment damage annually due to lightning, surges, according to insurance industry data.

The impedance of the earth ground is dependent on the resistance of the electrodes, the termination resistance, contact resistance of the electrodes to the adjacent earth, and the resistance of the body of earth surrounding the electrodes. Most of the ground resistance comes from the resistivity of the soil, which the electrode is in contact. Minerals, moisture content, and temperature affect soil resistivity.

**Earth Grounding and Bonding of Communications Systems.** The *National Electrical Code* required earth grounding of telecommunications [800-40(b)], antennas and lead-in cables [810-21(f)], CATV [820-40(b)], and network-powered broadband communications systems [830-40(b)]. This is accomplished by bonding the communications systems to the building earth ground.

The communications systems must be bonded to any of the following earth ground locations:
1. Building or structure grounding electrode system as described in Section 250-50.
2. Interior metal water pipe meeting the requirements of Section 250-104(a). The limitation of 5 feet in Section 250-50 does not apply.
3. Metal service raceway.
4. Service equipment enclosure.
5. Building or structure grounding electrode conductor.
6. Metal enclosure enclosing the building or structure grounding electrode conductor.
7. Accessible bonding means such as six inches of No. 6 copper conductor connected to the service equipment or raceway [250-92(b)].

**Author's Comment:** When an electrode such as a ground rod is installed for the communications systems, it must be bonded with a No. 6 copper or larger bare or insulated conductor to the grounding electrode system at the building or structure served.

Termination – Earth grounding termination to the grounding electrode must be done by exothermic welding, listed lug, listed pressure connector, or by listed clamp. Earth grounding termination fittings that are concrete-encased or buried in the earth must be listed for direct burial and marked “DB” [800-40(c), 820-40(c), and 830-40(c)].

**Metal Raceway** – If the earth conductor is run in a metal raceway, then both ends of the metal raceway must be bonded to the earth-grounding conductor [800-40(a)(5), 810-21(d), 820-40(a)(5), and 830-40(a)(5)].

**Telecommunications (Telephone) Systems – Article 800**

*Earth Ground* – The metallic sheath of telephone cable and primary protectors must be grounded to the earth (electrode) as close as practicable to the point of entrance of the phone cable to the building or structure [800-33]. The earth grounding is accomplished by bonding the telephone’s grounding block to an acceptable earth ground with a No. 14 or larger insulated copper conductor run in as straight a line as practicable [800-40(a)].

**Outdoor Antenna, Satellite, and Other Receiving Systems [Article 810]**

Proper grounding of antenna mast and lead-in cables is somewhat effective in protecting receiving equipment from voltage surges, as well as voltage transients that result from lightning.

**Mast** – The metal structure that supports radio, HAM, television and satellite receiving antennas must be grounded to an acceptable earth ground [810-15] with a No. 10 copper bare or insulated conductor run in as straight a line as practicable [810-21].

**Author's Comment:** If the mast is not properly grounded, the Low Noise Block (LNB), as well as the dc rotor motors that control the positioning larger satellite dishes often will be destroyed by voltage surges caused by nearby lightning strikes.
**Lead-in Cable** – Each conductor (coaxial, control, and signal conductors) of a lead-in from an "outdoor antenna" must be provided with a listed antenna discharge unit (grounding block). The antenna discharge unit must be located outside or inside as near as practicable to the entrance of the conductors to the building and it must not be located near combustible material [810-20]. The discharge unit must be grounded to an acceptable earth ground [810-21(f)] with a No. 10 copper bare or insulated conductor run in as straight a line as practicable [810-21].

**Author’s Comment:** If each conductor of a lead-in from an outdoor antenna is not properly earth grounded, the receiver can be destroyed by voltage surges caused by nearby lightning strikes.

**CATV Systems [Article 820]**

*Earth Ground* – The metallic sheath of CATV cable entering a building or structure must be grounded to the earth as close as practicable to the point of entrance to the building or structure [820-33]. The earth grounding is accomplished by bonding the CATV’s grounding block to an acceptable earth ground with a No. 14 or larger insulated copper conductor run in as straight a line as practicable to the earth [820-40(a)].

**Author’s Comment:** CATV systems are often terminated at a location that is not near the electrical service, and since most new homes have nonmetallic water piping systems, CATV systems require that an insulated No. 14 grounding conductor run to an acceptable earth ground.

**CCTV and MATV Systems**

*Earth Ground* – Closed circuit television (CCTV) and master antenna television (MATV) circuits within a building do not have to be grounded to the earth. However, exposed coaxial cable that extends beyond the building must be earth grounded [810-2]. The metal sheath of coaxial cables (exposed to nearby lighting) that enters a building or structure must be grounded to an acceptable earth ground as close as practicable to the point of entrance to the separate building or structure [820-33]. The earth grounding is accomplished by bonding the CCTV grounding block to an acceptable earth ground with a No. 14 or larger insulated copper conductor run in as straight a line as practicable [820-40(a)].

**Network-Powered Broadband Communications Systems – Article 830**

*Earth Ground Cable* – The metallic sheath of network-powered broadband communications systems cable entering a building or structure must be grounded to the earth as close as practicable to the point of entrance to the building or structure [830-33]. The earth grounding is accomplished by bonding the NPBCS cable
(grounding block) to an acceptable earth ground with a No. 14 copper to a maximum No. 6 copper conductor (depending on the current-carrying capacity coaxial shield) run in as straight a line as practicable [830-40].

*Earth Ground Metal Raceway* – Metal raceways used for network power broadband entrance cable must be bonded to an acceptable earth ground with a No. 14 copper to a maximum No. 6 copper conductor depending on the current-carrying capacity coaxial shield [830-40 and 830-43(c) Exception].

**Additional Comments**

**From: Stromberg, Eric (ER)**
The reason many grounds are "lifted" from the coax cable grounding block is to eliminate noise in the picture caused by ground loops. Of course, lifting the ground is the wrong solution. A better solution is to isolate the ground of the incoming cable using two Baluns (acronym for BALancer-UNbalancer). The first Balun will be attached to the incoming 75OHM coax and will transform the signal to 300OHM twinlead. The second Balun will convert the signal from 300OHM twinlead back to 75OHM coax. In this way, the signal passes through to the receiver but the outside ground stops at the first Balun. Of course, the inside equipment is grounded. This solution allows everything to be grounded properly while minimizing ground loops and induced noise.

**From: John West**
The dish mast should be grounded to the service entrance ground. If it is not done in this manner a difference in ground potential will be present between the electrical service (AC reference) and the dish mast. It is preferable to have the building ground resistance as low as possible at the service entrance. Depending on the type of dish system (dual or single horn), it's a good practice to install high performance surge protection for the coax line(s), telephone line input, any local antenna, and the AC power at the receiver.