All electrical systems, be they large or small, should be planned with the following requirements in mind:

1. Safe; prevention of fire and shock hazards.
2. Adequate; size of components adequate for present and some future needs.
3. Convenient; outlets, switches and other devices should be placed where they are convenient to use.
4. Efficient; power can be obtained at least cost.
5. Easy to expand; as future requirements increase, they can be easily provided.

SAFETY

Compliance With Codes

All wiring must be done in accordance with national, state and local electrical codes. This is not only desirable from a safety standpoint, but in most cases is required by law.

Grounding

Grounding of all electrically operated equipment and switching devices is a very important safety consideration. Effective grounding is accomplished by connecting the ground wire where it enters each building to a metal cold water pipe which is continuous metal (not plastic pipe) either to a well or a central water system. In the absence of a continuous metal pipe at any building, a 1/2-inch solid copper clad rod driven 8-feet into the ground may be used. If one is in doubt concerning the continuity of the cold water metal pipe, use the ground rod. The entering ground wire is connected to the ground rod or pipe with a No. 8 or larger solid copper wire with a metal clamp. This ground connection is to be made at only one location and the entire electrical system and electrically operated equipment is connected to this ground at the switch box as explained in the following paragraphs.

All permanently installed electrically operated equipment or motors must have a separate continuous ground wire (no switches or fuses permitted) connected from the switch box ground to the frame of the equipment. This wire is required in addition to the current carrying neutral wire which is sometimes referred to as a ground wire.

All new 115 volt wiring or newly installed electrical receptacles (outlets) are to be of the three wire type to accept the three-prong grounded type electric cords. The separate ground wire is connected from the receptacle to the switch box ground. When installing new outlets there is no justifiable reason for not installing the ground type outlets.
All portable electrically operated equipment must have a three-prong plug to connect to the three wire receptacle for safe operation. Never remove the third prong to connect to a two wire receptacle; instead use a grounding adapter and connect the ground wire on the adapter to the electrical ground.

Prevention of Fire Hazards

Be sure that the electric water pump is wired ahead of the master disconnect switch on the yard pole or other service entrance. This arrangement permits continued water pump operation in case electric service is cut off at the main switch.

Always use the proper size fuses. If a fuse blows do not install a larger size. Determine the cause of the blown fuse before attempting to reuse the circuit.

Do not overload any circuits, if new equipment is installed make sure that the existing circuit is sufficient to handle it. If the existing circuit is not sufficient have a new circuit installed before attempting to use the equipment. Remember that when new equipment is installed make sure that the existing circuit is sufficient or have a new circuit installed before attempting to use the equipment. Remember that when new equipment is connected to a circuit you must provide not only for the new equipment, but also for existing equipment that is connected to the circuit.

Maintain good housekeeping around electrical circuits and use fire resistive materials. In dusty areas and around all fuels be sure to use explosion proof electrical switches, connectors and equipment.

Don’t suspend heating devices such as heat lamps by their cords, use chains. Keep heating devices at least 18-inches from all combustible materials and inspect them frequently. Use only porcelain sockets for heat lamps. Do not leave heating devices plugged in when they are not in use, they might accidentally get turned on.

Prevention of Shock Hazards

Always ground all motors and permanently installed equipment. Always use grounded outlets for all equipment that has been provided with a three wire cord. Always ground the neutral wire of your power lines at the yard pole and at the service entrance for each building.

Do not turn on or operate electrical equipment with wet hands or while standing in water or on damp ground.

If you receive a shock from a piece of equipment have it repaired immediately by a competent electrician. Do not attempt to use the equipment until it has been repaired.

Use only approved electric fence controllers, never use a home-made device.

When transporting any long metallic objects, such as irrigation pipe, be sure to keep
it level to the ground when near power lines.

**Miscellaneous Safety Precautions**

Never work on electric wiring without first pulling the main disconnect switch or removing the fuses. If you will be working at such a distance from the disconnect switch or removing the fuses. If you will be working at such a distance from the disconnect switch that you cannot watch it, be sure to make provision so that it cannot be accidentally reconnected by someone else. Be sure appliances are unplugged before working on them.

If you do any type of wiring yourself be sure to have it inspected.

Before buying equipment check for the underwriters laboratories seal on both the cord and the equipment.

Promptly replace all frayed cords. Keep cords in good condition and away from water and oil.

**PROTECTION FROM LIGHTNING**

While lightning protection has no bearing on the adequacy of a wiring installation from the standpoint of convenience, it deserves consideration as a means of safeguarding persons and property.

The grounding conductor of the electric system in each building should be bonded to a metallic cold water pipe (if any is present) or to a driven ground rod or other grounding electrode in accordance with the National Electrical Code and local regulations.

All driven grounds for pumps, motors, TV or radio antenna, etc., should be bonded to the cold water pipe. Milker vacuum lines, stanchion hardware, and similar barn equipment should also be bonded to the water pipes and to the grounding electrodes.

Detailed requirements for lightning protection are set forth in the *National Fire Protection Association Code for Protection Against Lightning*, NFPA No. 78.