951 Fairview Avenue
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THE FARM
ELECTRICAL SYSTEM
UTILITY SYSTEM(S)

- Generation
- Transmission
- Distribution
UTILITY GENERATION
THE FARM ELECTRICAL CONSTRUCTION

NEC 2005
NFPA 70: National Electrical Code®
International Electrical Code® Series

An International Codes and Standards Organization
REGULATIONS (OR LAWS)
REGULATORY LAW

“SPEED LIMITS”
MORAL LAW
“MOSES OR MOM”
ONE OF KIRCHHOFF’S LAWS

A Summary: Current (electrons) will all return to their source through all conductive paths available.
NATURAL LAW
“GOD CREATED”
NATURAL ELECTRICITY

- Lightning
- Man’s Electrical System
- Cows Electrical System (All Independent)
MAN MADE ELECTRICITY

- DC (Direct Current)
- AC (Alternating Current)

(Established 120 Years Ago)
IMPORTANT POINTS TO REVIEW TODAY

• Grounding vs. Grounded
• Circuit Conductors
• Bonding Jumpers, Straps, Screws
• Equipotential Plane
• Voltage
• Current
• Resistance
The EARTH is where we ground our electrical systems
grounded neutral at the ground rod
GROUNDING
(GROUNDING CONDUCTOR)

Bare or Green
SUPPLY CIRCUIT CONDUCTOR (THE HOT WIRE)
SOME IMPORTANT POINTS:

• Usually copper or aluminum
• All conductors have a resistance to current flow
• The diameter determines the limit of current flow
• They must have insulation to keep the current on (or in) the conductor
BONDING
(INTENTIONAL CONNECTION)

- Jumpers
- Straps
- Screws
EQUIPOTENTIAL PLANE OR EQUIPOTENTIAL GRID (CONCRETE REINFORCING STEEL)
VOLTAGE

(volts)  (potential difference)
(force)  (pressure)
A pressure or force:

• Does nothing by itself
• Has potential to do work
• Potential difference appears between two points
• Is always there
CURRENT

(Amps)  (Electron Flow)
SOME IMPORTANT POINTS

- Requires force to move
- Is what moves
- Always returns to its source
- Never decreases in value in its circuit
- Produces heat
RESISTANCE
(CALLED IMPEDANCE IN AC CIRCUITS)

(Measured in Ohms) (Opposes Current Flow)
SOME IMPORTANT POINTS

• Aluminum wire has more resistance than a copper wire
• Smaller diameter wires have more resistance than larger diameter wires
• Longer wires have more resistance than shorter wires
• AC (resistance) impedance is more difficult to determine
SINGLE PHASE ELECTRIC CIRCUIT
TYPICAL 120 VOLT CIRCUIT

- Supply
- Main Panel
- Ground Rod
- Main Bonding Jumper
- Circuit Breaker
- Supply Conductor
- Switch
- 120 Volt Load
- Neutral Return
COMPLETE 120 V CIRCUIT
120 Volt Load
NEUTRAL RETURN
(INTENTIONALLY GROUNDED AT MAIN)
GROUNDING CONDUCTOR

- Supply 120/240 Volts
- Service Entrance Panel
- Main Breaker
- 120 Volt Circuit Breaker
- Manual/Control Switch
- Load
- Fan Motor

- Neutral Bar
- Main Bonding Jumper, Strap, or Screw
- Bonding Jumper, Strap, or Screw
- Ground Rod(s) (Grounding Electrode)
REVIEW
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