

ELECTRICITY IN YOUR HOME

SESSION 2

- VOLTS, OHMS, AMPS, & WATTS
- AREAS OF CONCERN
- UPGRADING/INSTALLING



$E = \text{Voltage (Pressure)}$
 $I = \text{Amperage (Flow)}$
 $R = \text{Ohms (Resistance)}$

$$E = I \cdot R$$



$$E = I \cdot R$$

VOLTAGE = CURRENT
X RESISTANCE

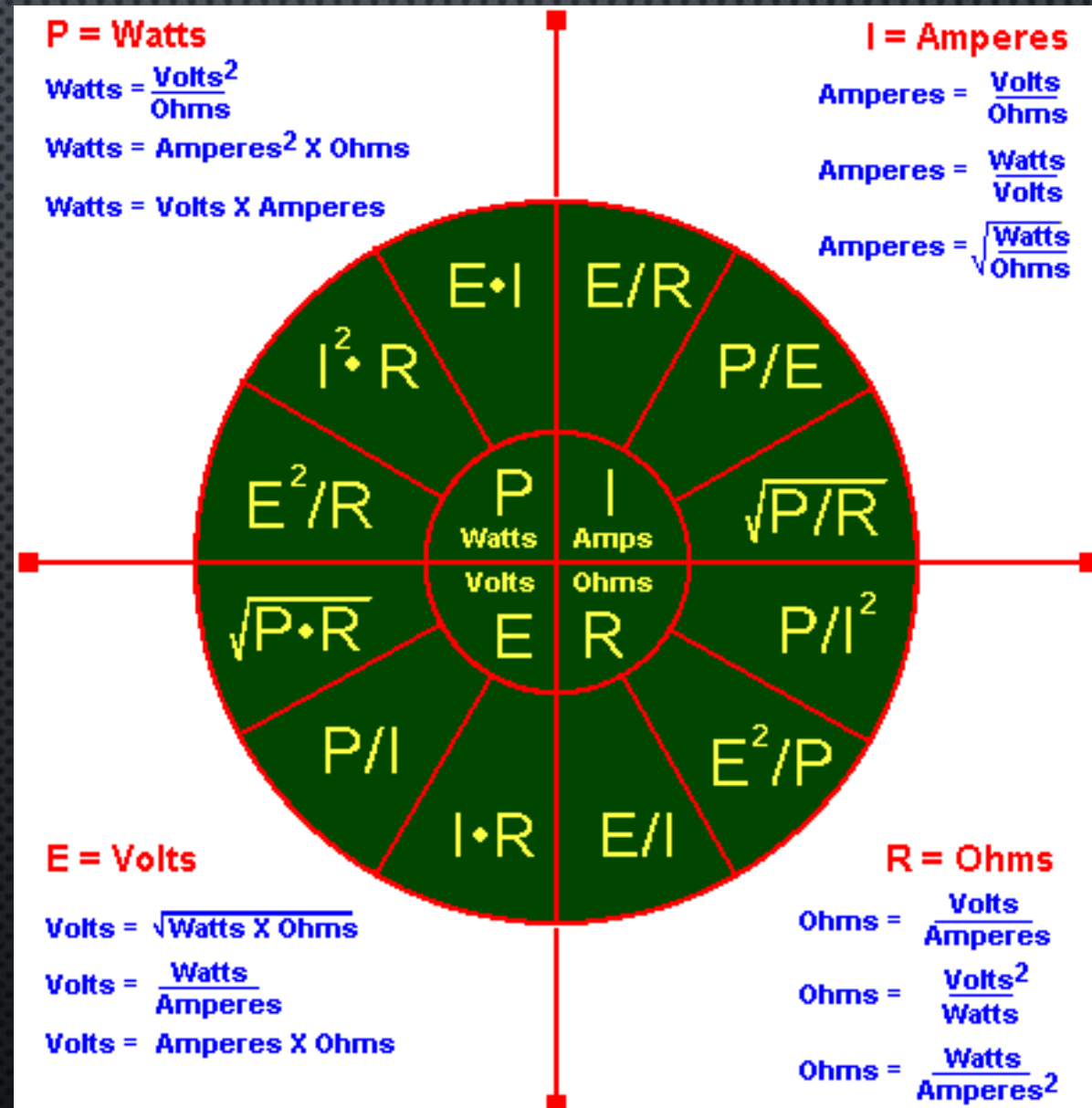
FLOW=PRESSURE ÷
RESISTANCE



VOLUME = PRESSURE X FLOW
WATTS = VOLTS X AMPS



THE CHART



TYPICAL POWER CONSUMPTIONS

Clothes Dryer	6000-9000	Oven	4000-8000
Hot Water heater	4000-6000	Central A/C	5000
Dishwasher	1000-1800	Coffee maker	750-1000
Refrigerator	750-1000	Toaster	800-1600
Hair dryer	250-1500	Blender	400-1000
Garbage disposal	400-900	TV	300-800
Vacuum cleaner	300-800	Attic fan	400
Shaver	10	Clock	2

Appliance	Wattage rating
Coffee maker	1,000 watts
Toaster	1,500 watts
Blender	1,000 watts
TOTAL	3,500 watts

Amps = watts/voltage
3,500 w/120 V= 29.2 amps

HOW TO BLOW A 15A CIRCUIT BREAKER

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Breaker is 15 amps

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POOF!

HOW TO BLOW A 15A CIRCUIT BREAKER

OLD VS. NEWER LIGHTING

Incandescent lamp	Bright start CFL	CREE std. LED
60 watt	15 watt	9 watt
820 lumens	800 lumens	800 lumens
13.7 lumens/watt	53 lumens/watt	89 lumens/watt
Life= 1.4 years	7.3 years	22.8 years

WORKING WITH ELECTRICITY

Download site:

<https://www.thespruce.com/common-electrical-codes-by-room-1152276>

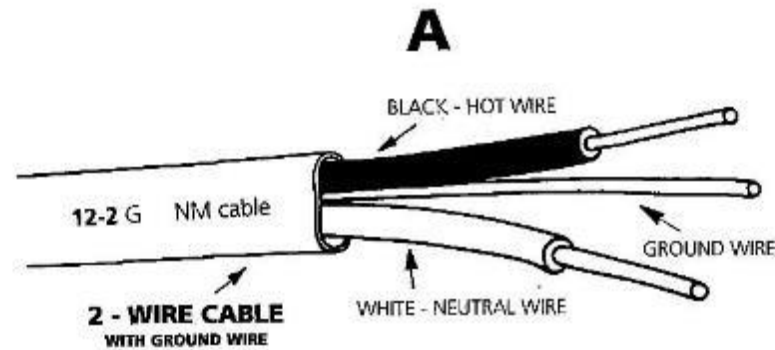
WIRE GAUGE AND CURRENT

Chart Shows Copper Wire Size, Amps and Watts		
Wire Size (Actual Size)	Amps (Also Fuse or Circuit Breaker size)	Watts (Based on 120 Volts at 80% loaded)
● No. 14 wire	15 amps	1800 watts
● No. 12 wire	20 amps	2400 watts
● No. 10 wire	30 amps	3600 watts
● No. 8 wire	40 amps	4800 watts
● No. 6 wire	50 amps	6000 watts

WIRE CONSTRUCTION

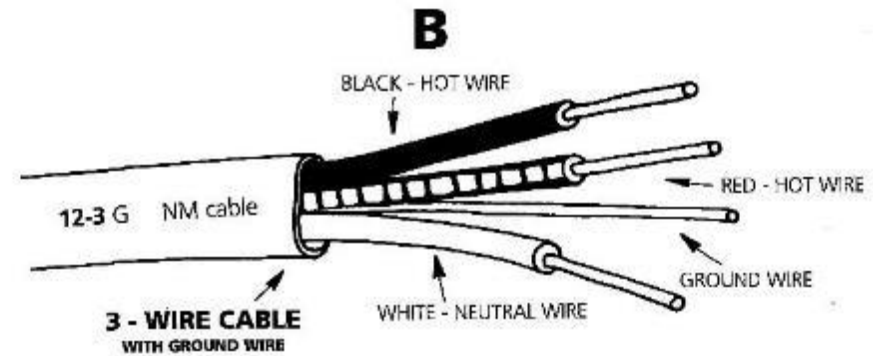
Chart Shows Color Coding of Wired		
Color of Wire	Color of Terminal Screw	Hot – Neutral or Grounding Wire
White	Silver or White	Neutral Wire
Black	Brass	Hot Wire
Red	Brass	Hot Wire
Green	Green	Grounding Wire
Bare Wire	Green	Grounding Wire

WIRE CONSTRUCTION



In Example "A" above, the numbers and letters stamped on the electric wire had the following meaning.

The "12" means it is No. 12 wire in size
The "2" means it has two wires
The "G" means with ground wire
The "NM" means non-metallic



Example "B" above is exactly like Example A, except it has three wires instead of the two.

CIRCUIT PLUGS

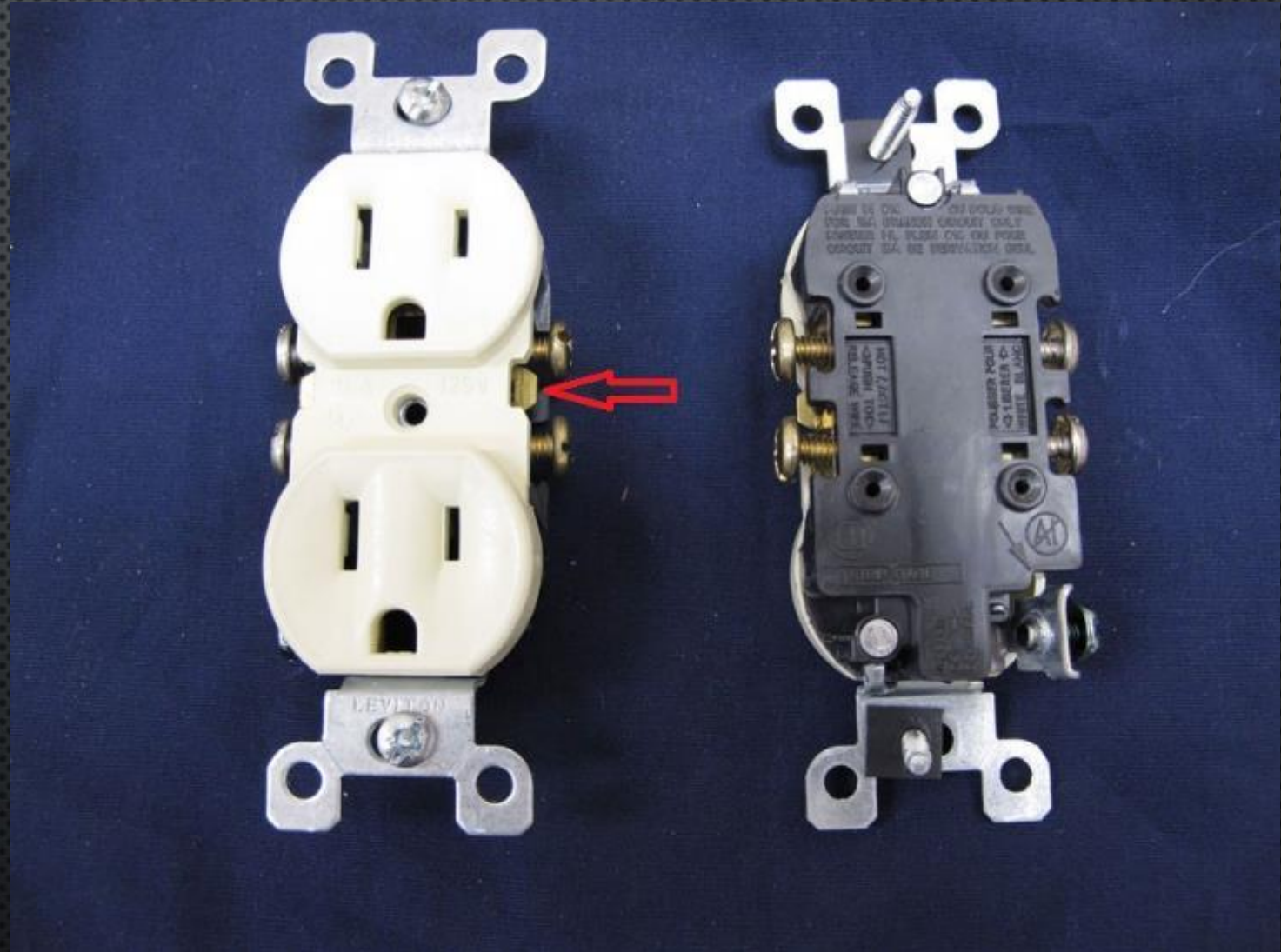


15 amp

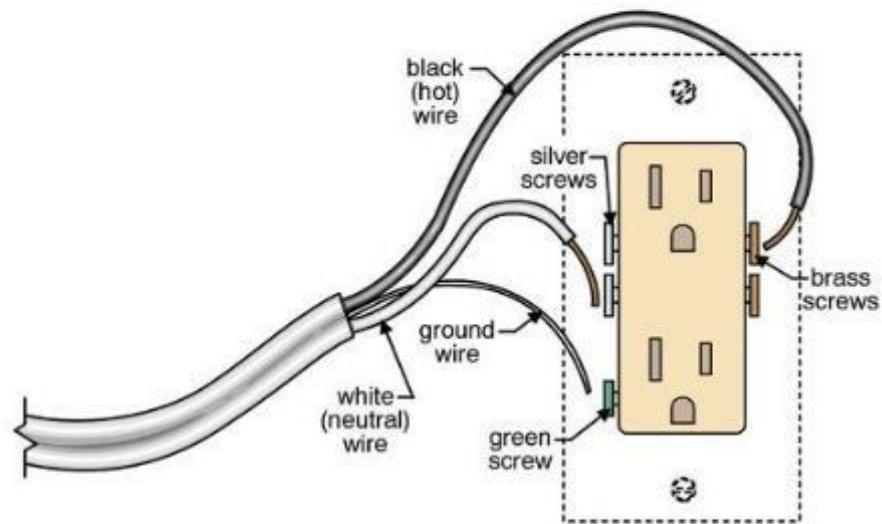


20 amp

CIRCUIT PLUGS

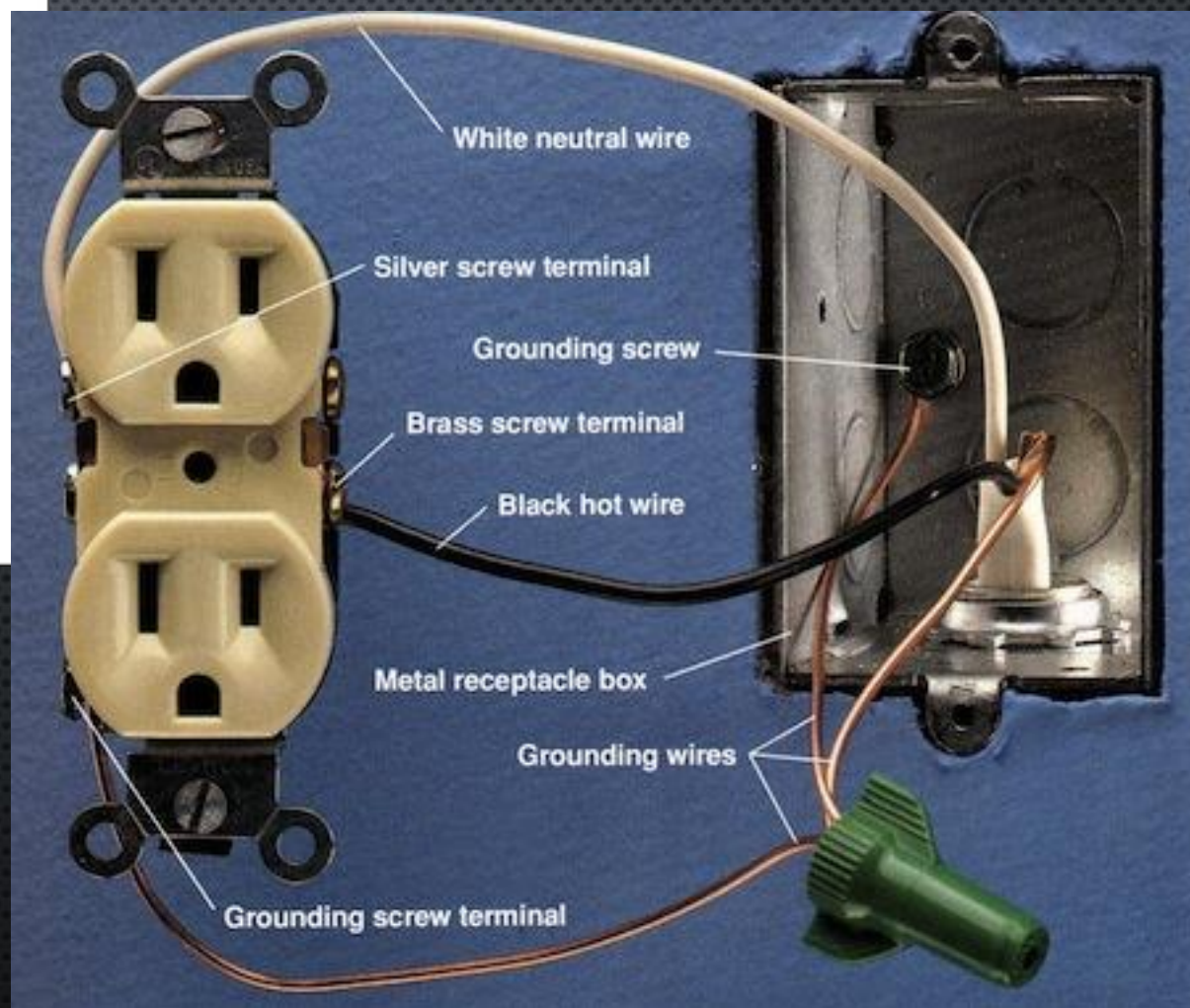


Color coding for typical 120 volt circuit

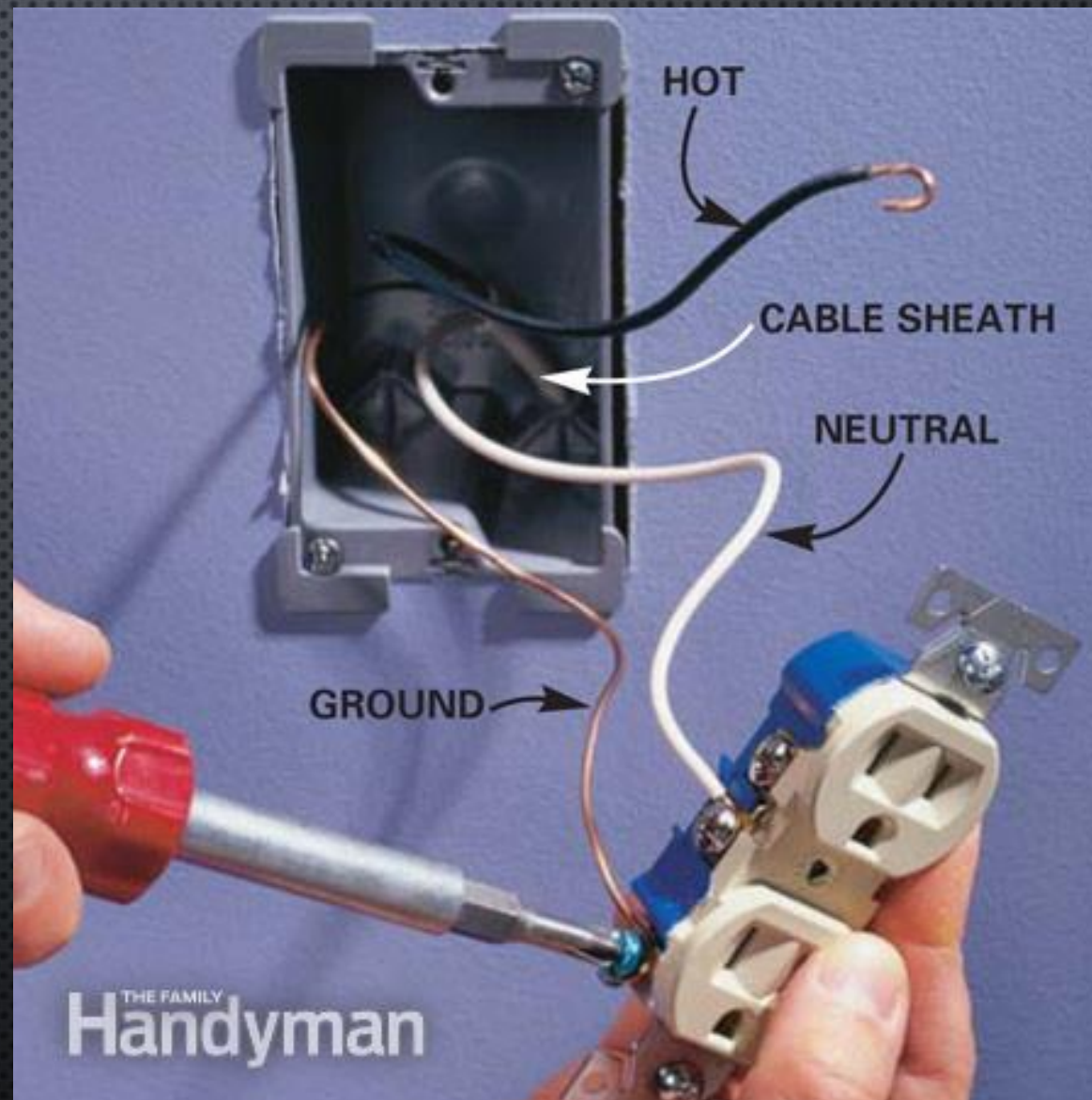


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HOW THE PLUG IS WIRED


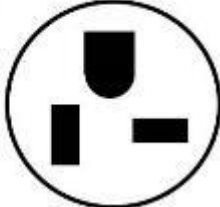

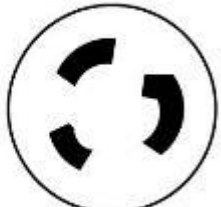


WIRING A PLUG



220VAC CONNECTIONS

COOKTOPS, OVENS,
DRYERS, SPA'S, ETC.

Size / type	Straight-blade connector	Twist-lock connector	Comments
			
208 Volt 20 Amp	 NEMA 6-20P	 NEMA L6-20P	3328 VA equipment load
208 Volt 30 Amp	None	 NEMA L6-30P	4992 VA equipment load

INSTALLING A GFCI



AFCI = ARC FAULT CIRCUIT INTERRUPTER

**AN ARC-FAULT CIRCUIT INTERRUPTER (AFCI) IS
A CIRCUIT BREAKER THAT BREAKS THE CIRCUIT WHEN
IT DETECTS AN ELECTRIC ARC**

AFCI = ARC FAULT CIRCUIT INTERRUPTER

- AFCI SELECTIVELY DISTINGUISHES BETWEEN A HARMLESS ARC (INCIDENTAL TO NORMAL OPERATION OF SWITCHES) AND A POTENTIALLY DANGEROUS ARCS
 - EXAMPLES
 - FRAYED LAMP CORD
 - LOOSE POWER WIRE IN DEVICES
 - INTERMITTENT SHORTS.

AFCI CODE REQUIREMENTS

- 2020 EDITION OF THE NEC®, SECTION 210.12 REQUIRES THAT FOR DWELLING UNITS, ALL 120-VOLT, SINGLE-PHASE, 15- AND 20-AMPERE BRANCH CIRCUITS SUPPLYING OUTLETS OR DEVICES INSTALLED IN DWELLING UNIT KITCHENS, FAMILY ROOMS, DINING ROOMS, LIVING ROOMS, PARLORS, LIBRARIES, DENS, BEDROOMS, SUNROOMS, RECREATION ROOMS, CLOSETS, HALLWAYS, LAUNDRY AREAS, OR SIMILAR ROOMS OR AREAS SHALL BE PROTECTED BY AFCIs.

THE SUB PANEL & BREAKERS



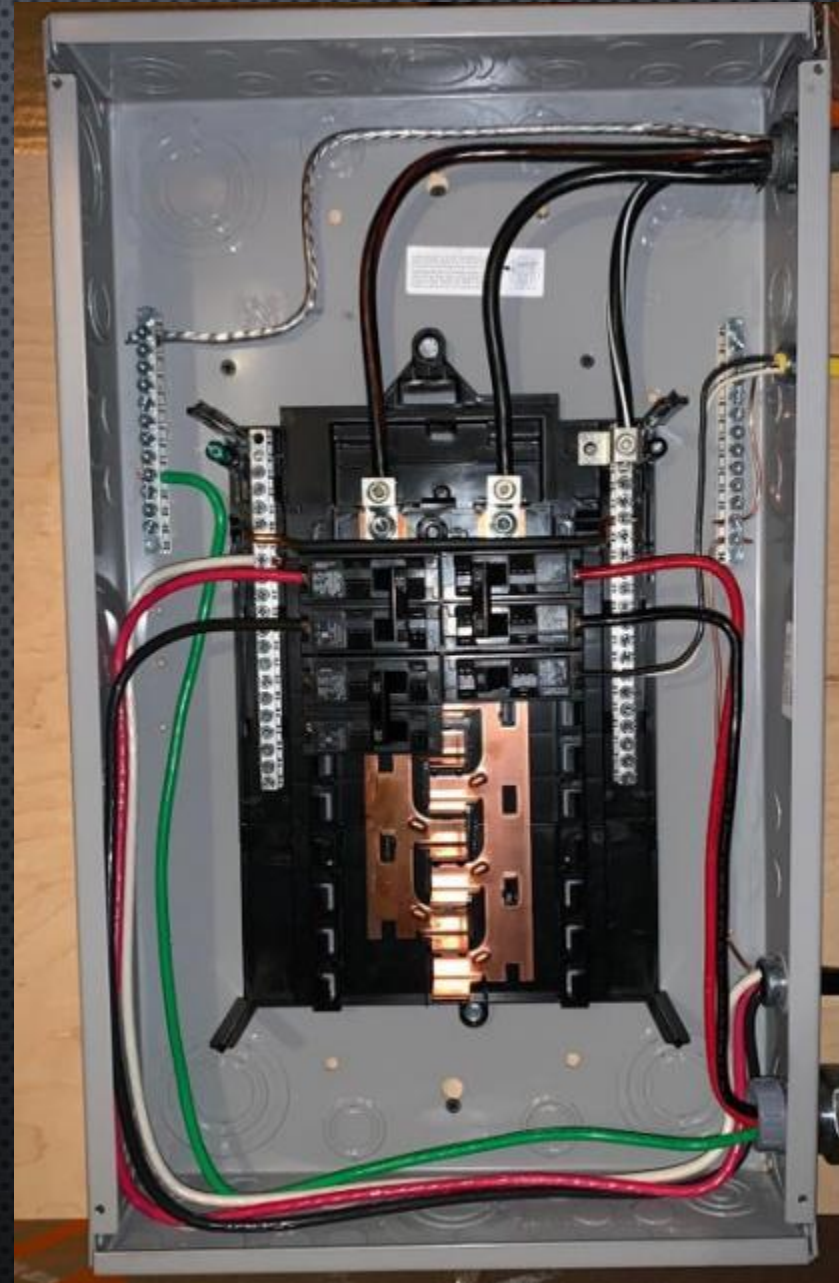
AFCI



DUAL BREAKERS



THE SUB PANEL 220VAC BREAKERS INSTALLED



**THE SUB PANEL
120VAC BEAKERS
INSTALLED**



THE SUB PANEL LABELED BREAKERS



CIRCUIT TESTERS



AREAS FOR CONCERN

Outlets

Discolored or burned

Buzzing or crackling

Intermittent operation

Loose in the wall

AREAS FOR CONCERN



HOME WIRING ACTIVITIES

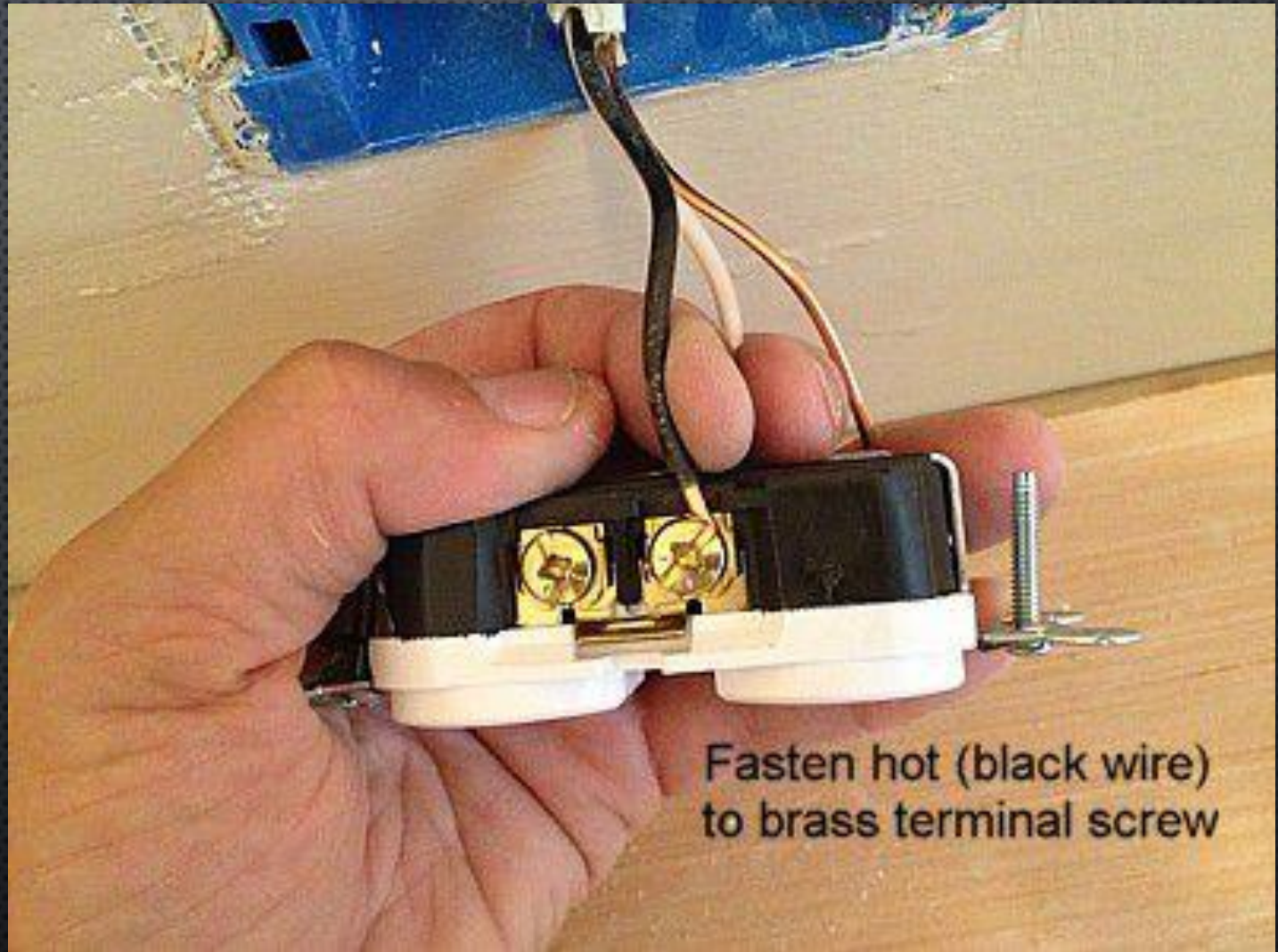
- REPLACING A WALL OUTLET
- REPAIRING A DAMAGED CORD (EITHER END)

WIRING
AN
OUTLET

How to wire an electrical outlet?

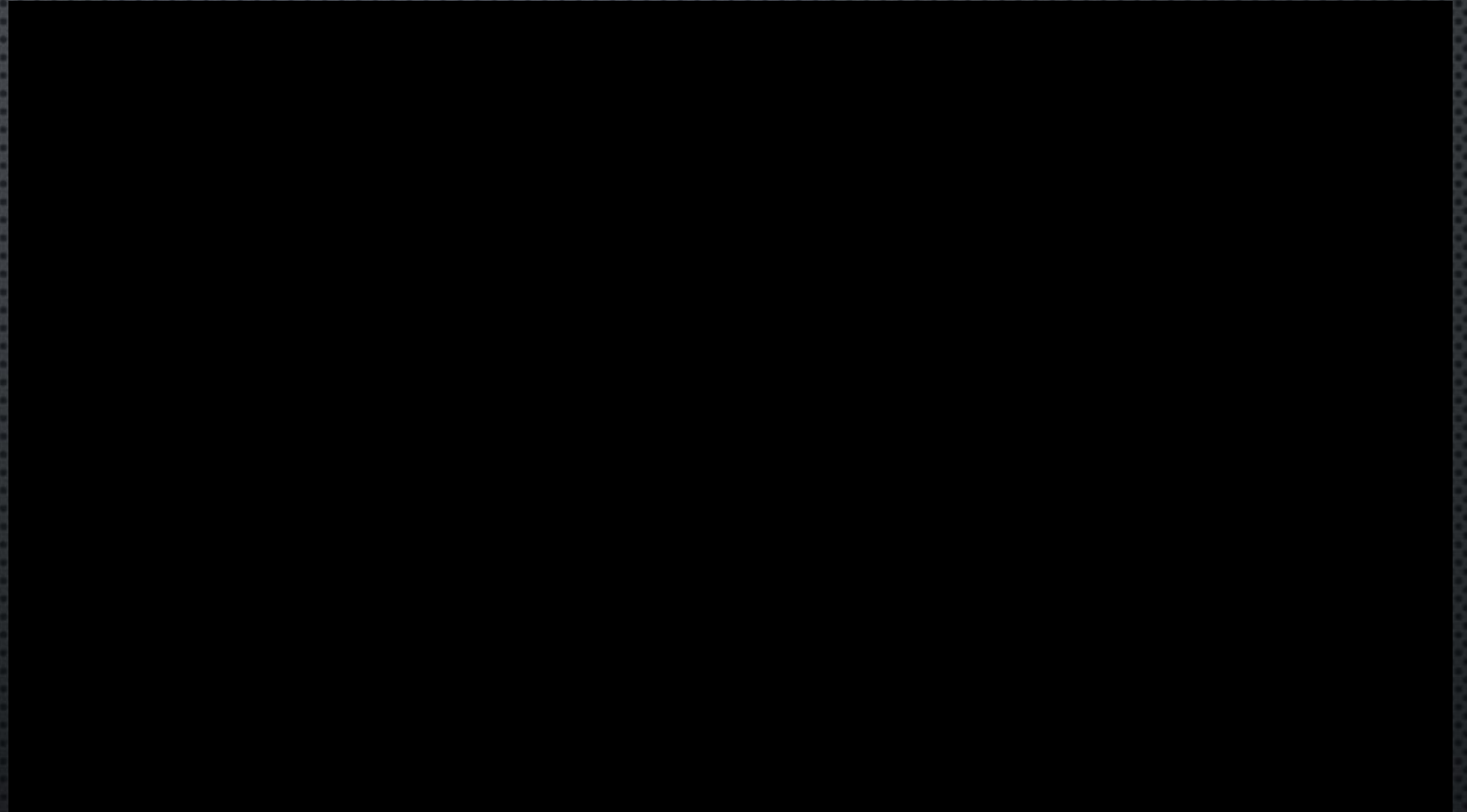
WWW.GOASKRED.COM

WIRING AN OUTLET



Fasten hot (black wire)
to brass terminal screw

REPAIRING AN ELECTRICAL CORD



HOME REWIRING WIRING CAVEATS

- FAILING TO ADD A JUNCTION BOX (TOO MANY WIRES ON AN OUTLET CONNECTION)
- RECESSING NEW SERVICE TOO FAR INTO THE WALL (ALLOWS FOR DEBRIS)
- CUTTING WIRES TOO SHORT (ALLOW 6 INCHES AT THE NEW BOX)
- MIXING WIRE GAUGES AND COLOR (REMEMBER BLACK, WHITE, GREEN)
- NOT ADDING GFCI'S WHERE REQUIRED
- NOT SUPPORTING NEW INSTALLATIONS AGAINST A TIMBER

YOUR QUESTIONS ?

SUMMERY

ELECTRICITY IS INVISIBLE AND DEADLY

ALWAYS SHUT OFF A CIRCUIT BEFORE WORK AND TEST IT

IF YOU ARE UNCERTAIN DON'T

NEXT WEEK

- PLUMBING
- TUESDAY — OUTDOOR
- THURSDAY — IN DOOR