Unlocking The Pirate's Hidden Realm – Worlds To Be Explored Behind The Murphy Doors

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"There is no key, no treasure map; X marks the spot, but X is hidden in plain sight... The hidden treasure is locked and kept away causing mystery, the kind other pirates would surely envy!"

The Murphy Hidden Door offers exactly just that sense of excitement, an unexpected disguised entrance. An electrical magnet activates or disactivates via an RF signal on a remote or by a hidden mechanism encased in the themed layout itself.

For ease of readability a clickable Table of Contents is depicted below.

Selecting and identifying a single 120VAC circuit.

First, we select our circuit and make sure we will not overload it. A good rule of thumb is to note not to load it more than 80% for continuous loads. 210.20(A) from the National Electrical Code (NEC) mentions the criteria for connecting Continuous Loads.

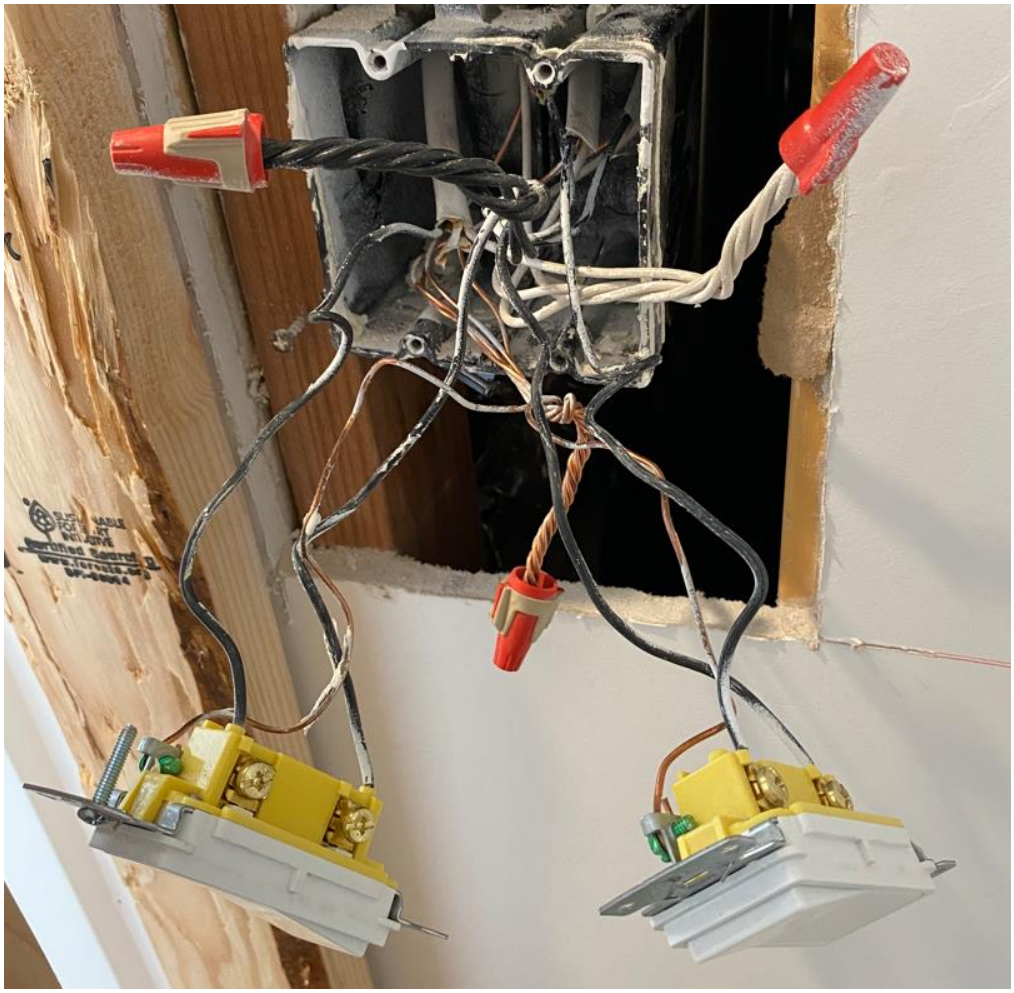
(Continuous Load) * 1.25 = Breaker Size

(Continuous Load) = 80% Circuit Capacity

This is how the 80% rule of thumb is derived. That Continuous Loads should run at 80% capacity of the circuit they are being fed from.

Continuous Loads according to the NEC under Article 100 are Loads where the maximum current draw is expected to be constant (undisturbed) for 3 hours or longer.

Our Murphy Door Lock draws 12 watts DC which is roughly 118mA AC or 0.12 amps AC a very small amount. Taking 210.20(A) into consideration most all your circuits in your home should be able to handle this load just fine.



Now that we have established our electrical demands and narrowed down on our circuit let us proceed to peek inside. As you can see, we have a total of 3 wire nuts, bare brown copper is the equipment grounding conductor (more on this topic mentioned on the **Tips&Tricks** section of this blog), your white in most scenarios is your neutral, and your black in most scenarios is your line, hot, or common. A lot of jargon I know (all fields have their own verbiage) hopefully this "Sparky" (as they like to call us electricians) can teach you a thing or two. This image for me depicts "Power In", "Power Out", and 2 "Power Pigtails" for the switches. In terms of electrical practicality, a "Pigtail" is a splice, in terms of circuit theory a "Pigtail" is at the same electrical potential hence it is the same node. "Power In" is the power supplied by the source in this case our residential electrical panel. "Power Out" think of it as jumper wires for a vehicle in the sense that you connect them to a specific power source to supply that same electrical potential elsewhere.

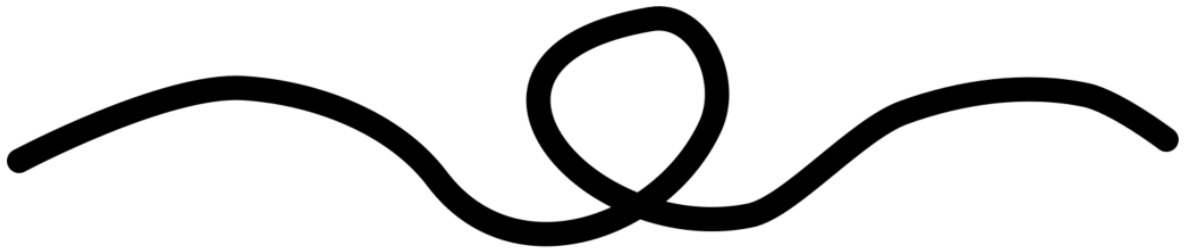
We move forward to identify the wiring. In the field we use electrical tape like so to identify conductors. For "Switch Legs" we create a loop like depicted below to indicate that that wire is going to become an energized conductor going out to the load from a switch (switched power

conductor or switch leg). For example, a single pole switch will get a “Pigtail” from the power node (line, hot, or common) on one of its terminals and on the other terminal the “Switch Leg”, hopefully the terminology is making sense now. This way the switch controls power out to the load in an easily conceptualized fashion. 404.2(C) mentions the grounded conductor (Neutral Conductor) must be present at the switch location.

Could we switch the neutral and have the power be constant?

Yes, we could, but 404.2(B) of the NEC says switches or circuit breakers shall not disconnect the grounded conductor of a circuit. So no, you cannot. This makes sense, because let us assume a handyman is changing an electrical fixture that has the grounded conductor (Neutral Conductor) switched instead of the line, hot, or common. The fixture will have an energized conductor even when the fixture is completely “OFF”, if accidentally the energized conductor comes in contact with the grounded conductor (Neutral) a “Short Circuit” will occur, or if accidentally the energized conductor comes in contact with the equipment grounding conductor a “Ground Fault” will occur.

More on the equipment grounding conductor (EGC) and “Ground Faults” in the **Tips&Tricks** section of this blog.



Sourcing the electrical junction box.

The electrical junction box I chose was 6in. (Height) x 6in. (Width) x 4in. (Depth) which is more than sufficient for one circuit and for the electrical components required for the Murphy Hidden Door.

Designating location and mounting electrical junction box.

The switches demonstrated were to be relocated so I took advantage of the situation and decided to mount the electrical junction box in that location. These electrical boxes can easily be removed from studs with a claw bar and a hammer if directly nailed on. This claw bar has helped me do many tasks including removing around 150 lbs. light posts. More tips and tricks will be discussed in the **Tips&Tricks** section of this blog.

"Brawn is tough to challenge,
Brains are tough to beat,
But together, they're unmatched…
A force no one can defeat."

If you must notch into studs to accommodate for installation it is ok as long as the studs are not Load-Bearing. Criteria to keep in mind is:

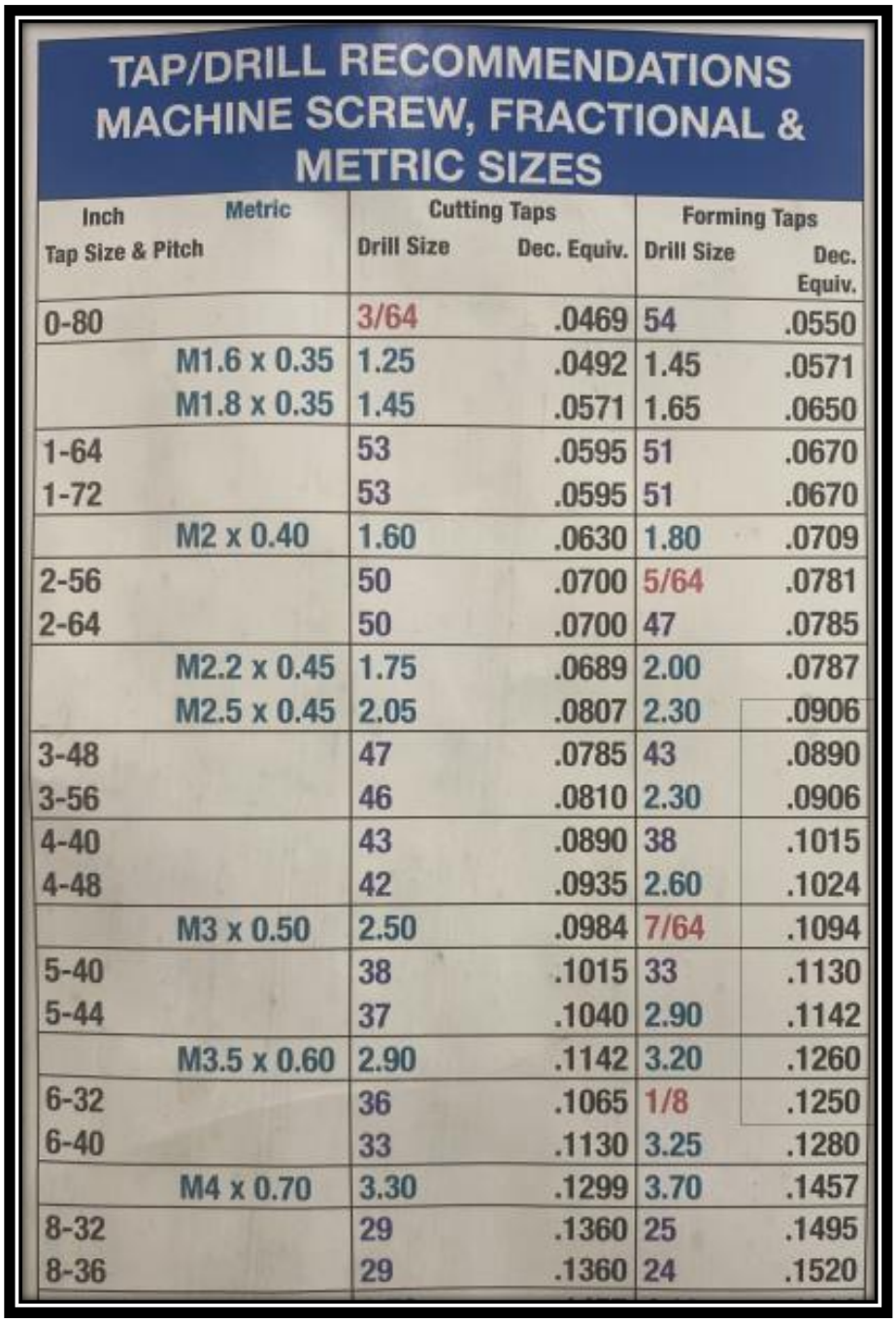
- Holes should be no larger than 40% of the stud's width.
- Keep maximum notch depth at %25.
- For cables or raceways through bored holes in wood members the edge of the hole must not be less than 1 ¼ in. from the nearest edge of the wood member (NEC 300.4(A)(1)).

A 90 degree elbow becomes very useful for mounting in tight spaces.

Always aim for an install as clean as possible, this makes life so much easier for everyone involved and it helps build an impactful reputation, if this seems daunting, always remember that small particles of sand almost insignificant on their own make up the vast sea floor.

Prepping and mounting the ferromagnetic plate.

Mounting securely the ferromagnetic plate required a little more ingenuity as some of the holes were not threaded on the mounting bracket.



TAP/DRILL RECOMMENDATIONS MACHINE SCREW, FRACTIONAL & METRIC SIZES

Inch / Metric Tap Size & Pitch	Cutting Taps Drill Size	Cutting Taps Dec. Equiv.	Forming Taps Drill Size	Forming Taps Dec. Equiv.
0-80	3/64	.0469	54	.0550
M1.6 x 0.35	1.25	.0492	1.45	.0571
M1.8 x 0.35	1.45	.0571	1.65	.0650
1-64	53	.0595	51	.0670
1-72	53	.0595	51	.0670
M2 x 0.40	1.60	.0630	1.80	.0709
2-56	50	.0700	5/64	.0781
2-64	50	.0700	47	.0785
M2.2 x 0.45	1.75	.0689	2.00	.0787
M2.5 x 0.45	2.05	.0807	2.30	.0906
3-48	47	.0785	43	.0890
3-56	46	.0810	2.30	.0906
4-40	43	.0890	38	.1015
4-48	42	.0935	2.60	.1024
M3 x 0.50	2.50	.0984	7/64	.1094
5-40	38	.1015	33	.1130
5-44	37	.1040	2.90	.1142
M3.5 x 0.60	2.90	.1142	3.20	.1260
6-32	36	.1065	1/8	.1250
6-40	33	.1130	3.25	.1280
M4 x 0.70	3.30	.1299	3.70	.1457
8-32	29	.1360	25	.1495
8-36	29	.1360	24	.1520

Tap/Drill Chart

8-32 was chosen as the fastening hardware screw. A #8 screw is 0.1640 inches in outer diameter with 32 TPI (threads per inch) or a fine thread pitch.

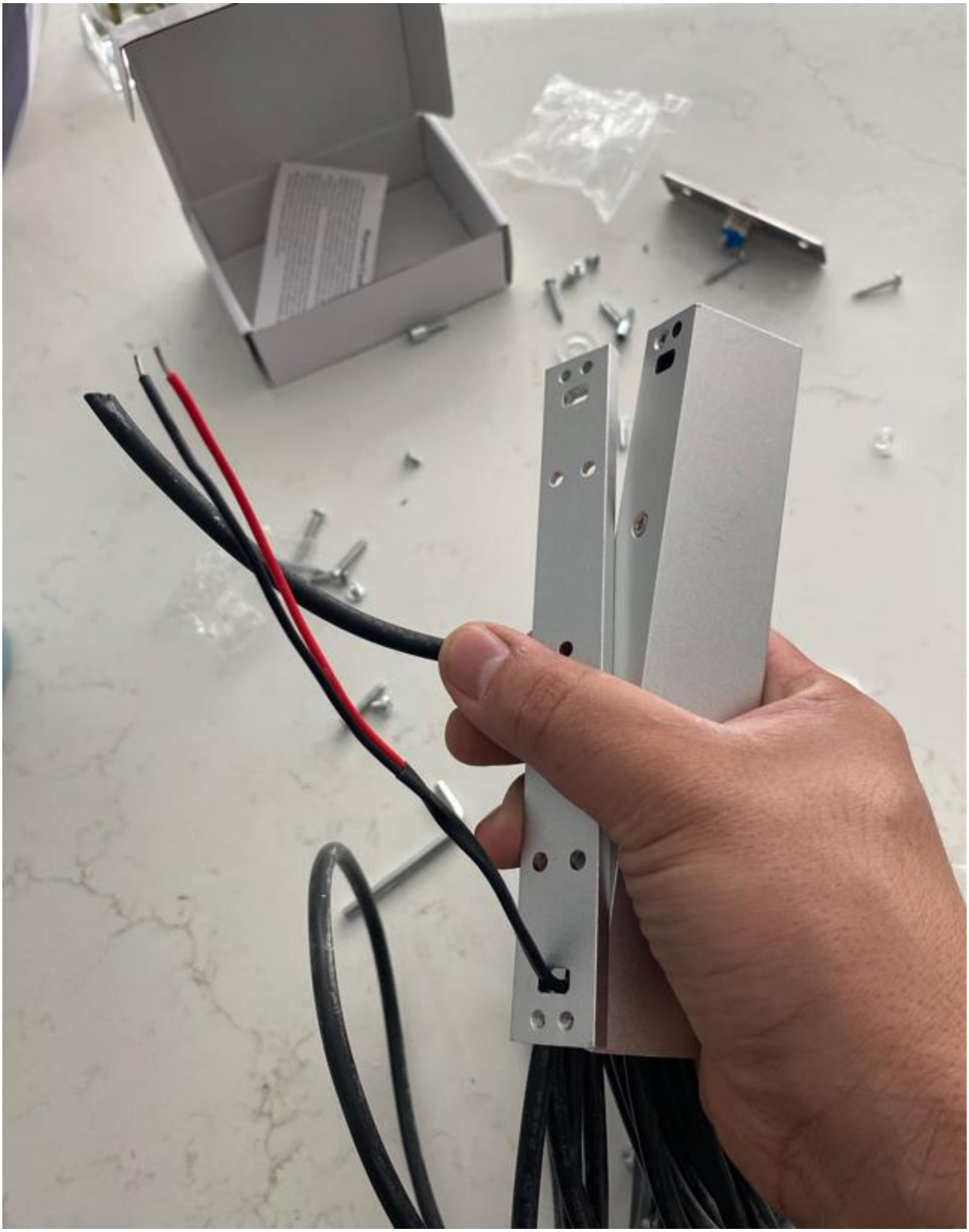
Utilizing cutting oil when cutting threads reduces friction, prevents tool wear, produces cleaner threads, reduces breakage risks of the tap while embedded in the material being cut.

For an 8-32 screw we reference the "*Tap/Drill Chart*" above. A drill size with a diameter smaller than size 29 is ideal, so a drill size 30 would be perfect to have the tap work less and remove less material to make our threads, allowing for cleaner threads. We mount the drill tip on a power tool to remove excess material. You can also just purchase a tap set like the one depicted about which will come with the adequate dill bit (tool used to drill the correct size hole) and the tap (tool that cuts the internal threads).

After we have removed the excess material with our power tool of choice, we then mount the 8-32 tap on the T-Handle to create our threads. Again, utilizing cutting oil reduces friction.

The 8-32 screws are then cut down to the required size. Electrician grade tools like Klein, Knipex, or Milwaukee have threaded 6-32 and 8-32 inserts with the focus of allowing for fast convenient bolt reduction capabilities. If you don’t have this type of tool I would recommend looking into a dedicated screw cutting tool with the emphasis of avoiding messing up the threads on the screw.

Mounting the electromagnet.



The electromagnet consists of a base and the electromagnet.

Locate the desired location for your electromagnet. We need it as close as possible to the ferromagnetic plate to allow for the strongest holding force.

Before mounting the base of the electromagnet, we must first drill a hole in the wood studs to allow for our supply voltage conductors to pass through.

Troubleshooting the Murphy Door Lock.

After you have 120VAC connected to the Murphy Door Module and the 12VDC wires are also connected to the electromagnet you are ready to test for action before finalizing the installation.

You can connect like so to the wires going to the electromagnet. When you activate the radio frequency transmitter the receiver should signal the Murphy Door Module to disactivate the supply of 12VDC disabling the electromagnet. RF signals do not travel like intended though metals so placement for these components is crucial. Other means of locking mechanisms are momentary switches and hidden mechanical configurations.

Tips&Tricks

Nuts&Bolts. One might not always know how to solve the problem but being prepared and having a variety or an assortment of hardware is extremely priceless, one idea leads to another, in other words one can never be overly prepared. This came from a dear friend by name of Don

Fernando (yo soy el mero vegetable) who did not posses the titles and certifications that electricians of high stature aspire to acquire but was extremely knowledgeable. Many times, like they say in Spanish “apariencias engañan” meaning “appearances can be deceptive”. It is not a coincidence that even wizards keep satchels.

Check out the craftsmanship on the equipment grounding conductor (EGC); one should always try to learn from exceptional craftsmanship. Article 100 of the NEC mentions the equipment grounding conductor under “Grounding Conductor, Equipment (EGC). (Equipment Grounding Conductor)”. The equipment grounding conductor creates a ground fault current path by connecting the normally non-current carrying conductor (Neutral Conductor) to the system grounded conductor or to the grounding electrode or both. The Grounding Electrode Conductor (GEC) connects the system usually at the main panel to the grounding electrode (ground rod or water pipe) to “Earth the System”. The EGC protects the system from a “ground fault”, a “ground fault” occurs when the energized conductor comes in contact with a metal part of the equipment like the chassis; without the EGC the chassis would remain energized (creating a potential shock hazard) but with an EGC in place a surge of current traveling through a very small resistive path back to the source will trigger a fuse to blow or a circuit breaker to trip. This in return protects the system and its conductors.

Just like you can never be overly prepared learning new concepts and new ideas never has an end, learning and adapting is the key to success (it is the key to the treasure chest in pirates’ terms). Many go as far as to say that it is evolution. Neanderthals known for their large heads, limited tool set, group hunting, controlled fire techniques, suggested limited innovation whereas Cro-Magnon showed rapid innovation, cave paintings, and abstract thinking. It is said that Cro-Magnon ultimately outcompeted and replaced Neanderthals. There are many phrases that get tossed around like, “don’t break what you can’t replicate”, but you should not admire it because then you would be limiting yourself.

Let me tell you another short story that really helped my curious personality. I used to work at More than Vacuums in the espresso/coffee machine line up when I was finishing my studies as an Electrical Engineer. These neat machines were tailored for small shop, residential setups. The fully automatic espresso machines consisted of but were not limited to the following:

- Built in grinder.
    - Grinds freshly roasted coffee beans.
    - Burr-style grinder setup which would allow for fine or coarse grind adjustment, directly impacting taste.
- Bean hopper.
    - Holds whole coffee beans.
    - Usually transparent and sealed to protect freshness.
- Water Reservoir (or direct water line connection).
    - Supplies water for brewing and steaming.
    - Some machines like “Miele” allowed to be plumbed into a water source (high-end models).
    - Limescale build up in the water system was a real problem. Miele Descaling Tablets worked wonders (Steven Gonzales’s go to).
- Boiler.
    - Heats water to precise temperature needed for espresso extraction (usually ~195–205°F / 90–96°C).

    - May have dual boilers, one for steaming and one for brewing.
- Brew Unit.
    - Automates the espresso shot: tamps, brews, and dumps the used puck.
    - Most are removable and fully serviceable for maintenance purposes.
- Pump.
    - Pressurizes water through the coffee puck to extract espresso.
    - Most used a rotary vibratory pump.
- Digital control panel or touchscreen.
    - User interface to select drink types, strength, volume, milk froth, temperature, etc.
    - Many have presets like espresso, cappuccino, latte, etc.
- Milk System (auto frother or steam wand).
    - Auto milk frother: draws milk from container and froths it into a cup.
    - Steam wand: more manual control, often found in super-automatic models.
- Cup warmer.
    - Warms espresso cups on top of the machine using residual boiler heat.
- Used grounds container.
    - Collects coffee spent pucks automatically.
    - Needs to be emptied periodically.
- Drip tray.
    - Catches water and coffee drips during brewing.
    - Often removable for easy cleaning.

Steven Gonzales a Certified Electronics Technician was who I worked under (very strict and very professional, most people who have mastered a craft are like this because it took very demanding discipline to be where they are). I remember one day when I was servicing a grinder on a Delonghi espresso/coffee machine I took it completely apart because I wanted to reverse engineer and fully comprehend the mechanism behind its capabilities. A cow-worker who had been there prior to me joining the team gasped when he saw to what extent I had taken this grinder apart and said to me, “don’t do that, I have worked here 3 years and have never taken the grinder assembly apart to the extent that you have”; he did a quick swirl motion (almost like a salsa shimmy) and walked back to his workbench. Shortly after Steven Gonzales came up to me (I thought to myself now I am in for it), but no he actually calmly and attentively looked at the pile of mechanical parts neatly laid out on my workbench and said, “don’t let those comments get to you, you have a curious mind, always do what you feel comfortable doing, don’t limit your curiosity because in return you will be hindering your growth which will stunt your potential”. And it clicked and stuck with me because honestly, I have been this curious since a was child.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MACHINE
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NEW &
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Please Be Gentle With Tools


BUONGIORNO
Tu vuò fà l'americano
Renato Carosone
MORE THAN VACUUMS


SEBO
World's Best Vacuums
for a Clean and
Healthy Home!
MADE IN GERMANY
SEBO
World's Best Vacuums
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SEBO
MEDALIST
DEALERS
SEBO
MADE IN GERMANY

For harness work nothing looks cleaner than soldering and heat shrinking electrical terminations; but that is chat for another day. If you are performing electrical terminations in vehicles, harness work, or are working with 18awg or smaller I would suggest you look into the following:

- Variable temperature soldering iron.
- Hot air station.
- Heat shrink.
- Quality solder, flux, and tin.

Another unseen detail that goes a long way, try to be as clean as possible and as organized as the work environment allows. Customers really appreciate this; it is irritating to have to go through a remodel process, having to clean the installers' mess only contributes to the headache, so do be considerate. Small parts with sharp edges can be stored or temporarily placed in corners where they will not be a hazard or cause unwanted damage to wood floors or walls.

Credits section.

Many thanks to Jill Cromartie and Genesis for allowing me to use their material to make this content and for granting me the confidence to elaborate the Murphy Hidden Door project together. After the installation was finished the holding force of the electromagnet was not very strong, Jill along with her daughter Genesis aligned the ferromagnetic plate and the electromagnet while also placing them as close as possible; this in return created a strong holding force where the door could not be propped open by hand.

Many thanks to Steven Gonzales, GC, Abdul, as well as the rest of the More than Vacuums team for contributing towards my growth.

Another big shout out to Jake McKusker and Colt Patterson (Mr. Limiting Beliefs and Negative Emotions) for their professionalism and willingness to help others.

Contact me if you need to stash your Treasure.

I try to be very professional I hope this blog showcases that about myself. I tackle most all electrical endeavors from fault finding in classic vehicles, to PLC programming from concept to commissioning, electrical installations in homes 120VAC-240VAC, to restoring electrical coffee machines back to factory standards as well as other electrical appliances!

My personal phone number is (720) 413-8971 and you can also find me with the links below:

Electrical-Enigma.com

Juan M. Moreno (LinkIn Profile)

Keep an eye out for my YouTube Channel to be coming very soon…

I hope you enjoyed and learned a thing or two from this content. Until next time pirates, happy sailing!