Episode Book

EPISODE #5780

Why Keyhole Slots Never Line Up

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SYNOPSIS

You've measured the keyhole slots on the back of a power strip, drilled exactly, and the thing still doesn't line up — because there was never a standard to hit. This episode cracks open the humble keyhole slot: why the spacing varies from 115 to 136 millimetres between makers, why some powerboards have slots facing opposite directions on the same plate, and why the countersunk screw in your drawer is the one shape that guarantees a wobble. Along the way: the pencil-rubbing trick that replaces measuring entirely, the physical two-part test for finding the right screw, and the eighth-of-an-inch protrusion number that turns out to be a range you set by feel with a piece of cereal-box cardboard.

TRANSCRIPT



Corn

And the thing is I actually believed it, for years. The screw goes in, the slot drops over it, done. That's a ten-second job.



Herman

It is a ten-second job. It's just never a ten-second job.



Corn

Right. Well. Daniel has thoughts about this.



Herman

Of course he does.



Corn

He's been doing the apartment move, the whole DIY craze has kicked off again, and somewhere in there he hit the keyhole slot and it stopped him cold. He says he used to just stick things up with VHB tape and hope, and when the tape let go, and it does let go, he'd move on. But this time he decided to actually crack the code, and he says he now partly regrets it.



Herman

That's the correct emotional arc for this topic.



Corn

So what he's asking is basically three things. One, is there a standard here at all. He's measured 136 millimetres on one plug strip, and 115 on another. He drills exactly, he measures with the ruler, he marks the point, and the spacing is different every time anyway.



Herman

Yeah.



Corn

Two, the screws. He's picked through the drawer, found something that worked, and has no idea what it was, so he can't do it again. And sometimes he checks the keyhole fits the head before he screws in, and then it doesn't fit once it's in the wall. And how proud does the screw sit, is there a number.



Herman

There is, actually.



Corn

And three, if there is any standard or even a handful of common geometries, he'd happily stock up on those and never think about this again. He wants to know whether it's just him that finds this finicky, and what he needs to know or buy to make it as simple as drilling a hole.



Herman

It's not just him.



Corn

So let's crack the code on this deceptively simple mechanism.



Herman

Right, so let's do it properly. The keyhole slot is two cavities in one, and people treat it as one shape, which is half the problem. It's a round entry hole, roughly half an inch across, twelve and a half millimetres, that's what the screw head passes through. And then a narrow channel, about a quarter inch, six and a half millimetres wide, that the shank slides down into, usually an inch or two long.



Corn

So the head goes through the hole and then the body drops.



Herman

The body drops, the shank sits in the narrow channel, and now the head is behind a slot narrower than the head. It can't come straight out. That's the entire mechanism. The plate locks against the wall because the geometry says it has to.



Corn

Which is elegant, when it works.



Herman

It's elegant, and it's used everywhere. Power strips, surge protectors, speakers, corbels, mirrors, picture frames, clocks. It's the default rear fitting for anything flat that you don't want to make a bracket for.



Corn

Because it costs nothing. It's a cavity in the mould.



Herman

It is a cavity in the mould. That's why it's on everything and that's why nobody has thought about it since nineteen seventy-something.



Corn

So Daniel's first complaint. Spacing. Is he right that there's no standard?



Herman

He's right. There's no industry standard for the distance between keyholes. Slot sizes vary between makers, and the standard advice in the trade is to test rather than assume. His 136 and his 115 millimetre measurements aren't outliers. They're just two moulders making two decisions.



Corn

Two decisions about a number nobody will ever see.



Herman

Nobody sees it, nobody spec'd it, and the number that comes out is whatever fell out of the tooling. That's why you get 136. That figure doesn't read like a design decision. It reads like whatever the cavity landed at when the mould was cut.



Corn

That's the part that gets me. He's measuring in good faith. He's marking the point exactly, drilling on target, and the thing he's measuring against was never designed to a round number in the first place.



Herman

You're measuring accurately to a target that was never chosen. That's the whole frustration. And there's a worse version of it, which is the powerboards where the keyholes face different directions on the same unit.



Corn

Different directions.



Herman

One slot opens upward, one opens downward, on the same back plate. So you can't slot it on in one motion. You hook the top one and the bottom one is pointing the wrong way.



Corn

Deliberate, or a moulding accident?



Herman

Deliberate, and there's a good argument on the DIY Stack Exchange thread about it from a poster called A. I. Breveleri, who points out that orienting the keyways in different directions makes it less likely that an accidental nudge in any direction will disengage all the keyways at once. So you'd have to be knocked twice, in two different directions, to drop the thing.



Corn

That's a real engineering argument. It's also the single most annoying thing I've ever heard.



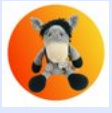
Herman

Both of those are true. And there's a second reason, which is cheaper and probably closer to the truth. You can hang that board horizontally or vertically without cutting extra holes, because some of the keyholes serve each orientation.



Corn

So it's a feature.



Herman

It's a feature on the drawing and a nightmare at the wall. And the cost argument is right there in the same thread. manassehkatz makes the point that with a ten dollar power strip, every penny counts. Which is absolutely crazy, but that's the state of mass-market consumer products.



Corn

Ten dollars of device, and a keyhole that saves a penny.



Herman

A penny per unit, across millions of units, is a real number to somebody. So you get the mould that does both orientations and no one ever has to think about the person holding it against the wall.



Corn

OK so spacing is a lost cause. That's the first thing he asked, and the answer is no and there never will be.



Herman

Correct. The fix is not to find the standard, it's to stop needing one. There's a trick in WOOD Magazine from years back, the power-strip hanging trick. You lay paper over the back of the strip, make a pencil rubbing of the slots like you're doing a brass rubbing at a museum, punch holes where the screws go, tape the paper to the wall, and drive the screws through it.



Corn

Transfer the actual object instead of a measurement.



Herman

You're not writing down a number, so you can't write it down wrong. HomeBuddy describes the same thing with painter's tape. Press the tape over the keyholes, pierce the top of each narrow neck, transfer it to the wall, level it, drill through the tape.



Corn

And the tape holds the hole positions.



Herman

And the tape is the template and the drill guide in one. You put the tape where the tape was on the object. That's the whole point. Any error you make is the same error twice, so it cancels.



Corn

So he can stop measuring 136. He should just stop measuring.



Herman

He should stop measuring. That's a genuine answer to his first question, and it costs nothing. Now the screws, which is where it actually gets interesting.



Corn

The screws are where he said he's been guessing.



Herman

Head shape matters more than size, and this is the part that isn't widely known. Pan head is the best. Flat underside, so it forms a clean shoulder that locks against the plate.



Corn

Shoulder meaning the flat rim of the head.



Herman

The flat rim of the head, yes. It sits square against the back of the keyhole plate and it doesn't wedge anything. Round or dome head is fine, washer head is fine if the washer clears the slot. And then there's the one everybody reaches for.



Corn

Countersunk.



Herman

Countersunk. Bugle head, same family. It's the most familiar screw shape in a household toolbox and it's the wrong one. The taper is designed to pull a plate flush into a countersink. Which is the exact opposite of what a keyhole wants.



Corn

So it pushes the plate off the wall instead of holding it on.



Herman

The taper wedges the plate away from the wall as it sinks, so the object never sits flat and never stops rocking. The line from Houseland is that using flat-bottomed pan-head screws is non-negotiable for a secure lock, and that's not marketing, that's just the geometry.



Corn

So the screw he's most likely to own is the one that guarantees the wobble.



Herman

The one that guarantees the wobble. And that also explains half of his bench-versus-wall problem, which we'll come to. Size-wise, the numbers cluster. Number eight or number ten pan head covers most of it. Number six or eight wood screws for most keyhole brackets. Ideal Security, who make this hardware, recommend a Phillips pan head or round head number ten. The screw diameter wants to be slightly smaller than the slot width so the shank slides but the head doesn't pass.



Corn

Give me the test. He asked how to identify the right one, and he's been doing it by vibe.



Herman

The test is physical and it's two parts, and he's already half doing it. Hold the screw head against the round opening. It should pass through with a little room to spare. Then slide the shank down into the narrow part. It should sit there without forcing, and now the head should be too big to pull back through the narrow channel.



Corn

And the failure readings.



Herman

If the head passes through the narrow part too, it's too small, the piece will just lift off. If it won't enter the round part at all, it's too big. And the line from Houseland that I'd put on a card and tape inside a drawer is: big enough to be caught by the slot, small enough to pass the round opening. That is the whole specification.



Corn

That's the entire standard, and it isn't a number.



Herman

It isn't a number, and that's why he can't replicate his success. He found a screw that worked and he has no way to describe it. So he can't buy another one.



Corn

He found the answer and couldn't write it down.



Herman

And there's a trap inside the test he's already fallen into, which is that you have to run it with the screws you're actually going to use.



Corn

Meaning not the drawer screw.



Herman

Not the drawer screw, and not the one you keep in the little bag on the shelf. Houseland is explicit about this. Test with the screws you actually intend to use, including the ones supplied with an anchor rather than the ones in the shelf box. Because the screw that ends up in the wall is frequently not the screw in your hand when you're checking.



Corn

The anchor comes with its own screw.



Herman

The anchor comes with its own screw, and that screw is chosen by whoever made the anchor, not by whoever made the keyhole. So the thing you verified on the bench and the thing that's in the wall are two different objects with two different heads.



Corn

So we've done spacing and we've done the screw. The protrusion. He asked for a number.



Herman

There is a number. Leave about an eighth of an inch of the screw head proud of the wall. Roughly three millimetres. Ideal Security's own instructions say leave an eighth of an inch of spacing between the screw head and the back wall, and HomeBuddy gives the same figure.



Corn

An eighth of an inch.



Herman

An eighth of an inch, and the reason it's a range rather than a spec is that the ideal is the thickness of the plate plus a little clearance, and plate thickness varies. So three millimetres is the practical answer, but Houseland is right that you set the last bit by feel.



Corn

What does the feel tell you.



Herman

That it seats with no rock and it lifts off cleanly. That's the target. And the trick for getting there without a gauge is a piece of thin cardboard. Cereal box thickness. Hold the scrap flat against the wall, drive the screw until the head just touches the cardboard, then pull the cardboard out and the gap left behind is usually right.



Corn

Take the cardboard away and the leftover is the clearance.



Herman

The leftover is the clearance, and the cardboard is your gauge. Then you fine-tune by hanging. Hang the piece, lift it off, turn the screw a quarter turn, hang it again. Repeat until it stops rocking, and both screws have to end up at the same depth.



Corn

Same depth because.



Herman

Because a piece that's skewed against the wall almost always has one screw further out than the other. That's the tell. If it rocks corner to corner, one screw is proud and one is buried.



Corn

So now the question he actually asked. Why does it fit on the bench and then not fit in the wall.



Herman

Three causes, and they stack. First, depth. If the screw is driven too far in, the head is now sitting in its own countersink of plaster or it's just too close to the wall, and the keyhole can't get over the head at all. Too far out, the object leans forward off the wall because it's hanging on the neck of a screw instead of being supported by the plate. So there's a window, and either side of the window it fails.



Corn

And the window is the three millimetres.



Herman

The window is about three millimetres, and it's a narrow window. A quarter turn of a screwdriver is the difference between seated and not seated.



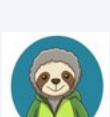
Corn

That's why it feels like a magic trick. The tolerance is a quarter turn.



Herman

Second cause. The screw you tested with isn't the screw that's in the wall. That's the anchor screw again, or the one you grabbed on the way up the ladder. Houseland warns about exactly this, and it's the most common reason a bench test means nothing.



Corn

And the third.



Herman

The wall itself. A high spot in the plaster, or an anchor sitting proud of the surface, so the bottom of the piece stands away from the wall and the top of the keyhole never seats. And in masonry, this is the one that catches people. A screw that bottoms out in its hole stops turning before the head reaches the right depth. The screw is done. It's not going further. So you have a screw permanently too shallow, and the keyhole won't go over the head.



Corn

And the temptation is to force it.



Herman

And forcing it strips the hole and you've now lost the fixing entirely. The answer is to drill deeper, not to push harder. Which is a sentence that applies to most of DIY.



Corn

There's also the anchor question, which I don't think he's considered. Some anchors and keyholes are actively incompatible.



Herman

They are, and it's an odd one. Metal expanding anchors and toggle bolts are fine, because they grip behind the board and it doesn't matter how proud you leave the screw. The anchor holds regardless of screw depth. Self-drive plasterboard anchors are the awkward ones. Many of them rely on the screw being driven fully home to spread the fixing. If you back the screw off to get your three millimetres, you've loosened the anchor.



Corn

So the fixing and the fit pull in opposite directions.



Herman

They pull in opposite directions, and the person at the wall has no way of knowing that from the packaging. Plastic expansion plugs in masonry are fine, those don't care. And the sizing rule is worth saying: use anchors rated for at least twenty percent more than the weight of the thing you're hanging.



Corn

Twenty percent margin.



Herman

Twenty percent margin, because the rating assumes a perfect installation, and we've just spent ten minutes establishing that nobody gets a perfect installation.



Corn

So what does he actually buy. That's his last question and it's the practical one.



Herman

A small assortment. Pan head screws, two or three lengths, one head type. That's it. Houseland's line is that that covers almost every shelf in a house. And then the thing that solves it permanently: keep one spare screw of the right size taped inside each piece. Then when you move, or when it comes off the wall, the screw that fits is already in the object.



Corn

Tape the answer to the problem.



Herman

That's the whole kit. And then there's the designed-for-it hardware, which is where it gets satisfying.



Corn

This is the bit he was fishing for. He said he'd stock up on whatever these are actually designed to mount onto.



Herman

Hangman Products have a patent, US 2008 0315063, for a keyhole mounting system. And the preferred fastener in that patent is a double-headed screw. Two heads, or rather a head and a built-in shoulder, with high helix angle threads, which is a steep, fast-cutting thread.



Corn

So the shoulder is the thing.



Herman

The shoulder is the thing. It guarantees the correct protrusion. You drive it until the shoulder touches the wall, and now the gap between the wall and the second head is fixed by the geometry of the screw. You cannot get it wrong, because there's nothing to get wrong. You drive it home and it's correct.



Corn

So the three-millimetre window stops being your problem.



Herman

The window stops being your problem. That's the designed-for-it answer, and it exists, and it's patented, which is why it isn't in the bag with the ten dollar power strip.



Corn

There it is.



Herman

And there's a modern version. There's a 3D printable thing on Printables called the Flush Mount Keyhole Screw Adapter System, and it's inspired by the Nest thermostat, which uses a proprietary screw for exactly this. It's an adapter that converts a standard drywall screw into a flush-mount keyhole system.



Corn

So you print the shoulder.



Herman

You print the shoulder and screw it onto a standard screw, and now you've got the double-headed behaviour without needing the patent holder to sell it to you.



Corn

Which is the thing Daniel's whole question is circling. Is this a standard I can just buy, and the answer is the standard doesn't exist, but the part does.



Hilbert

It's not a screw.



Corn

...Say that again.



Hilbert

It's not a screw. What he's describing, the double-headed one with the shoulder. I had one. Two thousand and four, maybe two thousand and five. I was between jobs and I worked eleven months at a hardware place on the industrial estate, and we had a kit come in with those in it. Six screws in a little poly bag, and a plate, and a paper template. That was the kit. The screws were the whole point of it.



Corn

And you sold them.



Hilbert

We sold four. In eleven months. And the ones we sold, two of them came back, because people had used them and then wanted more, and we didn't have more. That's the thing nobody tells you. The customer comes in with a plug strip and a fistful of screws and they're already annoyed, they've already been to the wall twice. They don't want a kit. They want one screw. And you can't sell them one screw, because it came in the kit.



Herman

So it was kit-only.



Hilbert

Kit-only. I tried to order a box. Just the screws. I had the part number off the bag and I rang the supplier, and I got a man called Trevor, and Trevor said they only came in the kit and he couldn't break a kit for me. I said I'll take a hundred kits and pull the screws out, and he said no, and I understood why, because the screws were most of the cost of the kit. The plate was nothing. The template was a piece of paper. So the screw was the product, and it was priced like the product, and nobody was going to put a two pound screw in a bag with a three pound power strip.



Corn

Two pounds for a screw.



Hilbert

Two pounds something, near enough. In the kit. And the power strip costs less than that, so it's not going to happen. He was right and I was right and the customer was still standing at the counter with a plug strip and a fistful of screws.



Herman

That's the whole economics in one transaction.



Hilbert

That's the whole thing. The right screw exists. It's been made. Somebody's holding the patent on it and somebody else worked out you can't sell it at the price the market will pay, so it goes in a kit nobody buys. And I've still got one of them in a tin, because when the kit came back I didn't put the screws back on the shelf.



Corn

You kept the screws from the return.



Hilbert

I kept one. The other one went back with the kit. It's a good screw. You put it in and you're done, no quarter turns, no cardboard. I put a shelf up with it in the flat and it's still up.



Herman

And the tin is where.



Hilbert

On the shelf. Next to the shelf.



Herman

Ha.



Corn

So the reason Daniel can't buy the thing he's asking for is that it's been designed and it's been manufactured and it's been deliberately kept out of reach by arithmetic.



Hilbert

It's not deliberate. It's just the arithmetic. Trevor wasn't being difficult. He had a box price and I had a retail price and there was no number in between. That's all it was.



Corn

What did you do with the customers after that.



Hilbert

I sold them pan heads and a bit of cardboard, same as you'd tell them now. The ones who took the cardboard were fine. The ones who didn't came back. And I'd ask them what they'd used and it was always a countersunk, because that's what's in the tin at home.



Herman

Every time.



Hilbert

They'd bring the screw in with them in their pocket and put it on the counter, and you'd know before they got it out of the pocket.



Corn

It's a good screw, you said.



Hilbert

It's a good screw. It's in the tin.



Corn

So Daniel's got his answer, and it's a slightly bitter one. The geometry that works reliably exists, it's been patented, it's in a hardware store somewhere in a kit, and you can't buy it loose because the maths doesn't close on a two pound screw and a ten dollar power strip.



Herman

It puts his own experience in a different light, actually. He's been treating each failure as his failure. He measured wrong, he picked the wrong screw, he set it at the wrong depth. And the whole time he was working against a mechanism that was never specified, never standardised, and has no instruction sheet anywhere.



Corn

The mechanism is fine. The mechanism is elegant. It's the absence of a spec that beats him.



Herman

There's a real question underneath that, which is why hasn't anyone standardised this. The obvious answer is cost. Nobody wants to be the moulder who adds a penny to save a customer twenty minutes, because the customer isn't choosing on that. They buy the strip.



Corn

But it isn't only cost, is it. Because a standard would have to come from somebody with an interest in it, and nobody at the wall is a customer of anybody's.



Herman

Nobody at the wall buys the keyhole. They buy the strip. And once it's bought, the mounting problem belongs to the person who owns a drill, which is nobody in the supply chain. It's a cost with no owner.



Corn

Which is why Hilbert's tin exists and why it will keep existing.



Herman

Which is why the tin exists. And the 3D printing thing is the first thing I've seen that might actually change it, because it moves the shoulder from the supply chain to the person who cares.



Corn

Daniel prints the shoulder. He doesn't wait for the moulder.



Herman

He prints the shoulder. He's got a printer and he's already spent the weekend measuring 136 millimetres, so I know which way he'd rather do it.



Corn

The cardboard trick and the tape-rubbing template are things he can do tonight with what's in the flat.



Herman

Tonight, with a cereal box. And one drawer of pan heads in two lengths, which is the entire shopping list he asked for about forty minutes ago.



Corn

One more thought, and it's the one that sticks with me. The reason the keyhole slot feels like a design that gave up is that it's a cavity with no interfaces, no markings and no documentation. It was never designed to be a system.



Herman

It was designed to be a hole.



Corn

The tape, the cardboard, the printed shoulder and Hilbert's tin of screws are all the same move, which is people building the interface the mould never supplied.



Herman

The thing to watch is whether printing makes that the normal answer. If a shoulder you can print and snap onto a normal screw becomes commonplace, the moulder's penny stops deciding whether your weekend goes well.



Corn

My thanks to producer Hilbert Flumingtop, who has been at the desk the whole time and whose tin I would like to see.



Herman

This has been My Weird Prompts.



Corn

If you've got a wall, a keyhole and a grudge, we'd love to hear it. Reviews are the thing that keeps a daily show findable, so if you've enjoyed this one, a rating on whichever app you're listening to us on helps more than you think.



Corn

We'll be back soon.

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