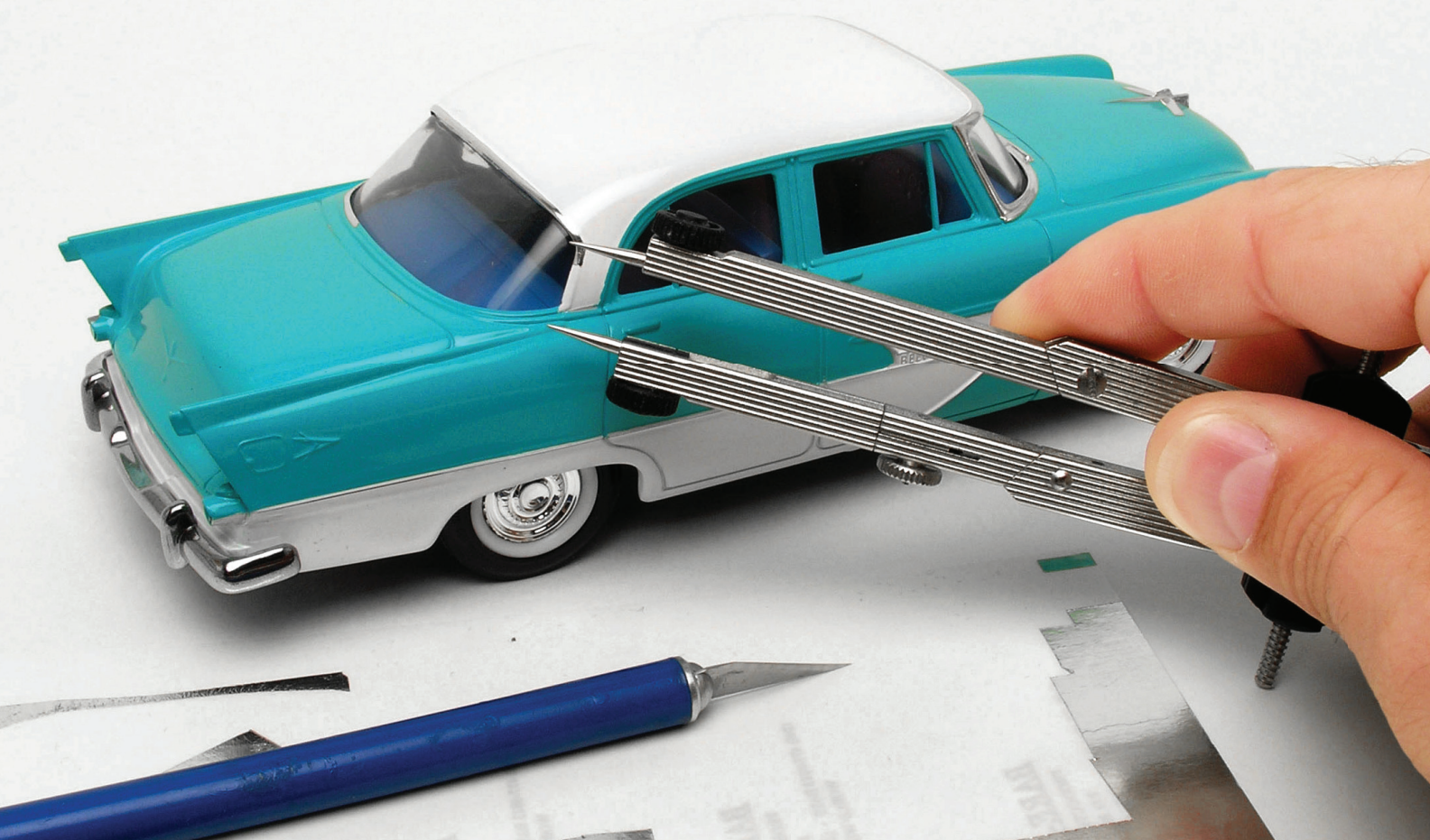


TOOLS FOR **SCALE** **MODELING**





Glue

SUPER GLUES

Technically speaking, all “super glues” are cyanoacrylates. Super glue is a handy all-around adhesive that will bond almost anything. Super glue forms an extremely

strong chemical bond between the parts, but it doesn't affect (or melt) the parts like solvent-based glues. It's a good choice for assembling cast-resin and photoetched-

metal parts – standard model glue won't stick to them.

Super glue comes in different viscosities (from water-thin to syrup-thick) and different cure rates (from instant to slow). Medium-thick gap-filling super glue is a good choice for most modeling needs. It's easy to apply with a toothpick, **1**, and will fill gaps between parts, too.

Most super glue cures quickly, but adding accelerator (sometimes called “kicker”) to a glue joint will cure the glue instantly. Flying-model builders use a lot of accelerator when they build, and that's why most bottles come with a high-volume pump sprayer on top. Never use this for plastic models. Instead, unscrew the sprayer and apply the accelerator with a Microbrush, **2**, or an old fine-point paint brush. Apply a small amount of accelerator near the glue joint and let it run in. If you apply the accelerator directly to the joint, you may accidentally bond the brush to the model!

Slow-cure super glue is good for joining large pieces with long seams (such as fuselage halves) when you need a little extra time for glue application and final



Basics

By Matthew Usher

Photos by William Zuback

Choosing the right glue makes model building easier

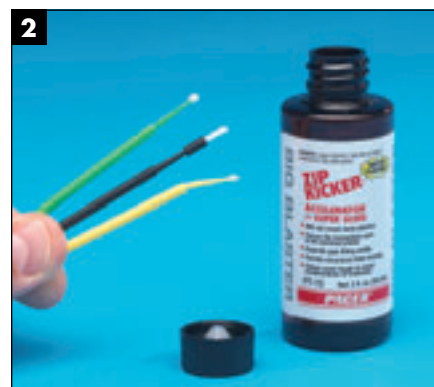
What's the one tool that turns a box of parts into a finished model? Glue. It's perhaps the most critical supply when you're building a model, and choosing the right type for the right job can be tricky – there are a lot of glues on the hobby-shop shelves.

A finished plastic model can contain parts made of dozens of types of material, including styrene, brass, aluminum, and resin. Is there one glue that will work well with all of these parts? Not really. It's good to keep a variety on hand, because different materials respond differently to different glues, and what works well with one part may not work well (or at all) with another. Here's a rundown of the most-common modeling adhesives and a description of what each does best.

adjustment. When the parts are in the right spot, you can let the glue cure on its own or use the accelerator.

Never use super glue to apply clear or chrome-plated parts – it can fog the surface of the parts with an almost-impossible-to-remove white residue, **3**. Try using white glue or epoxy for these parts.

Safety should be your primary concern when working with super glue. It's not a good choice for young modelers unless they're supervised closely. Super glue bonds most materials – including skin – instantly. If you should accidentally stick your fingers together (or your fingers to a model) resist the urge to simply pull them loose. Your skin will give way before the glue does, usually with painful results. Never work with super glue without a bottle of debonder close at hand. It'll dissolve the super glue bond without harming you or the model. If you should accidentally get super glue in your eyes, don't try to remedy the situation yourself – visit a doctor or go to the emergency room *immediately*.



SOLVENT-BASED GLUES



Solvent-based glues are available in two basic forms: good old-fashioned tube glue and bottled liquid cement. Both bond parts the same way: When solvent-based glue is applied between two parts, it softens the plastic and “welds” the parts together leaving a strong, permanent bond. Solvent-based glues should be applied sparingly – a little goes a long way, and using too much can distort or mar plastic parts. A toothpick is an excellent tool for applying tube glue, but there are more options for applying liquid cement. Many liquid-cement bottles have an applicator brush attached to the cap, but they are often too big for delicate modeling work. An old fine-point paintbrush makes a good sub-



stitute, and a Touch-N-Flow applicator, **1**, available from tool suppliers like Micro-Mark, works well, too.

Solvent-based glues take a while to cure. Rubber bands or small clamps will help keep the parts together and aligned properly while the glue dries, **2**.

These glues will bond only plastic to plastic, so they won't work if you're adding resin or metal parts. They don't have any gap-filling qualities, either, and will require smooth, flush mating surfaces between the parts you're assembling. Solvent glues can have strong fumes, too, and should only be used with adequate ventilation.

If you're working with a young, beginning modeler, try Testor's non-toxic cement. Available in tube (No. 3521) and liquid (No. 3527) form, this adhesive will handle most model-building requirements, but is safer than standard solvent-based glues.

OTHER OPTIONS



Some parts, such as clear canopies, windshields and chrome-plated trim, don't react well to standard modeling glues. Testor's Clear Parts Cement, Microscale Micro Kristal Klear, Pacer Formula 560, and even Elmer's Glue-All white glue are great choices for installing clear parts. These glues can be thinned with water and flowed into joints with a fine-point paintbrush, **1**. They're stronger than you might think, and they're non-toxic, too, so they're good choices for young modelers.

Two-part epoxy, **2**, will produce very strong joints. Epoxy is mixed from two parts, resin and hardener (sometimes called the catalyst).



When the two are mixed (usually in equal parts) the epoxy starts to thicken and harden. Epoxy is available in different cure rates, ranging from a few minutes to an hour, so you can pick the type that's best for the modeling you're doing. A longer cure rate is ideal when you need extra time to position the parts. One of epoxy's real strengths is its ability to bond dissimilar materials – with it, you'll be able to stick almost anything to anything.

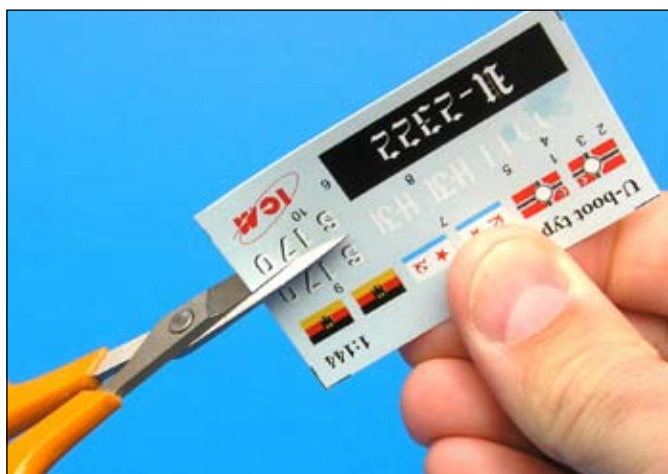
Glue is one of the most important tools on your workbench. Whether you need a glue that's fast, slow, thick or thin, there are plenty of options. Learning to use the right glue for the right job is a key step toward building better models. **FSM**



Cutting tool roundup

Outfit your workbench with the tools you need

By Matthew Usher

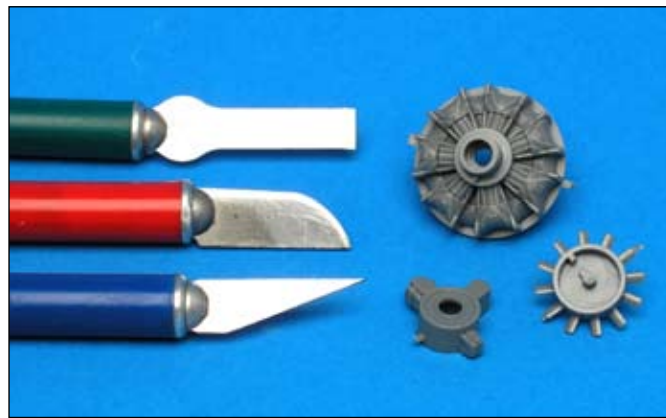


It's an ironic fact of model building that before you glue parts together, you usually have to cut some apart. Not surprisingly, having the right tool for the job makes building a lot more enjoyable, so here's a look at the most commonly used knives and cutters for model building.

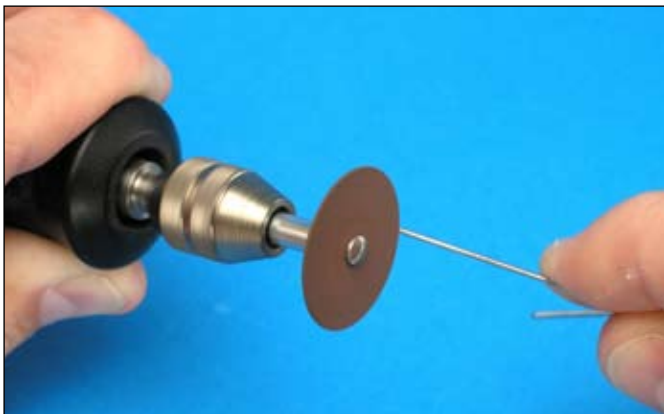
A small pair of sharp scissors makes cutting decals and masking tape a whole lot easier. I found this pair in the needlework section of a craft store, and I have a similar pair with curved blades.



Cutting shears are a great all-purpose tool, but they're especially handy for removing delicate parts from the sprue. This pair is from Xuron (www.xuron.com). Precision shears like these save lots of time at the workbench. What little sprue remains on the parts can be trimmed away with a hobby knife.



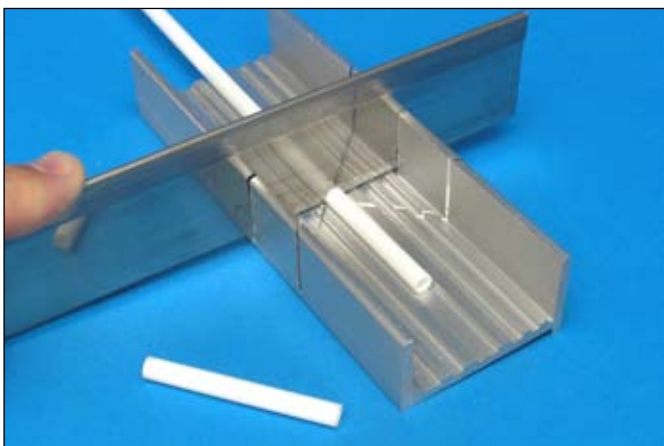
My first modeling tool was a hobby knife with a pointed No. 11 blade; it replaced my trusty Cub Scout pocket knife. Now I keep several knives on my workbench and I use color-coded handles to tell them apart easily. When the blades wear out, I place them in a plastic "sharp" container. You may have seen a sharps container in a doctor's office; they're normally used to dispose of syringes. With a sharps container, the old blades are stored safely, and when the container's full, it's disposable.



Although it's especially handy for grinding, drilling, and sanding, you may not think of your motor tool as a cutting tool. But if you need to cut more substantial materials, such as music wire, you may want to outfit your cutting tool with a mandrel and cutting discs.



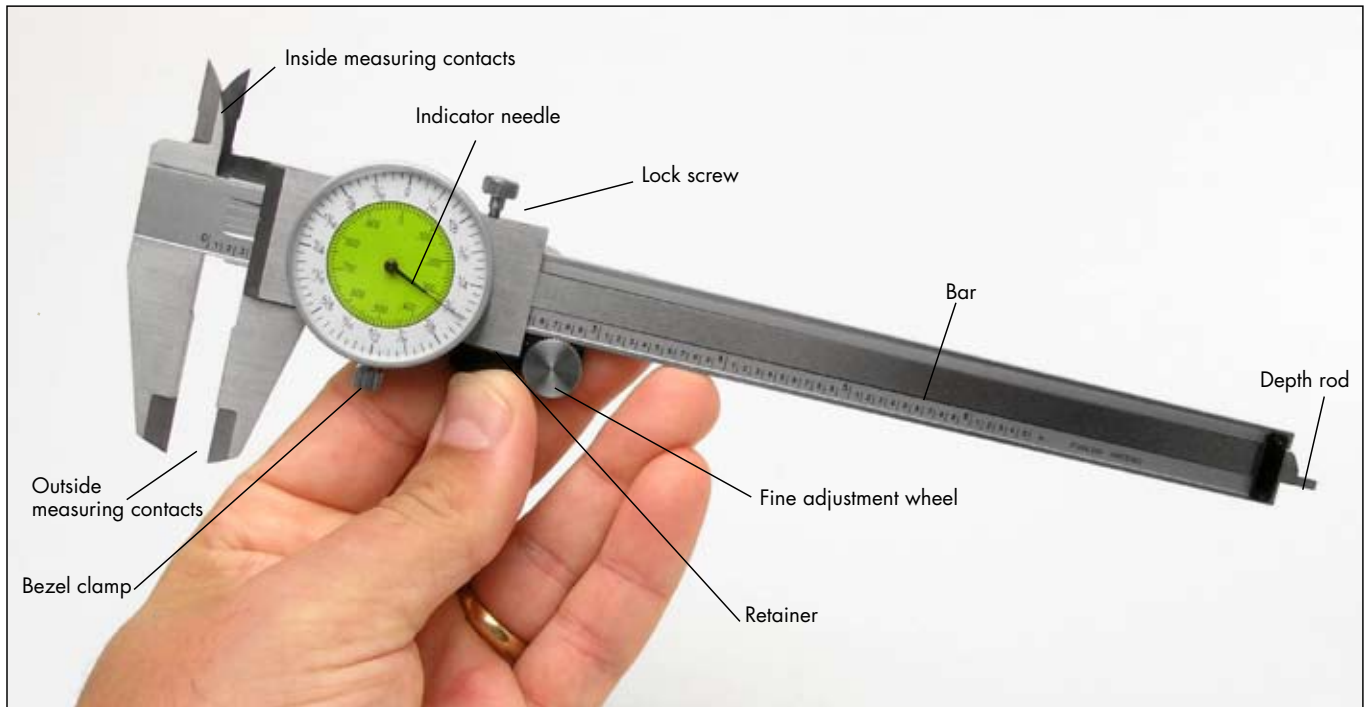
When you use a motor tool or most of the cutters outlined here, it's always a good idea to wear a good pair of safety goggles, which are available inexpensively at hardware and home stores. Cutting wheels can break, and tiny bits of wire and plastic can go flying – protect yourself properly.



A general-purpose razor saw and a miter box will serve you well, particularly if you're thinking about doing conversion or scratchbuilding work. There's no easier or more accurate way to cut a right angle in styrene stock.

Safety first

Few things are sharper than a new hobby-knife blade, and few things can tear you up more quickly. I've gone through plenty of Band-Aids in my modeling career, and once even ended up in the emergency room under the care of a plastic surgeon. I'll spare you the details, but I will tell you my wife almost fainted, and we could have filmed the model-building equivalent of a driver's-ed movie ("Red Workbench" starring Matthew Usher). In all seriousness, though, I made a stupid mistake with a common tool. The pain was considerable and I took a long, long time to heal. Bring up workbench accidents at a model-club meeting and you'll hear a wide variety of similar stories. Learn from our mistakes. All of the tools outlined here should be handled and stored with the utmost care.



A dial caliper may look like a slide rule (shudder), but once you familiarize yourself with its workings you'll find it extremely handy.

Measuring for MODELERS

Sizing up the tools you can use to build more accurate models

It's a great time to be a modeler. We have a huge variety of new kits to choose from, and by and large, they're accurate and build into great looking, beautifully detailed models right out of the box.

But where to you start if you want to double-check the length or wingspan of your latest project? What if you're considering a conversion that will require major surgery in the form of accurate razor-saw work? Or what if you decide to scratch-build a model from a set of technical drawings? How can you be sure your model's dimensions are spot-on where

they should be?

Thankfully, there are plenty of tools to help with everything from making sure your antennas are the right height to determining panel thickness within a thousandth of an inch (or millimeter). Here's a sampler of the tools you can use to make your models even more accurate.

Rulers

An accurate ruler (or *scale*) should be on everyone's workbench – and forget about that old wooden one that was in your school supplies. Invest in good quality metal 6" and 12" straightedge scales, **1**.

They're much more accurate than their wooden counterparts, and they're also ideal for cutting masking tape or frisket film in dead-straight lines.

Scale rulers are available for most popular modeling scales, **2**. They're especially handy if you do most of your modeling in one particular scale.

Divide and conquer

While you're in the drafting-supply section, pick up a good compass, one with a thumbwheel adjustment and an extra metal point to replace the lead. When you're not using it to draw circles, you can



1

Like an X-Acto knife, a steel scale (ruler) may be low-tech, but it's still indispensable on the workbench. This stainless-steel 6" scale is calibrated in both inches and millimeters. Match it with a 12" scale and you'll be ready for most modeling needs.



2

If you model in one scale most of the time, invest in a scale ruler. This one has measurements for 1/35 and 1/32 scale. No math required!



3

Dividers are great for quickly measuring "how much" when an actual dimension isn't critical. Here they're used to show how much metal foil is needed to cover a section of chrome trim.



4

Are the decals on your model in the same spot on both sides? Are the wingtips the same distance from the ground? A pair of dividers is great for checking symmetry and balance quickly and accurately.



5

The dial on this caliper has two scales: The inner scale provides standard decimal indications (in thousandths) and the outer ring has fractions. You can use it for ultra-precise readings as well as general measurement.



6

Would you rather read a dial, or an LCD screen? Calipers with digital readouts are also available. Note the "inch/mm" button; it instantly converts the caliper's readings from inches to millimeters and back again.



7

A calculator's always handy for scale-conversion work. (It's also handy for totalling up your hobby-shop expenses!)



8

Accurate references are a must. Every subject matter has a "reference of record" (like *The Encyclopedia of German Tanks of World War II*, shown here).



Even basic measuring tools will help you build more accurate models, whether you're building straight from the box or scratchbuilding.

install the second metal point and you'll have a great set of dividers, which is ideal for making quick measurements, **3**, and checking symmetry and alignment as you add detail parts and decals, **4**.

Calipers

The next step up in accuracy is a dial caliper. It looks frighteningly technical, but it's essentially a hyper-accurate tool for measuring outside dimensions, inside dimensions, and depth, **5**. Digital versions are available, too, and can convert from inches to metric measurements, **6**. A *vernier caliper* works the same way, but the readings come from a graduated, sliding scale, not a dial or readout.

Calculator

The numbers are piling up, aren't they? As you move into more complicated projects, it's a good idea to keep a basic calculator, **7**, and a notebook handy to keep track of your figures. Label everything in case you get distracted from the project for a while.

Speaking of calculations, we're certain the two charts on this page are helpful, judging by the number of times readers have asked us to reprint them!

Reference desk

Accurate tools are one thing, but how accurate are your references? Every area of modeling (or subject) has a "reference of record" that's considered to be the most accurate guide. If you're starting a complex project, make sure you're starting with good data. For example, the information in the exhaustive *Encyclopedia of German Tanks of World War II*, **8**, by Peter Chamberlain, Hilary Doyle, and Thomas Jentz would be a much better place to start your reference work than that sale-bin copy of *Army Larry's Big Book o' Tanks*. If you're unsure where to start, ask around at a club meeting or on our Reader Form on the *FineScale Modeler* Web site. Modelers are great researchers and love to help out.

While you're looking at dimensions, make sure you understand exactly what's being measured on the full-size vehicle. Does the length measurement include the gun barrel, or just the chassis? Does the wingspan measurement include drop tanks or missiles? It's worth making sure before you break out your razor saw and start cutting plastic.

Finishing up

With the tools and formulas presented here, you can do almost everything from simply improving your out-of-the-box builds to obsessing over every rivet on your next scratch-built masterpiece. Either way, make let the tools make the job easier and more fun – it's a hobby, after all! **FSM**

Metric conversion

INTO METRIC

If you know	Multiply by	To get
Inches	2.54	Centimeters
Foot	30	Centimeters
Yards	0.91	Meters
Miles	1.6	Kilometers

OUT OF METRIC

If you know	Multiply by	To get
Millimeters	0.04	Inches
Centimeters	0.4	Inches
Meters	3.3	Feet
Kilometers	0.62	Miles

Some popular modeling scales

Scale	1 inch=	1 scale foot=	1 scale foot = (decimal)	1 scale meter=	Comments
1/4	4"	3"	3.0"	250.0 mm	Flying models, live-steam trains
1/8	8"	1 1/2"	1.5"	125.0 mm	Cars, motorcycles, live-steam trains
1/12	1'	1"	1.0"	83.3 mm	Cars, motorcycles, dollhouses
1/16	1'4"	3/4"	.75"	62.5 mm	Cars, motorcycles, live-steam trains
1/20	1'8"	19/32"	.6"	50.0 mm	Cars
1/22.5	1' 10 1/2"	17/32"	.53"	44.4 mm	G scale trains
1/24	2'	1/2"	.5"	41.7 mm	Cars, trucks, dollhouses
1/25	2'1"	15/32"	.48"	40.0 mm	Cars, trucks
1/32	2'8"	3/8"	.375"	31.25 mm	Aircraft, cars, No. 1 scale trains
1/35	2'11"	11/32"	.343"	28.57 mm	Armor
1/43	3'7"	9/32"	.279"	23.25 mm	Cars, trucks
1/48	4'	1/4"	.25"	20.83 mm	Aircraft, O scale trains
1/64	5'4"	3/16"	.187"	15.62 mm	Aircraft, S scale trains
1/72	6'	11/64"	.167"	13.88 mm	Aircraft, armor, boats
1/76	6'4"	5/32"	.158"	13.16 mm	Armor
1/87	7'3"	—	.138"	11.49 mm	Armor, HO scale trains
1/96	8'	1/8"	.125"	10.42 mm	1/8" scale ships, aircraft
1/100	8'4"	—	.120"	10.0 mm	Aircraft
1/125	10'5"	—	.096"	8.0 mm	Aircraft
1/144	12'	—	.083"	6.94 mm	Aircraft
1/160	13'4"	—	.075"	6.25 mm	N scale trains
1/192	16'	1/16"	.062"	5.21 mm	1/16" scale ships
1/200	16'8"	—	.06"	5.0 mm	Aircraft, ships
1/220	18'4"	—	.054"	4.54 mm	Z scale trains
1/285	23'9"	—	.042"	3.5 mm	Wargame pieces
1/350	29'2"	—	.034"	2.86 mm	Ships
1/700	58'4"	—	.017"	1.43 mm	Ships
1/720	60'	—	.016"	1.38 mm	Ships

For figures sized in millimeters, use this formula: $1717 \div \text{figure size (mm)} = \text{scale denominator}$. This assumes a full-scale height of 5'8" (or 1717mm). For example, $1717 \div 54\text{mm} = 31.8$, so a 54mm figure is approximately 1/32 scale.