Toothpick Miniatures

by Alexandre Karadimas

Make your own 1:64 miniatures with common household tools and materials

If you have this, you can start right away:

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Required tools and materials

1. Tools

Commonly found at home

- 1 small segmented blade or "snap-off blade" utility knife. Cutting plastic will wear the cutter's edge quite rapidly.
- 1 pair of thin pliers with a wire-cutting capability.
- 1 cutting board, made of a piece of wood, MDF, thick plastic or any other suitable material.
- 1 nail, Ø 3,1mm (*meaning: of a diameter of 3,1mm*), to shape paper into clothing parts. *Note: if you don't have such a nail, you can wrap thin cardboard around a toothpick into a tube and then wrap this tube in a strip of scotch tape.*
- *If available*: another utility knife or hobby knife, to cut carboard and paper, thus leaving the aforementionned segmented blade utility knife for heavier duties. In doing so you will not need to snap off a segment of the blade whenever you need a clean or precise cut.

- Access to a metal file to file the clipped extremities of the barrels.

- 1 pair of nail scissors (slim ends are preferable) for cutting thin paper precisely.
- 1 nail file (the economical cardboard type is sufficient) or scraps of sanding paper in order to file parts, especially the shoes of the miniature.
- 1 nail clipper to cut thin wire precisely. (Note: this will slightly blunt the nail clipper's blade, so choose an old or inexpensive one).

- 1 pin Ø 0,6mm, common stationery item.
- 1 pin Ø 0,4mm, typically used to hold cloth while sewing or in newly bought shirts, to make more precise holes to start with.

- 1 permanent marker to mark metal parts before cutting.
- 1 mechanical pencil to precisely mark cardboard and paper.
- 1 ruler (thin translucent plastic rulers with markings at a right angle are ideal).

- *If available, but recommended*: 1 or 2 stationery hinge clips are really helpful in this design to hold small parts together while the glue dries. Larger sizes are more impractical ; weaker springs are preferable to stronger ones. If you don't have these hinge clips, you can hold the pieces together between your fingers until they are glued together, or use objects with some weight to the same effect.
- Househod glue, in liquid or gel form, to assemble the parts together.
- Some scotch tape is necessary when glueing the legs to the torso. If you don't choose to make ferromagnetic bases, a tape loop will be useful to stick your figure to the painting handle.

- Jar lids and bottle caps are useful to keep parts handy and store them in containers.
- Flat food containers with a cover or lid keep the aformentionned bottle caps together. In the event of anything upsetting the working space, the cover or lid helps in keeping the parts in the container instead tof them dispersing on the table or the floor. The flat cover are good places to place tools and parts on your working space.

Recommended additional tooling

- 1 hand drill with an Ø 1mm drill bit makes work with plastic pieces much easier. Such a drill usually costs about 10 Euros or US Dollars, including the drill bits. If you can, choose a model with a swivel top so that the drill sits in your palm while you turn the rest of the drill's body.

- 1 magnet (diameter 5mm to 10mm approximately) that can be part of a handle to assist in painting the miniature.

- 1 calliper (the very economical plastic variety is sufficient, costing about 3 Euros or US Dollars). It is the best way to make measurements at this scale, for instance for assessing the thickness of your materials. It will also prove useful when you'll develop you own designs.

Always cut downwards on the cutting board and never towards any part of your body.

Please don't cut yourself.

2. Materials

Commonly found for free or nearly free

- Thin paper like cigarette paper, paper bags for fruit and paper that is folded inside new shirts or shoes. They will be used for clothing such as trousers, vests and berets.
- Thin carboard (for instance, train or subway tickets). It is used for rifle handles, belts, webbing and other items.
- Thick cardboard (1,5mm thick, like in delivery pizza boxes) is used for the bases of the miniatures.

- Toothpicks are used for the legs, feet and neck.
- Plastic, 1 mm thick, taken from such packaging as those used for individual apple jam portions. It is used to make the central part of rifles.
- *Optional:* Ear cleaning swabs ("Q-tips"), using paper or cardboard, are used to make details and hand grenades. The cheaper brands are easier to work with.

- Cardboard/paper Ø 6 mm drinking straw, (for parties or in fast-food restaurants) is enough to make torsos for more than twenty troopers.
- Cardboard-paper Ø 4,5 mm drinking straw, (in small drink packages or tetra packs) is enough to make heads for more than twenty troopers.
- *Optional but recommended:* thin scraps of wire (up to Ø 0,8mm) and similar material to insert into the base so the miniature can stick to a magnetic painting handle. This makes it easier to paint the miniature.

Wire, which may be found at home or bought economically

- Ø 0,45 mm medium wire from plastic-wrapped "double-wire" metal clips, typically used to seal bread bags. The wire and its plastic sheath are used to make barrels and many other details.
- Ø 0,3 mm thin crafting wire (typically sold online or in supermarket "hobby" promotions) are used to make arms, hands and buckles.
- Ø 0,25 mm thin "freezer" wire: plastic-wrapped thin wire, used to seal bags for the freezer, can substitute for thin crafting wire but is more useful for small details like insignia.
- *Optional:* Ø 0,6mm straight wire, obtained from paperclips or thicker "double-wire" clips can be used to make rifle barrels.

Preliminary notes

Working on a small scale

The 1:64 scale is at the very limit of where one can operate visually and physically without optical help. The millimeter will be the unit of measurement here but it is often not practical to provide more precise values.

Below 0,5 millimeter, it is up to you to decide whether the result is satisfactory or not. Some practice will be required to cut the desired dimensions by eyesight alone.

The design incorporates some methods to bypass these size issues.

Working in batches

There are many parts and steps in this design. If for instance you plan to have ten miniatures it will be much faster and efficient to make ten parts in one session than making one complete miniature after another ten times over.
This booklet provides a duration for each operation per unit. Multiply this duration by the number of miniatures you intend to build to know how long this is going to take you.

Keep in mind this is not a race: in the beginning every step will take much more time than the duration given in the booklet.

All steps and operations have been organised in four parts, but you can make most subassemblies in advance at your own pace.

It is better to plan operations that involve glue or water at the end of your work day, so that the glue can harden and parts can dry up overnight.

Setting up templates and jigs. Making preliminary units.

Instead of having to use a ruler to make measurements and mark them on the pieces, you'll find it much easier to make templates.

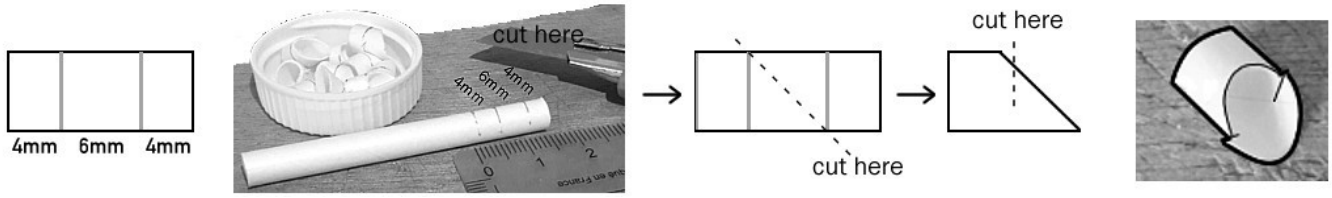
These are pieces of cardboard with all the markings needed to work on one particular pieces, and sometimes a way to position them precisely. Dimensions for the templates and photographic examples are provided in this guide. By using templates, you will be sure to have the same dimensions on all these pieces.

Be sure to label each template and also mark the dimensions, as you will see in the illustrations. This will prevent confusion between templates.

Before you engage in a batch production, it is advisable to start with one or two miniatures, in order to understand the entire process.

Part I: the basic body assembly A1 and the base

1. Making torso pieces from a Ø 6mm paper straw 130 seconds



The torso has a height of 10 mm on its spinal side, its sternum is 4 mm tall. The diameter of a paper straw is 6 mm, its length is 196 mm. One straw can provide 28 torsos.

Take a ruler or a template, a mechanical pencil and a paper straw. On the paper straw, mark the positions at 0,4 mm, 10 mm and 14 mm. Then rotate about one sixth of a turn and mark these positions again. Repeat until at a vertical glance on the straw you can see markings on each side.

Take the straw to the cutting board and align the cutter's blade between the 4mm millimeter on one side and the 10mm marking on the other side. Cut with a gentle sawing motion. Once the straw has been cut, cut the straw at the 14 mm mark, to create the second torso.

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When working in batches, measuring and marking one **tootpick** takes about 80 seconds, cutting about 20 seconds.

Additional cuts to the torso pieces

At this stage the lower part of the torso is not wide enough to accomodate the two angled toothpick legs, it is necessary to make two cuts to the side of the torso, about 2mm below the lower sternum limit. On the cutting board, put the torso on one side and determine visually where to cut, cut about 1mm towards the spine line, enough to flatten the flaps thus created. Repeat on the other side.

After a few trials with the toothpick legs, you will be able to judge quite precisely where and how to cut, without the need to measure.

After being cut from the straw, the upper part of the torso on the front /sternum side is too high, as if the ribcage were a barrel. You will have to cut a wide "V collar" of sorts, the low point of which will be about 1mm to 1,5mm below the torso upper limit. Visually, it is equivalent to 1/4th to 1/3rd of the sternum's original height. The V collar will not be visible on the miniature, but a torso without this cut will appear visibly awkward.

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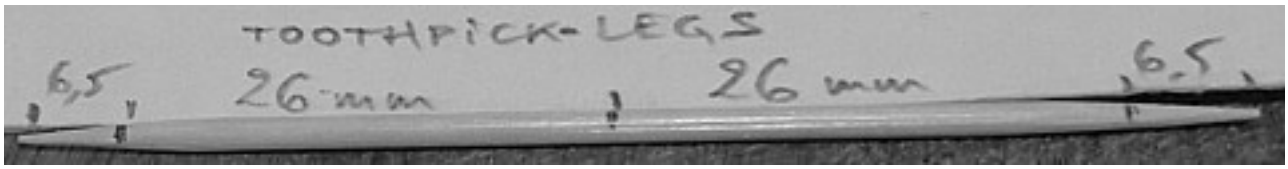
When working in batches, cutting the hips on one torso takes about 18 seconds and cutting the v-collar takes about 13 seconds.

2. Making legs and spacing jigs from toothpicks

70 seconds



A toothpick is about 63mm long and 1,8mm in diameter. It is more convenient to use a template than a ruler for this phase (see picture above). Cut 26 mm long parts for the "spread legs" posture, 25 mm for the "standing" posture.

Mark the toothpick using this template. Cut the toothpick by applying a moderate cutting force on it and rotate it with the other hand.

Note : cutting pliers are not recommended for this task as they tend to destroy the tootpick and require an unnecessarily high force.

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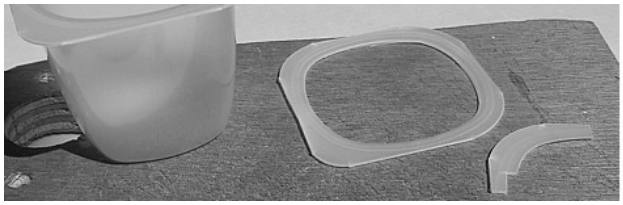
When working in batches, it takes about 20 seconds to mark a toothpick and 50 seconds to cut it.

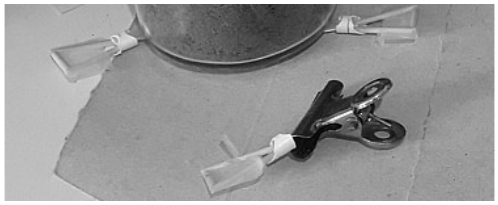
Making spacing jigs for the A1 leg + torso assembly

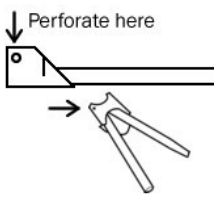
Cut 11mm long straight pieces from toothpicks, don't use the tapered ends of the toothpicks. These jigs will be used as spacers to give legs the correct angle when glueing them to the torso.
Mark these jigs with a permanent marker, to avoid confusing them with the "neck" pieces.

3. A1 assembly: glueing the legs to the torso and perforating shoulders

245 seconds







Take a 11mm leg spacing jig and place it in the middle of a strip of scotch tape. Place the legs on either side and have them join on the top side to form a rectangle. Close the scotch tape on the legs.

Apply glue inside the torso and on the back side of the triangle formed by the legs.

The top of the triangle should end flush with the top back end of the torso, where the neck would be on a human body. Use a hinge clip to clamp the assembly together while the glue hardens, as show in the second picture above.

If you don't have hinge clips, you can make levers out of plastic cups, as shown in the first picture above. *Note: see how to cut it out from plastic cups on page 9.* Slip the tip of the lever into the torso from above and place a dense object onto the rest of the lever (as shown in the second picture).

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Putting together, glueing and clamping one assembly with a lever take about 160 seconds.
Putting together, glueing and clamping one assembly with a hinge clip takes about 110 seconds.

Perforating shoulder holes on the torso

Once the glue on the A1 assembly has completely dried, take a thin pin (about 0,4mm in diameter) and by rotating it between your thumb finger and your finger, perforate the torso in the position marked on the third picture above, from the outside, then continue to the opposite side through the torso. Wiggle the pin in each hole afterwards to make it slightly larger. Then take the larger pin (0,6mm in diameter) and repeat the procedure.

Note : a pin will made a much cleaner hole than a hand drill for this task.

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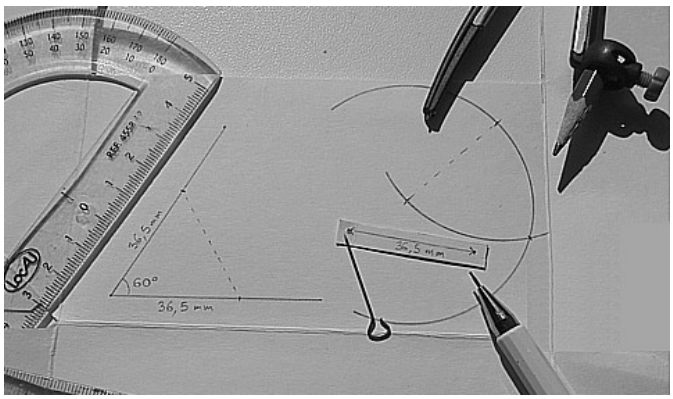
When working in batches, it takes about 85 seconds to perforate one torso on both sides.

4. Preparing the materials for the base

30 seconds



Making the equilateral triangle template

On a piece of cardboard, draw an equilateral triangle, using either a protractor, a pair of compasses or a strip of cardboard (see picture above on the left).

The sides of the triangle are 36,5mm long (*Note: this length accounts for subsequent trimming*).

Preparing the parts for the base

Use the template to outline the triangular pieces you want to cut on 1,5mm thick cardboard (for instance, a takeway pizza box is 1,5mm thick) then cut them out with a cutter dedicated to paper and cardboard, or with a fresh blade segment. Each simple base requires two triangular parts.

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When working in batches, it takes about 15 seconds to outline an equilateral triangle and 15 seconds to cut it out.

5. Assembling the base

65 seconds

Glue the two triangular pieces together.

Note: thick cardboard is corrugated, meaning that between two flat pieces of cardboard there is a "fluted" sheet of cardboard. Make sure that the flutes of each triangle are not parralel when glueing the together, in order to avoid the base bending along these lines.

When the glue has hardened, trim the base's sides to have straight sides. A final trimming will be made later on to adapt this base with its base cover (see Part II section 5).

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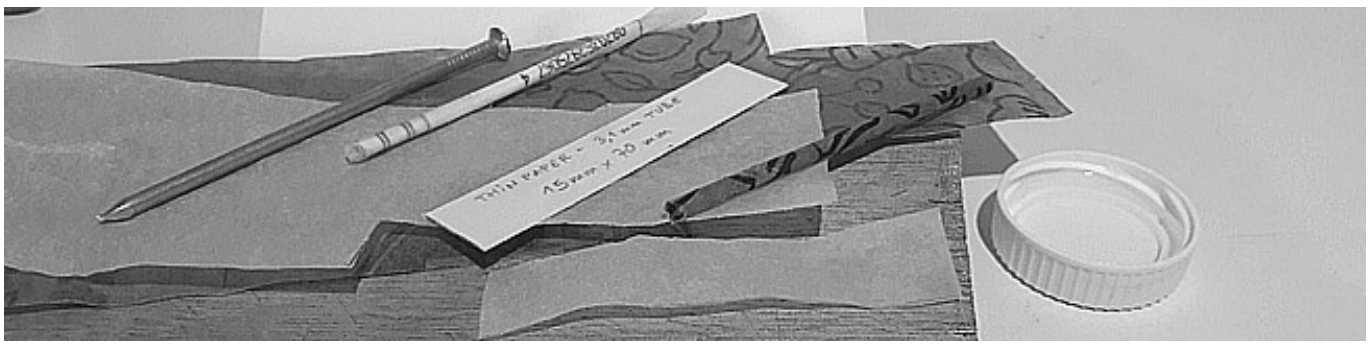
When working in batches, it takes about 35 seconds to glue all the parts together and 30 seconds to trim its sides.

Part II: connecting the basic body assembly to the base (assemblies A2 and A3)

1. Making tubes from thin paper for trousers and arms

80 seconds



Make a 15mmx70mm template. Use it to cut strips of thin paper.

You will need a nail of 3,1mm diameter and a small bottle cap with some water inside. Dip a finger in the water cap, moisten the strip of paper and wrap it around the nail into the shape of a tube.

Remove the tube from the nail and repeat the process for as many tubes as you require; four tubes are sufficient for ten miniatures, including possible wastage.

When the tubes are dry, place them on the nail again, apply glue on the bottom lip to about two millimeters from the edge, then roll the lip over the tube's body. Immediately slide the tube off the nail to avoid having both glued together.

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When working in batches, cutting and water forming tubes takes 40 seconds per miniature (about 100 seconds per tube). Glueing tubes and later cutting them takes 40 seconds per miniature (less than 100 seconds per tube).

2. Making shoes and necks from toothpicks

260 seconds

Make a template with 3,5mm and 12mm markings, as shown in the picture on the left.

Take a new toothpick and cut 12mm from both ends; these two parts will be necks.

A toothpick is cylindrical, but shoes are semi-cylindrical and tapered. The toothpick has to be shaved on one side (see first picture above) then rounded off with a nail file on the tip and the sides before being cut (see second picture above).

A shoe is 3mm to 3,5mm long; be cautious when cutting these small parts off the toothpick since they can fly off easily. You may want set up something like an empty salad container next to the cutting board to catch them.

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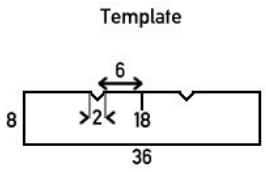
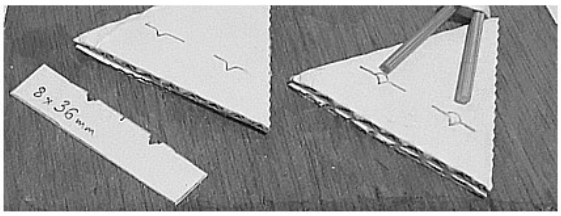
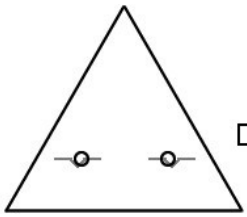
When working in batches, it takes about 260 seconds to obtain one neck and two shoes for one miniature.

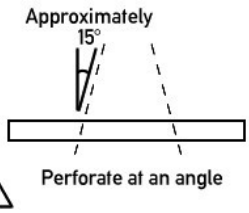
3. A2 assembly: associating assemblies to bases, perforating bases

120 seconds









The A1 assemblies have different dimensions one to another, they are not interchangeable. This is why you have to associate an A1 with the base you are going to connect it to. With a pencil, mark each A1 assembly with a different number.

Make a 8x36mm rectangular cardboard template. Using the template, draw the two positions that you will use to place the A1 assembly's legs.

Take one of the A1 assemblies and mark where the legs really are on this specific one. As soon as you marked it, write the number of that assembly onto the base with which it is now associated.

Once you have marked all bases, take a thin pin and perforate all bases at the center of the markings. Take a larger pin and repeat the process, enlarging the hole, then take a toothpick and enlarge the holes to the diameter of the leg.

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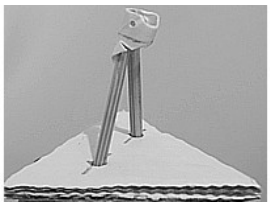
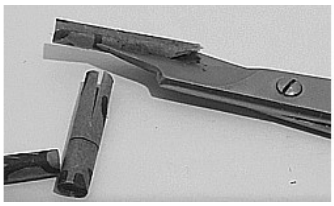
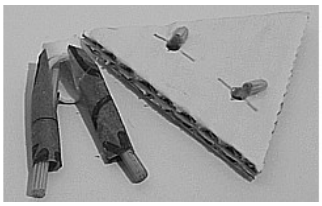
When working in batches, numbering the A1 assemblies and the bases takes about 15 seconds per miniature, marking and perforating one base takes 105 seconds.

4. A2 assembly: assembling body with trousers, shoes and the base

240 seconds


Begin with checking how the A1 assembly fits with its corresponding base. First insert one leg, then the other; the bottom of the legs have to be flush with the bottom of the base.

Remove the A1 assembly when you're done.

Glue the shoes to the base ; while the glue hardens, prepare the trousers.

With the nail scissors, cut 20mm of paper tube to make one trouser leg. Then make a cut inside the tube about 7mm long *(preferably along the contact line, that will emulate the sewing of the trousers)* to allow some wiggle room for positioning the tube.

Slide the trousers on the A1 assembly. Put glue on the end of the legs and slide them in the base; while you assemble, make sure that the trousers lap over the shoes and also that the joint between the leg and the shoes is not visible.

Do not wait to make adjustements as glue hardens quickly on paper.

Before leaving the assembly to dry, make sure the body is vertical and doesn't lean on any side.

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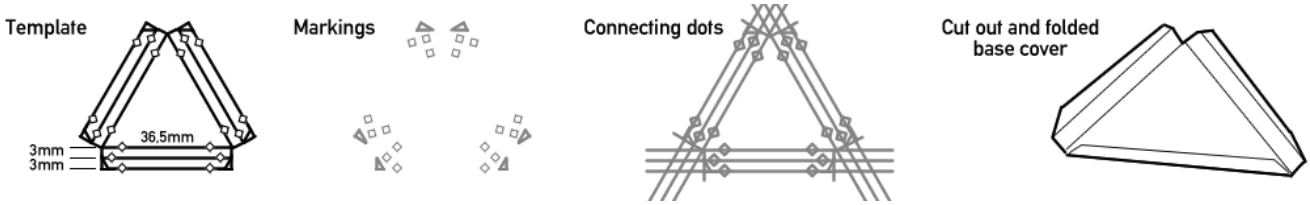
When working in batches, it takes about 25 seconds to check how the A1 assembly fits with its base, 55 seconds to glue the shoes on the base and about 15 seconds to make the lateral cut on the trousers.

It takes 145 seconds to slide the trousers on the A1 assembly, glue it to the base and make adjustements.

5. Making the template for the bases' covers



Use the equilateral triangle template to draw a triangle on a piece of cardboard. On each side of that triangle, draw two parallel lines at a 3mm and a 6mm distance from that side.

On these lines, create either two holes with a pin, or two lozenges-shaped holes, that may prove easier to cut and also easier to use.

You'll have to cut out small right-angle triangles out of the last side, so that these sides don't overlap when folded.

6. Cutting the bases' covers

310 seconds

Using the template you can mark a piece of paper with small triangles and dots or lozenges. Connect the dots together to create lines : the outerline will guide your cutter, the two other lines are guides for folding the cover.

Use the small right-angle triangles to draw the shape's sides. It is faster to cut the shape in a large triangle, following the outline, and removing the smaller areas at a second stage.

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When working in batches, it takes about 150 seconds to mark a cover and draw all the lines. It takes 90 seconds to cut a cover and 70 seconds to fold it.

7. Inserting pieces of wire and glueing the bases' covers

260 seconds

Making the bases magnetic will make it easier to paint the miniatures.

Use a pin to perforate from the side of the bottom triangle twords its center, preferably in the space between the shoes. Insert about three to four pieces of wire in these channels; there is no need to glue them in place.

- This takes about 15 seconds.

Take an A2 assembly and verify if the base cover can be folded ground the base. If the base is too large you can shave off excess material from one of its sides without the base losing its general shape (it is one of the advantage of an equilateral triangle shape).

When you can wrap the cover around the base, glue its bottom and as much sides as you have hinged clips. The hinged clip has to clamp the upper lip to the base's upper side.

If you don't have a hinged clip you can use a flat and dense object instead (like for instance a small box holding bolts and nuts) one side at the time, in conjuction with other objects to spread the pressure on the cover's bottom and avoid any slippage of the side.

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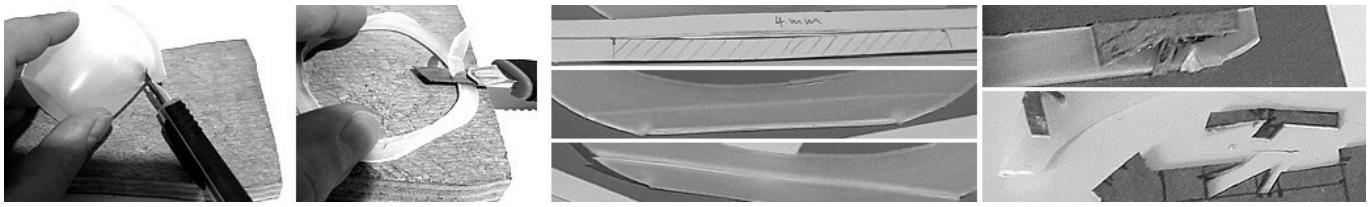
It takes 25 seconds to perforate three holes into the base and 40 seconds to cut the wire and insert the metallic pieces.

When working in batches, it takes about 45 seconds to check and correct the base's shape, 90 seconds to glue the bottom and two sides and 45 seconds to glue the last side.

Part III: connecting arms and weaponry to the A3 assembly

1. Making 4mm plastic strips for the rifle central part

20 seconds



Separate the cup's top: first cut the bulk of the cup, leaving only a rim on the cup's top. Then put the cup's top flat on the cutting board and trim the rim with the blade working away from you and your fingers on the opposite side of its possible trajectory, holding down the object firmly as shown in the pictures above.

Remove the upper film from the plastic: the cup has a film on top of it, where the grooves of the seal are. Make a cut on a corner of the "smooth" side (or cut a strip, as explained below) and snap it off. The snapped off part doesn't break away but remains attached to the cup by this film. Using pliers, you can then peel away this layer.

Cut strips of plastic: make a template with a lip, as shown above, that will align wih the straight ends of the cup's top. *Note: in this part we are going to work with 5 mm-wide strips, 4mm strips make for slimmer rifles which are also more delicate.*

Use this template to lightly cut a line with the cutter on the plastic, to make a mark. Remove the template and make further cuts on that line with the cutter.

After several surface cuts, pinch the plastic with the pliers and bend the plastic so it snaps along the line. Repeat this bending along the line until the plastic has full snapped.

Also make a **length template** (14 mm length) for the plastic piece.

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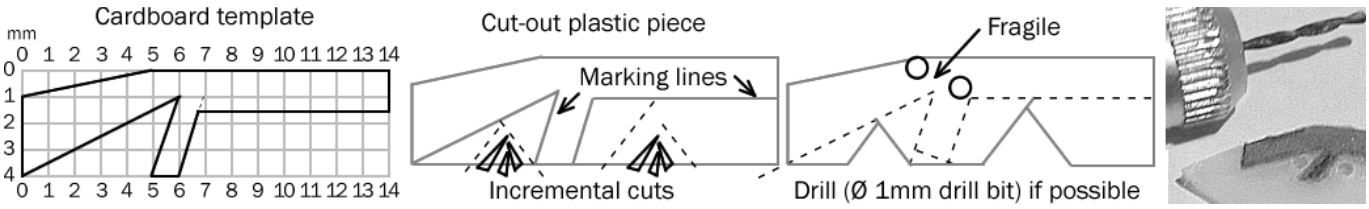
When working in batches (one cup top will yield 10 rifle parts), it takes about 9 seconds to mark 4 strips and 11 seconds to bend and separate them.

2. Cutting out rhe rifle plastic part

240 seconds



It is difficult to mark the plastic from disposable cups with sufficient precision, so we'll glue small cardboard **templates** to the plastic itself, and cut the shape around it.

These templates are themselves made from a template, as shown in the last picture of the Part III – 1 illustration.

Note 1: notice in the illustration that there is a difference between the template's shape and the cut-out plastic part, especially where the pistol grip is. The pencil is 0,7mm thick, when you use it to draw around a 1mm wide template, the end result will be visibly larger than the template.

In the case of the pistol grip, on the plastic part it has a width of about 2mm, on the template it is only 1mm wide.

Note 2: If you have a hand drill you can drill holes on either side of the pistol grip and thereby reduce the risk of breaking it off when cutting.

Note 3: in this step we are using a generic rifle shape that is quick to make and assemble. More elaborate firearm designs are presented in part V of this booklet.

Positioning: start with marking the correct length on the plastic strip using the length template and the cutter.

Glue the small template with the butt of the stock against the length marking, since the bottom of that marking is in itself a mark for cutting.

When the glue has hardened, mark the plastic strip along the template's outline using the cutter. When this is done, remove the small template.

Cutting: do not try to cut off large areas with one cut because it will break the plastic. The illustration above shows how to cut small then increasingly large parts away from the shape in order to avoid breakage.

The upper stock notch can be ground off with a nail file if you want to avoid snapping the stock off, the wrist of which being quite fragile.

Note: if you have a hand drill, you can drill the hole for the notch, as pictured above, and also drill a hole for the trigger guard, which helps a lot during assembly. Each hole takes 20 seconds to drill.

Finally, make a few passes on the buttstock length marking and snap the rifle part off.

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When working in batches, it takes about 30 seconds to make the length mark and glue the template to the plastic strip and 30 seconds to mark the template outline with the cutter. It takes 180 seconds to cut the plastic piece and grind the stock notch.

3. Converting large or medium wire into weapon barrels

80 seconds

Take a paperclip or the wire from a double-wire clip and straighten it out so you can get the most out of the straight portions of it.

Using a template, mark the parts to be cut with a permanent marker. For the standard rifle, the barrel length is 14mm.

Cut the paperclip with the pliers' inbuilt wire cutter. Once all barrel are cut, take a metal file and pass the cut barrels on it to deburr the extremities when necessary.

-

When working in batches, straightening out the paperclip and marking six barrels takes 30 seconds per barrel, cutting takes 20 seconds per barrel and deburring takes about 30 seconds per barrel.

4. Converting thin cardboard into strips for the handguard

15 seconds

Measure the distance between the limit of the rifle's rear notch and the end of the central part (in the case of the standard rifle, that would be 8,5mm) and add about 0,5mm to it, to account for disrepancies between the parts.

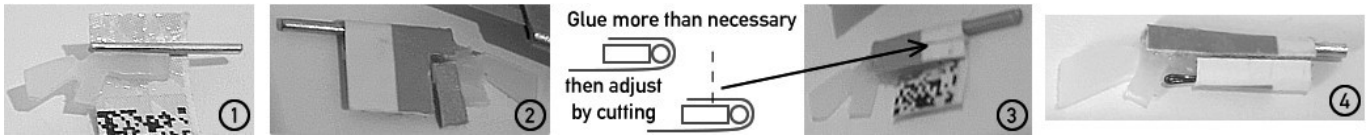
Take a train ticket or any other source of thin cardboard and draw a line to create a 9mm-wide strip. Cut that strip out and wrap its ends around a nail or a toothpick to give it a rounder shape.

-

When working in batches, its takes 55 sec to draw a line and 20 seconds to cut a 80mm long strip of cardboard paper from which we can make five rifles. The duration per rifle is thus about 15 seconds.

5. Assembling the rifle

80 seconds



Note: visually the carboard is the handguard and hand guard of the rifle, technically it binds the barrel and the plastic part together. What we are going to do in this design is glue too much cardboard and then remove the excess, rather than taking much more time in creating an elaborate cardboard piece (image 2).

Apply glue to the strip of thin cardboard, place the plastic part and the barrel on it, leaving some carboard available above it (image 1). Wrap that free cardboard over so that it sticks to the other side of the plastic part (as can be seen on image 3).

Use a dense object or a hinged clip to hold the assembly together while the glue dries. Once the glue is dry, cut away excess cardboard below the plastic part (image 3).

Turn the rifle assembly over and cut away an area around the trigger (image 2). This frees up a portion of the carboard that you wrap on the rifle from underneath. Wrap it a first time without glue to determine where to cut it to fit. Once the piece fits, apply glue on the plastic part and glue the strip to the assembly (image 4).

Note: if you don't have a hand drill, you can see on image 4 that, before assembly, a loop of thin wire has been placed between the cardboard and the notch in the plastic part to create a trigger guard, to make it easier to attach it to the hand.

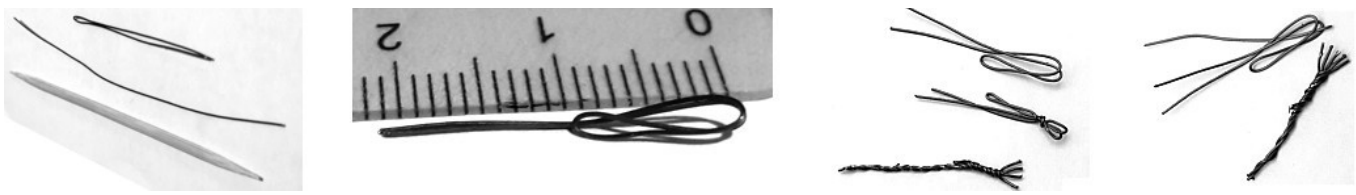
-

When working in batches, it takes about 45 seconds to glue the plastic part, the barrel and the cardboard together.

It takes 15 seconds to cut the handguard and the trigger area. Adjusting the lower handguard and glueing it takes 20 seconds.

6. Making arms and hands out of thin wire

310 seconds



Make a jig that allows you to bend wire at a 10 mm length, like in the illustration below. Cut a piece of wire about 63 mm long (you can use a toothpick as a template) and bend it in half. Take the bent end to the jig and bend it 10 mm inwards.

There is now one extremity with two loose ends and the other extremity with two loops. Pinch about 5mm of the two loops at one end with the pliers and twist the rest with with your fingers, or another pair of pliers if available.

Finally, cut the very end of the loop to create a four-fingered hand.

There is a possibility to make a "five-fingered hand", that will be worked into four fingers and a thumb. To do this, before twisting the arm, add a 2 mm-long piece of wire, make sure one end is flush with the two loops, and then twist it all into shape.

-

Cutting two pieces of wire, for two arms, for one miniature takes about 30 seconds, bending in half takes 30 seconds; the 10mm bending takes 40 seconds.

Twisting two "four-finger" hands and arms takes 70 seconds. Cutting an additional piece of wire and then twisting a "five-finger" hand and arm takes 130 seconds.

Cutting the loop ends takes 10 seconds.

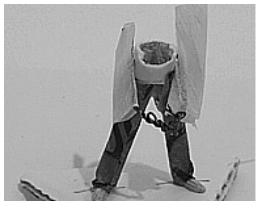
7. Connecting the arms to the body

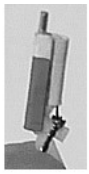
600 seconds

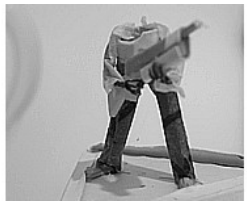
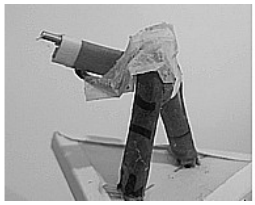
This is the **most complex operation**, it will take about ten minutes per miniature. You will have to be patient for this step.

This is also the stage when you can add variety to the miniature's posture. Experimenting on new postures is a demanding process but it is rewarding.

Note: at this scale it is difficult to obtain accurate proportions for these arms; clothing hides most variations in length. My reference lengths for "heroic scale" are: hand 4mm, forearm 4mm, upper arm 5mm, shoulder "hook" above 2mm.





Preparing the sleeve

To form each sleeve, cut 15 mm out of the thin paper tube.

Note: don't hesitate to cut more, it is always possible to cut paper in excess, while you'll have to discard arm sleeves that are too short and start the process all over again.

Like with the trousers, cut about 5mm inside the sleeve, and slide the arm into the sleeve.

Adapting the right hand to the weapon

With the tip of your thin pliers, take the hand's fingers and bend them in the shape of a hook. Using a pin, gently set the fingers apart one from another; these are very visible details on your miniature.

If you drilled a "trigger guard hole" in your firearm, it will make the assembly much easier: bend the index finger so it can enter the trigger guard.

This will prevent your firearm to slip away during the assembly process.

(Note : this way of holding a firearm is exactly what one should not do in real life, as the finger could trigger the weapon. Unfortunately this is how it is often pictured in commercial miniatures and in movies. Here it serves the purpose of securing the hand to the rifle, but now you know this is not this is supposed to be in real life.)

Mounting the arms on the torso

Bend the shoulder hook and insert it into the shoulder hole on the torso, then bend it hooks downwards

Note: the wire takes the weight of the arm and helps in assembling, the paper flaps at the end

of the sleeve stabilize the arm in its position.

This is the moment where you bend and adjust the arms, the hands and the weapon into a stance. It helps to maintain the miniature's shoulder in place with one of your hands while you work on its arm.

Once you are satisfied with the stance you can glue the hands to the weapon, then glue the sleeve flaps to the torso.

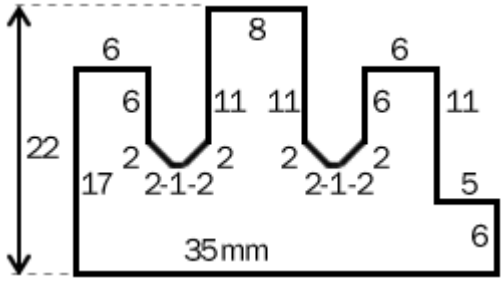
Wait until the glue has dired to create some cloth effects by moistening the sleeves and shaping then with the end of a toothpick.

Note: you can use one end of a toothpick to apply glue, and the other end to push the sleeve into position.

Part IV: adding the coat and the head

1. Making a template for the coat pieces and cutting the coat part

80 seconds



Make a coat template to the dimensions specified in the illustration on the left.

If you want to create a long coat, add two millimeters to the bottom when you mark the thin paper.

Use the coat template to outline coat shapes on thin paper and cut them out.

Note: it is more efficient to cut with straight cuts than to try and cut out a complicated shape.

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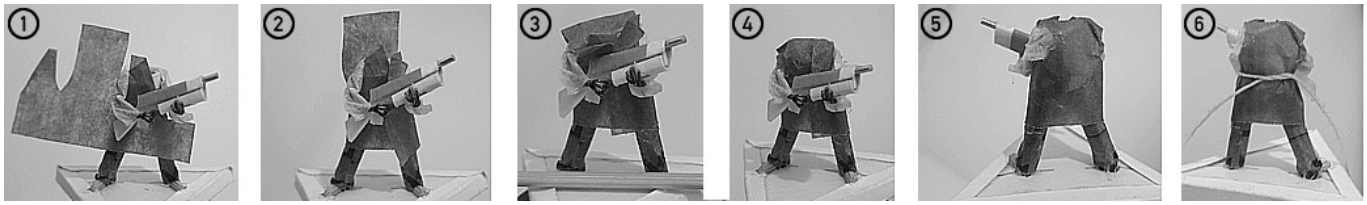
When working in batches, it takes about 20 seconds to outline one coat's shape on paper and 60 seconds to cut it out.

2. A5 Assembly: glueing the coat to the A4 assembly

420 seconds



Note: before putting on the coat on the miniature, wait until the glue holding the miniature's arms has hardened.

Fold the coat collar lapels on either side, then test-fit the coat. If the coat is too low because a sleeve is glued too low on the torso, you can make a small vertical cut on the coat's "armpit" for adjustement.

Slide in the coat's side next to the tab, which will be the coat right-hand side, between the torso and the arms (**image 1**).

Apply glue to the miniature's left thigh then press the "tab" on the coat to it. Wrap the coat around the miniature and slide in the left-hand side of the coat's front (**image 2**).

With one end of a toothpick, apply glue to the coat's right-hand side, on the "belly" but not higher, then put the coat's left-hand side on it. Make sure the lower end of the coat is parallel to the ground and that the coat's back side is centered on the miniature's back.

You need to keep the two "lapels" (the upper parts of the coat's front), free from any gluefor now.

Apply glue to the inner side of the overhanging part of the coat's back, flip it

over the torso and tuck it in between the torso and the two lapels. Use the clean part of a toothpick to help you push the part in (**image 3**).

Apply glue inside the overlapping parts of the coat in the shoulder areas and glue them so that it looks as natural as possible (**images 4 and 5**).

You can then glue the lapels to the upper front of the torso; the lapels should not go beyond the neck area.

Finally moisten the coat in the waist area and tie a piece of thread around it to create the shape and folds that appear when wearing a belt (**image 6**).

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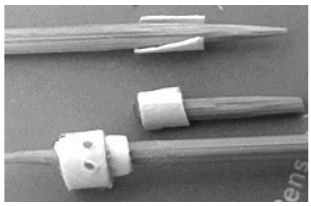
The whole assembly procedure takes on average about 7 minutes.

3. Making parts for the head from Ø 4,5mm paper straws

150 seconds



A paper straw has a spiral structure, if the spiral is on the front side it will be visible. To avoid this, locate where the spiral ends on the edge of the straw and mark it with a small vertical line.

Draw a small vertical line inside the straw on the opposite side (see first image above).Take the thin pin and pierce two holes on either side of the internal line.

Note: it doesn't matter much if these holes are not symmetrical in regard to the internal mark, because from the outside you will instanlty center these two "eyes". It is, however, important to keep them at the same height relative to the straw's border, or it will look as if one eye is higher as the other.

Enlarge these holes by inserting the thin pin from the outside, giving it rotary motion, while very gently pushing it. Once the thin pin has gone through, take the larger pin and repeat the process, also from outside.

Mark the straw with a small line 3 millimeter away from its border, then proceed to cut it.

To create the "jaw", cut a 5mm piece from the straw, then divide it vertically in three pieces.

Finally, cut a 3mm piece from the straw and divide it also in three parts. *Note: you can recycle the skull parts were the eyes are not horizontally aligned.* These pieces will be the fillers, that places the head in the corrrect position relative to the neck, and also prevents the jaws to be glued to the throat.

After the cutting operations, wrap the jaw and filler pieces around a toothpick to give them a rounder shape.

-

It takes about 70 seconds to mark the straw and perforate the eye sockets. It takes 30 seconds to mark and cut a 3mm part or 5mm from the straw.

When working in batches, it takes 25 seconds per miniature to obtain a jaw or a filler piece from the straw.

4. A6 assembly: assembling the head and placing it on the body

160 seconds

Take the neck and glue the filler; be sure that both pieces are flush on their top sides.

Glue the jaw piece inside the skull part so that it is symetrical to the eye sockets. Again, make sure both pieces are flush on their top sides.

After the glue has hardened, glue the two assemblies together.

On the A5 assembly, pierce the "coat's" overhanging so that the neck will be located as close to the inner toothpick "legs" as

possible, i.e. As close to the center of the torso as possible. Once the glue in the head piece has hardened, place the head after the clothing, also to adjust where it looks depending on the body's stance.

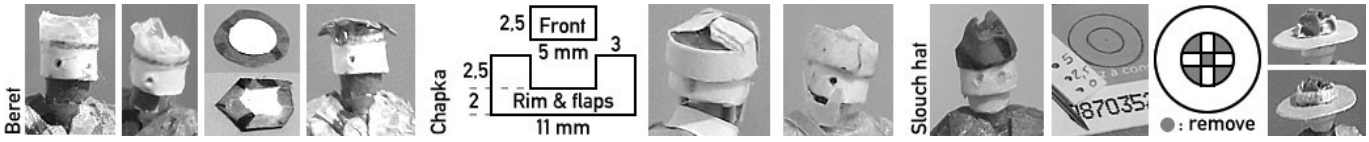
Note: the direction of the head is an important part of its body language and adds a lot of visual value to it.

-

When working in batches, it takes about 140 seconds to assemble the head and 20 seconds to place it on the A5 assembly.

Part V: customising the miniature

1. Headgear, jaws and blankets



Sailor's cap: Glue a piece of thin paper about 20mm long to the top of the head, in the shape of a cylinder, so that 1mm of the skull's top is covered. When the glue has hardened, take the nail scissors and cut the paper cylinder so that 1mm above the edge of the skull remains.

Take a Ø 6mm regular paper clipping from a paper punch or cut a Ø 6mm disc from regular paper. This disc will provide rigidity to the beret's top. *Note: regular paper can be softened by water and shaped, thick paper less so.*

Glue the disc to thin paper, then cut the thin paper with a 2mm distance to the paper clipping. Put glue on the paper clipping, wet the thin paper with a moist finger, then fold the wet thin paper onto the glued spot so as to form the shape of a beret. Bend it downwars at the edges.

When the assembly has dried and the glue hardened, apply some glue to the sides of the thin paper cylinder that are above the skull and fold it inwards. Place the barret top above it and adjust its position until is properly centered. Let the piece alone until the glue has hardened.

Beret: follow the same procedure than for the sailor's cap, but keep the paper cylinder upright on one side. *Note : the raised side is on the right-hand side for the French, on the left-hand side for other nations.* Glue a thin wire loop or any other shape as an insignia.

Hat string: some berets and hats have an integral piece of string to hold it in place Use thin wire to simulate it, as it is much more practical to work with than actual string or thread.

Pom-pom or pompon: cut a 1mm wide strip of medium cardboard. Cut its corners then inside make two cuts to create an octogonal shape when you finally separate it from the strip.

Apply some glue to the beret's top center then place the pom-pom on the beret.

Australian slouch hat: make the cylinder from thin kraft paper, moisten it and fold it inwards, so a round lip forms on its crest. Apply glue inside the cylinder, put a pin across the cylinder in the direction of the head's eyes and press the lips together on the pin to form a crease.

Make a small cardboard compass with 2,5mm radius and 5mm radius, draw these two circles on a piece of thin cardboard. Cut tabs inside the smaller circle (see image), then with the tip of the cutter make small indents along the path of the inner circle until it can be removed. Use the nail scissors to cut the outer circle away from the cardboard, test-fit the rim; the tabs are about 1mm long and are above the rim.

Use some thin paper or teabag paper, make a 4mm-wide ribbon and fold it in two to create

a 2mm-wide pugaree. Apply glue on the cylinder sides and wrap the pugaree around the cylinder and the tabs.

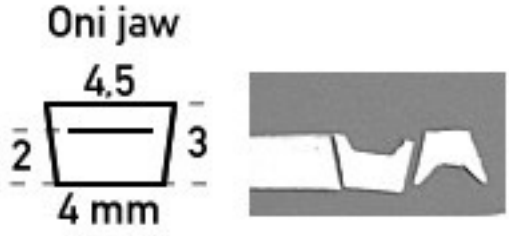
Finally, fold the hat's left-hand side upwards and glue it to the cylinder, this is the emplacement for an insignia.

Chapka: cut the rim and front pieces from thick paper; cut off the corners of the flaps to give them a more rounded aspect. If you want a texture closer to fur you can glue some teabag paper on these pieces, as is shown on the second chapka picture.

Bend the flaps, then glue the rim around the back of the skull. Finally glue the front in the space left vacant.

Oni jaw: the basic miniature has no jaw to speed up the process, but adding one can add a lot of personality to it. The Oni (*mythological creature*) jaw shown above with the chapka has protruding teeth.

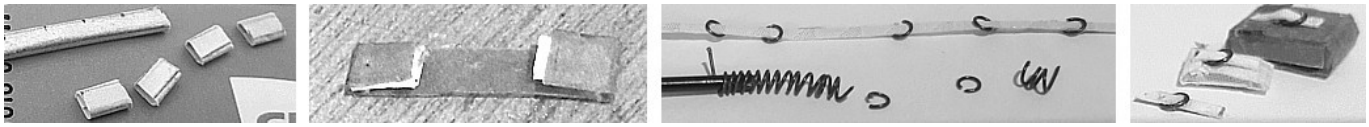
Make a 3 mm wide strip of thick paper with 1 mm markings on each side. Cut at an angle, then make the cuts inside the strip for the teeth, remove the part above the lip and finally cut off the finished jaw from the strip.



Blanket: cut a 24x36 millimeter rectangle from thin paper or newspaper. You can roll it into a 36mm long cylinder and wrap it across a shoulder or around a backpack.

2. Making pouches

105 seconds



Take thick paper or thin cardboard; with a ruler draw lines at 3x1x3x1x2mm intervals, with a ballpoint pen to ease folding afterwards. - This takes 90 seconds for a 50mm piece of paper that will yield 10 pouches, i.e. 9 seconds per pouch.
Cut this section off, fold it along the drawn lines until the shape of a box is obtained.
- This takes 3minutes in total, i.e. 18 seconds per pouch.

Glue the 2mm part to the opposite side, thus creating a long narrow box. - This takes 50 seconds in total, i.e. 5 seconds per pouch.
When the glue has dried, cut this box in 5mm intervals. - It takes 5 seconds per pouch to mark the intervals and 7 seconds to cut out one pouch.

Take thin paper, cut a 4mm wide strip and divide it in 30mm intervals; apply glue on it to wrap the carboard to each end, glue it and wrap it to three sides. Cut enough to finish the wrap and create a lip by folding the end. - This takes about 30 seconds per pouch.

Buckle: wrap thin wire around a nail 1 mm in diameter. - This takes 30 seconds for 7mm of wire, from which about 15 buckles can be made.

Cut the coil every time there is a full loop with the nail clipper. Flatten the circular shape and slide it onto a strip of thin cardboard less than 1mm wide upon which glue has just been applied.

When the glue has hardened, cut off the buckle & strip asssembly and glue it over the pouche's lid. Finally, glue the pouch to the miniature close to tits belt.

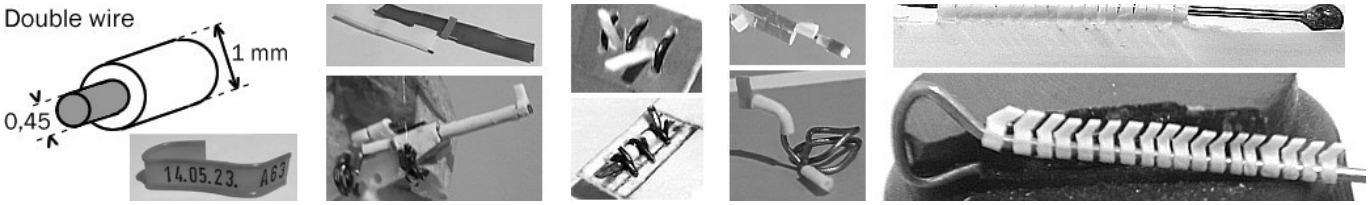
Belts can be made like a long pouch strap with a thin wire buckle, or with a larger rectangular buckle made from thin cardboard.

If the buckle is not really visible, it is simpler to just cut a thin cardboard ribbon, the ends of which meet on the back of the miniature and are hidden by a pouch. First glue one end of the ribbon to the back then wait for the glue to have hardened before completing the loop.

-

When working in batches, it takes 12 seconds to cut one buckle. It takes about 20 seconds to slip a buckle over a strip of cardboard, cut it once the glue has hardened and glue it to a pouch.

3. "Double-wire" clips: medium wire, sheath and hinges



Plastic-wrapped "double-wire" metal clips, typically used to seal bread bags, are very useful to create objects and details. Their uses can be summed up in three categories : **hinges**, **sheaths** and **wire**.

Among many possibilities, hinges can be useful to create chests or articulate parts on vehicles like wing flaps for instance.

The sheath functionality is useful to slide foresights on firearm barrels (*note: This is why one shouldn't make barrels out of wire larger than 0,6mm if possible*) and creating details on wires, for instance cables or hoses (especially if a hole has to be visible).

The wire itself is easy to bend into shapes with pliers, and unlike thin wire it will still keep that shape when manipulated. There are different diameter of wire inside these "double-wire"clips, some are thick enough to make acceptable rifle barrels.

Examples shown above: hinges, telescopic sights, rifle bolt, rifle handguard, rifle foresight, switches, rifle grenade, hose with faucet.

Finally, the "double-wire" design makes it possible to work on one sheath or hinge area while it is still connected to the clip, with or without a clip on the opposite side. In the picture above, you can see how a spine has been made on the plastic part then slid on a pin before being cut off.

Since the wire is also ferromagnetic, magnets can assist in building and painting small objects made from these clips.

Note : it is possible to slip the sheath on slightly larger wire, by passing a pin of the desired diameter through it. The taper of the pin makes the process smoother and gives a better shape.

4. Q-tips and zip ties: hand grenades and picatinny rail

Note: the stem of Q-Tips is a tight spool of paper, which makes it an interesting building material. When you shave off one side, you will obtain cylinders of variable diameter. In the center of the Q-tip is a 0,4mm diameter hole that will accept thin and medium wire.

Hand grenade: cut a 4 mm long piece from a Q-tip paper stem *(Note: the cheaper variety is easier to work with)*, insert a thin pin to make sure the hole is straight and wide enough.

Cut 20 milimeters of thin wire and wrap it around a pin so that both ends are oriented in the same direction. Insert one end into the Q-tip until the loop reaches the top, then bend what protrudes from the grenade's bottom to pinch the assembly in place.

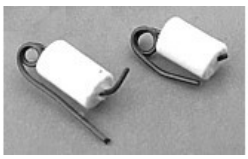
Slightly bend the other end into the shape of a handle. Finally, cut excess lengths with the nail clipper.

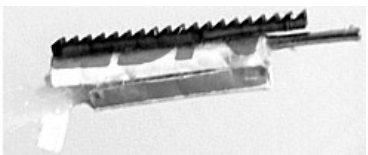
-

When working in batches, it takes about 30 seconds to mark and cut the Q-tip, 50 seconds to insert and remove a thin pin then insert and bend the wire.

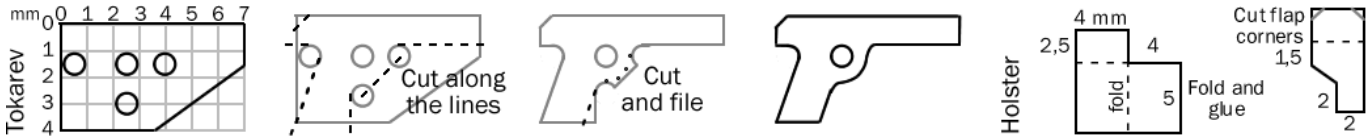
Finally, it takes 30 seconds to bend the handle in shape and cut all excess wire.

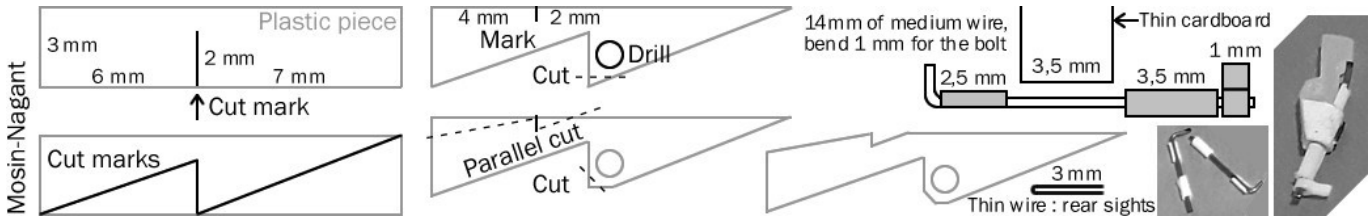
Picatinny rail: first cut a piece of ziptie to the desired length, then cut its sides off. The smaller the ziptie, the denser the serrations.

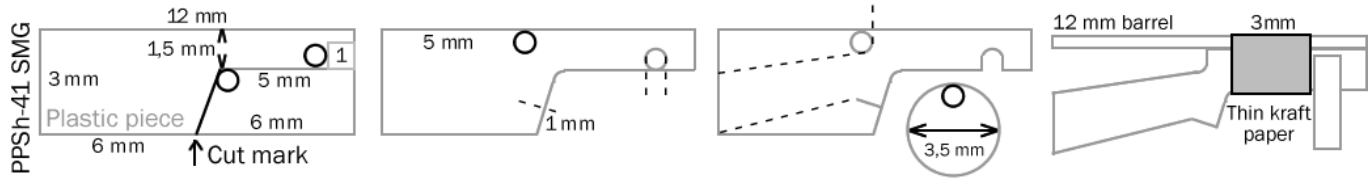


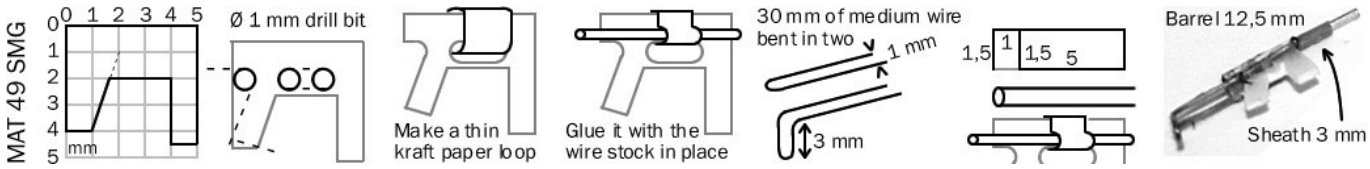


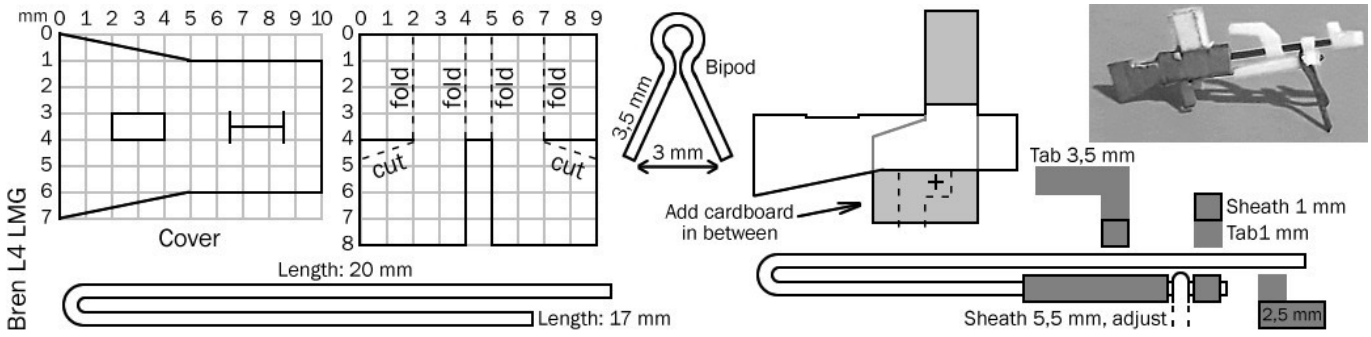
5. Additional firearms

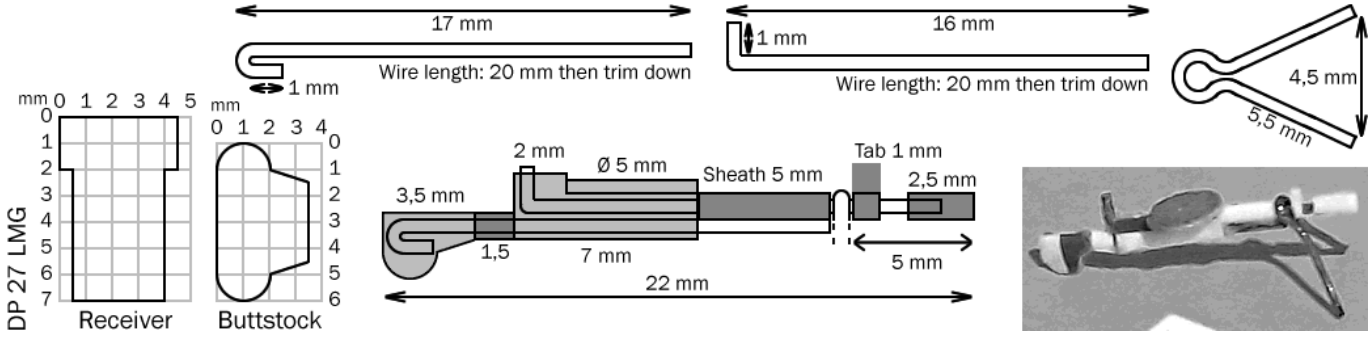












Decorating the bases

Mix wood glue with a few water drops, apply it to the base's surface then then dip the base of the miniatures in dry earth or sand, shake to remove the excess.

When the glue has hardened, wipe off insufficiently glued material with an old paint brush.

-

This takes about 140 seconds.

Painting

This booklet is limited to building miniatures, but in the same cost-conscious perspective oil paints are recommended.

For about ten euros, an assortment of twelve 12ml oil paint tubes can be bought at art stores that will provide, by mixing them, all the colours you need for more than two platoons.

Economical synthetic brushes can be bought for three euros, White Spirit is commonly found at home or in hardware stores (*Note: buy the odorless variety if possible*).

You will also need to purchase some medium, like lindseed oil (which gives a shiny aspect) or preferably matt medium.

Inexpensive palette

On the second illustration you can see food packaging that has been taped to a flooring sample. This prevents it from easily tipping over or being blown away.

If the dense material you want to tape packaging on is too dark, place a white sheet in between, it will make for easier colour recognition.

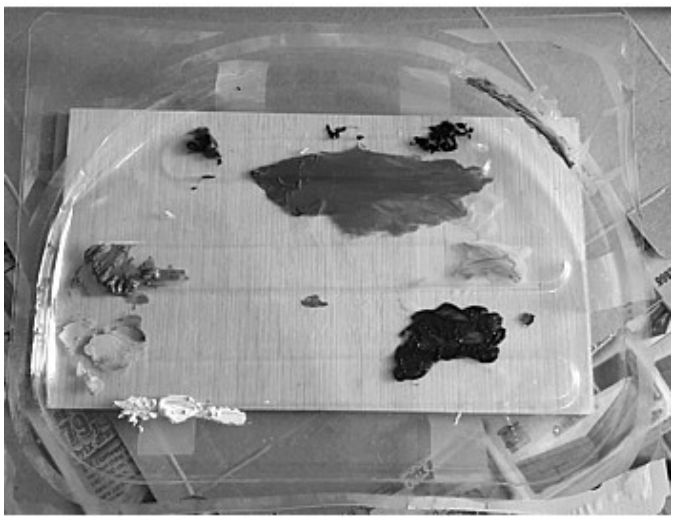
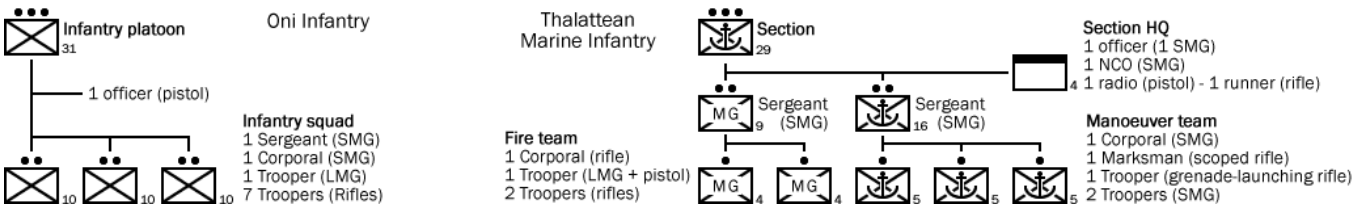
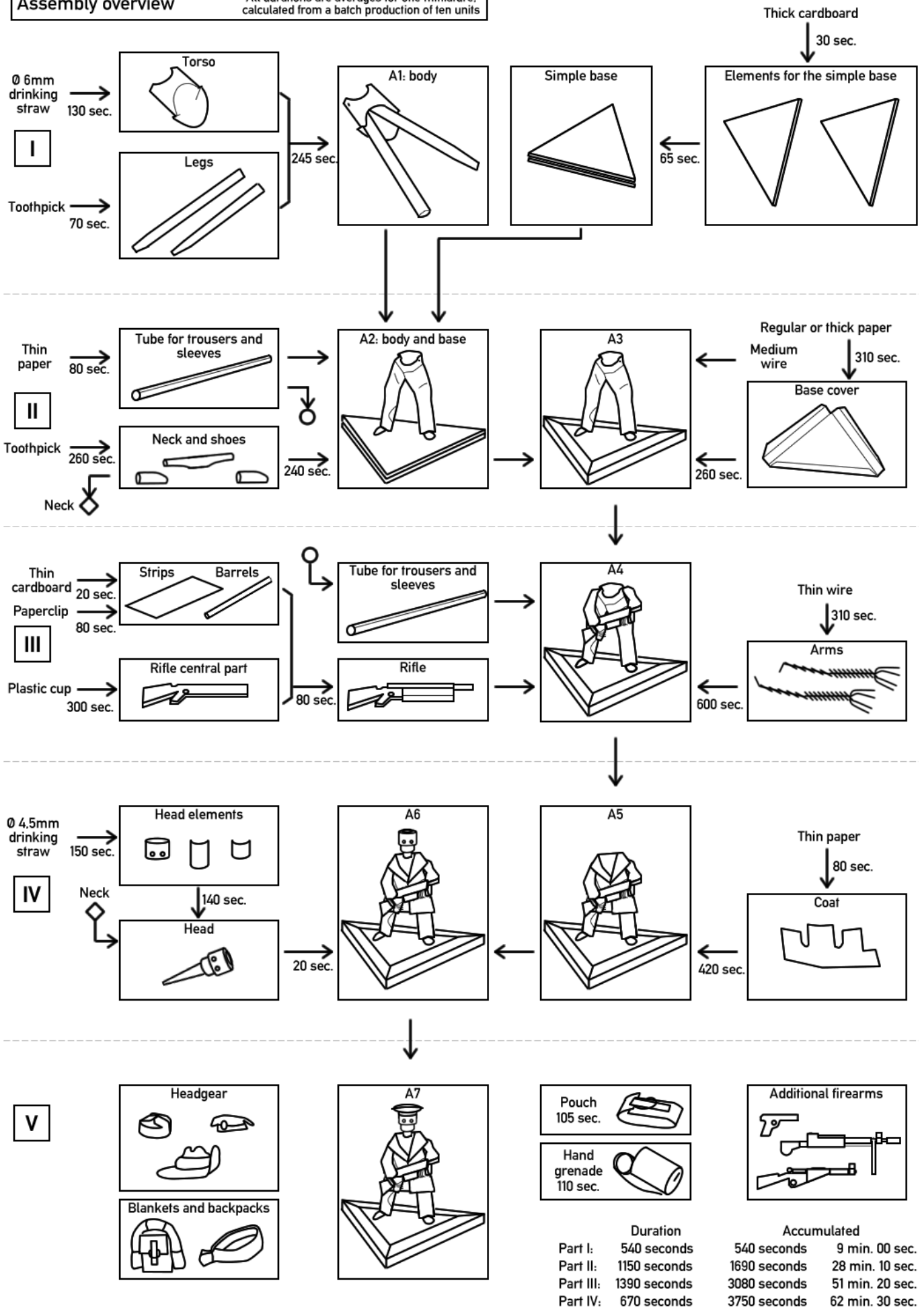


Table of organisation and equipment (fantasy Early Cold War period)



Assembly overview

All durations are averages for one miniature, calculated from a batch production of ten units



	Duration	Accumulated	
Part I:	540 seconds	540 seconds	9 min. 00 sec.
Part II:	1150 seconds	1690 seconds	28 min. 10 sec.
Part III:	1390 seconds	3080 seconds	51 min. 20 sec.
Part IV:	670 seconds	3750 seconds	62 min. 30 sec.