

HOW TO

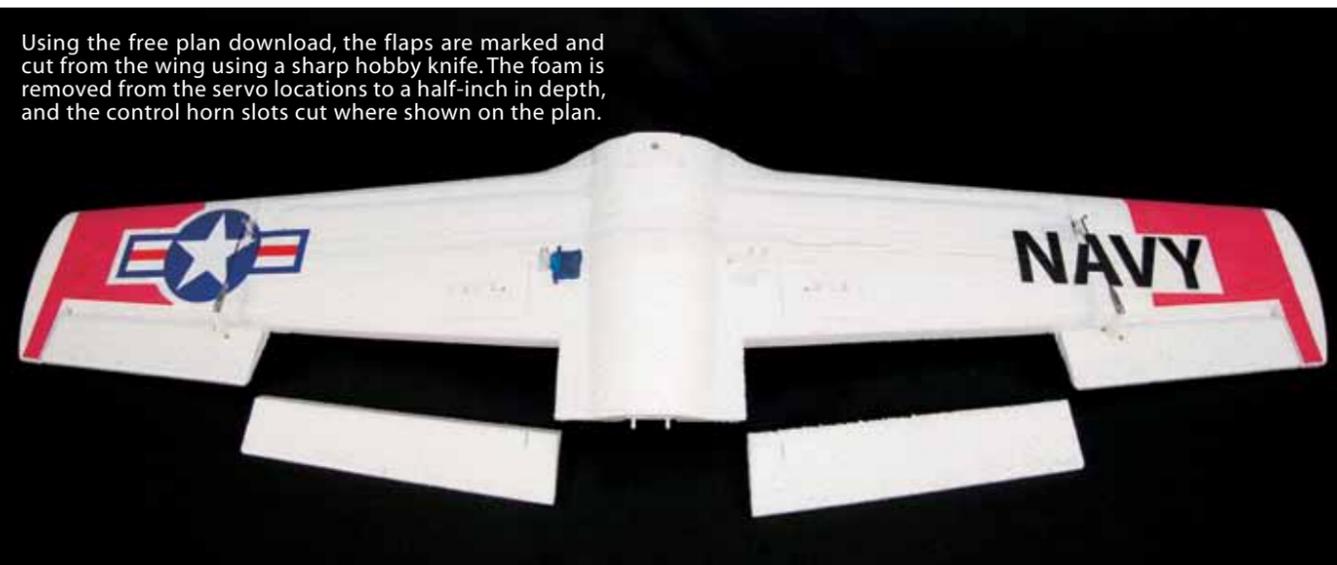
“SCALE-OUT” YOUR PARKFLYER

BY: **Mike MacFarland**



Most parents can remember a Christmas when the big box that the gift came in got more playtime than the gift itself. This same irony finds me flying the heck out of my foam Parkzone® T-28 Trojan, despite my first love being building and flying balsa wood airplanes. The reality of it is that just about anything that flies fascinates me, and many evening flights with this particular one have got me thinking of adding some “fun scale” touches to it. Things that I thought would look cool yet serve a function were navigation lights and flaps. The lights could extend the last flight of the day by boosting orientation, and I dreamed about how slow and scale-looking it could fly if it had flaps. With that in mind, I began to research these scale additions to the Trojan, and drew them up in plan format for many others who might want to make the same changes too.

▶ The addition of these fully deflected flaps help slow the flight speeds down to a crawl, making steep landing approaches and scale-looking flight possible. And the navigation lights, while visible during the day, are very prominent in low light conditions and greatly assist with proper flight orientation.



Using the free plan download, the flaps are marked and cut from the wing using a sharp hobby knife. The foam is removed from the servo locations to a half-inch in depth, and the control horn slots cut where shown on the plan.

Referencing an online plan of the T-28, I found that the wing on this model is a fairly accurate scale rendition of the original. The wing plan outline was traced, and things like the location of the navigation lights, pitot tube, aileron and flap sizes and locations were noted. The plans were made to be used as a marking template upon the wing of the model. By downloading this free plan (see the Source Guide), you can “tile print” the PDF with standard letter paper and tape or glue it together to make a full-size template. This will take the guesswork out of the modification and save you some valuable hobby time. The resulting flaps are of scale size and proportion, and are operated by a linkage connection to a dedicated servo for each flap. The servo’s are installed flush with the underneath side of each wing, and are nearly hidden from view. The entire process of adding the flaps, linkage, and navigation lights only adds 40 grams of weight to model, can easily be done in a day, and will likely find you having twice the fun as a result of your efforts. If you’re ready to take your T-28 to the next level, let’s discuss how it’s done.

Since we are adding a channel function to the radio system, you’re going to need to have a transmitter and receiver of sufficient channel capacity to handle the addition. Parkzone® sells two versions of the Trojan, and if you have the five channel FM transmitter version, you’ll need to find a compatible receiver with at least five channels available (the included one has only four). Whether you’ll need a five- or a six-channel system depends on the servos and type of transmitter (computerized or not) you decide to use. The servos will need to be digitally programmable, like the inexpensive Spektrum™ SPMDSP75 servos, if you want to use them with a “Y” harness on a five-channel system. The reason



▶ These are the flaps once they have been cut loose from the wing. The bottom one has been bevel cut and slotted for the control horn, while the top one has been marked in preparation for the bevel cut.

together to the channel five, “flap” switch, as well as programming the non-operation of the channel six, “gear” switch.

The other part of the project is the installation of the navigation light system. At my local hobby shop, I found a really nice parkflyer lighting system made by Electrotek R/C. This is a complete, plug-and-play light system that connects and draws power directly from a spare receiver port. It comes ready to shine for less than thirty bucks. for this is that the flaps operate in the same deflection directions (unlike ailerons, which move in opposite directions), and the servos are placed in mirrored orientation to each other on opposite sides. If you go this route, you’ll need to buy or borrow a Spektrum® module (SPMDSP) to reprogram a reverse direction to one of the servos. If you have a computer radio and two spare channels on it, you can plug any type of servos of this size and strength range (Spektrum, Hitec® HS65, etc.) into two channels and mix them together to the flap switch. I purchased the ARF version of the Trojan, so I added my own Spektrum AR6100 receiver with the servos connected to channels five and six. My Spektrum DX7 transmitter was then programmed to mix these two

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▶ This white vinyl electrical tape was purchased at my local home improvement center and worked well for concealing the servos and wire runs.





My local hobby shop sells these E-flite™ 7.5 gram servos which were used on each flap of the prototype. The plan and text has the model number of inexpensive Spektrum™ programmable digital servos which allow use with a “Y” harness without a computer radio.



This “Micro Sun Brite” parkflyer light system is a pre-wired aircraft lighting package. The included surplus wire, shown at left, was used to lengthen the wing lights length, and the red ramping beacon was installed on the top of the fuselage, immediately forward of the fin.

The entire system is only a few grams in weight, draws a few milliamps from the power system, and can be located easily due to its diminutive size. The only drawback to the application was a minor one of having to extend two of the light wires, and the manufacturer has already gone to great lengths (pardon the pun) to help you out

Purchased at my local hobby shop, this 3M Blenderm™ tape has a matte finish, and strong, yet flexible, feel. These properties are what make it perfect for hidden control surface hinging.



by supplying the extra wire. If you're someone who doesn't like to solder small wires together, the good news is that you can order a mini lighting system directly from the company, specifying the wire lengths from the start, and avoiding the adjustment. I simply cut the coiled surplus wire in half, snipped the two wing wires about eight inches from the central controller, tinned the wire ends, and soldered them together in just a few minutes. Each extension added fifteen inches of reach to the wires, which proved perfect for the T-28 wings.

The trick to concealing the wiring for the lights was to recess it into the existing channel of the wing spar, and apply new white vinyl tape over the finished installation. Start by disconnecting the aileron linkage from the control horn at the aileron surface. Using a heat gun on low power, carefully heat the decals on the underside of the wing near the tip, working from the trailing edge forward. You'll find that a slight and quick application of heat will soften the stick of the adhesive, making the decals easy to peel back. Be extra careful to not use too much heat, because if you do, you'll melt the foam and shrink-curl the stickers. After you get the stickers and decals



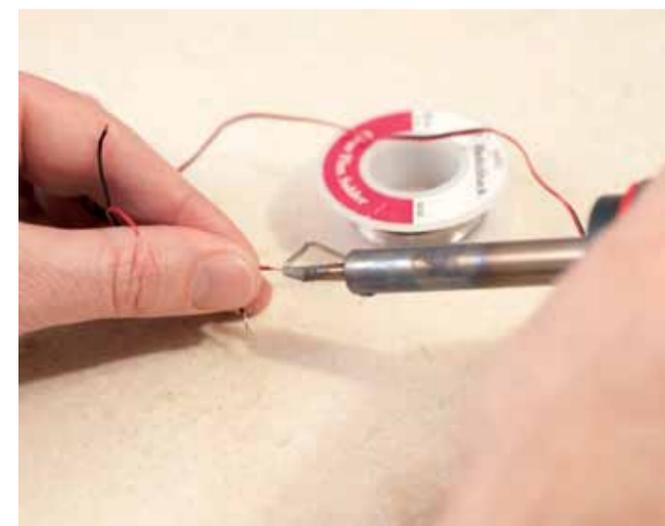
These flap control horns are laser cut from 1/16-in. plywood and glue into place with foam-safe medium CA into the user-cut slots in the flap surface.

past the spar slot, use a piece of waxed paper on each decal to temporarily protect them from foam bits and from rolling up and sticking to things. With the sticky part done, I used a piece of 5/32-in. brass tubing to poke a tunnel from the light location in the wingtip toward the spar location beneath the wing. The 3-mm head of the navigation light fits perfectly into the brass tube, and a piece of heat-shrink tubing locks it into place, making it a great “fish-tape” to pull the light through the tunnel. A sharp hobby blade is used to slice a thin, shallow groove to run the wiring along the back of the spar to the center section where the wire will enter the fuselage. Again,

The flap control horn has been glued into place with foam-safe medium CA, and the finished servo cutout is ready for mounting the 7.5 gram servo.

The Spektrum AR6100, six channel receiver was used with a DX7 transmitter to provide the necessary channels for the aircraft including the addition of the flaps.

The first step to lengthening the lighting system wires is to strip about 1/8-in. of insulation from the wire ends. Heat the exposed wire with a 35 watt soldering iron, and touch the rosin core solder to the wire to melt a small amount on each end. This is process is referred to as “tinning” the wire.



the brass tube easily pulls the light from the top through the bottom on the start of its trip to the tip.

The power for the lights is supplied through the receiver connection. On the Spektrum AR6100 receiver, there is a spare connection labeled "battery" that allowed me to plug directly to the receiver. If you don't have a spare connection, you can install a "Y" connector to one of the other channels and plug it in there. The navigation lights turn on when the motor battery pack is connected, so it also doubles as a reminder

that the system is powered up, which I appreciate. And, since the current draw is very slight, I haven't noticed any difference in flight times. My system uses red and green "always on" wingtip lights, and a "ramping light beacon" for the rear light. The ramping beacon is a red light that "ramps up" in intensity, simulating a revolving light. You can also purchase the system with a strobe instead, or add another one since the full scale has one directly below on the fuselage underside. It really just boils

down to how tricked out you want to make your machine.

The process for installing the working flaps is simple and straightforward. The wing template is first placed on the underside of the wing, and the servo cutouts are made with a sharp hobby knife, and finished to a depth of about one-half inch. The template is then placed on the top of the wing and aligned to the aileron locations, and the flaps are cut out, again using a brand new #11 hobby knife blade. Be sure to cut carefully along the lines and keep

the blade perpendicular to the surface. The detached flap pieces are then marked on the bottom side for the bevel cut and flap horn connection. I taped a metal rule to the flap underside along my bevel line and carefully cut the angle to the flap tip. A touch from a block sander smoothed out any cutting wobbles prior to hinging them to the upper wing surface with 3M® Blendederm® tape. The laser-cut horns were glued into place with thick, foam safe cyanoacrylate (CA) glue, and the servos were installed with double stick tape to the bottom of the pre-cut wells. Dubro™ mini E-Z connectors, micro E-Z links, and .047 music wire were used to connect the servo to the flap horn. The servo

and cutouts were concealed with white vinyl electrical tape.

I've flown hundreds of takeoffs and landings in front of my house, and have become very familiar with the landing approach and rollout of the stock Trojan. Flying this new version has been very rewarding and quite impressive. Being able to "dirty it up" for landing with full, twenty-three degrees of flaps, has put a huge grin on my face. My typical landing distance is now easily half of what it was before. I've flown it slow and dirty, with mid and full flaps, and it just putts around the sky at minimum flight speed with about one third throttle.

If you have a computer radio, spend the time to trim some "down"

elevator into the flap switch. This is easily done by trimming the airplane for straight and level flight at half throttle with neutral flaps, then deploying the flaps and seeing how many clicks of trim are needed to trim it to level again. Land and measure the difference between the clicks of trim, then introduce that amount into the flap mix. Fly again, deploy the flaps, and see if the aircraft pitches up or down. A few flights will be necessary to dial things in, but once you do, you'll enjoy deploying the flaps at half throttle and starting a stable approach for landing.

I've found it's really fun to climb the airplane a hundred feet in the air, and deploy full flaps, then approach in a steep, nose down



Once the two wire ends are tinned, slide a short length of heat shrink tubing over one end, making sure it's moved a safe distance away from the heat zone. Secure the soldering iron in place, then align the wire ends alongside each other, and allow the joint to meld together as it's placed on the soldering iron tip.



Using a pencil type heat gun with a narrow nozzle tip (available at craft stores), the clear heat shrink tubing was slid over the now cool solder joint, and shrunk into place with heat.



I used a piece of 5/32-in. brass tubing as effective "fish-tape" to make the tunnel and pull the light bulb and wiring through it. The 3-mm head of the navigation light fits perfectly into the brass tube, and a piece of heat-shrink tubing locks it temporarily into place.



The existing stickers were heated and carefully peeled back out of the way, then safely stuck to waxed paper scraps for re-use. The wire has been installed into a small, shallow groove and made ready to cover with white vinyl tape.



The stickers have been reinstalled, and new white vinyl tape placed, over the now-hidden wire installation to the navigation light in the wingtip.



Dubro Mini E-Z connectors and micro links connect the .047 music wire to the servo and flap control arms. The servo on the left has been covered with the white vinyl tape, and is nearly hidden from view.



The added flaps provide 23 degrees of control deflection, helping to increase both lift and drag of the wing. This allows the airplane to approach at a steeper angle of descent without building excessive airspeed, as well as to fly at a lower controllable airspeed under power.

attitude. You'll be amazed, as I was, at how effective these flaps are at killing off the airspeed. When you want to play with slow flight, keep the power on when the flaps are deployed. Using between a third and half throttle, it's easy to trim a controllable, nose up, power-on cruise on the backside of the lift-to-drag curve. This is the zone where the induced drag from the excessive lift is at its highest, so the

flight is very slow as it uses more power than flying in the sweet spot. The lights are very effective, highly visible, and look really sharp in flight. I immediately noticed a difference during both daytime flights when flying against a dark background, and dusk flights require much less attention than before. On bright days, the effect is very slight and not something that you'll likely notice. I find it

more relaxing now to fly with these lights, because it just seems like the amount of brain processing is minimized by a simple red and green reassurance on the wing tips. I am still planning to make some teardrop covers for mine which will glue onto the tips, look more scale, and enhance the spread of the light. For the minimal cost of this simple-to-add "bling", it makes a fun and functional statement.



Since I plugged the flap servos into channels five and six (flaps and gear respectively), it was necessary to join them together using the programmed mix one. The user selects the flap to gear, then sets the range to plus and minus 100%.

Without a doubt, these scale additions are must-do for your T-28, and you'll wonder why you waited so long to start having as much fun as I am. Since fun-scale comes in many packages, types, and sizes, be sure to sample as much as you can as part of a well-balanced R/C diet. I'll see you next month as we explore another aspect of the Scale Scene. **EF**

- ▶ The completed flap installation is clean and factory looking. It is an easy installation which gives added scale looks and flight realism, at an affordable cost.
- ▶ The full size plan is offered on the Fly2Build.com website as a free download. You can tile print the PDF, tape or glue it together, and use it as a template to easily perform the modifications to your wing.

▶ The Spektrum™ DX7 has a flap to elevator mixing mode, which offers three settings for the triple position flap switch. Here we can see that at the middle switch position, 32 units of down is mixed into the elevator, while at the full flap deflection, 36 units of down keeps the T-28 flying level.

▶ In order to keep the channel six "gear" switch from having an effect on proper flap operation, the "gear" travel is set to zero in both directions. If this step is skipped, at some point you might find yourself without a properly working flap on one side.

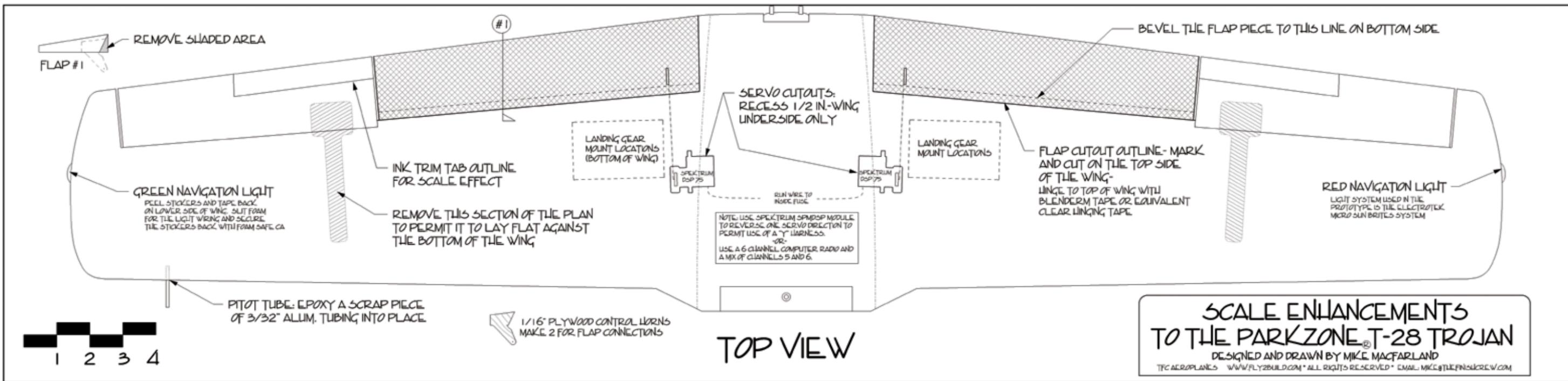
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