October 2021 Issue

Hi and welcome to the F5J USA Tour newsletter. For details and scores from past Tour events you can always find links from the Tour Calendar page. Good flying to you!

In this issue

Here's a listing of articles in this issue:

2021 Tour events in the queue

Tour Calendar

Reminder that the F5J USA Tour season runs from Dec 1 through Nov 30.

Texas National Tournament F5J, Oct 16-17, Greenville TX (Western region 2-day event). Info here, Pilots list here. Register @ F3Xevents.com. This event is hosted by **Dan Ahern** and the members of *Soaring League of North Texas* (SLNT). CD is **Henry Bostick**. All day Friday is a practice and fun-fly day.

SLNT
Soaring League of North Texas

2021 F5J at the Ranch, Oct 30-31, Maricopa AZ (Western region 2-day event). Info here, Register here, Pilots list here. Organizer **Randy West** and the *Southwest Soaring Society* (SWSS) have a really great event lined up. From Randy: "*Our club is thrilled to host our first 2-day contest at the Ranch. We have 3.3 acres of grass with room for fourteen F5J landing tapes. We will be ready for pilots to arrive as early as Wednesday before the contest. RVs and tent camping are welcomed; we will have areas designated for this.*"

SWSS field looking north--Awesome grass in the freaking desert!!

This October date had originally been scheduled for a 3-day Team Selects but after the F5J world championships were canceled they decided to keep the date and host a shortened 2-day "team selects" format event: day 1 is all 10 minute rounds and day 2 is all 15 minute rounds. No fly-offs so every pilot flies every round on both days. The Tour's Advisory Group had to approve this format since a normal FAI non-team-selects contest would not run 15 minute rounds. CD is *Sandy Smith*. Friday SWSS will run a different type of event compared to the *Low Launch Challenge* they often have in the west. Details at the field ☺.

Food Food Food! - As usual the AZ club will provide lunch both days. On the subject of food and "entertainment" pilots in the western region have been generously treated to BBQs on one or sometimes even two evenings at Tour events. This time there is going to be a special **Roast Whole Pig BBQ** on **Friday**. Chef/Pilot **Dale Olstinske** leads the effort with key assistance from **Darwin Barrie** and **John Armstrong**. BBQ info and sign ups here ($10 if you sign up

early, $15 later). Everyone is invited to contribute a side dish or desserts. Don't miss this BBQ!

Field location and nearby accommodations - This page has location details (GPS, link for driving directions, map with dropped pin). The field is about 50 minutes from the PHX airport. Outside of the Maricopa area the nearest hotels are in Chandler along the I-10…about 40 minutes from the field. Houses are also available for rent in Maricopa.

SWSS field looking southeast

East Coast FALL F5J Festival, Nov 6-7, Farmville NC (Eastern region 2-day event). Info here, Pilots list here, Register here. This event is hosted by **Oleg Golovidov** and the *Down East Soaring Society* (DESS). Oleg will also be the CD. This event is well on its way with an already very respectable pilots list. They are having fly-offs with awards for both expert and novice classes.

From Oleg: *"Join us for our annual Fall event in friendly North Carolina, near Farmville, NC. You will enjoy our always welcoming event atmosphere, our southern BBQ lunches, all combined with some strong F5J competition. New pilots are most welcome and will receive lots of help and advice. Friday is the usual fun-flying and practice day. Saturday-Sunday we fly the F5J tasks. Sign up yourself and bring your friends too."*

Organizer Oleg G. at the beautiful DESS field

Other Tour events coming soon:

F5J in the Desert, Dec 4-5, Maricopa AZ by SouthWest Soaring Society (SWSS)- Details coming soon. This event includes the **2021 Tour Awards Ceremony** and is always a great competition. Don't miss it.

Assembling the 2022 Tour Event Calendar

How the Tour will review and work through Tour event applications

The Tour season runs from Dec 1 through Nov 30 each year. As many of you know we will start accepting applications for the 2022 season on Nov 1. With the dramatic increase we are seeing in USA F5J and Tour event popularity we felt it was important to share insights into how we will be working to ensure good Tour competitions in the face of increased demand for events.

Past club Tour dates are protected

Before we get too deep into this topic it's important to understand how we work with clubs who have hosted Tour events in the previous season. Since the beginning of the Tour we have always given date priority to clubs who have hosted events in the prior year. With the exception of special one-time dates such as the Sept 2021 Sacramento event, this means any club that had a contest in the prior year will usually be granted first rights to apply for a contest in that same calendar slot next season. If that club "releases" their date then it is up for grabs via an application from another club.

At a crossroads: Lots more events or fewer bigger events?

We have recently spoken with a fair number of Tour pilots and asked whether they want to see lots more events in their own region with less concern for date spacing, or whether they would prefer fewer events that would result in bigger pilot lists. You might think there is one popular answer but you would be wrong--there are advocates on both sides. Some pilots (who fly but don't host events) would be in favor of many more Tour events in their region. I have heard responses like "It would be great to have lots more contests; we would just pick the ones we want to attend and skip the others." This may seem okay until you start looking at it from the perspective of the clubs that host the events.

Clubs that host Tour events invest a huge amount of spin-up time, preparation, expenses, and hard work to make them happen. The last thing most hosting clubs want to see is so many events that pilot attendance is significantly reduced at any given venue just because another close date in their region is pulling pilots away from their

potential pilot list. With such a strategy we would eventually (or quickly) lose hosting clubs and the Tour would take a hit. Not good.

Seeking calendar balance with flexibility

Making up the Tour calendar cannot be dictated by a set of hard and fast published rules-- regions are different and no two events are the same or have the same “pilot draw” history.

So what is our looking-forward approach for the 2022 calendar?

For more active regions (i.e. west) newer clubs are not likely to host more than a single event in a season and their ability to choose a favorite date is going to be limited since it appears we will see 100% of the 2021 clubs staying on the Tour in 2022. On the other hand clubs in less busy regions (i.e. central) will have a much better chance for at least picking a preferred single date.

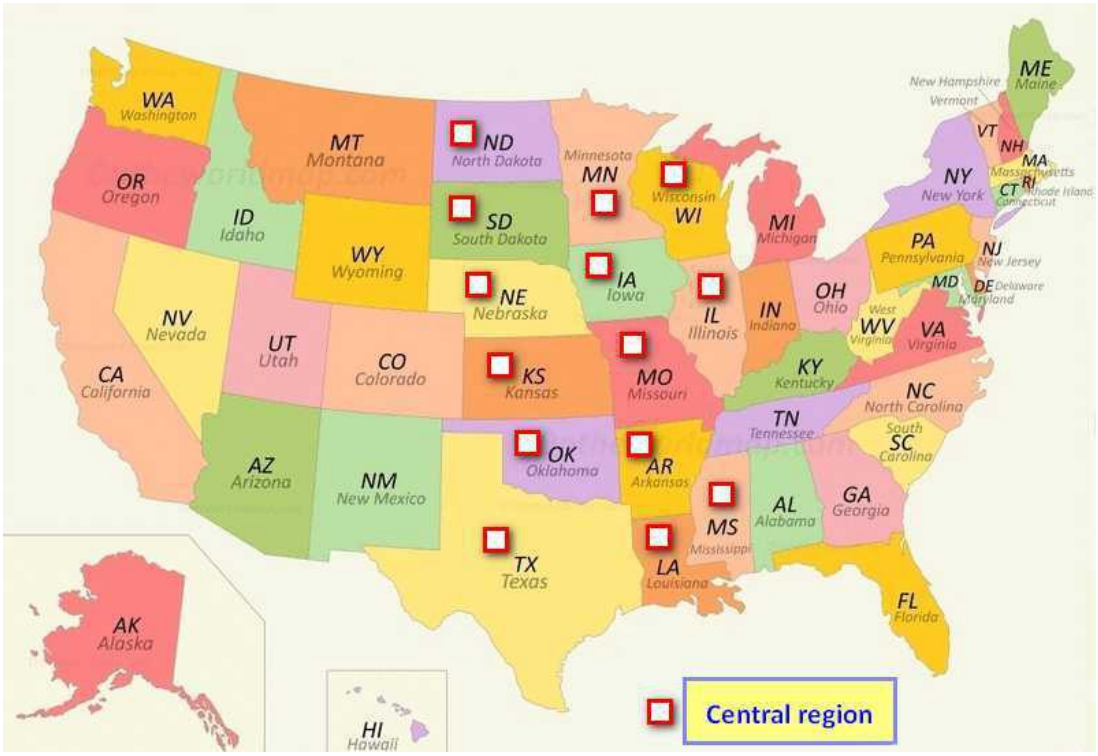
How about date spacing between events?

When we started the Tour 5 years ago our guideline was 2-3 weeks between regional events. Looking forward it looks like a 3-4 week guideline between regional events is a more workable spacing. Remember, though, each application will be reviewed based on its individual merits. One thing we will continue to do: if we receive an event application and we think it is too close to another event we will call that event's coordinator and discuss it. In some cases their concerns have resulted in date adjustments, in other cases not. We think it's especially important to listen closely to those clubs who have been hosting Tour events the longest.

We now have 3 regions

Because we are seeing an increase in the number of mid-US clubs that are planning to host 2022 Tour events we have decided to split the USA into 3 regions: Western, Central, and Eastern. Region boundaries are now more important because we generally will try to allow overlapping event dates as long as they are hosted in different regions. The exception to this will be geographically driven i.e. if 2 events are in different regions but are physically close we may try to adjust one of the dates for more spacing.

Central region = ND, SD, NE, KS, OK, TX, MN, IA, MO, AR, LA, WI, IL, MS



In Summary

We acknowledge there is no perfect way to set the Tour calendar given the variables and competing interests. We do hope this article has given you at least a little more insight into the things we are trying to balance as we work to set the 2022 calendar. At least we all have one thing to be extremely thankful for: that our major issues at present are due to F5J growth in the US. ☺

F5J USA TOUR

F5J and glider “etiquette”

Earlier this year a group of us were flying in a Visalia monthly F5J contest. During one of the flights a mini-gaggle happened in a nice thermal. Several of the guys participating were new to F5J and also to glider competition and were not aware of the unwritten “rule” in glider competitions that you should always try to enter a gaggle of planes circling in the same direction.

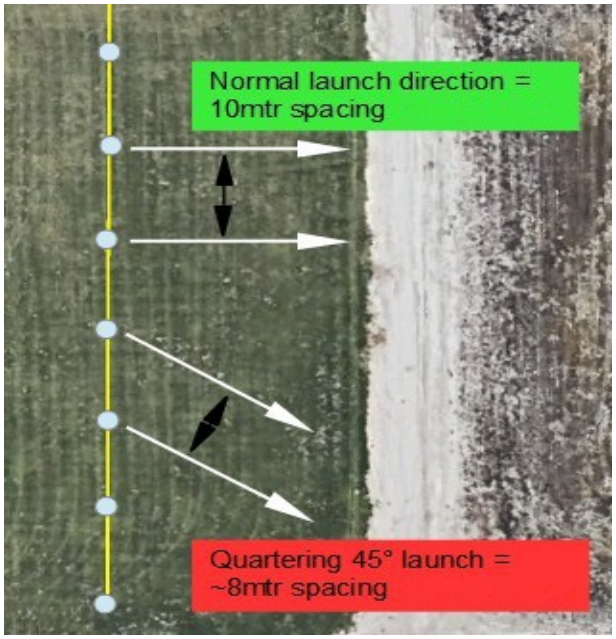
After that flight we had a chat about it and both of the new pilots appreciated the info.

A while after that contest I got a nice email from one of the pilots **Kenneth Meeks** suggesting that maybe there would be some benefit to sharing more of these unwritten practices for the benefit of newer F5J guys. Great idea, Kenneth! Below are several and maybe we will follow this up with more in future newsletters.

- **Approaching and joining planes in a thermal** - Kenneth did his own research and shared that often it is the top / highest plane that sets the direction of rotation (clockwise or counterclockwise) and that the models should always position themselves to have sky between them. Obviously in the heat of competition it doesn't always work out perfectly but entering an occupied thermal turning in the opposite direction is a recipe for an expensive mid-air. 'Nuff said.

During the first few years of the Tour we had a run of unfortunate mid-airs during launches and landings until we collectively figured out how to be better and safer man-on-man pilots. In other words, how to survive simultaneous launches and landings without incidents.

- **Man-on-man launches** - Always launch perpendicular to the flight line for the required 3 seconds before turning. If there is a quartering headwind and everyone angles their launches into it your flight launch spacing is reduced by 20%. And your effective lane spacing is even less if you angle into the breeze while a neighboring lane does not!



- **Landing pattern flying** - We had our fair share of landing midairs early on. What ultimately reduced these collisions was everyone getting the message and flying more “predictably” meaning no sudden turns and maneuvers when in your landing pattern, and *especially* when on final approach. Let pilots on either side know your landing approach. Fly predictably. If you plan to do something squirrelly let your neighboring pilots know ahead of time.

F5J- Hobby or Sport?

This one is just for fun. I hear a fair number of casual conversations where guys are referring to F5J as their "hobby." Every time I hear that I grind. Think about all the thermaling skills practice we do, the trained focus and concentration it takes to work low and weak thermals, the skill and steady nerves from practice and experience that it takes to fly your plane to the very edge of visibility (and beyond) and then get it back home, the experience and skill it takes to make good air reads before launching, the endless hours of attention to glider and transmitter setups just to squeeze the last ounce of performance out of our amazing planes, and the trained flying coordination and reflexes it takes to be a good F5J pilot. Hobby? Pffft. I don't think so.

Here are some true hobbies: collecting stamps, comic books, or antiques, playing games, cooking, building models, building things in your woodshop, making your own beer and wine, and (of course) underwater basket weaving.

I ran across several Internet discussions on this and landed on what I think is a good definition of the difference between a hobby and a sport:

> *A **hobby** is an activity that one enjoys doing in one's spare time while a **sport** is any activity that uses physical exertion or skills competitively under a set of rules that is not based on aesthetics.*

Interestingly, competitive cheerleading and fishing can be sports too. Anyway, your honor, I rest my case! --*Chris*

New 2022 Tour Rule: Reading of altimeters

After an Advisory Group discussion we have decided that starting with the 2022 season (Dec 1) a new Tour rule will go into effect that requires the timer person to always read the start height from the AMRT (altimeter) after each flight and then record it on the physical scorecard. In practice we expect that both the timer and the pilot will usually look at the altimeter together.

Several reasons for this rule one of which is that it is good preparation for Team Selects and World Championship competitions where the timer persons will always read the altimeters. This practice will also add a degree of validation on Tour scores when the competitions are especially tight as they have been lately.

Reminder: Warm those Lipo batteries

Now that we're getting into the fall season the early morning temps are a bit cooler. Every year around this time I start hearing from pilots who are having motor cutouts during launches. The cause is usually cold lipo batteries. When they are cold lipos have much higher Equivalent Series Resistance (ESR) which results in larger voltage drops at launching motor currents. This in turn causes ESCs to cut off when they see the battery voltages dipping below the ESC cutoff threshold (unless you disable ESC cutoffs).

There are tons of Internet references on lipos versus temperature. All you really need to know is that lipos work better when they are toasty warm.

There are numerous ways to warm lipo batteries including using 12v powered warming bags. I use one of the easiest methods: I buy cheap disposable hand warmers from Walmart ($5.70 for a 20-warmer pack) and throw one or two into each battery safety pouch an hour before the contest starts. Keeps 'em nice and warm and I (almost*) never have battery cutouts.

--Chris

** Unless the battery pack is too old and needs to be retired.*

Programming AMRTs for reliable F5J performance

Feature article by Tuan Le (fnnwizard@gmail.com)

Forward: *We are very fortunate to have this article contributed by Tuan Le. Tuan is well known in the RC soaring community for his analytical and technical skills (in addition to being an excellent soaring competitor and all-around great guy!). This summer Tuan did a deep dive into how to program your TX so that it works predictably with your AMRT (altimeter/motor timer). One of the things he realized is that without a tool to display your motor control channel signal you were "flying blind" when it came to properly setting up your TX's motor control signal range.*

So Tuan rolled up his shirtsleeves and designed a clever control signal viewer that displays any pulse width modulation (PWM) signal in microseconds. The construction of that viewer is in this article. He also included a section on how to program a BL Heli ESC which is available in a separate PDF via the link at the end of this article. Thanks much for the article and sharing your design work, Tuan! --Editor

The AMRTs we use have specific settings per FAI code:

3.4 Motor Run Timer

3.4.1 The Motor Run Timer function must operate with the accuracy specified in item 2.3.5.

3.4.2 On initial power-up of the AMRT, the Motor Run Timer must be protected from false triggering during the period defined in Item 2.4 (c). After this period, the Motor Run Timer shall commence operation and 'Start Height' determination shall be initiated on the first occasion that the command signal exceeds 1.2 milliseconds.

3.4.3 After the Motor Run Timer has been triggered, the timing of the motor run ceases when either the command signal reduces below 1.2 milliseconds, or the elapsed time reaches 30 seconds and a definite stop command must be applied to the ESC by the AMRT.

3.4.4 The 'Start Height' determination process shall continue for a further 10 seconds after the instant of "motor stop".

3.4.5 Once the definite stop command has been applied to the ESC, the system must not respond to any further changes in the motor command signal.

3.4.6. A small amount of hysteresis is permitted in the sensing of the 1.2 milliseconds motor command signal to eliminate malfunction with jittering command signals.

From this code, we see that the "trigger" value for motor start and stop is at 1200us (1.2ms) with "a small amount of hysteresis" on either side of 1200us. I have found out the hysteresis is +- 20us. So to the up side, the Altis AMRT sees motor on at 1220us, and sees motor off at 1180us.

But the motor off has another step in there and can be verified with the Altis logger. What happens is that the Altis measures and records the TX signal low throttle position when first booted up. It uses that as the default setting when we cross the 1180 threshold throttle off.

For example, if our throttle off position is 1000us, upon moving our throttle from above 1200us to below 1180us, the Altis immediately cuts it further to 1000us.

I've posted this info on RCG showing how an unscrupulous person can go about tricking the Altis to gain unfair advantage in a competition.
https://www.rcgroups.com/forums/showpost.php?p=47499577&postcount=21

Since most TX/RX combos have user settings capable of transmitting PWM signals between 900us - 2100us, the fixed 1200us setting specified can cause issues for the AMRT.

If we assume this hysteresis to be 20us in either direction for all AMRTs, (it may or may not be due to manufacturing tolerances of all the components for F5J) then the following programming can be used for effective control of Motor, ESC, AMRT.

This figure will help visualize what the PWM range should look like:

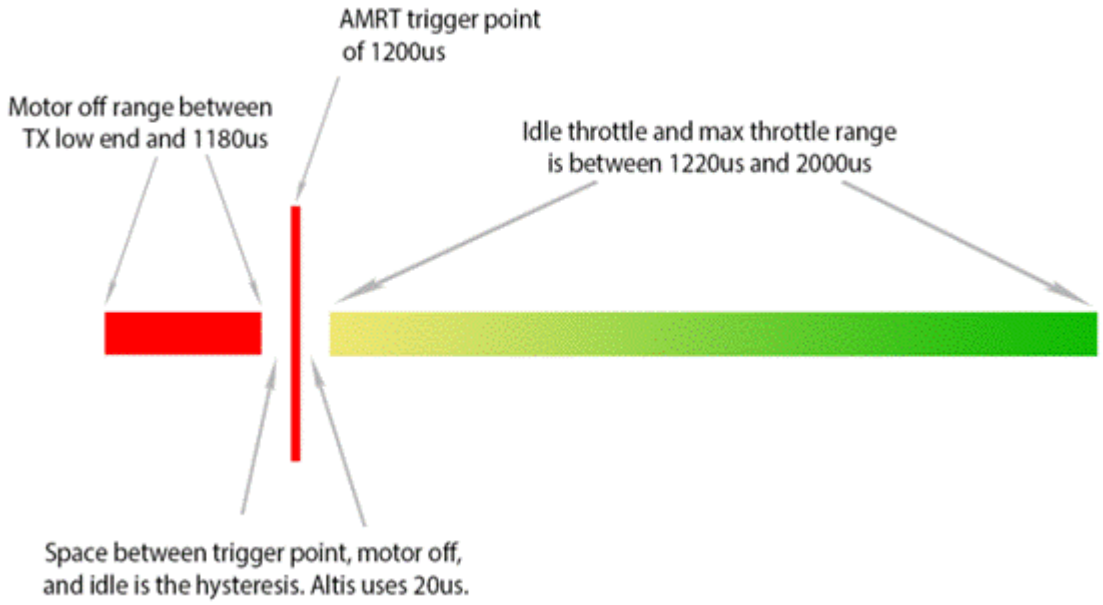


Figure 1 - PWM programming range

TX/RX **THROTTLE OFF**, using switch etc., should read lower than 1180us. I like to add some extra buffer of 30us so anything between 900us - 1150us.

TX/RX **THROTTLE IDLE** should be higher than 1200us. How high depends on your ESC/Motor/Prop/Battery setup. It basically is where neutral drag is for the spinning prop. I would guess it'll be 1300us - 1500us for most setups. This needs to be set in conjunction with ESC IDLE.

TX/RX **THROTTLE MAX** using slider, switch, stick etc should be 2000us or higher.

Just remember that it must not be lower than 1180us (again depending on jitter of TX/RX, I add about 25us as a buffer here), since that is where Altis sees and sets ESC off to, see below.

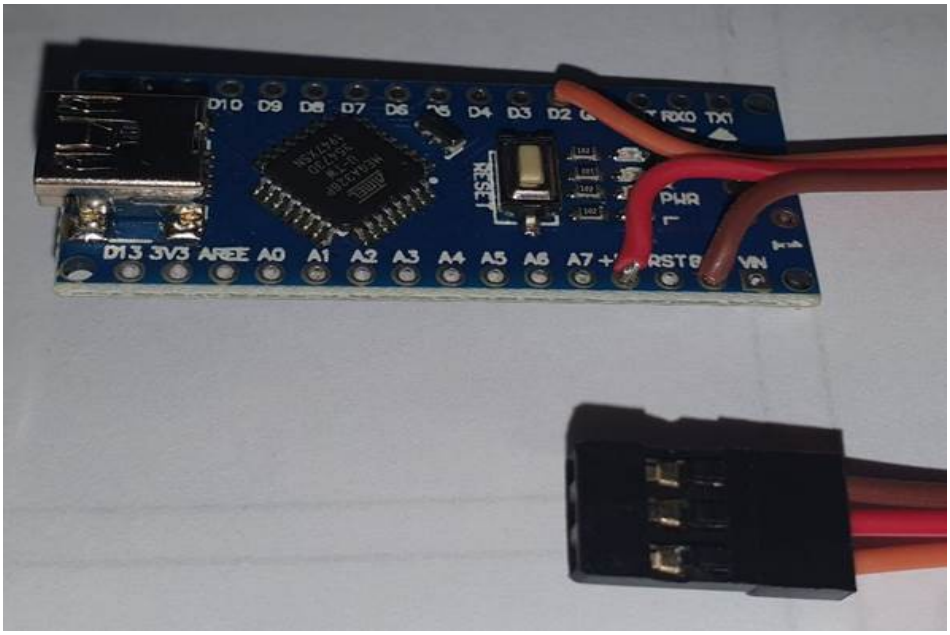
ESC **THROTTLE OFF** should be just slightly higher than 1200us (Mine is set at 1205us)

ESC **THROTTLE IDLE** again depends on power setup. I would guess it'll be between 1300us - 1500us for most setups but it can be in just about any range and still work since you can always program accordingly in the TX.

ESC **THROTTLE MAX** should be lower than TX Max, 2000us or less (Mine is set at 1980us).

Ok, now that we have an idea of what needs to done, we can setup the TX/RX accordingly. There are tools out there that will read the signal values, as well as some TXs like the FrSky Taranis that have the feature built in. But we can also use an Arduino Nano to help us display that PWM signal value.

Programming an Arduino NANO to read PWM from a plane's RX

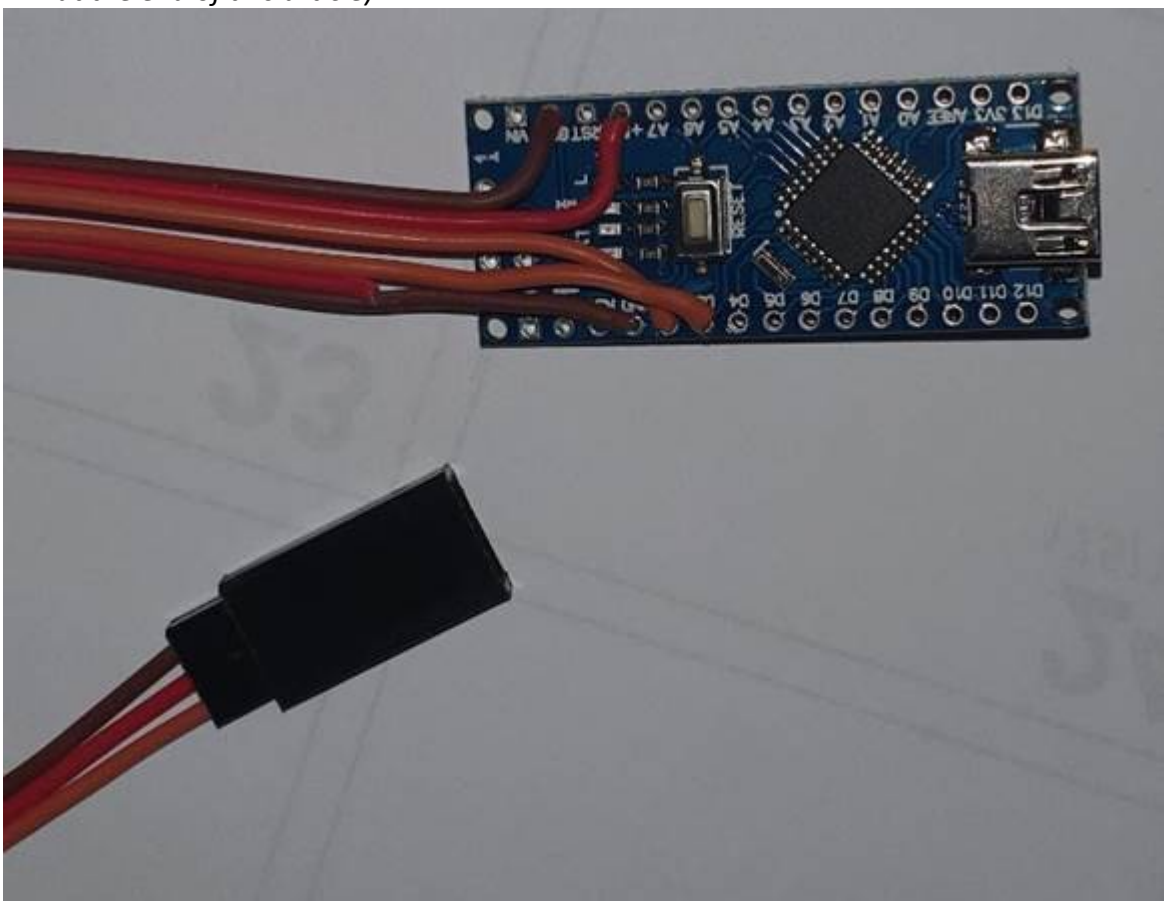


I bought the Nanos without headers and soldered the female end of a servo extension to the board. This connection goes into the throttle channel of the receiver to read its PWM signal. Connections are:

- Servo Ground to 1 of the ground pads on the Nano
- Signal (orange wire) to D2 pad
- Positive to +5v on Nano Pad

Preparing the NANO for programming BLH ESCs

(Connections for BL Heli ESC programming are shown here but are covered in a separate PDF via the link at the end of this article)



The male end will be used to program the BLH ESC's later on. Make these connections:

- Ground (brown wire) soldered to another GND pad of the Nano.
- Signal to D3 pad on the NANO

DO NOT CONNECT the positive wire (you can see I cut that)

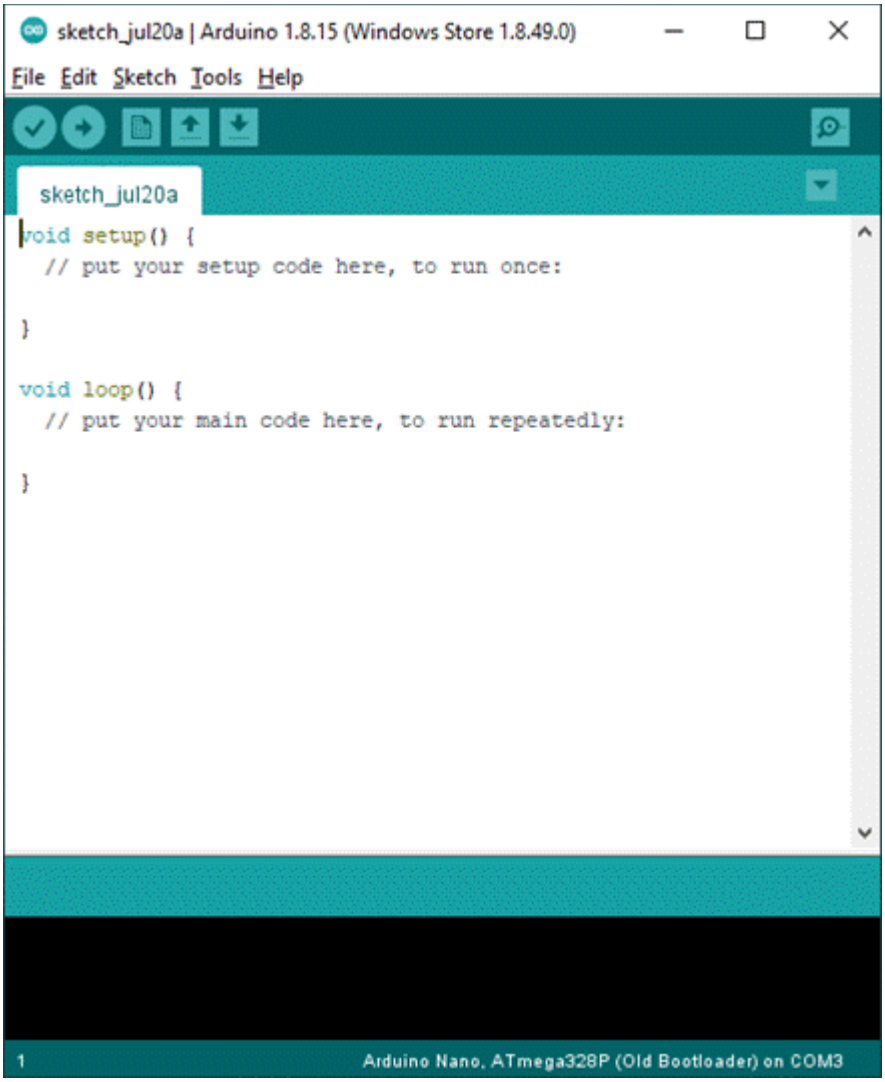
Finish with some heat shrink to prevent shorts.

Now we need to prep the software:

Nano Driver link:
https://drive.google.com/file/d/1oDpJ2ZBGofbW4FNgFWabktUkfJhaJLi_/view?usp=sharing

Arduino App link:
https://downloads.arduino.cc/arduino-1.8.15-windows.exe
Download and Install. Then Open the App.

We get this default screen:



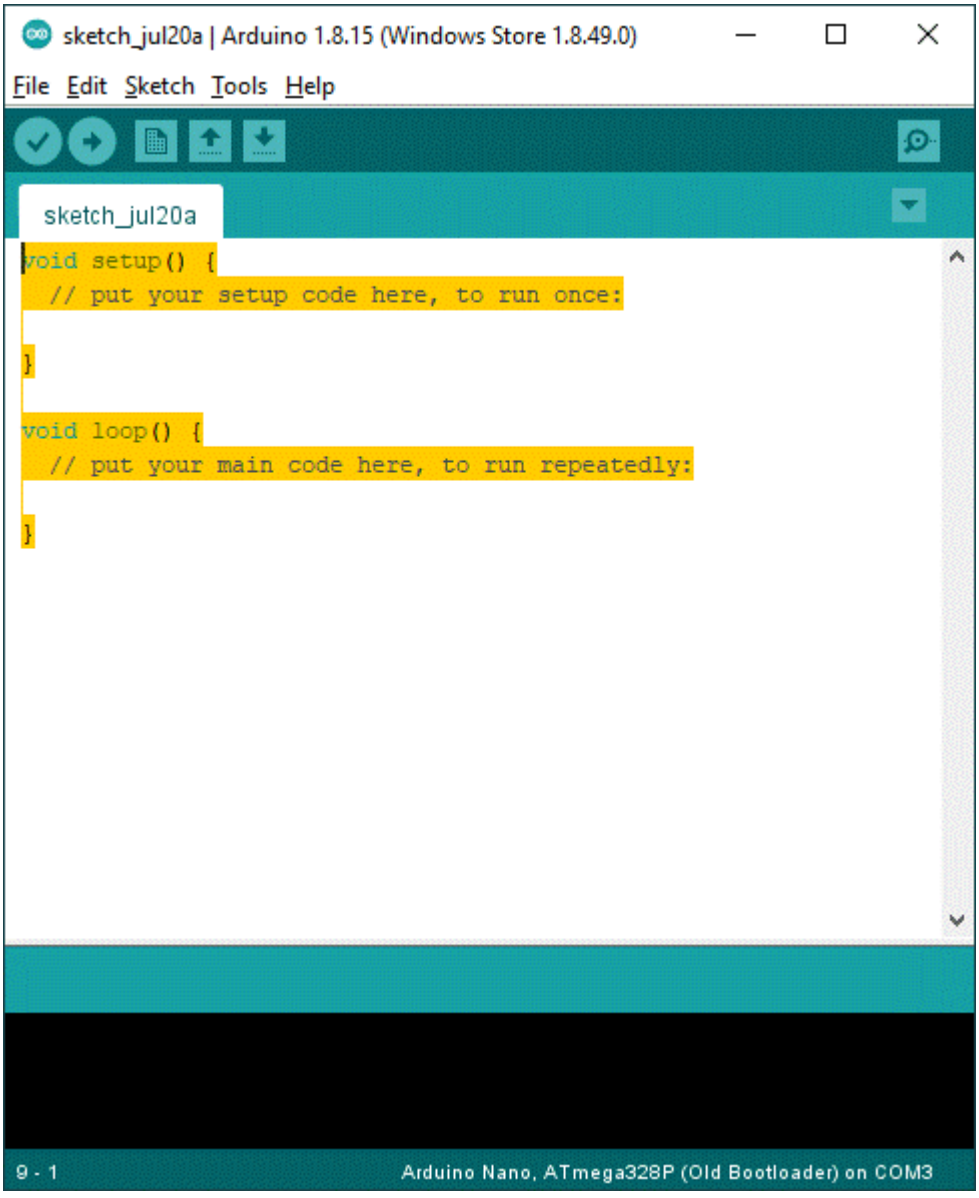
Go to Tools and set three things:

1. Select Board = Arduino Nano
2. Processor = ATMega328P (Old Bootloader)
3. Port: Choose Com port corresponding to what is shown in your device manager.

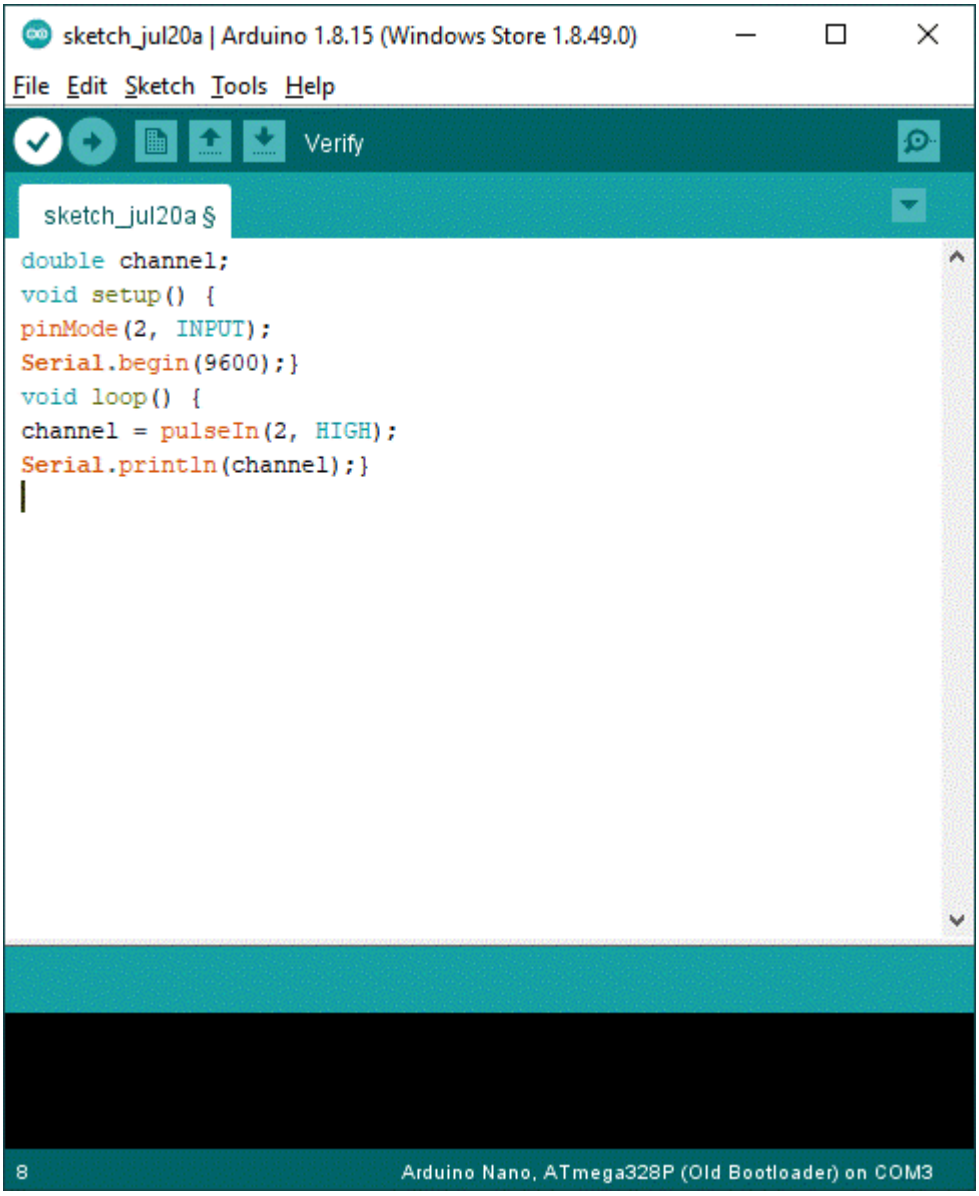
In Ports (COM & LPT), look for USB-SERIAL CH340, it'll show the COM #

Then copy this code:

```
double channel;
void setup() {
pinMode(2, INPUT);
Serial.begin(9600);}
void loop() {
channel = pulseIn(2, HIGH);
Serial.println(channel);}
```

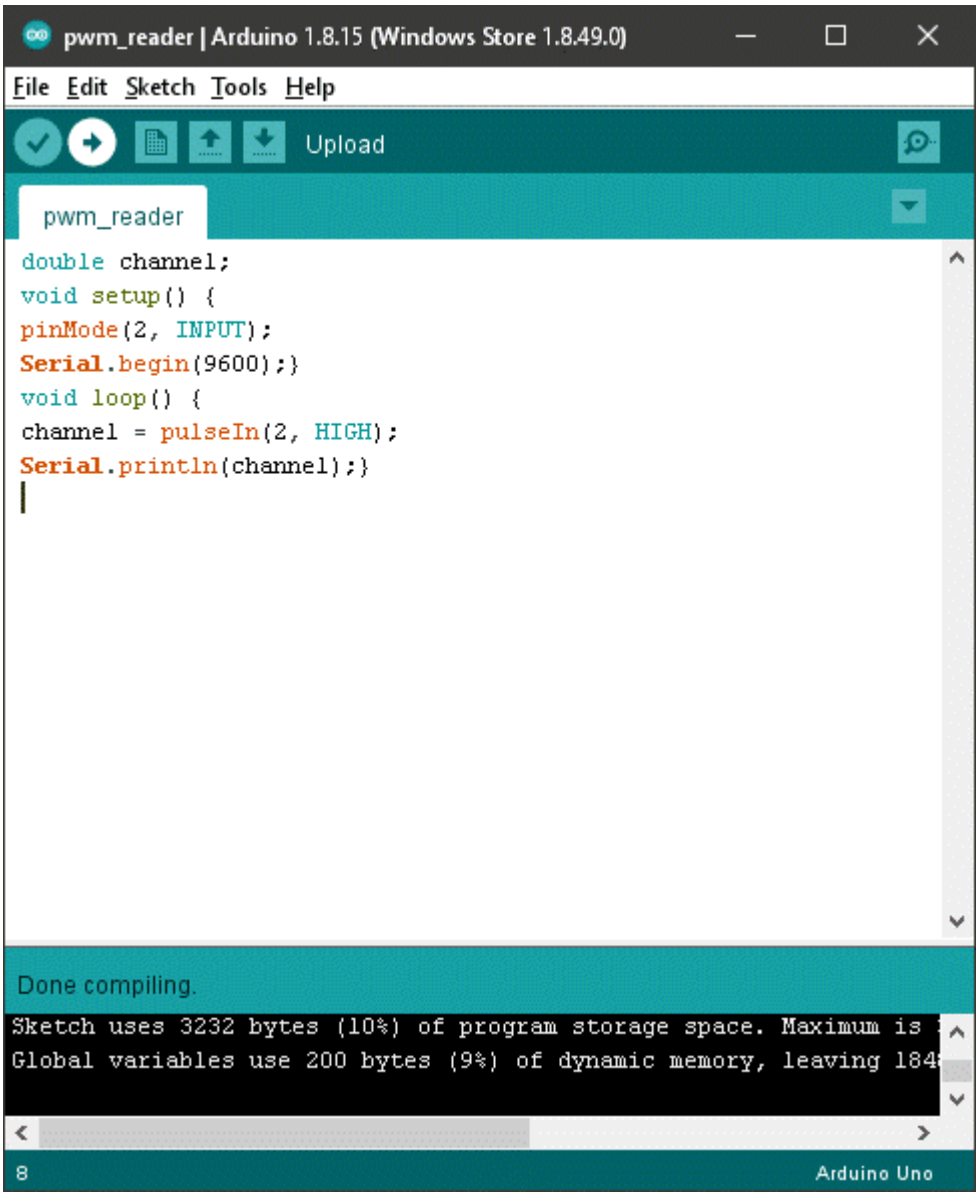


Then highlight the above default code in yellow and paste the copied code into the edit box overwriting the default lines.



Click the “check” circle in white above. This Opens a box to Save. Name it “Pwm Reader” or whatever.

It will then verify and compile.



Then plug the Nano into your computer using a USB cable.

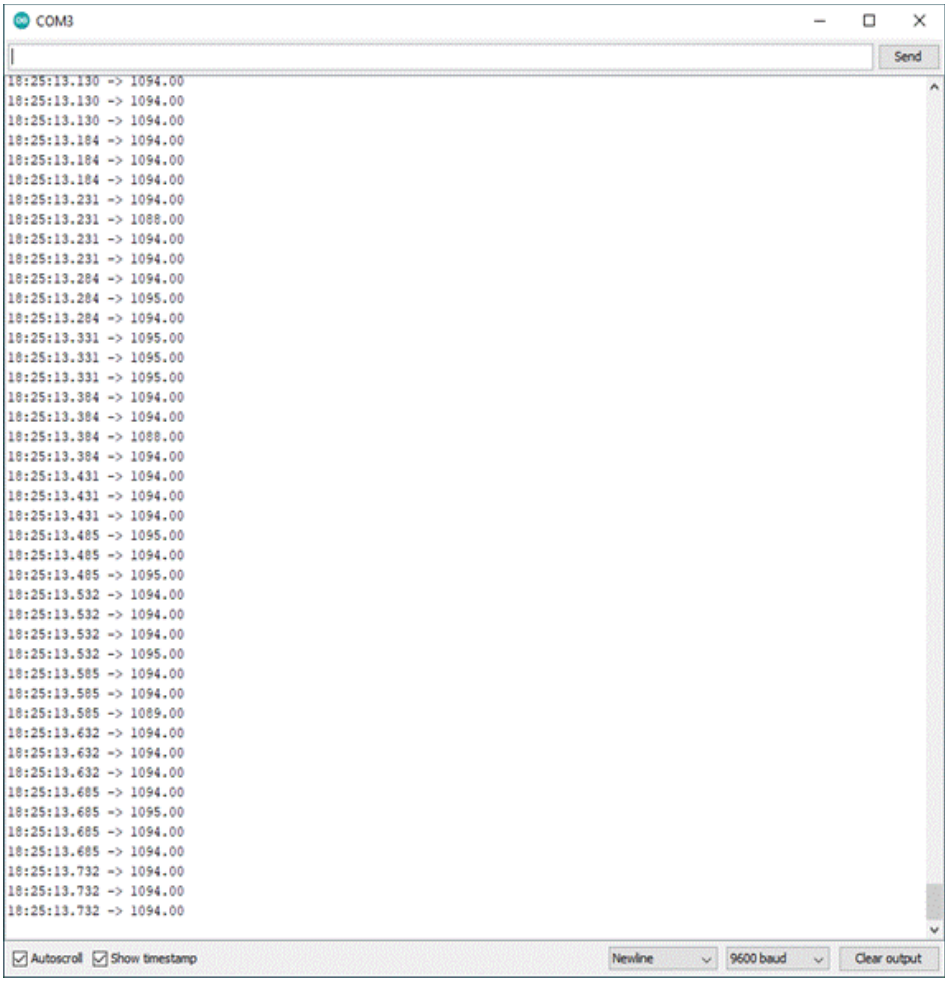
Click the right arrow highlighted in white above to load the code into the Nano.

Give it a few seconds. When it's done uploading the code (sketch), then:

Plug NANO into the RX channel you want to monitor.

Select Tools, Serial Monitor

You should now see the PWM signal value in microseconds being displayed (as in the example screen below):



Please Note: the displayed PWM value could have errors between 1-10us. For our purposes this doesn't matter much.

Now you can set the throttle channel endpoints for your arming switch and whatever control for variable throttle you are using per Figure 1 above. Keep in mind the variable throttle control should not turn off the motor at its lowest setting.

If you want to monitor other channels on the RX, just plug the servo connector into the corresponding RX channel. You will need to close and restart the serial monitor screen to see the new results.

Programming a BL Heli ESC

As a bonus Tuan also has covered how to program a BL Heli ESC in the extended PDF document that also includes the above article. You can view and download that PDF at this link.

About the Tour's Advisory Group

This group is responsible for managing the Tour and includes the following key supporters and pioneers of USA-based F5J: Lee Wolfe, Steve Neu, Lenny Keer, Larry Jolly, Jim Monaco, David Beach, and Chris Bajorek. Each advisor brings significant experience and energy to this group. If you have suggestions or feedback feel free to contact any of us directly, or you can send an email to Chris Bajorek here.