Retro Arms v2 Split Gearbox (second production run beta)

It is important to know that in the previous setup for this G&P I used exactly the same parts, but in a Lonex v2 shell with absolutely zero issues. The only thing I changed for testing were the RA shell and a DBoys tappet plate since the lonex ones are proprietary.

Shell general overview:

Good:

-strength requires more time to test.
-pre-radiused cylinder window is helpful, keep this.
-wide wire channels are helpful, keep these.
-wire guide/shelf is a great addition to protect the wires, keep this.
-QSC is very convenient for working on the gearbox.
-tuning a hair trigger is simple and easy with the split design.
-the split design is extremely convenient and makes maintenance so much easier.
-the arl release is innovative, but in a spot that makes it useless. You can only access it if you take apart the motor grip which is the standard way of resetting the ARL on any other gearbox.
-the finish is amazing on most of the shell, a few rough spots though. Most notable on the top of the shell.

Bad:

-no cutout for piston, bad for a split shell, especially since you need to see where the piston stroke is before you take off the upper half of the gearbox.
-tappet Plate spring peg is too loose, cool feature but it screws right out (needs to be loctited down, taking away the removability)
-extreme function and compatibility issues (described below).

Receiver fitment:

-fits in G&P upper and lower with G&P outer barrel with some issues. The middle pin and the shell are very loose and there is a lot of play horizontally and vertically until you lock in the rear pin (which is slightly misaligned with the receiver) and the motor grip screws are tightened.
-motor alignment, even in G&P body with G&P grip, is not the best. The way that the upper shell locks onto the lower and the lower shell fits in the body causes the buffer tube screw and motor grip screws to always drastically affect how the motor lines up with the bevel gear inside the gearbox. The lower shell is too loose in the receiver and I

think that is allowing all of these factors to affect it this much. The grip alignment changed once the shell was inserted into the body, which made shimming very difficult. Even now I am having some motor alignment issues with the all G&P setup and only one of my motors have actually worked so far.
-when the shell is in the receiver and the motor grip is screwed on, the entire shell is pulled downward and you can no longer hit the rear pin out resulting in the split function not working. The lower shell being loose in the body and not mating with the motor grip completely are causing the motor grip screws to do this.
-hopup/barrel alignment in G&P seemed fine.
-charging handle compatibility includes G&P, KA and A&K.
-buffer tube screw fit fine, but caused the gearbox to be tilted upward and the front pin can no longer lock in place due to the gearbox causing the receivers to not line up properly.
-fitment in other brand receivers has not been tested yet.

Rear pin barely fitting into place (see how it is naturally tight against the left side of the slot) due to slightly off spec receiver fitment/pin holes:

The motor grip pulling down the shell even more, worsening the fitment and alignment of the shell in the body:


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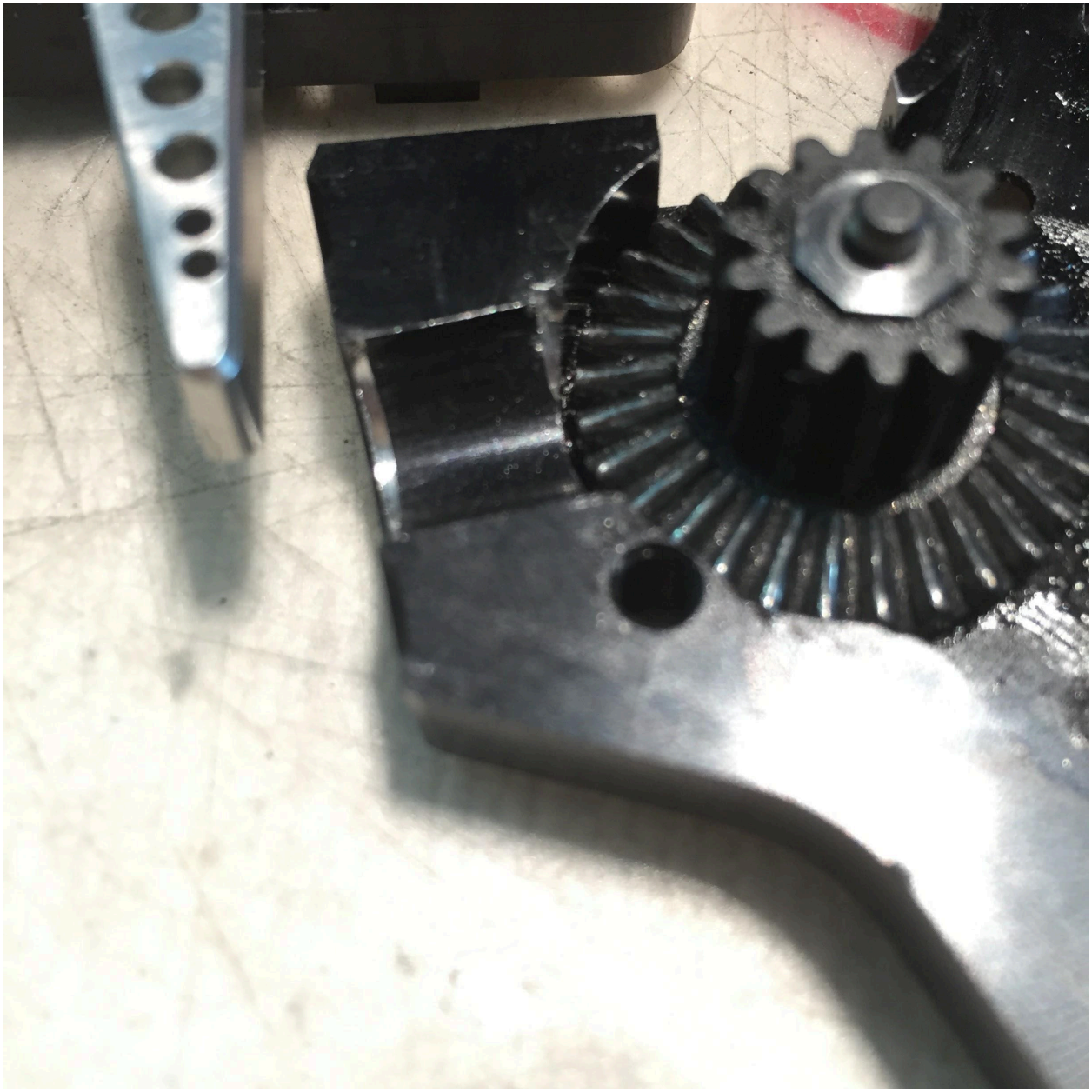
Evidence of motor misalignment:



Example of how the lower half of the shell fits in the receiver loosely allowing it to move when screws and pins are put in place:

Natural fitment of the lower shell without any pins or screws in at all:

Proprietary Hopup:

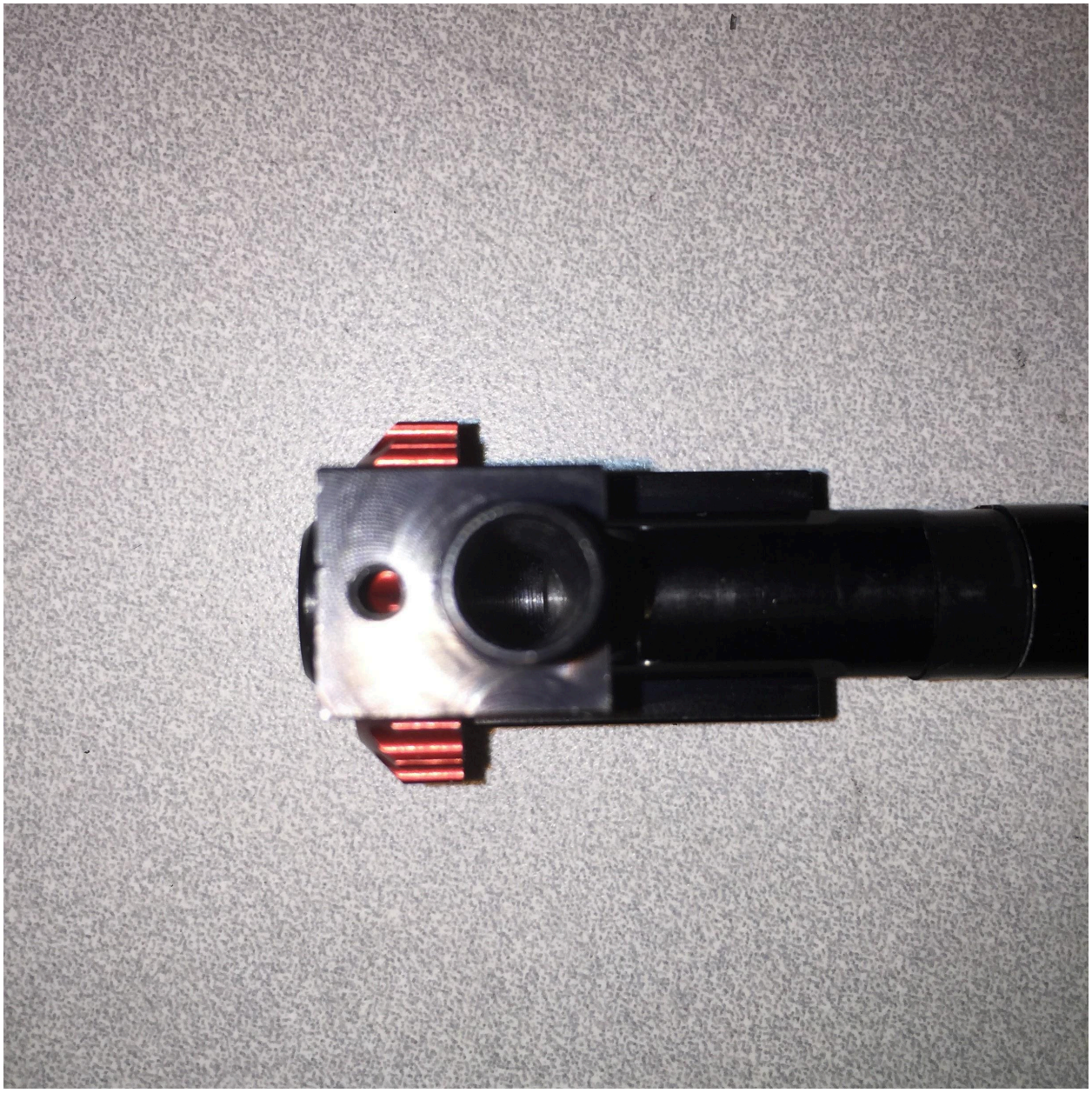
-I don't like the o-ring on the feed tube. Since a bb does not pass through without slight force, I only see it causing feeding issues with weaker magazines or heavier bbs. It also keeps bbs in the chamber after a mag has been removed. Due to this safety hazard I have taken this o-ring out.
-magazine compatibility seems fine so far, but it is hard to tell with the hopup, barrel, bucking and air nozzle issues listed below.
-hopup wheel tension is fine.

-hopup arm is a bad design. There is no benefit of a built in metal nub to press down on the bucking, it actually worsens hop performance. Just include your hopup arm with the space cutout for the installation of a normal nub.
-air nozzle, bucking, barrel and hopup compatibility are terrible. The cutout for the "c-clip" in the hopup is too far backward by roughly 1.15mm, simply in the wrong spot. It holds the barrel too far towards the air nozzle and gearbox causing fitment issues. This means that when a barrel is jammed in place to lock in, the bucking lips protrude into the hopup feed tube and block the bbs from feeding into the chamber. This causes three main problems. **Firstly**, the bucking lips stop bbs from feeding into the chamber and the gun does not function. **Secondly**, if you space the barrel forward away from the gearbox to correct the feeding issue, it can no longer lock into place in the hopup. **Thirdly**, the air nozzle presses up against the bucking lips and it pushes the barrel further outwards away from the hopup chamber (since the barrel no longer locks in place) and causes massive air seal and consistency issues. This combination of problems causes very inconsistent feeding and low fps values.

RA center of feed tube to first edge of c-clip cutout is 26.85mm
TM Spec center of feed tube to first edge of c-clip cutout is 28mm

Barrel jammed in place to lock in the hopup:

See how the bucking lips stick out into the feed tube, which blocks bbs, when the barrel is locked in place:

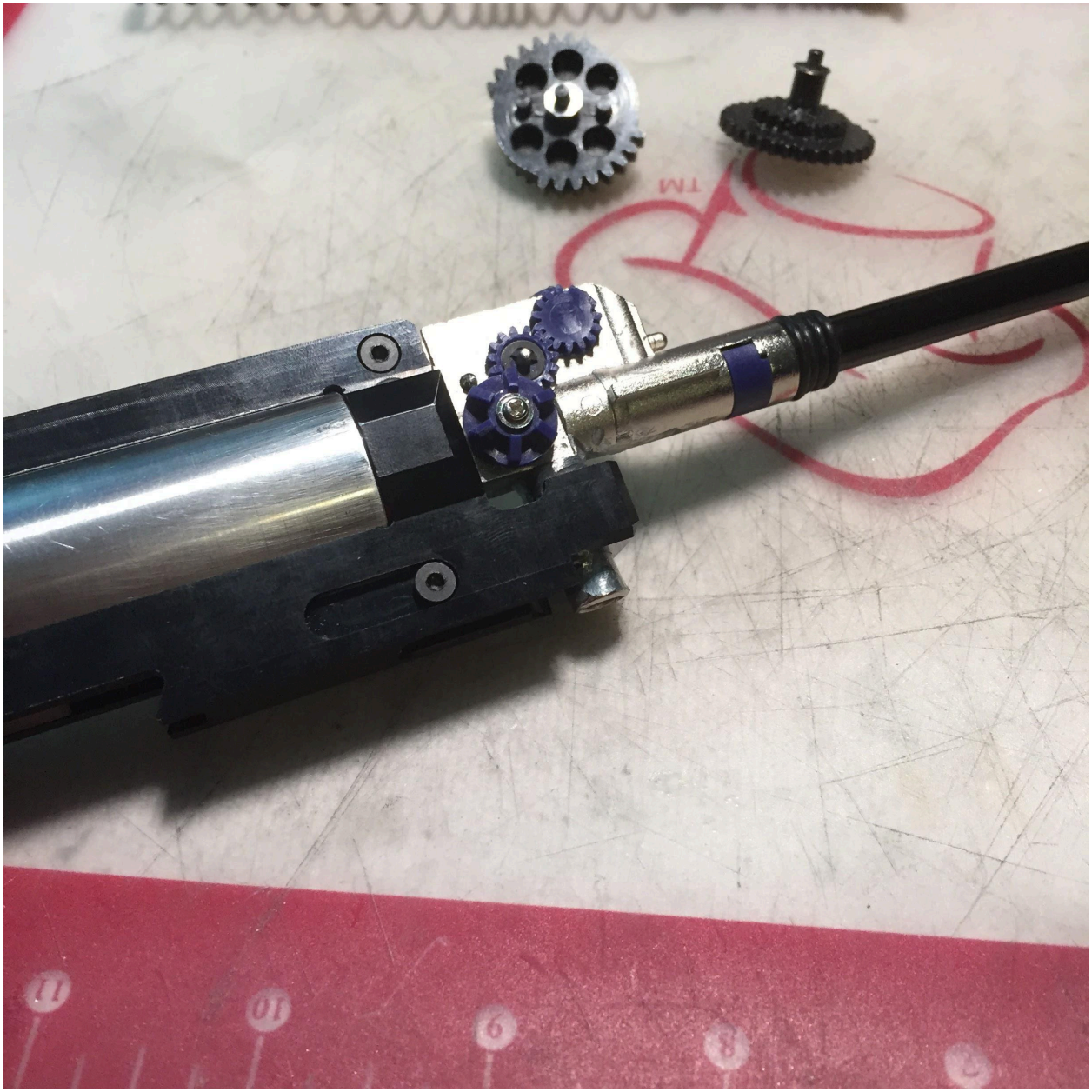


This is where the barrel naturally wants to sit (roughly 1.15mm forward of the locking position on the hopup or roughly 1.15mm further away from the gearbox) so that it can both feed and seal properly, but it doesn't line up with the c-clip cutout on the hopup so it cannot lock in place here:

Due to the barrel not being able to lock in place, when you install the air nozzle it moves the barrel even further forward creating air seal and consistency issues:

I have been going through multiple barrels, buckings, air nozzles and tappet plates to find a temporary fix to this design flaw. So far I have to shave down the bucking lips and modify the air nozzle spacing to get the shell to function with minimal sealing issues:

My other alternate fix was to modify a Lonex hopup chamber to fit in place of the proprietary one (I did not modify the split shell in any way) so that I would have a chamber with correct barrel spacing (the c-clip is in the correct spot) eliminating all of the issues:



Spring guide durability:

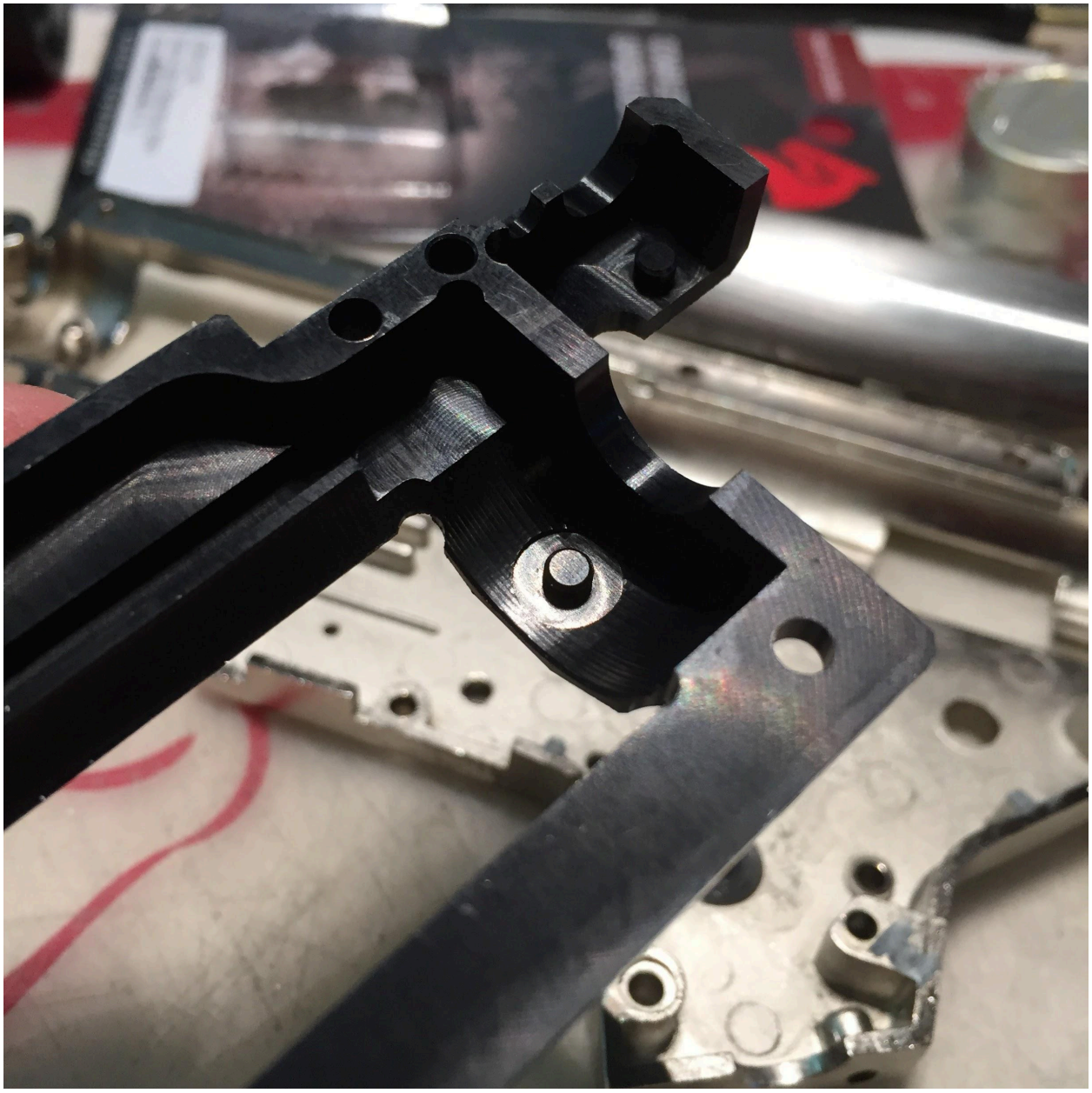
-not been able to test yet.

Cylinder Head fitment:

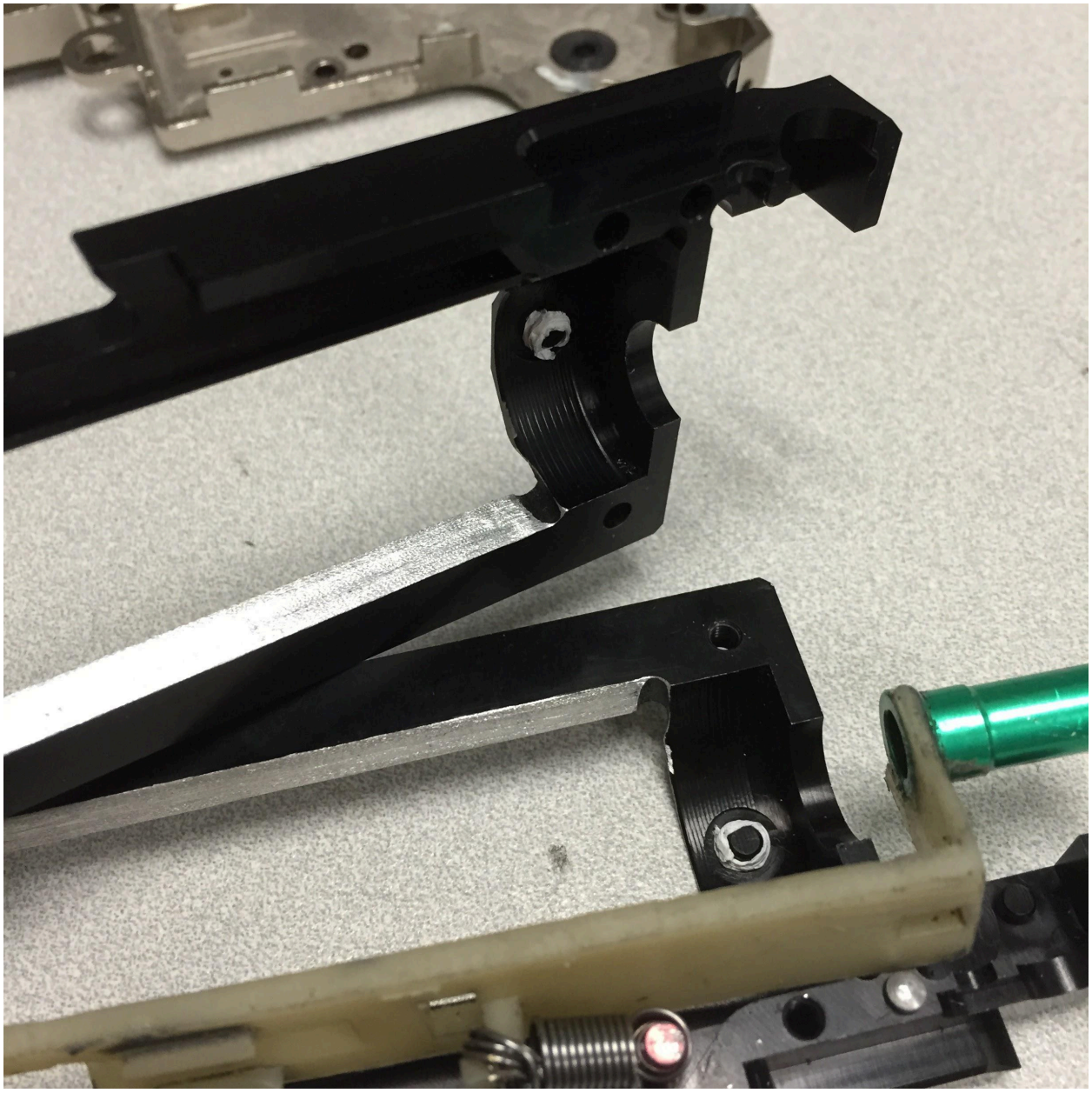
-upper shell Cylinder Head tabs are too small in diameter. This may cause issues since the Cylinder Head holes are wider than the tabs on the gearbox shell. This causes the Cylinder Head to move when the piston hits it due to the space between the holes and tabs, so all of the force of the spring/piston gets slammed into those tabs. If that force breaks the tabs, then the shell is useless.

RA CH tabs are 3.3mm in diameter
TM spec CH tabs are 4.3mm in diameter

The Cylinder Head tabs on the RA shell are about 1mm in diameter smaller than normal TM spec Cylinder Head tabs:



Temporary fix for this spacing issue, teflon (PTFE) around the Cylinder Head tabs on the RA shell:

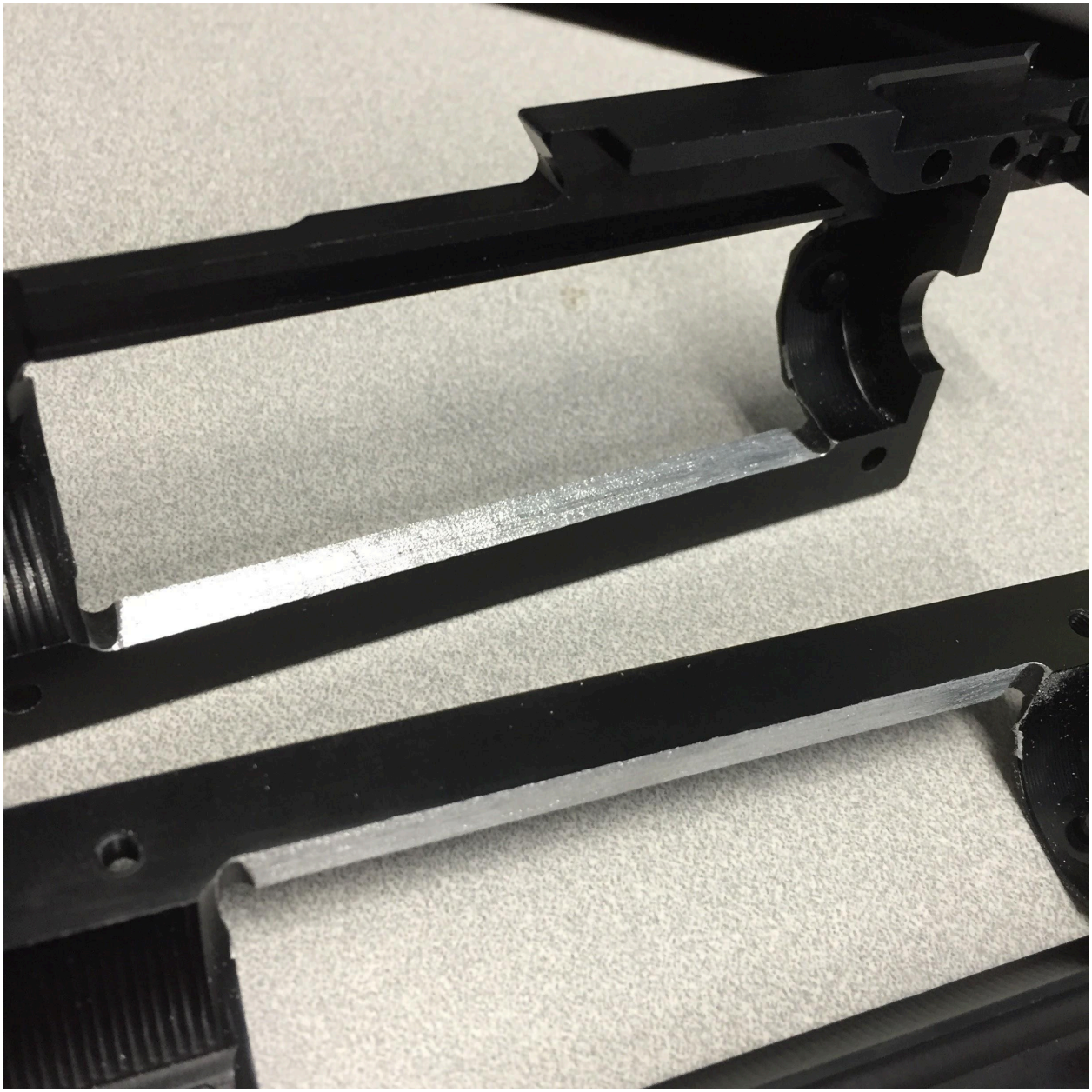


Cylinder fitment:

-lots of fitment issues. Out of the 8 cylinders I had on hand, not one of them fit properly. The length of the cylinder window in the upper shell is perfectly fine. However the width was too restrictive, causing the shell to not be able to close around any cylinder I tested (SHS, ZCI, A&K, G&G, Angel Customs, Stock brass x3).

RA cylinder window width is 21.05mm
TM spec cylinder window width is 22.10mm

Cylinder Window modified to fit normal TM spec cylinders (the width had to be increased roughly 1mm to fit cylinders tightly in place):



Piston fitment:

-there is a rounded corner in the back of the piston cutout of the upper shell. This rounded corner gets in the way of the piston on a backwards full stroke and can seize it up. Get rid of the rounded part and make it a 90 degree angle to stop this potential issue.

-the piston guide rails are slightly too wide causing fitment issues in some generations of various brands of pistons. Most notably the newest generation SHS pistons.

RA piston guide rail width is 2.03mm
TM spec piston guide rail width is 1.83mm

The rounded bevel near the back of the piston cutout that should be a right angle:

The piston guide rails that are on the thicker side, both height and width wise:

Air nozzle fitment:

-all air nozzles have properly fit, but none are functioning yet. There are major issues between the compatibility of the air nozzle, bucking and barrel due to the proprietary hopup.

Tappet Plate fitment:

-all tappet plates have properly fit, but none are functioning yet. There are major issues between the compatibility of the air nozzle, bucking and barrel due to the proprietary hopup.

Bushing and Bearing fitment:

-lonex 8mm bushings fit fine.
-some bearings are held slightly too far into the shell, restricting the space the gears have to be shimmed. This is not a major issue, but you may want to look into moving every bushing hole in the lower half of the shell slightly outward to allow more room for the gears to fit and be shimmed properly. Not only will this make the shell more compatible with brands of bushings and bearings, but it will also let the user shim properly gaining higher performance and reliability out of their setup.

Gear compatibility:

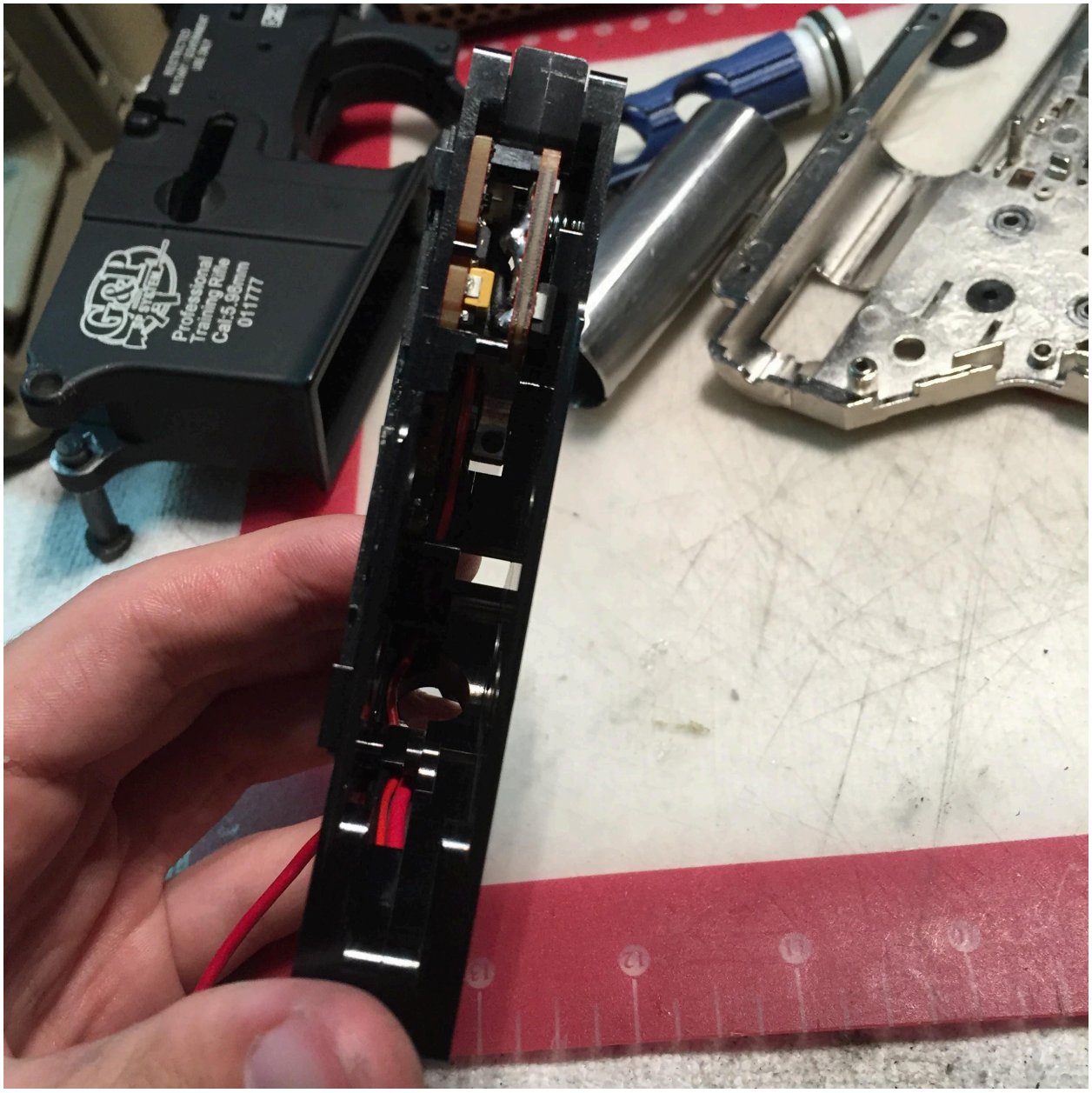
-so far all gears tested have fit fine.

Mosfet/contact housing fitment:

-BTC Spectre dropped in perfectly.
-No issues with the fitment of other contact sets so far.

BTC Spectre Fet:


SPECTRE
V2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Training Rifle
Cal:5.56mm
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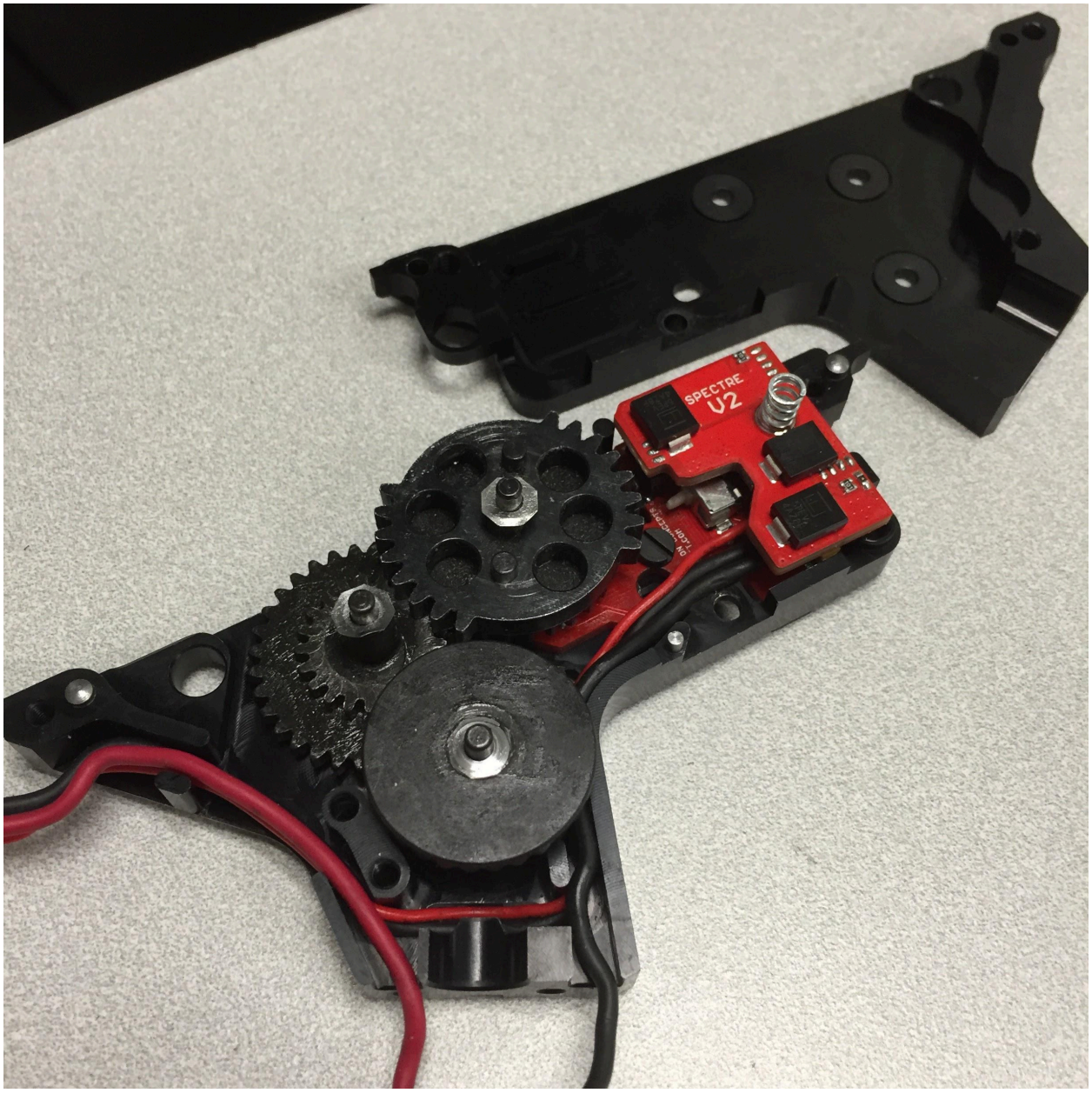
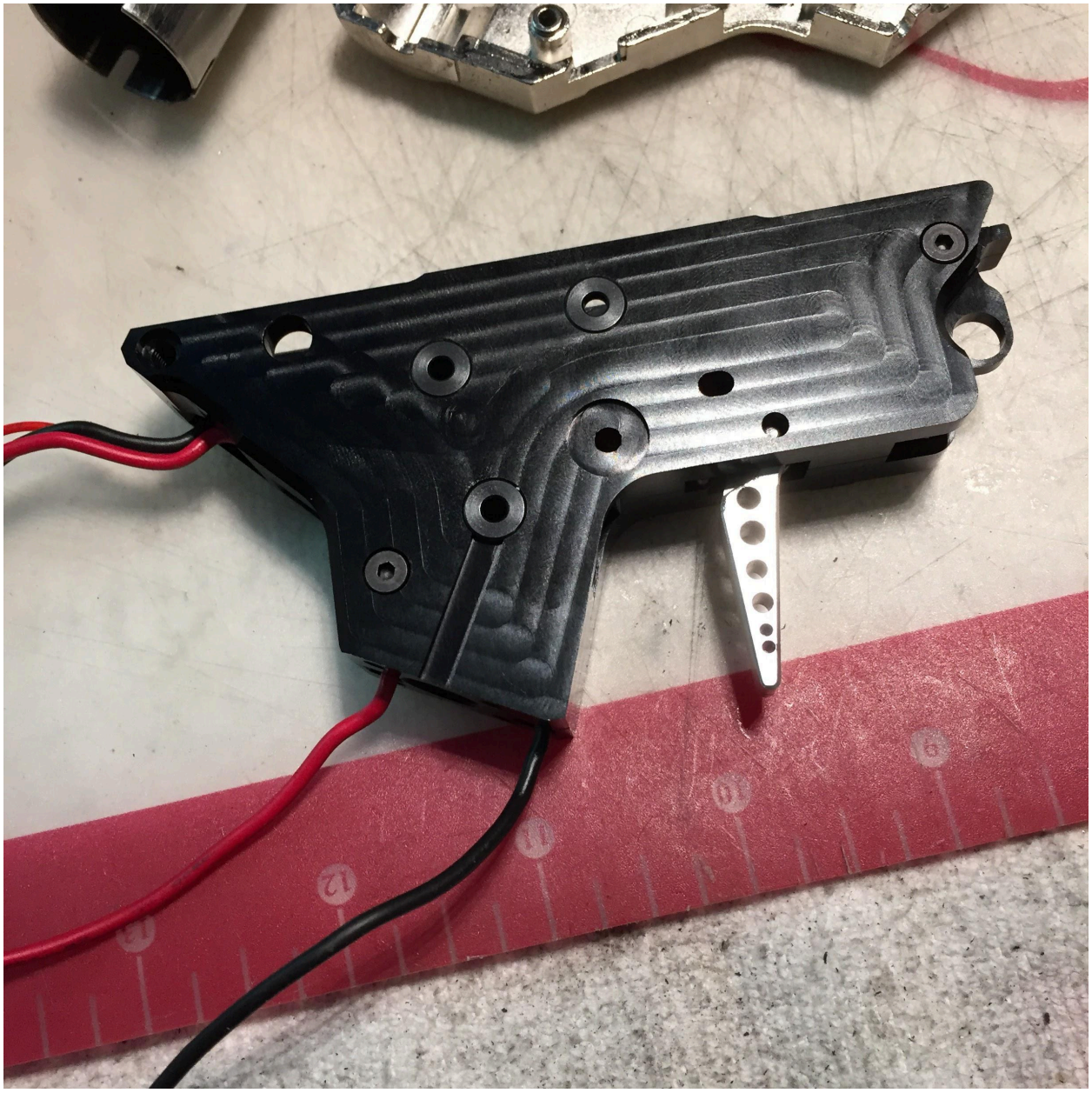


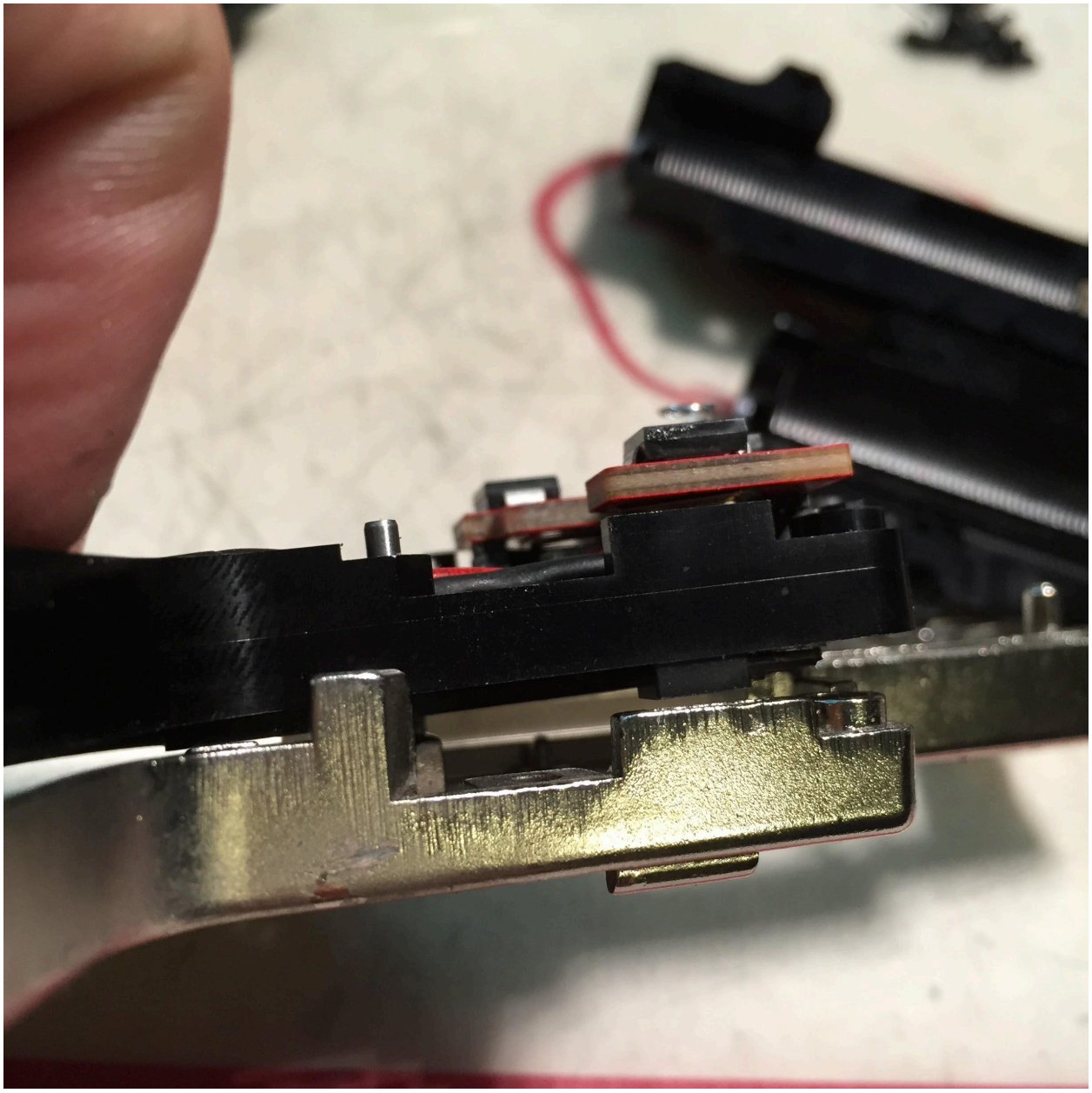
Trigger fitment:

-SPEED airsoft straight trigger fits, but has vertical play and is slightly annoying to install since the part of the shell that stops the triggers backward movement is much lower on the split compared to normal TM-spec shells.

SPEED airsoft straight trigger fitment:



The shell post which contacts the trigger, RA vs TM spec:



Proprietary ARL:

-the ARL release tab is a cool feature but in a bad spot that makes it somewhat useless since you have to take apart the motor grip to access it (what you do for every other shell as well).
-I love the design of the new ARL and the incorporated screw, still need to test durability though.

ARL release hole placement:

Selector plate fitment:

-the guide rails hold the selector plate pretty loosely and give it a lot of play, causing issues with thinner selector plates contacting the tabs in computerized mosfets such as the BTC Spectre. The tappet plate simply cannot push down on the tabs with enough force. Thicker tappet plates wrapped in electrical tape work best.

Rail spacing issue with BTC fets and thin tappets:

Rail spacing issue resolved with thicker tappets wrapped in electrical tape:


AWS
AIRSOFT
STEALTH FET
(STANDARD)
RAPTOR FET
(PROFESSIONAL)
WIRING:
REAR
FRONT
FOR V2 GEARBOX

Motor Compatibility:

-only one out of the 3 motors I tested was able to be shimmed. This was due to the poor motor alignment between the grip, motor, lower receiver and gearbox shell (this issue was not present with the previous Lonex shell, however). The other two motors were jammed against the pinion gear and were not able to be shimmed. One was pushed so high into the bevel gear at its maximum height that it could not cycle the setup. I do not know if this is an issue with the alignment of the gearbox or the position of the bevel gear due to the gearbox.

Main Issues:

These issues cause the shell to not function. If anything else, these are the issues that must be addressed for proper function of the shell. All of the above listed issues should be addressed, as they are all faults in the design, but these specifically cannot be modified to work, they make the shell unusable.

The two most important issues are the motor alignment and hopup compatibility. These two issues alone make the shell very hard to use.

The lower shell changes its motor alignment drastically when it is put into the receiver and all the pins/screws are tightened down. It fits loosely in the G&P lower receiver so every pin or screw that is inserted move its position slightly throwing off the alignment with the motor. Specifically, on one motor, before the shell was put into the receiver the motor was held very high into the bevel gear. However, after the gun was all locked up, the motor was held much lower, barely contacting the bevel gear. This makes both motor height and shimming a literal guess and check game, which is absolutely terrible. It creates efficiency issues with the setup and wears down both the motor and pinion gear. In depth details with this alignment issue were pointed out above.

The hopup incompatibility is just as bad, if not worse. Barrels simply do not fit in the RA hopup properly without extensive modification. The cut out for the "c-clip" is too far towards the gearbox which causes buckings and barrels sit too far backward covering the feed tube. This creates feeding issues and, when the barrel is spaced to correct these issues, the air nozzle pushes the bucking and barrel further out of place creating a host of feeding, velocity and consistency issues. If you move the c-clip cutout about

1.15mm forward (away from the gearbox) so that the barrel locks in the correct position in the hopup, all of these issues will go away.