Track IR in Aces High

One of the most important aspects of Aces High is the "immersion factor". AH is designed to provide the most realistic simulation of WWII air combat (well…OK, some GV stuff as well). This immersion factor goes beyond the basic necessities for simulating flight and provides the realistic "sense" of what it was like to fly these planes so we have highly detailed, realistic cockpits, moving levers and gauges, stall buffet, blackout, etc., all designed to give that all-important "immersion". So, what's missing? Well, we certainly don't feel "G" forces but that'll probably remain a bridge too far until someone invents some sort of gravity-field generator. We also don't have 360 degree spherical displays capable of putting us actually "in" the environment. Short of gravity-field generators and building a "domed" simulator cockpit the biggest difference between AH and RL is in the way we do views. Many WWII and almost all current fighters have "coolie hats" on the stick just as our gaming controls do; however, we use those "coolie hats" as Point Of View (POV) controls while in RL they are used for trim. The POV switch is a good solution to the problem of looking around within the game but the resulting views are unrealistic and based on fixed lines of sight. There are other modes such as padlock but the most common method remains the POV switch.

Enter TrackIR (or TIR for short). TIR is a device made by Natural Point (www.naturalpoint.com) that provides the ability to track head position and translate it into changes in view within the game. The system has two major components, a camera and reflector(s). Infrared light is emitted from an IR source within the camera.

TIR4 Camera:

The camera is usually mounted on top of your monitor. The IR is reflected back to it from either one or three reflective dots (depending on which model of TIR you have) usually mounted on a ball cap. For extra fun make sure you leave your hat on with the Official Martian Fighter Pilot Antenna™ attached when you answer the door for the Pizza man.
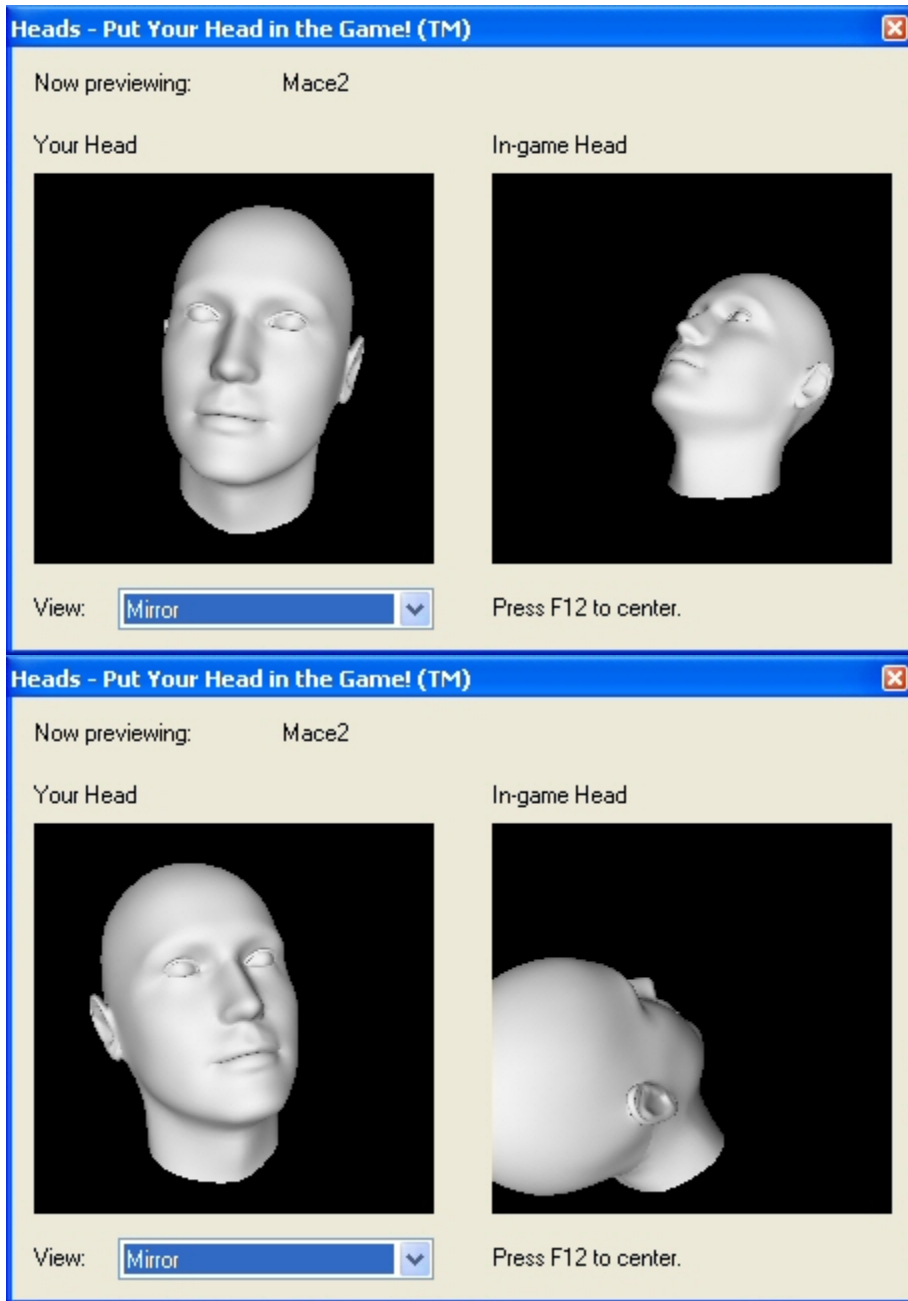
Martian Antenna…errr…Reflective Clip (for 6DOF, attaches to either a ball cap or your headset)

The camera detects and tracks the movement of the reflectors and turns it into either one or two types of motion within the game depending on which model of TIR you have. Early models of TIR (TIR 1, 2 and 3) are only capable of view rotation (there's an exception for TIR3 I'll get to). Envision your head being located at a single spot within the cockpit like a camera on a tripod. TIR can cause the view to rotate in pitch and yaw (called two-degrees of freedom or 2DOF) the same as "mouse view". While an improvement on normal AH views, it still lacks realism and many lines of sight are blocked by the canopy bows, the headrest and even the sides of the fuselage. In RL, pilots work around these obstructions by moving in the cockpit; turning, leaning, sitting higher, etc. Natural Point replicated this movement with an add-on to TIR 3 called Vector Expansion (VE). VE added the roll axis as well as direct movement *along* three axes so TIR can now account for any movement along any axis just like RL. This is referred to as six-degrees of freedom or 6DOF for short. In the TIR software these are simply referred to as the X, Y and Z axes but what it means to you is you can now slide your head to the side and the "in-game head" moves to the side. You can sit up higher or scrunch down lower and your in-game head follows. Move closer to the monitor to see over the nose of the plane and your in-game head moves closer to the gunsight. These motions along the X, Y and Z axes are called "translations." Now, you can turn around to check-six, slide your head back a bit and to one side and easily see around the headrest or you can slide forward and to one side, sit up higher and look down a bit and see right down the side of your nose to set up a deflection shot or track a bandit in a flat scissors. We're now talking about movements very close to what you experience in RL.

It's still not perfect however as there is no getting past the limitations of your monitor and you can only turn your head so far until you can no longer see it. The solution for this little conundrum is the TIR "profile." The profile is a tool which translates small movements of your head into larger movements in the game (and on the monitor of course). I'll just pick some numbers here as examples to explain how the profile affects movement, the actual numbers vary according to how you set up your profile. In this example, turn your head slightly to the left (about 10 degrees) and your in-game head rotates 90 degrees left. Move your head an additional 5 degrees and your in-game head rotates an additional 90 degrees so you're now seeing your six-o'clock view even though your real head is only pointed at the left edge of the monitor. Notice the difference in that the first 10 degrees of rotation provides 90 degrees of in-game rotation while it only takes an additional 5

degrees to get the second 90 degrees. In most profiles the rate increases the farther you get from the nose of the aircraft and that's important to understand. Profiles also control the in-game reaction to translations where five inches of forward motion can result in 15 inches of in-game motion. Below are two windows from the TIR software that show the effect of the profile. The head on the left depicts the position of your real head while the one on the right shows where your in-game head is looking. These pics makes it pretty easy to see how exaggerated the in-game motion is.

Heads - Put Your Head in the Game! (TM)

Now previewing: Mace2

Your Head   In-game Head

View: Mirror   Press F12 to center.

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Now previewing: Mace2

Your Head   In-game Head

View: Mirror   Press F12 to center.

After developing VE, Naturalpoint followed with the TrackIR 4. This puppy comes with VE as well as a larger field of regard (a larger "viewing" angle for the camera)

so it's a bit less likely that your head movements will go outside of the area the camera can see. Also, they've fine-tuned the movement algorithms a bit so that the in-game head pivots at the "neck" making movements, particularly pitch, feel a bit more natural.

Moving On:
OK, enough of what it is, how do you use it? First, you have to set it up. TIR installation is pretty straight forward, just follow NP's instructions. If you do have problems go to NP's website and locate the TIR forum. They're pretty good at responding to posts quickly. So, you have it installed, how do you get it to work with AH? First, launch TIR and select the *Profiles* tab. You'll see a list of games that support TIR in the upper window and profiles in the lower window. In the filter dropdown select "Flight" and then find AHII in the upper window (conveniently placed at the top of the list you'll notice, who says HT has no "pull"?). Use the dropdown next to AHII and select the "Combat Flight" profile (should be the default). Now, when you launch AH it will automatically use that profile.

Profiles Window:
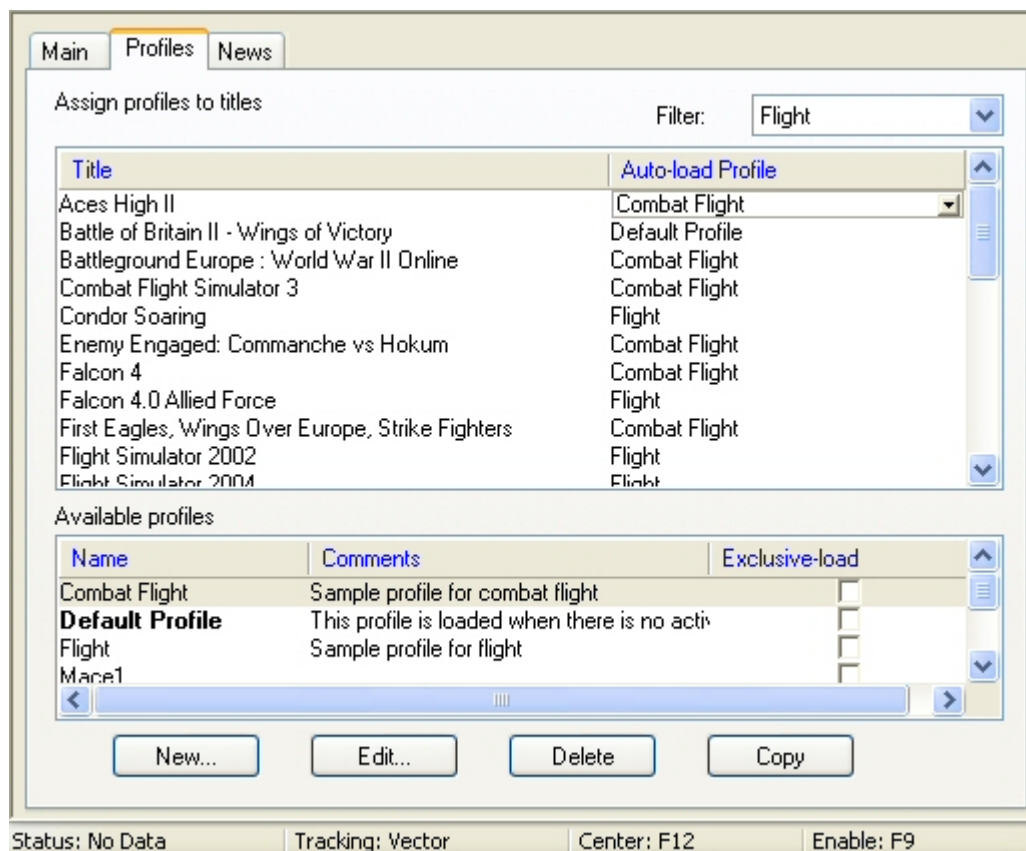
Double clicking on the Combat Flight profile will bring up another window that you'll use to tailor each of the six axis and motions.

Profile Editing Window:
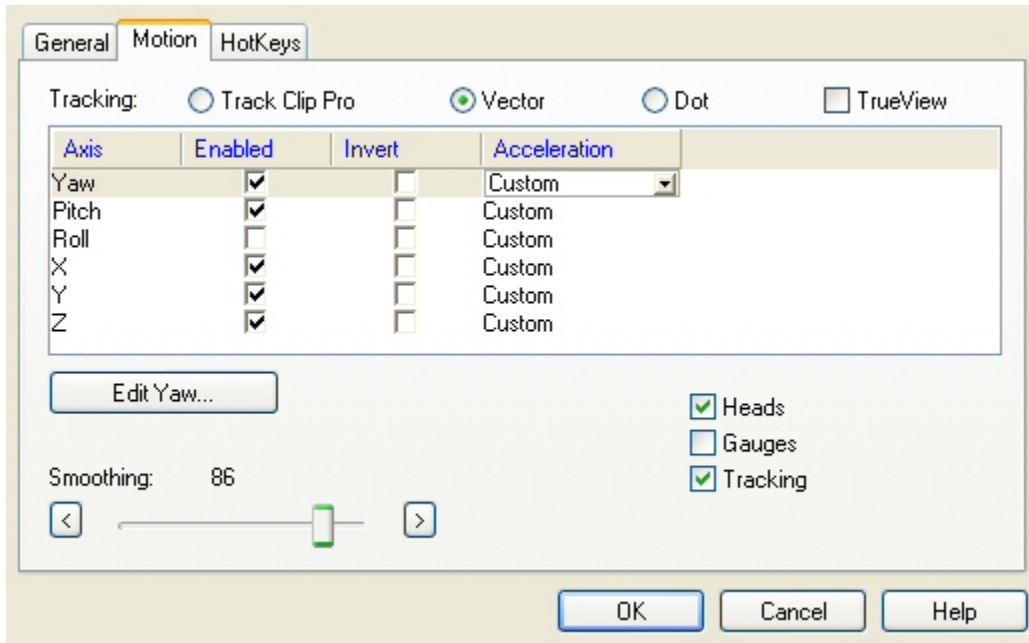
At this point notice the box for *TrueView*. MAKE SURE **TRUEVIEW** IS TURNED OFF!
I'll explain why later. Something else you might notice in the picture above is that
the Roll axis is disabled. This is a personal preference of mine as I think roll just
complicates things but it's up to you if you use it or not. More on that later.

I recommend, you just leave the rest of the profile as is until you have some playing
time under your belt. Last thing before you leave the profile select the *"HotKeys"*
tab and you'll find three pre-set buttons for controlling TIR in-game. They are
"Recenter", *"Precision"* and *"Pause."*

HotKeys:
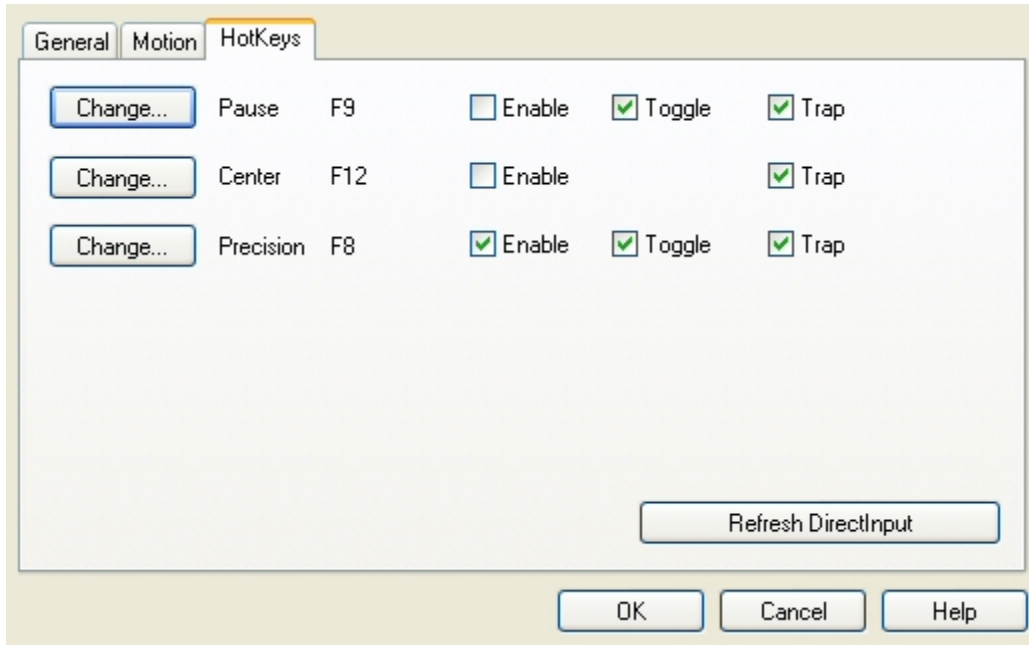
Each of these are pre-set in the profile to "trap" the associated key on your keyboard so you can use that key to perform that function in-game but, depending on how you have your keys mapped in AH, you may have conflicts. For instance F12 is TIR *Center* but in AH it's a VOX button. In my setup I've disabled all of the *HotKeys* and then programmed the functions to different HOTAS buttons. Since there is a wide variety of personal setups for keys and buttons I won't tell you how you should do it other than to say that you will want *Center* to be easily accessible (it tells TIR when your head is pointing at the center of the screen) so, if you can, put it on your HOTAS. With my profiles I don't need *Precision* so don't have that mapped at all but I recommend you map *Pause* somewhere. If you don't think you have enough buttons on your stick to do this remember that you won't have to use all of your POV coolie hat positions for views so you could reprogram certain positions on it. Your 3 o'clock and 9 o'clock views could be set for *Pause* and *Precision* for instance. Once you've played around with TIR for a while you'll develop your own preferences for how you want it to react and you can go back and create a new profile, modify an existing profile or install someone else's profile whenever you want. I've had TIR for about six months and still occasionally go back and experiment with new settings.

OK, while we're not going to mess much with the profiles themselves right now you have to make sure that the TIR camera and reflectors are aligned. Back on the *Motion* tab of the profile editing window you'll see boxes for three additional windows, one is *"Tracking."* Select it and you'll have a window pop up like this:

Tracking

Current dot (pixels):   116   Settings...
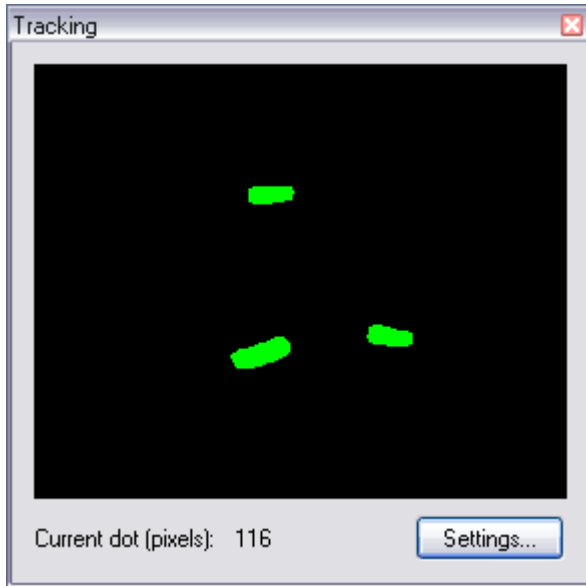
This is what the TIR camera sees (I don't know if it's just me but it's kinda creepy to look at....especially at night and when it moves...maybe I got scared by a three-eyed vampire bat when I was a kid or something). The three green dots are the IR reflections from the three reflectors on your track clip. If you're using an earlier version of TIR without VE then you'll have just a single dot. Sit in your normal playing position and use this window to adjust the position of the TIR camera so that the three dots are centered. Move around a bit to make sure all three dots stay visible. One thing I've found is that for typical setups, angling your hat brim up a little bit more than you would normally wear it makes it easier for TIR to keep track. For you younger guys that may not be aware of this the bill of the hat goes in front, not in back.

I mentioned that you need to turn *TrueView* off in TIR, here's why. A problem that some people have had with TIR is getting TIR to correctly orient its views, unfortunately it gets complicated and the stories have been a bit confusing but I'm pretty sure I've figured out what's been going on. The simple answer is to make sure that you start with both *TrueView* and AH's *TrackIR Object Relative Move* OFF (go to Clipboard /Options /Preferences /View Options):

AH's View Options Page:
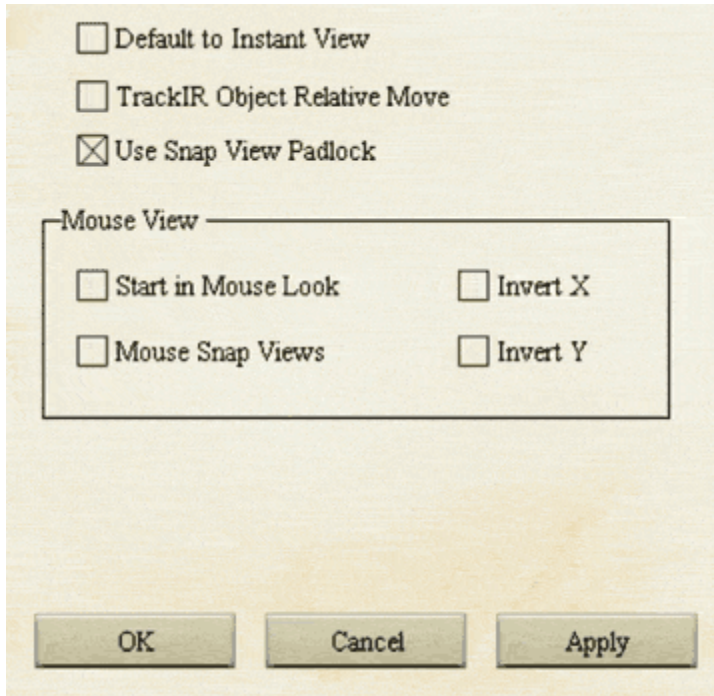
If everything works with both of those off, good! Move along. If it's not working (or if you're just masochistic) then read on.

Translation Problems:
There are two situations you may see involving translations. In both of these situations rotation works fine, i.e., you rotate your head left and look up and your view rotates left and up; however, there is sometimes a problem in how TIR and AH work together to handle translations. There are two possible ways for TIR and AH to interpret this type of movement, one is relative to your viewing angle (i.e., the direction you're looking) and the other is relative to your aircraft as if you're sitting still and looking forward. You want it to be relative to the direction you're looking. When translations are correctly referenced movements appear to go in the direction you would expect. Say you're looking forward and slide your head to the left. Your head position slides toward the left side of the plane just as you'd expect. When you turn around and look out your six and slide your head to the left it should again move to the left <u>relative to your view</u>. In other words, since you're turned around looking behind the plane, moving your head left means your in-game head would actually move toward the RIGHT side of the plane. Makes sense doesn't it? The problem arises when TIR and AH decide that all translations should be done <u>relative to the airplane</u> instead of the direction you're looking. TIR acts as if you're always looking forward and any time you slide your head to the left it will move toward the <u>left side of the plane</u>, regardless of the direction you're actually looking. So, look forward and slide left and everything looks fine but look out your six and slide left and your in-game head appears to move <u>right</u> since a left translation will always move your head toward the <u>left side of the airplane</u> as if you're looking forward. Even stranger, if you're looking back and move your head backwards to get farther away from the headrest your head actually moves toward the headrest, sound confusing? It is! If this is happening to you, first make sure that both

TrueView and *TrackIR Object Relative Move* are OFF! If your rear views are fine you're good to go, if they're not then turn only *TrueView* ON and this should fix the problem. I've never seen a reason to have AH's *TrackIR Object Relative Move* turned on. You could leave *TrueView* OFF and turn *TrackIR Object Relative Move* ON but for some reason it appears to disable the latest TIR movement algorithms so I don't recommend it.

Flying with TIR:
Allllrighty now. We have TIR installed and TIR/AH software configured so we should be ready to fly. Before launching AH make sure you have TIR running (you can minimize it or select the option to "run minimized". Launch AH and then don your official Martian Fighter Pilot Antenna™ and if you have a Little Orphan Annie Secret Decoder Ring then you can put that on also so you can communicate in secret with your squad mates.

I strongly recommend you first spend some time in the off-line practice area. TIR is pretty cool but it takes quite a bit of getting used to. You need to break the habit of using your POV switch for all your views and you need to acclimate yourself to the head movement required. Just about everything in AH including three dimensional maneuvering, gunnery and especially your sense of where your plane is pointing will be different. That leads us to:

Adaptation:
Many people find TIR very disorienting when first trying it out, especially if they've been playing AH or other flight sims for a while. Some folks seem to adapt easily while others tend to take a lot more time. Some never adapt at all but I'm not sure that they approached it right or gave it enough time. Certain muscle memory such as using the POV switch need to be unlearned and correct head movements learned. Also, this disorientation can lead to some significant discomfort at first and people have reported a tendency to become nauseous as well as experiencing increased muscle tension, eyestrain, and even headaches. Don't worry, you'll probably overcome this in short order but this is why I recommend starting with a fairly benign profile like Combat Flight. Over time most people will increase the gains in their profiles so that TIR reacts faster so jumping in right at the beginning with someone else's very aggressive profile may not be a great idea. If you're experiencing problems with the Combat Flight profile try switching to the Flight profile for a while and see if that helps. When I first started I limited myself to about 30 minutes of flying followed by a break. If you take it easy on yourself you'll limit the disorientation, discomfort, and frustration. Most importantly give yourself time to acclimate. It probably takes the average person a week or two to get comfortable and it could take up to a couple of months to get really good at using TIR. It probably took me a couple of weeks to work up to unlimited time (bladder and adult-beverage dependant).

Centering:
The first thing you need to do once you get "in-game" is to *"center"* your view. Centering is telling TIR when your head is directly in front of your monitor and it then uses that position as a reference point. Just look at the center of your monitor in your normal flying position and hit the *"center"* button (either F12 if you use the default or whatever you mapped this command to). As with most of these things TIR has its own little tricks and one of these is the way you center. Most people like to move their head forward some and a little down and then center the system. This positions your in-game head toward the back of the cockpit and as high as possible

moving you away from all the clutter around the windscreen and improving your view over the canopy rails. To see forward better you just lean forward. One of the big "hidden" benefits; however, is that when you rotate your head to check six the effect is that your in-game head moves toward the front of the cockpit. In other words your head is farther from the headrest making it much easier to see around it.

Maneuvering:
In the off-line arena practice basic your fighter maneuvers, in particular loops and barrel rolls. Practice a lot of looping maneuvers around the drones while keeping sight of them. One of those things that can happen with TIR is losing track of where the nose of your airplane is in relation to where you're looking. In a loop you're typically looking through the top of your canopy at your target and you can find that you have no real idea where your nose is, particularly on the back-side of the loop. You keep pulling thinking you're bringing your nose up but in fact your nose is buried low and you become one with Terra Firma. Using the POV switch you know when your view is forward and up 45degrees so you know your nose is 45degrees below your line of sight but you don't have that reference with TIR, at least at first. You have to notice things like your canopy bows or make quick forward checks to keep track of both the bandit and your own aircraft. Eventually you'll begin to develop a sense of your aircraft position through the slight movements of your head. After a while this becomes easy but there's a learning curve.

Gunnery:
Gunnery presents its own set of issues with TIR and there are several techniques to master it. Most people have set certain forward views with their POV hat that gives them a good sight picture for gunnery and, with the standard AH views your forward view is always aligned with the centerline of your aircraft simplifying things quite a bit. TIR on the other hand doesn't present the stable sight picture you're used to and the gunsight requires you to position your head correctly behind the sight. Some people suggest pausing TIR or hitting *center* for gunnery but there are big disadvantages to doing either of these. Here's the technique I use. First, understand that your POV hat or number keypad will override the viewing angle commanded by the TIR; however, TIR still allows you to translate (slide to side, rise up, move forward/aft, etc.) So, as an example let's say you're looking left and up with TIR and then move your POV hat switch to the right. Your view will change to your 3 o'clock position looking directly out your right wing; however, you can still slide closer to the canopy or slide left or right for a better view. This works for all of the views programmed into your POV hat or keypad. While this is useful for other things (such as a quick check-six look) the most important use for this function is gunnery. By pushing the hat switch forward (or KP8) your view ANGLE is slaved forward and is perfectly aligned with the forward axis of the plane just as if you didn't have TIR. This aligns your view with the centerline of the plane, and more importantly, with the firing line of your guns, regardless of whether or not you can see the pipper in the gunsight. You can slide to the side and forward a bit to see better while setting up a high-angle deflection shot or move to the side to see around the canopy bows or move forward toward the gunsight for real accurate placement of your shot. In any case, if you fire, your rounds will go directly to the center of your screen. It's a very useful (some would say essential) capability. In addition to having outstanding forward views you can also quickly release the POV switch to check six or scan around and then by simply hitting the POV switch again go right back to perfect forward alignment.

Profiles:

OK, so you've been flying with TIR for a while now and are pretty comfortable with it BUT it just isn't feeling "natural" and seems a little sluggish or you can't quite keep up with guys zipping past you at the speed of heat. Remember the profiles? Time to get to work on those. Here's a good write-up by Charvel that includes some good discussions on them: http://www.airwarfare.com/guides/tir_setup.htm. He focuses quite a bit on profile development so I won't repeat it all here as my main purpose is to help you tailor TIR for AH.

Here are some general tips.

Take it slow. Make a few changes to a single axis and try it out for a while to see if you like it. If so then move to another and repeat.

Create and save a "development" profile so you can always go back to your previous profile if things get out of hand.

Don't go from a value of 5 to a value of 50 in one jump. TIR will be very jumpy and erratic if you do. I've found the best profiles have very smooth, continuous curves on each side of the 0 position.

If the profile works well but you just want to "punch it up" a bit then use the "Shift entire curve" function to move it up. Conversely, you can ease it off a bit by shifting the entire curve down.

Dead Zones: The default profiles (and most of the profiles others have built) all go down to a value of 0 at the 0 position and personally I don't like it, particularly for the pitch and yaw axes although I don't like it affecting translations either. The lower the value the less movement of your in-game head and by going real low the profile creates a "dead zone" in the center of the axis. Let's say you're watching a bandit flying over the top of your canopy from right to left. As you track him everything is fine until he approaches directly overhead where he crosses the yaw axis dead zone. When this happens your view seems to lag and almost pause directly overhead and then pick up again as he passes to the left. This is very irritating to me; it feels almost like the views are held back by a rubber band or a detent. I prefer that the views always move smoothly and, while they have to accelerate near the ends of the axis, you don't want it stopping in the middle. My profiles are all designed to almost completely eliminate dead zones but there is a disadvantage to this that you have to weigh. The 0 position for the pitch axis is a horizontal 360degree circle around the plane (near the horizon if you're wings level). The 0 position for the yaw axis is another 360 degree circle but in the vertical going along the lift vector from the nose to the tail. These two circles intersect at the nose and tail providing a combined dead zone which, in extreme cases causes the view to almost "snap" into a direct forward or aft position. This is helpful at times and can make the view more stable when looking straight ahead but, since I use the POV switch to command a direct forward view, it's not useful to me. This is an area where I would disagree with Charvel, bottom line is to do what feels most comfortable to you.

Roll Axis: The roll axis is a bit unique, some like it, others (me) don't. I leave it off in all of my profiles. The roll axis contributes only a little to your views while increasing the variables that you have to contend with. Ideally you'd think TIR should exactly replicate your head movements in the cockpit (including roll) and to a large degree that's true but, in reality, you have to remember that you're missing a lot of the information you would normally have in RL regarding where you're actually looking. For instance, in a real cockpit I have complete sense of where I'm looking because I have all of my physical senses. In other words even with my eyes closed I'll know what direction I'm facing relative to the aircraft, there's no "interpretation"

going on (don't confuse this with instrument flight which is a completely different animal). I "know" when I'm turned around to the left, leaning towards the nose of the plane while using my hand to push off the canopy to one side so I can see around the headrest to check my high 7 o'clock. Plus, in RL you have greater peripheral vision, close to 180 degrees or almost twice what you can "see" in AH. You don't get these clues with TIR, instead you're limited to "interpreting" very slight head motions and looking for reference points in the cockpit to know where exactly you're looking. This can easily lead to losing track of your head position relative to your aircraft. 8 o'clock high looks the same as 10 o'clock high especially when there is no aircraft structure in sight. You have to compensate for this by learning how slight differences in your head angle and body position translate into views so that you can keep your situational awareness. To me, adding roll into an already complex problem contributes a lot to the complexity and adds additional interpretation that you just don't need. By leaving roll off your views remain stable in the roll axis (i.e., parallel to your wing plane) while still allowing full pitch and yaw movements necessary to keep sight. Trust me, if you leave Roll off you won't miss it.

GVs: This is a tough one. TIR doesn't add a lot to GV's, it actually seems to add complexity particularly since you jump from position to position a lot but I'll admit I haven't really worked on this very hard. I do know that aiming tank cannons is more difficult and, for the most part you lose some of the excellent views that can be saved using F10. For instance, I have my driver's position in most vehicles saved as high as possible which actually gives a very good view (it's like having your head out the hatch). With TIR you have an outstanding view of anywhere WITHIN the driver's compartment. Basically, when GVing (or operating ship's guns) I'll just turn TIR off.

Sample Profile: I really recommend starting slow and trying out the Combat Flight profile for at least a little while to allow you to acclimate but once you think you're ready either make your own or try someone elses. My current profile is shown below.
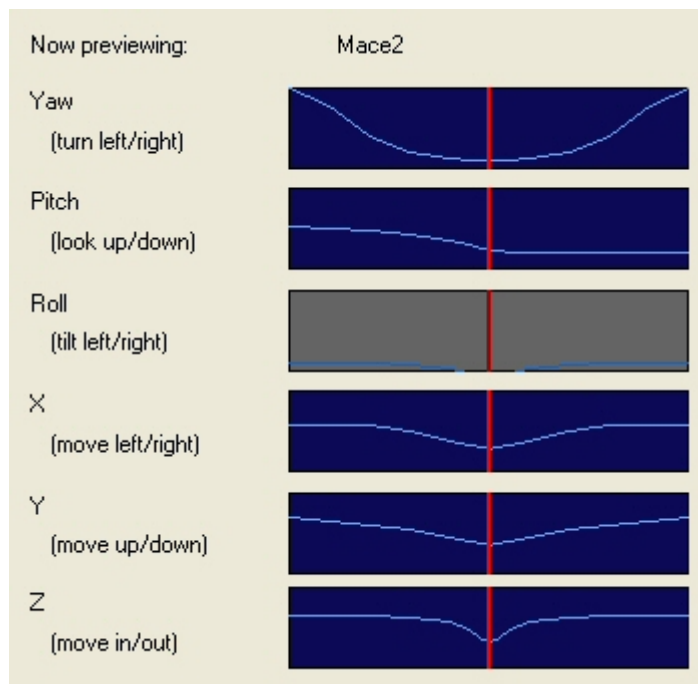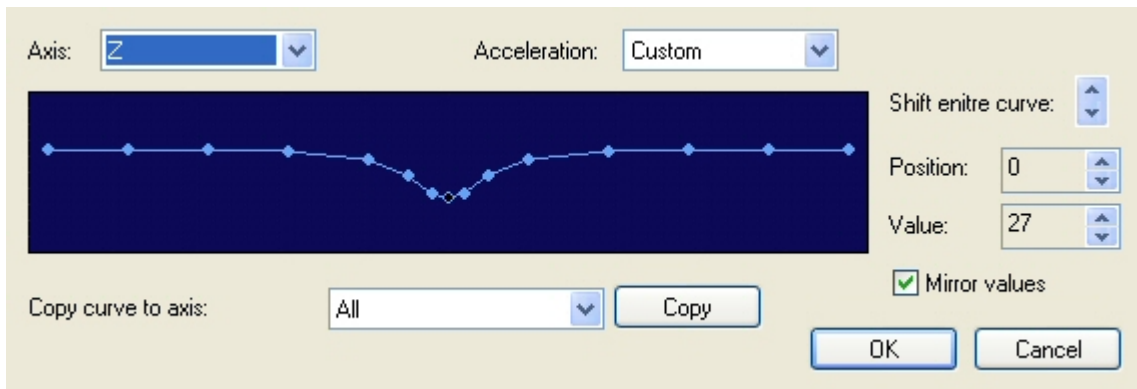
The most important thing to take away from my profiles is probably that they're pretty smooth and progressive. You can also see where I've raised the 0 position to reduce the deadzones. I also run my smoothing rather high at about 90, you may or may not like it.

Troubleshooting:
OK, I've covered several "idiosyncrasies" of TIR such as incorrect translations but there are a few more. Check NP's website and the TIR manual for a pretty complete list but here are the one's I see complained about most often in AH:

Tracking is erratic: Check to make sure you have no sources of light (including reflections) behind you. TIR can pick up on these and become confused. The best way to check this is to call up the "Tracking" window. Ideally you should see nothing but the hat reflectors in the window and these should all be green. If you see other green sources you've got a problem. If there are other sources visible but they're red then TIR is recognizing that they're not valid tracking sources; however, it's best to eliminate these, even if they're red.

TIR "pauses" when checking six or looking up/down: Again using the "tracking" window make sure that TIR is able to see the reflectors throughout the full range of motion necessary to see everything. If not, and adjusting your hat or the TIR camera doesn't help then see if you can mount the camera farther away. Since the camera FOV gets wider the farther away it is you can increase the area it can see. On the other hand, TIR only works out to about four or five feet so you can't move it too far away. If your camera is already pretty far away try moving it closer.

TIR "freezes" looking straight down: There is a known glitch in the TIR software that began with the Beta versions of .029 and hasn't been completely fixed as of .030. When you move out of the TIR FOV the view should pause for a second or two and then go directly to the centered position and then pick up again when the reflectors return to the field of view. It doesn't always do that and instead locks up pointing straight down. The fix is to *center* your view again (great reason to have *"center"* mapped to HOTAS). Don't know when NP will fix this but it's a known bug.

Can't see well behind the XXXX: There are a few planes in AH where checking six is difficult with TIR. Almost all planes have outstanding rear views with TIR, views that are much better than using stored POV hat positions but some, notably the F4U1A/D and the Bf109E/F/G2 can be harder to see behind with TIR than without. Some have complained about the F6F and F4F also. The reason has to do with their cockpit design. In the F4U a metal skin extends forward over the pilot's head and in the early 109s there is a piece of armor that extends forward. Both of these impede your view (just as they do in the real plane). Without TIR, people use the page up/down and arrow keys to move the rear view to the best possible position and then save it using F10 so they always have the best view possible even if it's not great; however, TIR doesn't work that way. You cannot save head positions so while you can slave your view aft it doesn't go to a pre-saved position that works well. This is just the nature of the beast. You can improve views a bit by playing around with your *"center"* position but the only real answer is to get used to it and learn to position your head for the best view.