T14MZHP Set Up Instructions for Helicopters

Since the instruction manual is basically useless with regards to practical application Cliff Hiatt and myself (Wayne Mann) have decided to pool our mental resources and create a practical application guide or user manuel… if you will.

Before we get started setting up your new radio I must do something that really pains me. In this era of frivolous law suits and sue happy individuals I feel it necessary to put a disclaimer in this manual. So here goes. This manual represents the ideas and opinions of Cliff Hiatt and Wayne Mann. We are not employees of Hobbico or Futaba. Any use of the ideas and opinions contained herein is done at your own risk. We assume no liability for the use of said material.

Upon turning on the radio there is a sequence that should be follwed to get you started on the right path.

Choosing Model Type and Swash Type

Go to the **Linkage Menu**, this is the box on the right side of the screen down about the middle that has a wrench and a nut driver in the picture. Next, click on **Model Select**. On the right side of the page click **New**. Click on the diagramm under **Swash Type** and choose the diagram that corresponds with the type of control system on your helicopter. If you are flying a mechanical mixing type of helicopter you will choose the diagram that reads **H-1 Pure Function**. Then click **Yes**. If you are flying an ECCPM machine then select the appropriate swash plate control type that your model is designed with from the menu. This will bring up the Frequency page. Select the frequency that you will be using and set the frequency in the receiver. We will not cover frequency setting as the factory owner's manual does an adequate job of explaining this. Refer to the Owners Manual to get the receiver frequency changed and get the receiver up and running.

Setting Swash Mixing

If you selected an ECCPM model type, that uses 3 servos to control the swash plate, click an the **Linkage Menu** and click an **Swash**. In the **Swash AFR** section you will notice that all the values are set at +50% for Aileron, Elevator and Pitch. These are the standard values and will apply to most helicopters. Servos should be installed and servo wheels should be fitted and aligned at this time. A neat trick that I learned from Mike Swift is to go to the **Linkage Menu** and click an **Servo Monitor**. In the top right corner of the screen you will see **Moving Test**. Click on this and it will changed to **Neutral Test**. Select **ON** and all the servos will move to their center position and hold there. This is ideal for setting up an ECCPM helicopter. Otherwise go to the **Home Page** and adjust the collective stick so that it is perfectly centered. Just under the timers an the **Home Page** you will see **THR Stick Pos.** and to the right of that **Pitch**. I use the numbers under **Pitch** for centering my collective stick as these numbers read out stick position in tenths of a percent witch is much mor accurate than the **THR Stick Pos.**

Set up the servos wheels as per the helicopter manufactures instructions making sure that the servo wheels are perfectly square to the bell crank post that they will be controlling. Adjust all pushrods so that bell cranks are square to the frames (or in "neutral"). Adjust the pushrods from the bell cranks to the swash plate to set the proper height and to ensure that it is perfectly square to the main shaft. At this point, determine whether the swash plate is moving in the right direction for collective and cyclic. If the collective is moving backwards change the +50% value in the **Swash AFR** to -50%. This will change the direction of the swash plate movement relative to the collective stick. Next check right and left cyclic and fore an aft cyclic and change those values to "-" if necessary. If while moving the collective stick up and down one or more of the servos is moving against the others, go to the **Servo Reverse** page in the **Linkage Menu** and reverse those servos and repeat the **Swash AFR** direction check. Be careful moving the collective stick to the extremes as you don't want to bind up any of the servos. IF the swash plate is traveling too far and binding to **Linkage Menu** and click an **Swash**. Under **Swash AFR** reduce the **Pitch** number to stop the swash plate from over throwing. With rotor baldes on the modell and a pitch gauge you con now use this **Pitch** number in **Swash AFR** to adjust the total throw you need from the swash plate to give you the pitch range you need.

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Setting Swash Detail

Note: It is very critical that the balls on the inner ring of the swash plate are in perfect line with the balls on the outer ring of the swash plate when performing this tuning exercise, otherwise you will be introducing fore and aft cyclic when you give right and left cyclic and vise versa. Also when you give a full cyclic command make sure that you are only giving that command and that you are not inadvertently holding a small amount aft cyclic with right cyclic and so on.

Here you will adjust the Servo throws to keep the swash plate level throughout the entire collective range and eliminate interaction with cyclic inputs while at either end of the collective range. In the **Linkage Menu** click an **Swash** then click an **Swash Detail** in the top right corner of the screen. In the **Mixing rate** box the first two mixes you see are **PIT to AIL** and **PIT to ELE**. These two mixers are used to level the swash plate at both ends of the collective travel. If you move the collective stick up you will notice that the two left boxes are highlighted and if the collective stick is down the two left boxes are highlighted. To make adjustments click an the highlighted box that you want to adjust then use the data input keys an the right side of the screen to make adjustments. With the collective stick up at full pitch and looking at the nose of the model adjust the **PIT to AIL** mix so that the swash plate is level. Move the collective stick to the bottom and do the same thing. **Tip:** Set a pitch gauge to 0 and put the gauge on one of the fly bar paddles.You can use the top of the rotor head for a level reference. This makes any movement in the swash plate very easy to see. Now turn the paddle with the pitch gauge 90 degrees so that you are looking at the side of the model. Now adjust the **PIT to ELE** mix so that the swash plate at high and low collective.

The next three mixers are used to stop interactions in the swash plate when the collective stick is at 50% or centered. Adjust the **AIL to PIT** Mix so that when you give full left and right cyclic the swash plate stays level in the fore and aft plane as viewed from the side of the model. Next adjust the next two mixers. **ELE to AIL** and **ELE to PIT** so that the swash plate stays level in the right and left plane when full fore and aft cyclic inputs are made. This is best viewed from the nose of the model.

Next we will adjust the **Linkage Compensation**. This adjustment compensates for interactions in swash plate deflection at extreme collective settings. There are four adjustments for high collective and four adjustments for low collective. With the collective stick at the top and viewing the swash plate from the side adjudt the **Aileron** mix so that there is no fore and aft cyclic change in the swash plate when full right and left cyclic is applied. Now turn the rotor head 90 degrees and do the same adjustments for **Elevator**. Now lower the collective stick and go through the entire process again.

Speed Compensation. This adjustment is for 120 degree ECCPM only. Because of the mechanical advantage of the Aileron and Pitch servo they are twice as fast at getting from full forward cyclinc to full aft cyclic than the Elevator servo is. This problem is usually only seeen when operating the fore and aft stick back and forth rapidly. Adjust the **Speed Compensation** so that the Heim Ball in the middle of the swash plate doesn't jump up and down when operating the force and aft cyclic stick rapidly. This setting seems to be close when adjusted between 15 and 20.

Changing Model Name

In the **Linkage Menu** click an **Model Select**, that at the bottom right side of the page click **Rename** This will bring up a computer looking keyboard that you can use to change the model name. Use your stylus and touch the screen just to the rigth of the name in the bottom left corner. Then keep clicking the **BS** key at the top right of the keyboard until you have erased the name. Use the keyboard to input the desired name of the model and the hit **Return** on the right side of the keyboard to save the name. Click **ESC** at the top left of the keyboard to exit this page.

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Activating Conditions

Go to the **Home Page** and click on the **Model Menu**, the box with the helicopter picture. Next click on **Condition Select**. This page is where we do our initial set up of our flight conditions or idle ups and throttle hold. In the red box you will see the word **Normal**. This is typically known as the hovering condition. Click on **Add** at the bottom of the page. Now click on **Idle Up-1**. Next, click an **NULL** on the right side **Idle Up-1**. This is where you assign whichever switch you want to activate **Idle Up-1**.Click on your desired switch, then, click an **On Posi.** for On Position. Once you determine which switch position you want to activate **Idel Up-1** click on the "on-off" box to the right of the switch diagram that you want to activate the condition. Make sure that the other positions of the switch are clicked to be OFF. Now click **Close**. Click on **Idle Up-1** to highlight it, then click **Add** again. Now using the same process add as many Idle ups as you want or need and then add throttle hold at the end. **Warning:** If you are using two idle ups and throttle hold they have to be listed in the correct order.

Example: Normal
Idle Up-1
Idle Up-2
Hold

They can not be listed in any other order or they will not function properly. Now return to the **Home Page**. Turn all of your condition switches off. Just under the **Modell Menu** box you will see the word **Normal**. Pull on your **Idle Up-1** witch and make sure that **Normal** changes to **Idle Up-1**. Do the same for your other conditions to ensure that they are working properly.

Separating Pitch and Throttle Curves, AFR's Expo's and Dual Rates

Click on the **Model Menu** and then **Pitch Curve**. Just to the left of the graph you will see a red box that has yellow papers or files in it with **Gr**. in a small blue section. This stands for Group. And since our flight conditions are likely to have different pitch curves we need to separate the curves. Click on this box and it will change to **Sngl** for single, then click **Yes** in the **Sure ?** box that pops up. Do this for Normal each Idel Up and Throttle Hold. Click out of **Pitch Curve** and then click **Throttle Curve** and do the same procedure for all conditions in **Throttle Curve**. Click out of **Throttle Curve** then click an **AFR(D/R). Alieron** will be in the box at the left side of the screen. Change the **Gr.** to **Sngl.** for each flight condition. Then click on **Aileron** and select **Elevator** and to the same procedure. Now click an **Elevator** and select **Rudder** and do the same procedure. We are just preparing all of these flight condition parameters for later adjustments. This will allow you to make changes to pitch, throttle, afr's dual rates and expo's in one condition without affecting any of the other condtions. (Another option is to set the basic throws for **Normal** while still in **Gr.** Mode and select **Sngl** for each additional flight condition for later fine tuning.) Now turn the transmitter off and allow it to save all the data that you have centered. You are probably in need of a break by now, so take one.

ATV's

The ATV's are in the **Linkage Manu** and any adjustments made to the ATV's will affect all conditions.Typically we never used ATV's much with the 9Z as they would effect programm mixers if you made any changes o the ATV's after the mixers are adjusted. So most of us won't be using the ATV's with this radio either. AFR's are a much better choice if you need an endpoint.

Choosing Between the Many Curve Types for Pitch and Throttle

This radio is very flexible in that it has many different types of curves to choose from for both Pitch and Throttle. In the **Model Menu** click an **Pitch Curve**. At the top right corner of the graph you will see a box that has the word **Linear** in it. Clicking an this box will bring up a box with six different types of curves for you to choose from. **Spline** is the curve type that is most familiar to those of us coming from Futaba's 9Z transmitter. If you click an **Spline** it will bring up a curve with 9 points that can be adjusted. Any of these 9

points can also be removed to create your own type of curce. Simply click on **Rate**, use the double arrowed cursors at the bottom right hand side of the graph to move from one point to another. After highlighting the point to be removed click **Delete** Use the double arrowed cursors ouce again to move to another point. This last step will deletet the unwanted point. The single arrowed cursors are used to add more point to the curve. Example: If you wanted a point between the center point at half stick and the next point up simply highlight the center point with the double arrowed cursors, then use the single arrowed cursor to put a hollow, square green box anywhere between the two points. Then click on any of the data input cursors an the far right side of the screen and the point will be added.

Gyro

In the **Model Menu** click an **Gyro**. There are three rates that can be selected and activated by any switch. Also the gyro gains can be set to automatically change when switching from condition to condition. On the **Rate 1** line and at the far right side of the page you will see the **Gr.** folder. Click an the folder changing it to **Sngl** and then click **Yes**. Do this for every condition. This will allow different gyro settings for each condition. Under **ACT** click on **INH** changing in to **ON**. In the next box under **Type** it should say **GY** if you are using one of Futaba's GY series of gyros. The next box should read **AVCS** if you want the gyro to be in heading hold mode and **NOR** for normal mode. The next box under **Rate** is where you will make changes to the gyro gain. This nimber will have to be set for each condition. The next box is for **Switch** selection if you want to be able to switch from **Rate 1** to **Rate 2**. If you are wanting to use a seccond rate for **Normal Mode** or a lower rate on heading hold mode make sure that you use the same switch for both rates and that you have the switch turning off rate 1 when it activates rate 2. Change all of the **Gr.** folders to **Sngl** for the second rate as well.

To the right of **Switch** you will see **Fine Tuning**. Under **CTRL** you can assign any dial or slider to controll the gyro gain. The **Rate** value will allow you to determine how effective the trimmer is. Refer to the GY owners manuel for instructions an adjusting and setting up the amplifer for Futaba's GY series of gyros.

Governor

Begin by connecting the GV-1 amplifier to the RX as show in the instructions, where the rpm lead is in channel 7 and the on/off lead is in channel 8. Next select **Governor** in the **Model menu**, select the **Rate 1**, **INH** key under **ACT**, it will change to **ON**. Leave **Group** set to **Gr.** so that initial setting will carry across to all flight conditions, they can be separated and changed later. Select the % key on the right side of the screen, it will change to **rpm**. Turn on the RX and select the rpm setting screen on the GV-1 amplifier select **2000rpm** in the **Set GOV** box in the TX governor menue screen and set the GV-1 speed for 2000 rpm. Do the same for **1500rpm** and **1000rpm** in the **Set GOV** box in the TX governor menu screen. This calibrates the GV-1 rpm setting with the TX governor settings.

Now select the **1500rpm** key under **Rate** for **Rate 1**, and use the up and down arrows that appear on the right side of the screen to set the desired governor rpm. The rpm screen on the GV-1 amplifer should match this setting. If different governor speed settings are desired for idle up(s), select the **Gr.** key under **Group**, this key will now display **Sngl**. Again select the **1500rpm** key under **Rate** for **Rate1**, and use the up and down arrows that appear on the right side of the screen to set the desired governor rpm. This will carry across all the remaining flight conditions. If the same rpm is desired for all remaining Idle up flight conditions, leave each in the **Gr.** mode. If not, then repeat the preceding step to set the desired speed for each. To disable the govenor for autorotations, switch on the throttle hold flight condition and set **Group** to **Sngl** and set **Rate** to **OFF** using the arrows.

The above technique yields automatic governor controll and independent speed settings for each flight condition. Each flight conditions can have up to 3, switch selectable, governor speed settings (including off). Each speed setting in each flight condition can have independent fine tuning (trim) controll, over a specified rpm rage if so desired.

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To control the governor on/off condition, select **Function** in the **Linkage menu**, select the **NULL** key for **Governor 2** function and select the desired switch and direction. Leave the switch selection in the **Gr.** mode so that the governor on/off switch is enabled in all flight conditioins if this is desired. On the GV-1 amplifier, select SWCD menu and see if the on/off position for the TX switch is as desired. If not, use **Servo reverse** in der **Linkage menu** in conjunction with the SWCD on the GV-1 amplifier to abtain the desired switch polarity.

Flight Trimming With Mixers

This section will explain how some of us Contest Types use program mixers to trim the helicopter once we have the model mechanically trimmed. Although you are free to use the digital trims on the front of the radio, some of us never use right anf left ot fore and aft cyclic trim. I have actually deactivated mine to eliminate the possibility of bumping them. We mechanically trim the model for a neutral fore and aft swash plate and about one turn of right cyclic for a clockwise rotating rotor. After we have adjusted the nose weight for hands off hovering in calm comditions and adjust the size of the horizontal fin so that the model stays I trim in forward flight we then start working on mixers to tweak the trims in certain attitudes upstairs. We also use mixiers to advance or retard the swash plate timing in an effort to make the modell roll correctly in vertikcal lines and horizontal lines.

In the **Model Menu** click an **Prog. Mixes** This will bring up ten mixers that you can use to trim the modell so that the modell stays in trim in many different flight attitudes. Don't worry we will only be using a couple of them. The first mix we use is **Collective Stick J3** as the master and **AIL** as the slave. We are using the collective stick for the master as opposed to throttle or pitch channel because this will eliminate the mix being changed if we adjust the throttle or pitch curves. For example: We us the **Collective Stick to AIL** mixer to adjust the right and left cyclic trim for forward flight and inverted hover. We do not use the digital trims to change trims for upstairs flight. Beside mix number 1 click on **Inhibit**. Now on the left side of the page under master click an **Aileron**. At the bottom right corner of the page click on **H/W** for hardware. Now click on **J3** with is the collective stick. This is the master. Click **Close** and then click **Elevator** underneath **Slave**. Click on **Aileron** which will be the Slave. At the top left corner of the screen click on **INH** to activate the mixer. Now click on **Prog. Mixes** at the top left corner of the screen which will take you back to the main Program mix page. Click on **Gr.** for group out beside mix number 1. Change this to **Sngl** in every conditions except normal for hovering. Now click on mix 1 **J3 Alieron** then click on **NULL** in the top left corner of the screen and select your switches. We use our idle up switches and throttle hold to activate this mix. Remember to do this for each contdition. Click **Close** then click on **Linear** at the top right corner of the graph and choose **Spline**. This will give you a nine points that you can adjust for various flight attitudes in an effort to keep right and left cyclic in a trimmed state at all times. Click on the **Gr.** for group out beside mix number 1. Our models typically hover at half stick whether we are in normal mode or idle up so we don't adjust the half stick point in the mix because we have to do one aerobatic maneuver that has hovering in it. Now with the model flying along at all the stick position above half stick adjust each point so that the model stays in trim. Then roll the model to inverted flight and do the same. Whether you are hovering or flying around the modell should always be very close to trim on right and left cyclic. Adjusting the points requires the same procedure as in pitch or throttle curves. Remember you can also add or remove points if desired.

The second mix we use is **Aileron** master to **Elevator** slave, but we will be using **J1** which is the right and left cyclic stick for the master for the same reasons we used **J3** for the master in our first mix. Follow all of the steps above in the first mix to set up the **J1** to **Elevator** mix. You can use mix number two for the location of this mix. This mix is a little tougher to fine tune than the first mix as it will require quite a bit of time at the flying field to get it adjusted properly for each idle up. The mix should be adjust so that the model will roll in a perfect line in idle up 1 for vertikal up and down rolls. Then it should be adjusted in idle up two so that the model rolls in a perfekt line while doing horizontal rolls. Note: we do not use this mix in throttle hold. Note: Left rolls generally require a little down elevator mix and right rolls generally require a little up elevator mix, but I have found that when starting a left roll I have to give it up elevator right off of center as I start the roll to keep the nose up. This is why we use a spline curve so that you can vary the mix in any direction to give the model what it needs to execute a perfect roll. Feel to contact Cliff or myself if need further instructions an how to use these mixers.

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Throttle Hold

In the **Model Menu** click an **Thottle Hold**. Now you have to decide whether you want to use **Thottle Cut** which means when you are approaching the start of an auto you will pull the throttle hold switch, but nothing will happen until you lower the collective stick below a preset position. Once past that position the engine will go to idle where it will remain until you switch out of throttle hold. Very few contest pilots use this option because of the inherent risks. Example: If you pull thottle hold on and for some reason abort the auto before hold is activated you may forget to turn off throttle hold and go do some maneuver. You could find yourself upside down and lowering the collective when all of the sudden the engine goes to idle. This is not desirable thing to have happen. So most of us use **Throttle Hold** which can be found on the right side of the screen. Pull an the switch you have assigned for throttle hold. In the throttle hold box on the right side of the screen click an **Gr.** and turn it to **Sngl** in throttle hold condition only. Now activate throttle hold by clicking on **INH**. Now at the bottom of this box click on **NULL** beside **Switch**. Choose the same switch that choose for throttle hold in the **Condition Select Menu** and set it's ON position. In the same box you will see **Mode**. This should be set to **Manual**. We generally leave throttle holds idle position tied to the throttle trim so that the engine idles at the same speed in throttle hold that it does in normal mode.

Saving Models To The Flash Card

My first thoght and recommendation here is that is a computer and strange things happen sometimes. Always back up your models to the flash card so as to protect your programm. If you make changes at the flying field remember to save the model when you get home.

As far as I can tell, the 14MZ will not overwrite any program as the 9Z would. If you save a model to the flash card, it will createt a different model, If you copy the same model to the card more than once it creates a different model with a suffix. For example: If I save my Tempset to the card I get tempest. I copy it again, on the card I see Tempest-1 I If repeat I get Tempest-2. I can delete the old programs and rename the newest copy to Tempest and I have the latest version only in the card. It works the same way in the transmitter, If I copy from the card, I get a different model and I must delete the originag and rename the copy. **BE CAREFUL** when you do this so as to NOT delete your primary program. A good idea would be to put the days date after your model name so you will know when you updatet last.