

DIGITAL SERVO PROGRAMMER

Welcome to the world of high performance servo technology. Using your new servo tester and Hitec digital servo programmer, you can test any brand of transmitter for the pulse sent to the receiver and any servo for voltage and proper movement. Additionally it will allow you to program the functions of Hitec digital servos.

This manual is split into two sections, the first being the Hitec digital servo programming section, followed by the information on how to test any brand of servos.

Charging the HFP-20

The HFP-20 uses an internal 4.8V Rechargeable battery to power the test and programming functions. The re-charging port is located at the end of the unit and is designed for use with a standard overnight wall charger. Before using the programmer, charge it for 24 hours using a charger from any modern radio system. If you do not own a overnight AC wall charger, remove the battery from the charger and charge it directly using any peak charger capable of charging a 4 cell 4.8V. at about 1 to 1.5amps

Low Battery Warning : If the programmers voltage is below 4 volts, the programmers LCD screen will flash "LOW BATT" . Programming should be halted until it is recharged.

General Hitec Servo Information

Pulse Data

All Hitec servos require 3-5V peak-to-peak square wave pulse. Hitec digital servos require 0.8-5V peak-to-peak square wave pulse. Pulse duration is from 900 μ s to 2100 μ s with 1500 μ s as center. The pulse refreshes at 50Hz (20ms).

Voltage Range

Most of Hitec Servos can be operated within a 4.8V-6V. range. The HS-50 and some feather sized servos operate exclusively with 4 Nicad cells (4.8 volt).

Wire Color Meanings

On all Hitec servos the Black wire is 'ground', the Red wire (center) is 'power' and the third wire is 'signal'.

Direction of Rotation

All Hitec servos turn in a Clockwise direction (CW).

The following is the function flow chart of the Tester/Programmers features;

This instruction manual is formatted to follow the tester/programmer software flow. To access the features listed below, the user would turn on the device and scroll through the screens using the UP/L or DN/R button.

HFP-20 OPERATION MANUAL

Text in the LCD display	Function
1. Program Reset	Reset to factory default
2. Resolution Select	High or Low Resolution
3. Overload Protection Rate	Protect Motor from Overrunning
4. Program DB Width	Sets the dead band width
5. Program cw/ccw	Sets the direction of rotation, clockwise / counter clockwise
6. Program Speed	Slows or speeds up the rotation speed
7. Program FSOnOff	Turns the Fail Safe on or off
8. Program EPAneuFS	Sets the End points, Neutral point and Failsafe point
9. Measure Pulse	Measures the receivers pulse to the servo
10. Measure Voltage	Measures the receivers voltage to the servo
11. S-Test Auto	Automatic Servo movement test program
12. S-Test Manual	Manual Servo movement procedure

Section One: Hitec Digital Servo Programming

Hitec Digital Servo General Information. Hitec digital servos can be used "out of the box" without any programming and they will act like any traditional servo product.

However Hitec expanded the capability of our digital servos to include the ability to program your own unique performance specification parameters. Many of you will have modern computer radios that will allow you to program most of these functions, some like dead band width are only programmable by using the tester/programmer device.

Programmable functions of the Hitec digital servos

- Factory Default Reset
- Dead Band Width Adjustment
- Direction of Rotation
- Speed of Rotation
- Fail Safe on - off
- End Point
- Neutral Point
- Fail Safe Point Preset

***NOTE : 1. Resolution is used for HS-7XXX Digital Servo Series Only
2. Overload Protection Rate is used for HS-7XXX Digital Servo Series and HS-5055, 5056, 5065, 5082 and 5085MG Digital Servo Only.**

1. Program Reset:

The reset function will set your servo back to the factory default settings. This should be done before programming your servo for the first time.

**! WARNING !
REMOVE ALL CONTROL LINKAGES FROM THE SERVO
BEFORE PROCEEDING WITH THE RESET FUNCTION.**

→Program Reset
DISPLAY

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- To reset the servo press the input button, at this point the programmer will search for the settings; up+down will appear on the screen after it finishes searching.
- To reset the servo to factory default you will need to push the "UP/L" and "DN/R" buttons at the same time.
- After completion the screen will read " Reset Success." Now the servo is set to factory default settings and can be used without further programming, or is now ready for further programming with the HFP-20.

! Additional Warning On Early Production Hitec Digital Servos !
A very few early model Hitec digital servos will "lock" to one side and appear to die when the reset function is used. If this happens to you, simply unplug the servo from the programmer and manually twist the servo horn to the approximat "center point of travel". The servo will have been reset and is ready for programming.

2. Resolution (For HS-7XXX Digital servo series only)

Select High or Low Resolution

→Program RSNTN
DISPLAY

Traditionally the servos used for RC radio systems and have approximately 120 degrees of travel angle. The Hitec HS-7XXX servos are adjusted 120 degrees as default setting for maximum performance. However for some applications, a wider travel angle is desirable. If you want to use up to 180 degrees of travel for RC Applications, adjust the maximum travel angle within 180 degrees using EPAneuFS function.

Please note : Increasing the travel angle will decrease the servos resolution. There is a finite number of "steps of resolution" and widening the angle of travel will increase the distance of each step.

So you can choose one between high and low resolution for your application. That is, maximum travel angle is 120 degrees in High Resolution mode, and 180 degrees in Low Resolution mode.

- Press the input button.
- To select low resolution, push the UP/L button. To choose high resolution, push the DN/R button.
- Press input to exit.
- This function is used for HS-7XXX servo series only.

3. Overload Protection Rate (For HS-7XXX Digital servo series and HS-5055, 5056, 5065, 5082 and 5085MG Digital servo only)

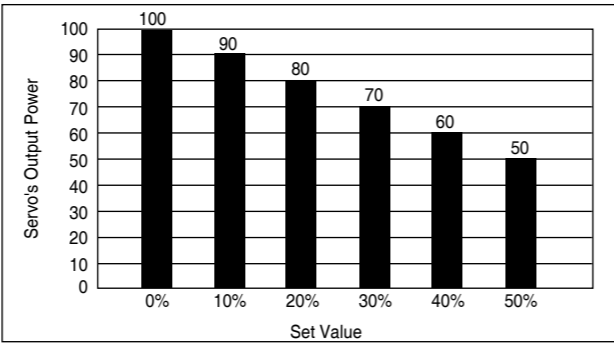
This function allows you to set the amount of torque reduction to protect the motor from stress that would cause it to burn-up.

→Program OLP Rate
DISPLAY

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What is Overload Protection Rate?

If the servo is overloaded, and can't reach the destination position as it would be directed to do, the overload protection system is activated. In this case, the servo amp. will reduce its output power by the value you set from the maximum power. Increasing the overload protection rate, is the same as limiting the output power, or torque..



That is, if you select a value of 10% by adjusting the knob, the servo amp. will reduce the power by 10% and output only 90% of the maximum torque in overloaded situation. You can set the value between 10% and 50%. If you select "Off" in this mode, overload protection will not be activated, and the servo will always produce maximum torque. When the overload is released, the protection mode is terminated and the servo will work normally.

- Press the input button to execute, and the programmer will search for the settings; X:Y will appear with X being the current setting and Y is adjustable from Off to 50%.
- Use the adjustable knob to select Y, the reduction rate.
- Press M button to change the setting.
- Press input to exit.
- This function is used for HS-7XXX servo series and HS-5055, 5056, 5065, 5082, and 5085MG only. Factory default is Off

4. Dead Band:

This will allow the width of the neutral point to be changed from 3 μ s - 48 μ s.

→Program DB Width
DISPLAY

What is dead band width and why do I want to program it? The dead band width is configured in microseconds or " μ s". It is the "space" the neutral point takes up. The larger the number, the wider the dead band will be. Large planes and surface vehicles often will "gang" several servos together on one control surface. It is important that these servos have matched dead band widths to avoid having them "fight" each other at the center point.

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- To adjust this feature push the input button and the programmer will search for the settings; X:Y will appear with X being the current setting and Y is adjustable from 1-16. The value of "1" is about 3 μ s and is the smallest dead band width setting available.
- With the knob, select the Y setting you want and "M" button to change the setting.
- "One" is the tightest dead band width setting and provides the best centering.
- Press Input to exit

5. Rotation:

Select the servos rotation from either clockwise or counterclockwise.

→Program cw/ccw
DISPLAY

- To adjust this feature push the input button and the programmer will search for the settings; ccw or cw will appear.
- Press DN/R to set the servo to cw (clockwise).
- Press UP/L to set the servo to ccw (counter clockwise).
- Press input to exit

6. Speed:

The programmer allows you to slow the rotation speed of the digital servo.

→Program Speed
DISPLAY

- Push the input button and the programmer will search for the settings
- X:Y will appear with X being the default speed value. The factory default value is always the servos fastest possible speed.
- The "Y" value is adjustable with the knob and is used to adjust the speed value. 1 being the slowest and the servos default value "X" being the fastest.
- Adjust the value you wish to try and press the "M" button to save your selected value.
- Press the Input button to exit the Program Speed mode.

!Additional Warning on Early Production Digital Servos!

Digital servos built prior to October 2001 will always show a default value of "40". The actual speed can be between 28 and 40 based on the following chart:

Model Number	Actual max speed	No speed change zone
HS-5625MG	22	22-64
HS-5645MG	12	12-64
HS-5925MG	16	16-64
HS-5945MG	10	10-64
HS-5735MG	10	10-64

While the "X" value may show "40" the true speed value could be less based on the above chart so drop the "Y" value below the "actual max. speed " as shown on the above chart to slow the servo down.

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- To then set the failsafe point, turn the adjusting knob to the desired position and push the UP/L and DN/R buttons simultaneously. To turn the failsafe function on or off within the servos programming, see step 5.
- Push input to exit.

! A Note on the EPA or End Point Adjustment Procedure !

So as to avoid overdriving your servo past its physical limits of travel, You can not set a servo center point more than 15 degrees from its factory preset center point. If the center point is set more than 15 degrees from the factory default center point position, the EPA function will not work.

Section Two Transmitter and Servo Test Section

The following are test functions and can apply to any model of servo or transmitter.

9. Transmitter Signal Pulse:

See the pulse the receiver is supplying to the servo.

→Measure Pulse
DISPLAY

- For this procedure the programmer must be plugged into the receiver channel that you want to test. NOTE: there must be a 4.8 or 6V battery plugged into the receiver to power it.
- Push the input button to view the pulse from the transmitter.
- Move the stick associated with the channel the programmer is plugged into to see the pulse range.
- Press input to exit.

10. Voltage:

View the voltage that is being supplied to the servo from the receiver.

→Measure Voltage
DISPLAY

- For this procedure the programmer must be plugged into any receiver channel.
- Turn the transmitter on and then turn on the receiver switch.
- NOTE : there must be a 4.8 or 6V battery plugged into the receiver to power it.
- Press the input button and the voltage will appear. The lowest voltage level will be shown on the display. When you press the M button, you will see the actual voltage level. The voltage level will drop down when you have servos connected to the receiver are moving. You also can connect one servo to the field programmer and drive it with the knob.
- Press the input button to exit.

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7. Failsafe :

Turns the failsafe function on or off.

→Program FS OnOff
DISPLAY

What is Failsafe and how is it used?

Traditionally a PCM radio system would allow the user to program a "failsafe" point that selected servos would revert to if the plane or surface vehicle suffered a loss of signal from the transmitter. With your programmer and a Hitec digital servo you can program a failsafe point into the servo and have the benefits of failsafe without the expense and drawbacks associated with PCM technology. Suggested uses would include dropping the throttle servo to idle, slight deflections from the neutral point for aircraft ailerons and or elevators

The following will arm or disarm the failsafe parameters you can program in step 6.

- To turn this feature on or off, push the input button. Once it has searched it will show you if the failsafe feature is turned "on" or "off,"
- To turn the failsafe feature "on," push the DN/R button. To turn it "off," push the UP/L button.
- Press input to exit.
- Go to the EPAneuFS screen to set the failsafe point. (See step 6)

8. EPAneuFS (EPA, Neutral and Failsafe):

This feature allows you to set your End Point, Center point and Failsafe position.

→Program EPAneuFS
DISPLAY

To set the End points, Neutral point and Failsafe point,

- Push the input button. The programmer will wait until you have set the adjusting knob to its center. The display shows you → or ← when the knob is out of the center. After centering the knob the display shows you. →←The programmer will search for the current settings and the servo movement will be controlled with the adjusting knob.
- To set the center point, use the adjusting knob to set the servo to the desired position and push the M button, center should appear in the screen. Important: If you change the center point, the end point must be re-set.
- To set the left end point turn the adjusting knob to the left and when the position desired is reached press the UP/L button. For purposes of calibration in respect to Hitec transmitters the values are -225 one direction from center and +225 the other direction. With the value of + or -100 being 40 degrees of servo travel from center and corresponding to the value of a 100% travel on a Hitec radio.
- To set the right end point, turn the adjusting knob to the left and when the position desired is reached, press the DN/R button.

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11. S-Test Auto:

Test the servo movement automatically.

→S-Test Auto
DISPLAY

- Press the input button to execute.
- Turn the adjustable knob to actuate the servo manually.
- To test the end points press the UP/L button to actuate the servo automatically. The normal parameters for this are 2100 μ s to 900 μ s.
- Use the adjustable knob to set the sweep speed.
- Press the input button to stop.
- To test the operation of the servo potentiometer, press the M button. The programmer will sweep the output pulse from 2100 μ s to 900 μ s and back. The servo will drive slowly from one end point to the other. Observe the servo horn, if it moves smooth, things are fine. If the movement is jerky or stutters, the servo potentiometer could be dirty or defective.
- Use the adjustable knob to set the sweep speed.
- Press the input button to stop.
- To test the resolution of the servo and see the difference in dead band values between other servos, press the DN/R button.
- Turn the adjustable knob to set the jitter value from 0 μ s -31 μ s.
- Press input twice to exit.

12. S-Test Manual:

Test the servos movement manually.

→S-Test Manual
DISPLAY

- Press the input button to execute.
- Turn the adjustable knob to actuate the servo manually.
- To test the left endpoint, press the UP/L button. The value should be 900 μ s.
- Press the input key to exit.
- To test the center point, press the M button. The value should be 1500 μ s.
- Press the input key to exit.
- To test the right endpoint, press the DN/R button. The value should be 2100 μ s.
- Press the input key to exit.
- To test the failsafe position push the UP/L and DN/R buttons simultaneously. The value should be 0 μ s (no pulse to the servo). After a second, the servo should drive into the failsafe position, you enabled in step 5.
- Press the input key to exit.
- To exit back to the main menu, press the input key again.

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