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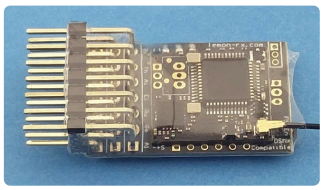
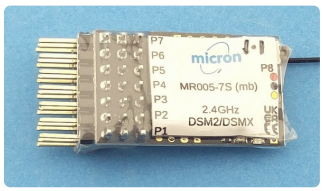
Micron MR005 2.4GHz DSM2/DSMX Receiver

This document is regularly updated and the most recent version may be found online at http://micronrc.uk/mr005 where you will be able to view larger versions of the images.



MR005 Top



MR005 Bottom

MR005 is a 7 channel DSM2/DSMX compatible receiver designed for model railway layout control. It has 7 JR/Futaba style pin sets to which servos or LEDs may be connected. MR005-7S has 7 servo outputs, MR005-7X has 7 on/off outputs (0V / 3.3V) to which LEDs may be directly connected as there is a 220 ohm series resistor on the receiver board. MR005 with a combination of servo and on/off outputs, or different R/C channel to receiver output mappings, is available to special order. MR005 is small (30x18x11mm) and it weighs 4.5g.

Each MR005 output is controlled by one R/C channel (e.g one switch on Tx27v2). Receiver state (servo position or on/off setting) is saved once a minute and restored when the receiver is switched on. This allows MR005 to be switched on without the transmitter being switched on.

MR005 requires binding with your transmitter before use. All versions of MR005 are manual bind so will not go into bind mode if the transmitter is not switched on. Once bound, the transmitter should normally be switched on before the MR005.

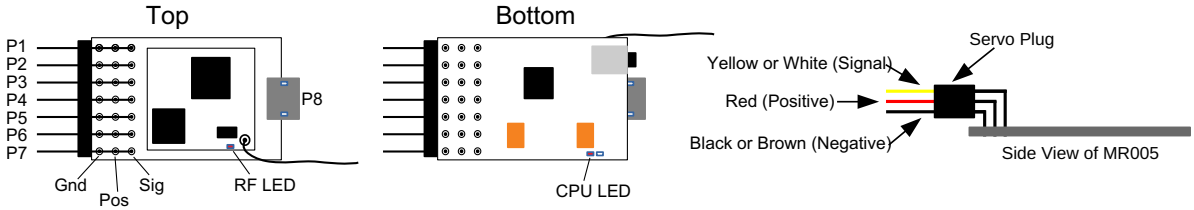
The MR005 free-air range, when used with a Micron low-power transmitter, is 50m-60m and approximately 200m when used with a full-power (100mW) transmitter. This range will be reduced indoors due to absorption by furniture / fittings and reflections from metal surfaces. Range is also reduced if the receiver aerial is in a metal enclosure. Ideally, the aerial should be placed outside an enclosing box and clear of any metal. The active part of the aerial is the last 30mm and this needs to 'see' the transmitter. The MR005 aerial should not be cut short or made longer as this will affect operation of the receiver. It is important to perform a range check after installation to ensure you have full control at all positions around the layout.

Features

- Compatible with all DSM2 and DSMX transmitters with up to 10 R/C channels (only 7 used in the standard MR005 versions, both Micron model rail and aero model stick type transmitters.
- 3.45V to 8.4V working voltage range - 5 NiMH cells is ideal.
- All outputs have a 220 ohm series resistor which allows direct connection of a low-current LED.
- Servo outputs are reversible and end-points may be adjusted.
- Outputs maintain current setting on signal loss and are saved every minute so that they can be restored next time the receiver is switched on.
- The CPU LED is repeated to P8 (rear JST-ZH socket or solder pads, depending on the MR005 version).

Connections and Indicators

MR005 has 7 sets of output pins which can be used for servos (MR005-7S) or LEDs for colour light signals or trackside lighting (MR005-7X). The pin sets, numbered from the top of the diagram below, are 0.1" pitch to take standard R/C plugs.

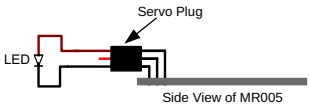


MR005 can be powered from a battery of 3.45V up to 8V; use of a 4 or 5 cell NiMH rechargeable battery or a 5V regulated power supply for permanent trackside installation. for permanent trackside installation.

The 2 standard configuration have servo or on/off switched outputs on P1 to P7:

MR005-7S: servo on P1..P7 = R/C chan 1..7

MR005-7X: on/off (0V/3.3V) on P1..7 = R/C chan 1..7
A LED is connected to the signal (top row) and negative (bottom row) pins. There is a series 220 ohm resistor on the receiver board so the LED may be connected directly to the receiver.



All have LED2 on P8, but not all receivers have a socket. Connect to the solder pads or request a socket to be fitted. LED2 repeats the CPU LED for binding and servo adjustment feedback.

Other output configurations can be supplied to special order at no additional cost.

MR005 has 2 LED indicators, one on the top near the aerials and another on the bottom, these are labeled 'RF LED' and 'CPU LED' on the diagram below. There are actually 2 LEDs on the bottom, but only one of them is used.

RF LED:
indicates when a good signal is received, flashes rapidly when the rx is in bind mode and flashes slowly if the receiver power was interrupted

CPU LED:
indicates the receiver status:

- flashes slowly after switch on and waiting for a good transmitter signal
- lights continously when a good R/C signal is being decoded
- used for feedback when setting servo travel end points or reversing servo direction

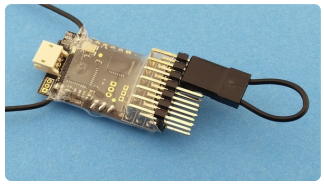
Binding

MR005 must be bound to a transmitter before use. Once bound, MR005 remembers the transmitter identity and searches for this when it is switched on. When binding, we recommend that servo connecting rods are disconnected in case they are incorrectly set.

To bind a receiver, the large jumper plug supplied with the receiver is connected across the signal pins (top row) for P5 and P7 and then the receiver is switched on with the transmitter switched off. If fitted, P5, P6 and P7 plugs must be removed when binding.

MR005 does not support auto-bind.

Bind mode is indicated by a rapid flashing of the receiver RF LED and the following steps should be followed to bind with your transmitter:


Manual Bind

1. transmitter switched off
2. switch the receiver on in bind mode
3. only when the RF LED is flashing rapidly, hold down the transmitter bind button and switch on
4. wait for the transmitter to indicate that it is in bind mode and then release its bind button (the power LED on Micron model rail transmitters will flash when binding)
5. after a short delay, the RF LED should stop flashing and go dark and, after another 4-5 seconds, both RF and CPU LEDs will light and stay on
6. the receiver is now bound to the transmitter

If the receiver RF and CPU LEDs do not come on solid (no flash) within 10-15 seconds, the bind process has failed. This can happen for several reasons and does not normally indicate a fault. During binding, the receiver searches for the transmitter's signal and this can be distorted by holding the transmitter and receiver to close. So, if you get a bind fail, try again after moving them slightly further apart or changing the relative orientation of the aerials. Binding is most reliable when no other 2.4GHz transmitters are turned on.

Reset

The receiver settings can be reset back to the as-supplied configuration using the large jumper across signal pins P1 and P3. This removes any servo adjustment changes that have been made. To reset:

1. turn off the receiver
2. put the large jumper plug across signal pins (top row) P1 and P3
3. the CPU LED will flash once per second
4. remove the jumper plug
5. the receiver will reset and the CPU LED will flash rapidly until the receiver is switched off

Jumper Changes

This is a summary of the configuration changes that can be made using a large jumper across the signal pins:

Reset to factory setup	P1 & P3
Manual bind	P5 & P7

Other jumper settings are used to change servo direction and alter the servo travel end points (see below).

Servo Adjustment

Note: this section applies only to MR005-7S

Servo direction and throws (low and high end points) can be changed using the supplied small and large (bind) jumper plugs. The method is simple and comprises 2 steps:

1. select the servo output to be adjusted using the small jumper
2. reverse the servo using the small jumper, or increase or decrease the servo throw using the large jumper

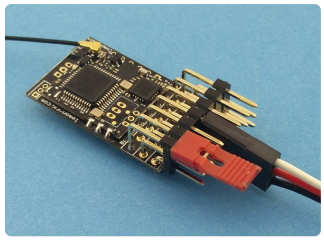
Servo reversing or end point adjustment can be performed as many times as required on the selected servo. When complete, remove power from the receiver to stop, all changes are stored to the CPU memory. The next time power is applied, the receiver will operate normally.

Only one servo output can be changed at a time, the method must be repeated for each servo that requires adjustment.`

WARNING: never place the small jumper across the positive (middle row) and negative (bottom row) pins. This will short the battery.

Step 1 - select servo output to adjust

The small jumper plug is used to select one of the outputs for adjustment; it is placed across the wanted signal pin (top row) and the adjacent next higher signal pin. To select P7, the small jumper is placed across signal pins P1 and P2 plus the large jumper is placed across signal pins P5 and P7. The battery plug is then connected to a spare pin set leaving P6 and P7 free (if adjusting P1 to P5) or P1 and P2 free (if adjusting P6 or P7). The table at the end of this section shows which pins are to be used for adjusting the servo on a particular output pin.



Select P1 to adjust

When the battery is connected, the CPU LED will show a flash count equal to the servo pin selected. If you are attempting to select and output that is not configured as a servo, the CPU LED will show a continuous rapid flash.

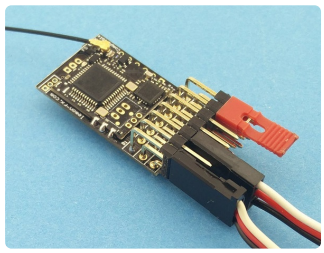
Steps:

1. receiver must be bound to transmitter
2. receiver power off
3. transmitter on
4. place the small jumper (and large jumper if adjusting P7) as shown in the table at the end of this section
5. plug the battery into a free pin set (as shown in the table)
6. the CPU LED will flash a sequence to indicate the selected pin set - e.g. flash pause flash pause ... for P1, flash flash pause flash flash pause ... for P2, and so on
    - if the selected output is not a servo, the LED will flash rapidly
7. remove the small jumper plug (and large jumper plug if adjusting P7) **do not remove the battery**
8. connect a servo, this will respond to the transmitter control
    - no other output pin is active

The servo output is now selected. Jumper plugs are used on P6 and P7 (or P1 and P2 if adjusting P6 or P7) to reverse the servo or adjust the travel end points. Reversing or end point adjustment can be repeated as often as desired while the servo is selected. To stop the process, remove power from the receiver.

Step 2 - adjust selected servo output
The selected servo may now have its direction reversed or have the travel end points adjusted:

Reverse servo direction
The small jumper plug is placed across signal pins (top row) for P6 and P7 to reverse the servo direction or P1 and P2 to reverse a P6 or P7 servo . The image shows a servo plugged into P1, a battery plugged into P3 and the small jumper across P6/P7.

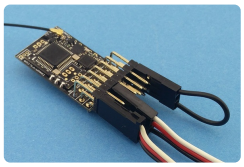

Reverse direction of P1 servo

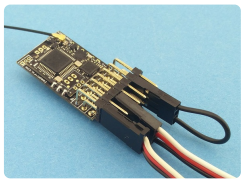
Steps:

1. select servo output to adjust (see above) and plug servo in
2. place the small jumper across signal pins P6 and P7
3. the CPU LED will flash rapidly
4. remove the jumper
    - the CPU LED will stop flashing
    - the servo will respond to transmitter controls in the opposite direction to previous

The servo direction will reverse each time the procedure is executed.

Adjust servo travel
The servo travel end points can be increased or decreased using the large jumper plug on P6 (decrease) or P7 (increase). The adjustment is done in small steps every ½ second and the CPU LED flashes for each step. To make an adjustment:


Increase throw


Decrease throw

1. move the servo to the low or high end using the transmitter control
2. use the large jumper to make changes:
    - on P6 to decrease the throw
    - on P7 to increase the throw
3. either remove the jumper or move the servo away from the end to stop the adjustment

The CPU LED will stop flashing and the servo will stop moving when the adjustment limit is reached.

- The limit for decrement is the mid point of travel so, if an end point is decreased to the maximum amount, there will be no servo travel in that direction when the transmitter control is moved.
- The limit for increment is the minimum or maximum signal value. **Take care:** not all servos will respond to the maximum range of servo signal values; stop decrementing when the servo stops moving even though the CPU LED is still flashing.

Jumper connections for selecting a servo, reversing and adjusting travel

Servo Pin	Jumper to Select	Battery Pin	Reverse	Inc Throw	Dec Throw
P1	Small on P1/P2	P3	P6/P7	P6	P7
P2	Small on P2/P3	P4	P6/P7	P6	P7
P3	Small on P3/P4	P1	P6/P7	P6	P7
P4	Small on P4/P5	P1	P6/P7	P6	P7
P5	Small on P5/P6	P1	P6/P7	P6	P7
P6	Small on P6/P7	P4	P1/P2	P1	P2
P7	Small on P1/P2 Large on P5/P7	P4	P1/P2	P1	P2