

MBD-12F

Automatic Antenna Switch Controller



MBD-12F is an intelligent controller compatible with all twelve-antenna switches manufactured by Hamplus. It has a band decoder to receive the information coming from the connected radio equipment. In addition to antenna switching, the **MBD-12F** also offers nine frequency-driven **GPOs** (**General Purpose Output**), one **Band Data BCD Output**, one output to command **Band Pass Filter**, **12 GPOs** to automate the operation with TopBeam's Waller Flag receiving antenna, **GPI / O** for reading and triggering external equipment . The **MBD-12F** also commands the **RS-28** and **RS-48** Rotator switches. There are four ways that antennas and enabled rotators can be selected; **1)** manually by the front panel of the **MBD-12F**, **2)** manually by frequency or band change on the front panel of the transceiver, **3)** automatically by frequency or band change by the remotely controlled transceiver, or **4)** automatically by a remotely controlled personal computer via **Lan** port to the **MBD-12F**.

On the front panel is a set of twelve illuminated push buttons for manual selection of antennas, twelve "Busy" LEDs to indicate which antennas are in use by other **MBD-12F** Controllers, eight LEDs to indicate rotator selection, one LED to indicate when the radio is transmitting, one LED to indicate the controller is in "Split Antenna" mode and one LED to indicate when the **MBD-8F** is connected to +13.8 Vdc power.

GPI/O = General Purpose Input and Output

Functions and operation

1- Connect the MBD-12F to a antenna switch type AS-1202 / AS-1204 / AS-1206 ...

2- Startup

When you turn on the **MBD-12F**, it should turn on the last antenna that was used, if it is connected to a Radio ask the radio what frequency or band it is on and then turn on the last antenna used in that band and its aggregates, such as rotor and the **GPI / O**.

3- Choose the antennas

To select an antenna press one of the twelve push buttons. When the push button is pressed, it lowers the output pin that activates the corresponding relay on the antenna switch (AS-1202). It also activates the selected rotator for the antenna. This information is also present in the corresponding I2C output.

The antenna switches and the corresponding rotator are informed on the Busy Net port so that the other **MBD-12F** signals the red LED of the **BUZY** and **Rotator** line so as not to allow another **MBD-12F** to select an antenna or rotator already in use. When there is conflict the signaling is done flashing for 1.5 seconds the LED of the push button and the one of the rotator with short and continuous flashes with cadence of 0.5 seconds. The rotator signal remains on for as long as there is a conflict.

4- SPLIT Mode

This mode allows operation with two antennas. One for transmission and one for reception.

5- **EXCLUSIVE Antennas for RECEPTION**

The **MBD-12F** allows you to configure receive-only antennas. Whenever an antenna configured as **EXCLUSIVE** for **RECEIVE** is selected, the **MBD-12F** will automatically activate the **SPLIT** mode and when leaving this antenna the **MBD-12F** will disable the **SPLIT** mode.

6- **GPOs2 Activation**

The **GPOs2** are eight pins available on the **DB-9** connector labeled **GPO2** located on the back of the **MBD-12F**. These **GPOs2** are used to tune shortened antennas with **high Q coils**.

GPOs2 can be triggered in two ways. By frequency and or by band. Each **GPO2** is individually configured and is associated with one of the 12 antenna positions. This means that the eight **GPOs2** can be configured to a single antenna position or one can be configured for each of the twelve antenna positions.

To configure the **GPOs2** see item **14 B**

7- **Switching Rotors**

The **MBD-12F** also commands the **RS-24**, **RS-44**, **RS-28** and **RS-48** rotor switches. In this way a single rotor control can control up to 8 rotors.

8- **Communication with Icom, Yaesu, Kenwood, Elecraft K-3 and Flex Radio**

- a. **ICOM - CI-V protocol** (CI-V port) for reading the frequency for the activation of the selected Antennas, Rotors and GPIs.
- b. **YAESU- BCD protocol** for reading the band for the activation of the selected antennas and GPIs.
- c. **Kenwood- RS-232 protocol** for frequency reading for the activation of Antennas and GPIs. K3 and Kenwood use the same RS-232 protocol.
- d. **Elecraft K3- protocol BCD and RS-232**.
- e. **Flex Radio, K3 and Kenwood use the same RS-232 protocol**.

9- **Band Data Table**

Band	Frequency	BCD
160 m	0.0 to 2.9 MHz	0001
80 m	3.0 to 4.8 MHz	0010
60 m	4.9 to 5.9 MHz	0000
40 m	6.0 to 8.9 MHz	0011
30 m	9.0 to 12.9MHz	0100
20 m	13.0 to 16.9MHz	0101
17 m	17.0 to 18.9MHz	0110
15 m	19.0 to 22.9MHz	0111
12 m	23.0 to 25.9MHz	1000
10 m	26.0 to 34.9MHz	1001
6 m	35.0 to 54.9MHz	1010
-----	above 55 MHz	1011

Frequency Band for communication via RS-232 and CI-V

Band 1 from 0 to 399 KHz, **Band 2** from 400KHz to 549KHz, **Band 3** from 550 KHz to 1.599MHz, **Band 4** from 1.6 to 1.999 MHz, **Band 5** from 2.0 to 3.999MHz, **Band 6** from 4.0 to 5.999 MHz, **Band 7** from 6.0 to 7.999 MHz, **Band 8** from 8.0 to 10.999 MHz, **Band 9** from 11 to 14.999 MHz, **Band 10** from 15 to 19.999 MHz, **Band 11** from 20.0 to 21.999 MHz, **Band 12** from 22 to 24.999 MHz, **Band 13** from 25MHz to 27.999 MHz, **Band 14** from 28 to 29.9999 MHz, **Band 15** from 30.0 to 59.999 MHz, **Band 16** above 60.0MHz

10- **Antenna Memory per Band, Fixed or Mobile**

All **MBD-12F** are shipped in **Mobile Memory** mode. In the **Mobile Memory** operation whenever a band is selected in the radio the antenna to be connected will be the last used in that band.

In the operation by **Fixed Memory** whenever a band is selected the antenna to be connected will be the same and not the last that was used in that band. Ex: 160m band> ant1, 80m band> ant2, 40m band> ant. 3 and so on. To choose the antenna that each band goes you must first be in the **Mobile Memory mode**. Then

go through the radio and choose the desired antenna for each band. Then enter setup mode and follow the procedure to memorize your choice.

11- Firmware update via USB

To update the firmware, place the USB stick in the USB port and reset the CPU by pressing the internal key, or press and hold the push buttons 10, then the 11 and finally the 12. This procedure starts firmware update.

12- Configuration Mode

The setting mode is only possible when the Radio is properly connected to the **MBD-12F**. To enter setup mode press and hold the push button of the antenna that will receive the configuration plus the push button 1 until the confirmation signal appears. (+ or - ten seconds). In this mode the push buttons available for setup blink.

To exit setup mode press the push button 12 for 1 second.

A- Configure Rotors

Enter configuration mode by pressing the push button of the antenna you want to configure to the Rotor plus push button 1. After confirmation press the push button 1 to enter the Rotor configuration mode. After the confirmation signal the push buttons 1 to 8 will flash indicating the rotors 1 to 8. Press the push button corresponding to the desired rotor. The push button and red indicator light of the chosen rotor will be illuminated. The choice can be redone as many times as you want.

To undo your choice press the illuminated push button.

To exit setup mode press the push button 12 for 1 second.

B- Configuring the GPO2

Enter setup mode by pressing the push button on the antenna you want to enable **GPO2** plus push button 1.

After confirmation press push button 2 to enter **GPO2 configuration mode**.

Press the push button 1 for the frequency setting mode, the push button 2 for the Band configuration mode, or the push button 3 for frequency setting with command activation on the average frequency between the marked point and the previous point.

To trigger the GPOs2 by frequency:

The trigger points of the **GPOs2** are chosen by varying the frequency in the radius in order to obtain the desired frequency for the drive. Start with the lowest frequency and the **first GPO2** by pressing the push button 1. Raise the frequency to the next frequency and mark the **second GPO2** pressing the push button 2 and so on for the **next GPOs2**.

To trigger the GPOs2 on the average frequency between two points:

Choose the frequency of the starting point and press the push button corresponding to the chosen **GPO2**. This push button will blink. Advance the frequency on the radio dial to the desired point and press the blinking push button again. It will stop blinking and the midpoint will be marked.

To exit setup mode press the push button 12 for 1 second.

To trigger the GPOs2 by Band:

GPO2 can be triggered by Band, it can be done by reading the **BCD** or frequency according to item 11. Put the radio in the desired band and press the push button corresponding to the **GPO2** that you want to trigger. Any available **GPO2** can be used in any band.

To exit setup mode press the push button 12 for 1 second

Conector DB-9 GPO2

<u>Pins</u>	<u>Function</u>
-------------	-----------------

1	Cmd1
2	Cmd2
3	Cmd3
4	Cmd4
5	Cmd5
6	Cmd6
7	Cmd7
8	Cmd8
9	+12v

All Cmds are Active Low

C- Set the Communication Speed (9600 - 19200 - 38400 - 57600 - 115200)

To configure the communication speed, enter setup mode. Then press the push button 4 to enter speed setting mode. After confirmation press the **push button 1 to 9600, 2 for 19200, 3 for 38400, 4 for 57600, 5 for 115200.**

To exit setup mode press the push button 12 for 1 second.

D- Set up operation for Fixed or Mobile Memory Mode

Enter configuration mode. Then press push button 5 to enter Memory setup mode. After confirmation press push button 1 for Mobile Memory Mode or press push button 2 for Fixed Memory Mode.

To exit setup mode, press key 12 for 1 second.

In Mobile Memory mode each radio band is linked to the last antenna used in this band. In Fixed Memory mode, each radio band is linked to a previously chosen antenna.

To choose the antenna that each band will operate in the **Fixed Memory Mode**, you must first be in the **Mobile Memory Mode**. Then go through all the radio bands and choose the desired antenna for each one.

Then enter setup mode and follow the procedure to memorize your choice

E- Select and Store the Antennas for Operation in the Fixed Memory mode.

In the **Mobile Memory mode** select the desired antenna for each band, proceeding from the following way:

Set the radio to 160m and choose the 160m antenna on the MBD-12F. Then set the radio to 80m and choose the antenna for 80m on the MBD-12F. Do this for all bands. After choosing the antennas enter the setup mode by pressing the **push button 1**. After confirmation press the **push button 5** to enter the Memory configuration mode. After confirmation press the **push button 5** and the Fixed Memory mode will have all the antennas configured.

To exit setup mode press the push button 12 for 1 second.

F- Procedure to enter SPLIT mode:

a- First select the transmission antenna.

b- Then press the **PTT** of the radio and holding down, so press the push button of the desired antenna for reception.

When the **PTT** is released, **SPLIT** mode is active and will be indicated by the illuminated **Split Led**.

Perform the function test by pressing and releasing the **PTT** of the radio and observing the push button of the **MBD-12F** that must switch between the chosen antennas.

To change the receiving antenna simply press the push button of another antenna.

To exit SPLIT mode switch band on the radio or press the antenna button set to transmit

G- Band Data out

The **DB-9 BCD Out** connector on the rear of the **MBD-12F** provides a **Band Data output** corresponding to the radio frequency that is connected.

When the **MBD-12F** receives the radio band information from the **Radio Band Data**, this same information will be passed to the **BCD Out** connector. When receiving the information through Frequency the conversion to **Band Data** will be done according to the table in item 11.

DB-9 BCD Out connector

<u>Pin</u>	<u>Function</u>
1	Data A
2	Data B
3	Data C
4	Data D
5	NC
6	NC
7	NC
8	GND
9	NC

J- DB-9 To Bandpasser connector

<u>Pins</u>	<u>Band</u>	<u>Frequency</u>	<u>Function</u>
1	20 m	13.0 a 16.9 MHz	-----
2	40 m	6.0 a 8.9 MHz	-----
3	80 m	3.0 a 4.8 MHz	-----
4	160 m	0.0 a 2.9 MHz	-----
5	-----	-----	GND
6	-----	-----	-----
7	-----	-----	Bypass
8	10 m	26.0 a 34.9 MHz	-----
9	15 m	19.0 a 22.9 MHz	-----

All control pins are **Active Hight + 12V**

K- TOPBEAM Waller Flag conector

The **HD-15** connector labeled **TOPBEAM Waller Flag** on the rear of the **MBD-12F** provides power (+ 12V) and controls for triggering the filters of the **Waller Flag** receiving antenna control box. The commands follow the **Band data** table or the **Radio frequency**.

Conector DB-9 TOPBEAM Waller Flag

<u>Pins</u>	<u>Band</u>	<u>Frequency</u>	<u>Data</u>	<u>Function</u>
1	160 m	0.0 a 2.9 MHz	0001	On Active Low
2	80 m CW	3.4 a 3.59MHz	0010	On Active Low
3	80 m SSB	3.6 a 4.8 MHz	0010	On Active Low
4	40 m	6.0 a 8.9 MHz	0011	On Active Low
5	30 m	9.0 a 12.9MHz	0100	On Active Low
6 e 7	-----	-----	-----	+12v
8	-----	-----	-----	PTT
9 e 10	-----	-----	-----	GND
11	-----	-----	-----	RTX On A. Low
12	-----	-----	-----	RX1 On A. Low
13	-----	-----	-----	RX2 On A. Low
14	-----	-----	-----	RX3 On A. Low
15	-----	-----	-----	RX4 On A. Low

L- DB-9 To Radio connector

This connector receives from the Radio the power supply (+ 12v), the transmission command (Send) and the data For frequency reading via RS-232 or Band reading via Band Data BCD

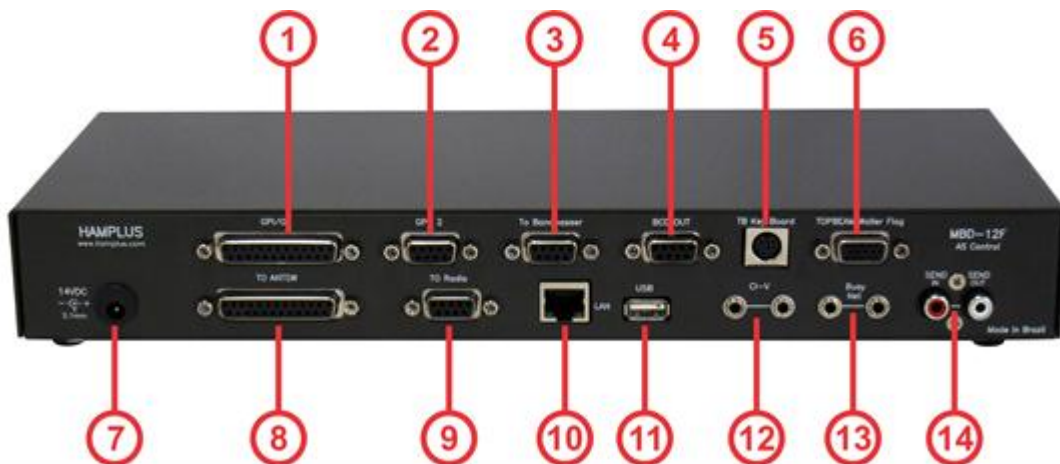
<u>Pins</u>	<u>Function</u>
1	+12V from Radio
2	RX (RS-232)
3	TX (RS-232)
4	PTT (Send) from Radio
5	GND

6	BCD A from Radio
7	BCD B from Radio
8	BCD C from Radio
9	BCD D from Radio

M- DB-25 To ANTSW connector

This connector connects the **MBD-12F** to the Antenna Switch and the Rotor Switch. It also offers I2C Commands for the Expansion Interfaces.

<u>Pins</u>	<u>Function</u>	<u>Pins</u>	<u>Function</u>
1	Ant 1	2	Ant 2
3	Ant 3	4	Ant 4
5	Ant 5	6	Ant 6
7	Ant 7	8	Ant 8
9	+12 out	10	GND
11	SDA	12	SCL
13	NC	14	Ant 9
15	Ant 10	16	Ant 11
17	Ant 12	18	Rotor 1
19	Rotor 2	20	Rotor 3
21	Rotor 4	22	Rotor 5
23	Rotor 6	24	Rotor 7
25	Rotor 8		



- 1- GPI/O (DB-25F connector with 16 GPI /O for control of external equipment)
- 2- GPO2 (DB-9F connector with eight Frequency drive GPOs)
- 3- To Bandpasser (DB-9F connector to control Band Pass Filter. Active + 12v 120mA)
- 4- BCD OUT (DB-9F connector for BCD output)
- 5- TB KeyBoard (8-pin Mini Din connector for TopBeam WF antenna control keypad)
- 6- TOPBEAM Waller Flag (HD-15F connector for activating TopBeam WF antennas)
- 7- AUX. POWER SUPPLY
- 8- To Switch (DB-25F connector for Switch Antenna and Rotor Switch)

- 9- To Radio (DB-9F connector for connection to the radio)
- 10- LAN (for remote operation)
- 11- USB (for software update)
- 12- CI-V (for communication with Icom radios)
- 13- Buzy Net (P2 connector for communication between MBD-12F controllers)
- 14- Send In/Out (RCA connector type for SEND connection. It has internal relay)

Settings List of MBD-12F

MBD-12F Settings

All settings can be made directly from the keyboard in just two steps. First step to enter the setup mode. The second step is to choose the function you want to set.

1- First step

How to enter setup mode

- a- Press the antenna **push button** that will receive the settings and the **push button 1** until the confirmation signal appear, about ten seconds. After confirming, the push buttons available for configuration will flash. The **push button 12** flashes different cadence from the others and when pressed for more than one second the system exits the setting mode.

2- Second step

In setup mode choose the function to configure and press the corresponding button

1- Push Button 1 to set Rotators

- a- Push Button 1 -> Rotator 1
- b- Push Button 2 -> Rotator 2
- c- Push Button 3 -> Rotator 3
- d- Push Button 4 -> Rotator 4
- e- Push Button 5 -> Rotator 5
- f- Push Button 6 -> Rotator 6
- g- Push Button 7 -> Rotator 7
- h- Push Button 8 -> Rotator 8

To exit press the push button 12 for 1 second

2- Push Button 2 to set GPO2

- a- Push Button 1 By frequency, with the activation point at the frequency indicated on the Radio
- b- Push Button 2 By Band
- c- Push Button 3 By frequency with the activation at the midpoint between the chosen point and the previous point

To exit press the push button 12 for 1 second

3- Push Button 4 to set the communication speed

- a- Push Button 1 -> 9600
- b- Push Button 2 -> 19200
- c- Push Button 3 -> 34800
- d- Push Button 4 -> 57600
- e- Push Button 5 -> 115200

To exit press the push button 12 for 1 second

4- **Push Button 5 to configure antenna Memoria fixed or mobile**

a- Push Button 1 -> Mobile antenna Memory

b- Push Button 2 -> Fixed antenna Memory

c- Push Button 5 -> To record the antennas chosen for the Fixed Memory mode

To exit press the push button 12 for 1 second