

Magic Antenna Box (MAB)



MAB is a sophisticated Antenna Switch fully programmable by user without PC. Its use is simple in intuitive and can be used , manually ,Web interface or automatically and included Band Decoder. The user can choose the format decoder band for use via Yaesu CAT, Yaesu Band Data 4 pin,Yaesu Band Data 1 pin, Icom Acc, Icom CI_V, Elecraft Band Data, Elecraft RS232,Kenwood RS232,etc for each transceiver.

Allows 3 ways to use, like **Antenna Switch** which allows up to 4 transceivers and 16 antennas. Like **SO2R** (Single Operator two radios) which allows 2 transceivers and 8 antennas. Like **Stack Match**. Both working in one way or another can be used manually, where the user controls everything or automatically, where the transceiver, he controled MAB and selected the antenna according to the band in which the transceiver is located. Like Stack Match only work manually.

All parameter uesd by MAB are fully costumizable, both on transceivers and antennas , you can change the antenna's names or the transceiver's names with a maximun of 10 characters for easy indetification. You can assign the desired antennas in automatic mode , or if you want the operation to be manual or automatic and what settings to use for band decoding.

MAB is fully upgradeable by software and allows to use relays of 5V and 12V feeding it to 13'8V.It can also be used with 24V relays but you will need an external voltage source of that voltage cc. which can be configured internally.

MAB allows independent configuration of the Normal Switch function, SO2R function and Stack Match.

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FEATURES

- Power supply: 13'8 Vcc.
- Relais at 5V or 12V . (Internal configuration). 24V with external power supply.
- 6 languages to choose : Spanish, English, French, Italian, German and Portuguese.
- Based on Arduino Mega 2560 + Arduino pro mini.
- Work like Antenna Switch,SO2R or Stack Match.
- Two modes of use: Manual , where the user has control , Web interface or automática where the transceiver has control.(BCD,RS232,ACC,CIV,etc)
- Like Antenna Switch , can control up to 4 transceivers and 16 antennas. Like SO2R , can control 2 transceivers and up to 8 antennas.
In Stack Match mode, can control up to 4 transceivers and 3 antennas and his entanglements.
- Connection of up to 4 transceivers for control of antennas in different protocols independently.
- InterLock: Separate PTT lock for each transceiver.
- Display of status information on 4'3 "touch screen.
- Fully configurable by the user without PC.
- Software upgradeable.
- 10 Characters to name transceivers and antennas.
- Internal control of the band encoder or from another external program.
- Three 25 pin connectors for all wiring.
- Multiple protocols for the band decoder.
- Four independent RS-232 ports.
- Four independent Band Data ports in BCD format.
- Four ACC ports for Icom or Band Data for a single connection for Yaesu standalone.
- Voltage calibration for ACC ports for Icom or Yaesu.
- Four separate CI_V ports for Icom
- It allows to chain boxes of relays like normal switch.
- Weight: 1.6 Kg
- Measures: 232x183x101 mm

DEFAULT PARAMETER OF MAB

Parameter	Antenna Switch	SO2R	Stack Match
Transceiver Activo	1	1 and 2	1
Mode Transceiver 1	Manual	Manual	Manual
Mode Transceiver 2	Manual	Manual	Manual
Mode Transceiver 3	Manual	--	Manual
Mode Transceiver 4	Manual	--	Manual
Antennas Transceiver 1	No antenna fixed	No antenna fixed	--
Antennas Transceiver 2	No antenna fixed	No antenna fixed	--
Antennas Transceiver 3	No antenna fixed	--	--
Antennas Transceiver 4	No antenna fixed	--	--
Name Transceiver 1	TRANSCE. 1	TRANSCE. 1	TRANSCE. 1
Name Transceiver 2	TRANSCE. 2	TRANSCE. 2	TRANSCE. 2
Name Transceiver 3	TRANSCE. 3	--	TRANSCE. 3
Name Transceiver 4	TRANSCE. 4	--	TRANSCE. 4
Name Antena 1	ANT 1	ANT 1	ANT 1
Name Antena 2	ANT 2	ANT 2	ANT 2
Name Antena 3	ANT 3	ANT 3	ANT 3
Name Antena 4	ANT 4	ANT 4	--
Name Antena 5	ANT 5	ANT 5	--
Name Antena 6	ANT 6	ANT 6	--
Name Antena 7	ANT 7	ANT 7	--
Name Antena 8	ANT 8	ANT 8	--
Name Antena 9	ANT 9	--	--
Name Antena 10	ANT 10	--	--
Name Antena 11	ANT 11	--	--
Name Antena 12	ANT 12	--	--
Name Antena 13	ANT 13	--	--
Name Antena 14	ANT 14	--	--

DEFAULT PARAMETER OF MAB

Parameter	Antenna Switch	SO2R	Stack
Name Antena 15	ANT 15	--	--
Name Antena 16	ANT 16	--	--
Protocol Trx 1	Any	Any	--
Protocol Trx 2	Any	Any	--
Protocol Trx 3	Any	--	--
Protocol Trx 4	Any	--	--
ACC Volt Icom Trx 1	2V. for band	2V. for band	--
ACC Volt Icom Trx 2	2V. for band	2V. for band	--
ACC Volt Icom Trx 3	2V. for band	--	--
ACC Volt Icom Trx 4	2V. for band	--	--
Control CAT Trx 1	MAB	MAB	--
Control CAT Trx 2	MAB	MAB	--
Control CAT Trx 3	MAB	--	--
Control CAT Trx 4	MAB	--	--
Mode MAB	Antenna Switch	--	--
Bauds Trx 1	9600	9600	--
Bauds Trx 2	9600	9600	--
Bauds Trx 3	9600	--	--
Bauds Trx 4	9600	--	--
Hex.Add Icom Trx 1	96	96	--
Hex.Add Icom Trx 2	96	96	--
Hex.Add Icom Trx 3	96	--	--
Hex.Add Icom Trx 4	96	--	--
ACC Volt Yaesu Trx 1	2V. for band	2V. for band	--
ACC Volt Yaesu Trx 2	2V. for band	2V. for band	--
ACC Volt Yaesu Trx 3	2V. for band	--	--
ACC Volt Yaesu Trx 4	2V. for band	--	--

DEFAULT PARAMETER OF MAB

Parameter	Antenna Switch	SO2R	Stack
Limits 160 m	1810 - 2000	1810 - 2000	--
Limits 80 m	3500 - 3800	3500 - 3800	--
Limits 60m	5000 - 6000	5000 - 6000	--
Limits 40 m	7000 - 7200	7000 - 7200	--
Limits 30 m	10100 - 10130	10100 - 10130	--
Limits 20m	14000 - 14350	14000 - 14350	--
Limits 17m	18068 - 18168	18068 - 18168	--
Limits 15 m	21000 - 21450	21000 - 21450	--
Limits 12 m	24890 - 24990	24890 - 24990	--
Limits 10m	28000 - 29700	28000 - 29700	--
Limits 6m	50000 - 52000	50000 - 52000	--
Limits 4m	69900 - 70500	69900 - 70500	--

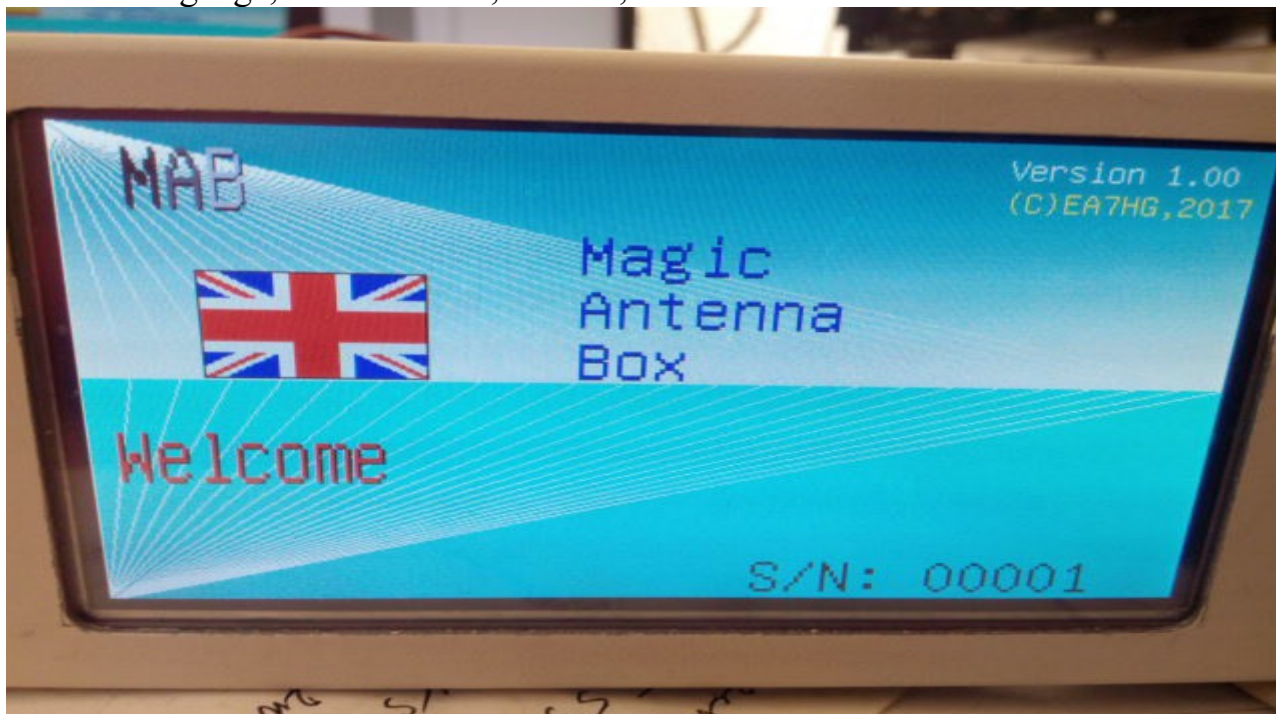
START

The first time you turn on MAB or after having performed a reset, will allow us to select the desired language. Tap on the screen the language flag you want to use.



WELCOME

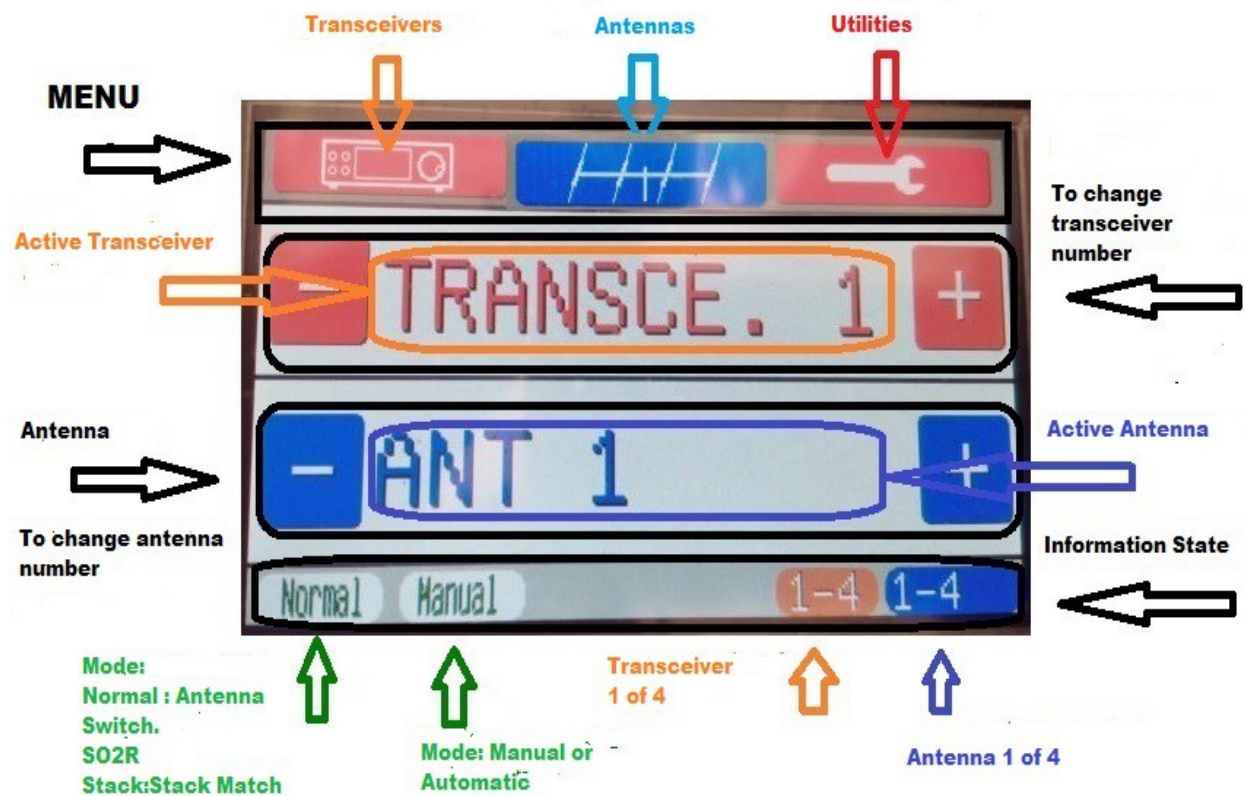
Once initialized MAB will make your presentation on the screen, showing us the selected language, serial number, version, etc ...



Seconds later, MAB will be operational in the Normal switch function, ie it is used as a simple antenna switch.



SCREEN DESCRIPTION



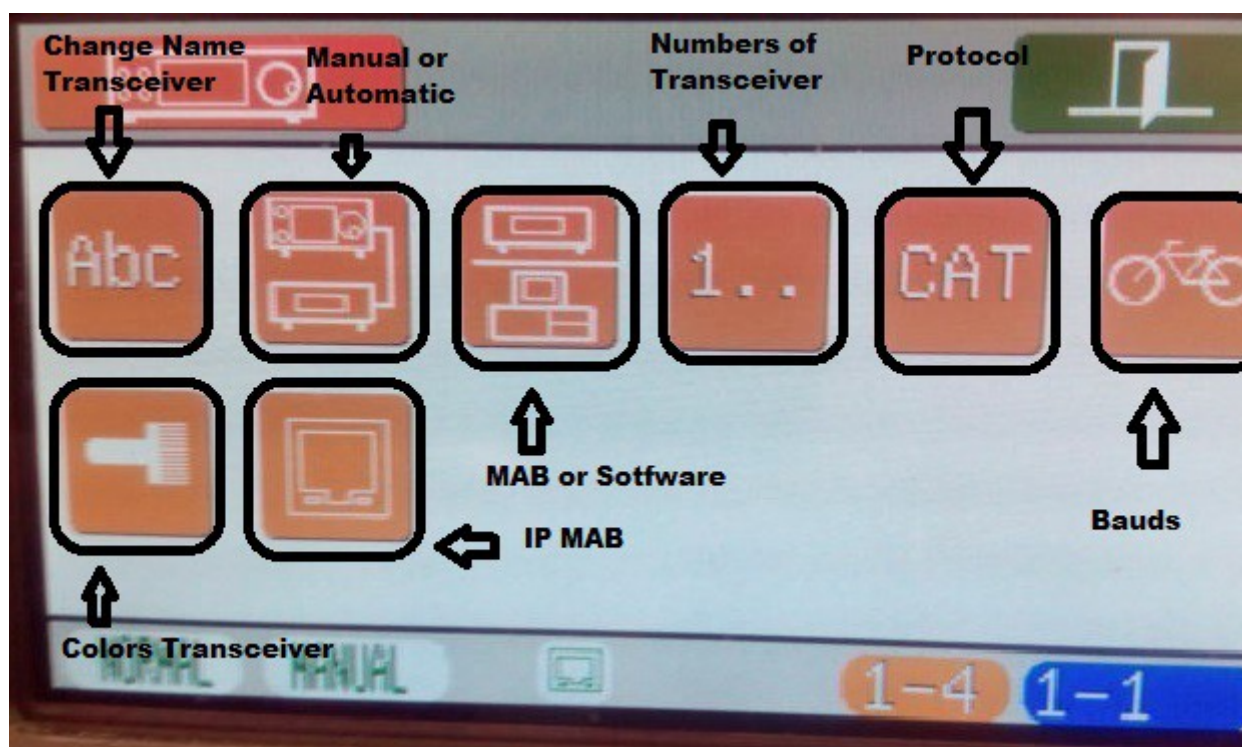
MENU DESCRIPTION

MAB has three menus that are accessed by pressing on the screen the desired icon at the top of the screen:



Transceivers:

Transceiver icons. It is divided in turn into several options indicated below:





Allows you to rename the active Transceiver for easy identification on the screen, both as an antenna switch, as in SO2R, as in Stack Match. Use the keyboard that MAB shows you, to enter the name. A maximum of 10 characters is allowed. If the name contains the 10 characters it will be recorded automatically. Otherwise press the accept icon.



It tells MAB to work in automatic mode or in manual mode in each Transceiver. Before using the automatic mode make sure that you have selected the necessary protocol between the Transceiver and MAB to work properly. It allows two options both as normal switch and SO2R:

- **Auto** : MAB will work by changing the antenna automatically according to the band in which the Transceiver is located.
- **Manual** :The user will select the desired antenna using the buttons indicated on the screen.
-

If MAB is running in Stack Match mode it allows two options:

- **Normal** : Activates relays according to the following table: Ex: SJ2W

ANTENAS	ANT 1	ANT 2	ANT 3	BALUN
ANT 1	+V	0	0	+V
ANT 2	0	+V	0	+V

ANT 3	0	0	+V	+V
ANT 1+2	0	0	+V	0
ANT 1+3	0	+V	0	0
ANT 2+3	+V	0	0	0
ANT 1+2+3	0	0	0	0

- **Invested** : Activates relays according to the following table:Ej 4O3A

ANTENAS	ANT 1	ANT 2	ANT 3	BALUN
ANT 1	+V	0	0	0
ANT 2	0	+V	0	0
ANT 3	0	0	+V	0
ANT 1+2	+V	+V	0	+V
ANT 1+3	+V	0	+V	+V
ANT 2+3	0	+V	+V	+V
ANT 1+2+3	+V	+V	+V	+V



Data Source : It allows to obtain data from MAB directly or from a CAT program for the antenna change in automatic mode when using the RS232 protocol. It is only required in CAT and Icoms CI_V protocols. If MAB works as Stack Match, it does not perform any function. It allows two options both as normal switch and SO2R:

- **Program** : It allows to obtain data from an external cat. You will only need to connect the RXD pin of the RS232 cable to MAB.
- **MAB** : It allows to obtain directly from the RS232 port of the Transceiver. You will need to connect the RXD and TXD pin of the RS232 cable to MAB.



Number of transceivers : Allows you to change the number of Transceivers to use. If you initially defined 4 transceivers and subsequently selected 2 for example, MAB will not let you access Transceiver number 3 and 4, but all the stored configuration information of these Transceivers will remain recorded in MAB. Values supported between 1 and 4 Transceivers. If you select 2 Transceivers, it will be Transceiver 1 and 2 respectively. If they are 3, they will be Transceiver 1, Transceiver 2 and Transceiver 3. If MAB is operating as SO2R you can not change this value and it will always be two, Transceiver 1 and Transceiver 2.



Protocol : It allows to change the protocol to use between the Transceiver and MAB used in the automatic mode as much as normal switch like SO2R. Not used in the Stack Match function. The protocols you can select are:

- **Yaesu Cat** : It allows the control of MAB through the RS232 port of its Transceiver. Valid for Yaesu Transceivers in which the commands are of type FA, FB, etc. It is not valid for the equipment that used commands in Hexadecimal of type 0A, 10,03, etc. . MAB also allows you to adjust the baud rate. The speed selected in MAB must be the same as that of the Transceiver for MAB to work. By default it uses 9600 baud. You will also have to define the CAT control, if you are going to be getting the data through some CAT program or if it will do all MAB.
- **Yaesu BCD** : It allows the control of MAB through the BAND DATA of its Transceiver through its connection Data A, Data B, Data C and Data D. Do not use in Yaesu where the BAND DATA has only one connection pin, since it operates by variable voltage depending on the band. For the case of a single pin, use the Yaesu B.Dat protocol that is debunked later.
- **Icom ACC** : It allows the control of MAB through the ACC connector of Icom which supplies a different voltage in each band. As in each Transceiver this voltage undergoes variations, to avoid errors once you have connected your

Transceiver to MAB.

- **Icom CI_V** : It allows the control of MAB through Icom's CI_V port. For correct operation you must define the Hexadecimal address that your computer has. The address of each Icom is defined in this manual. On some models this address can be changed. If the Hex Address recorded in MAB does not match the Hexadecimal address of the Transceiver, MAB will not work. It is also necessary to select the baud rate. Since Icom, sends information when you move the dial knob or change bands you must move the dial or change bands so that MAB can read the frequency to change the antenna. Otherwise it will indicate that it is without antenna. You will also have to define the CAT control, if you are going to be getting the data through some CAT program or if it will do all MAB.
- **KENWOOD CAT** : It allows the control of MAB through the RS-232 port of the transceiver. Valid for Transceivers in which the commands are of type FA, FB, etc. MAB also allows you to adjust the baud rate in the Transceiver Baud Submenu. The speed selected in MAB must be the same as that of the Transceiver for MAB to work.
- **K3 RS232** : It allows the control of MAB through the RS-232 port of the transceiver. The speed selected in MAB must be the same as that of the Transceiver for MAB to work. You will also have to define the CAT control, if you are going to be getting the data through some CAT program or if it will do all MAB.
- **K3 ACC** : It allows the control of MAB through the ACC connector of its transceiver through its connection, BAND0 OUT, BAND1 OUT, BAND2 OUT and BAND3 OUT.
- **YAESU B.DAT** : It allows the control of MAB through the Band Data of the transceiver of a single pin, normally marked as Band C in the connector CAT / Linear, which supplies a different tension in each band as it is the case of the FT817.
- **No** : No protocol.



Bauds : It allows to select the baud rate for the RS-232 communication between MAB and the transceiver. There are 4 options:

- **4800**
- **9600**
- **19200**
- **38400**



Colors : It allows to change the color to everything related to transceivers.

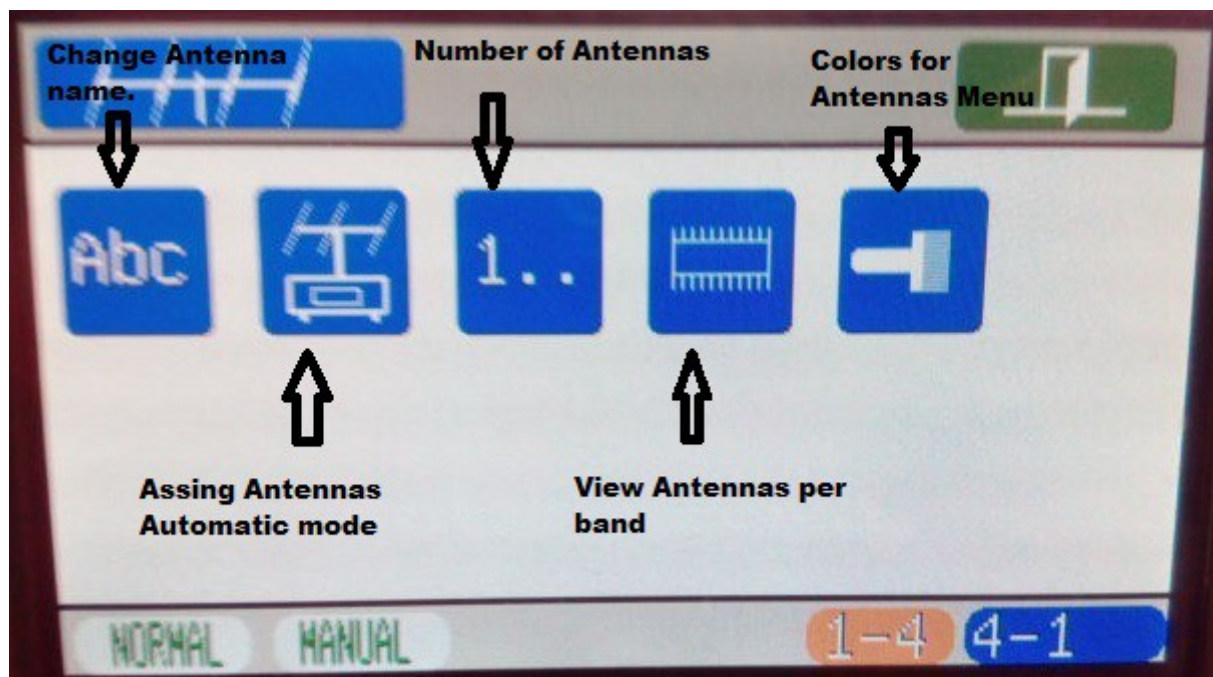


IP : Allows you to know the IP to which MAB is connected.



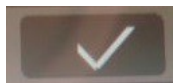
Antennas:

It corresponds to the icon of an antenna. It is divided in turn into several options indicated briefly below:





Names : Allows you to change the name to the active antenna for easy identification on the screen, both as an antenna switch, as in SO2R, as in Stack Match. Use the keyboard that MAB shows you to enter the name. A maximum of 10 characters is allowed. If the name contains the 10 characters it will be recorded automatically. Otherwise press the accept icon.



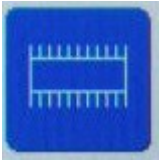
Config. Auto : Allows you to assign the antennas to be used by each Transceiver when using MAB in automatic mode. Each antenna will be assigned to the band asking MAB. If you do not want an antenna assigned for a band, select the antenna 0 (NO ANTENNA). It will begin with the band of 160m until reaching the band of 4m. If MAB is running as Stack Match, you can not access this option.



Numbers : Allows you to change the number of Antennas to use. In the upper bar you will be shown to select the number of relay boxes to use if you are in normal switch mode or if you are in SO2R mode you will see the number of antennas to use. If you are in normal switch mode, if you define a single box, under the bar you only have the number of antennas you want to use and in this case you have up to 16 antennas. If you initially set 16 antennas and then select 14 for example, MAB will not let you access the antenna number 14 and 15, but all the stored configuration information of these antennas remains recorded in MAB. If you select 3 antennas, they will be antenna 1, antenna 2, antenna 3. Values supported between 2 and 16 antennas. If for example you decide to use 2 boxes of relays of 4 antennas, you have a maximum of 8 antennas in theory, but they really are 7, since the antenna 4 of the first box is used to connect the second box, so that of the First box can connect 3 antennas and in the second box can connect the remaining four. See examples in the

chapter on linking boxes.

If MAB is operating as SO2R the antenna value is between 2 and 8 and it is not possible to chain relay boxes. If MAB is operating as Stack Match, you can not access this option.



View : Allows you to view the antenna assigned to each band for the MAB auto mode. If MAB is running as Stack Match, you can not access this option.

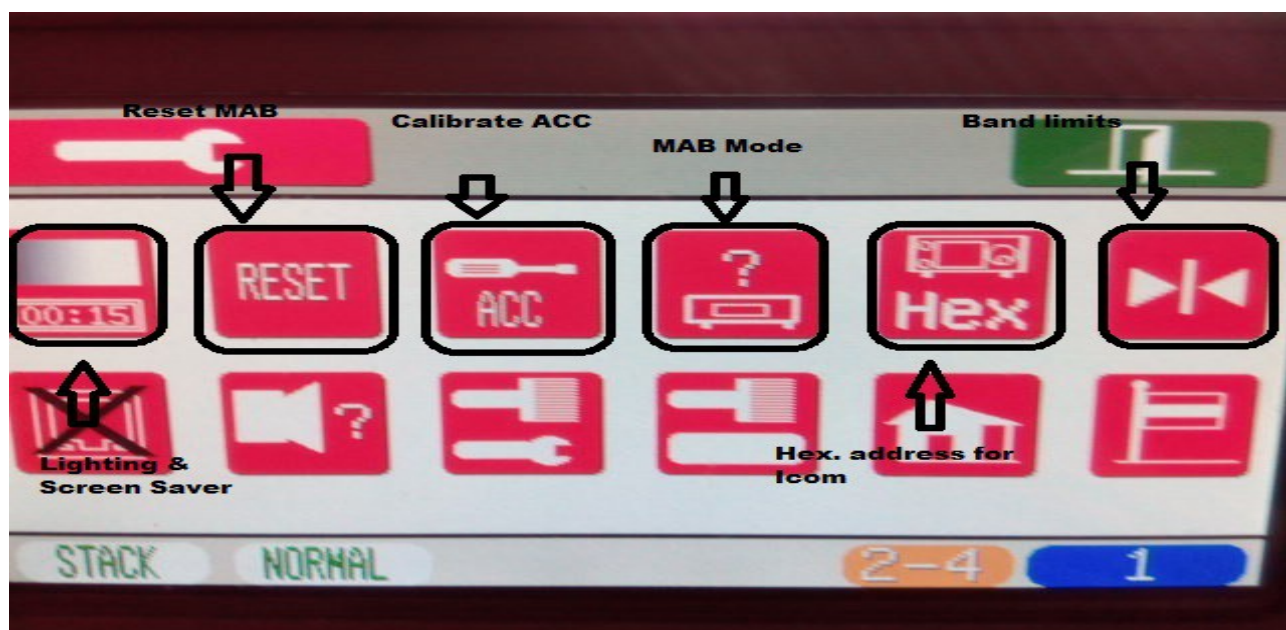


Colors : It allows to change the color to everything referring to the antennas.



Utilities:

Corresponds to the utilities icon. It is divided in turn into several options indicated briefly below:





Lighting and Screen Saver: It allows the degree of illumination of the MAB screen and time for it to enter screen saver mode. If it is in screen saver mode, MAB will continue with its switch functions. To exit the screen saver mode, it is only necessary to touch the screen.



Reset : It allows to reset all the MAB memory, both the normal switch function and the SO2R function or as the Stack Match function and save the default parameters. Once the memory has been reset, you can select the language for MAB again and reset it as you wish.



Calibrate ACC : It allows to calibrate the voltage obtained from the Transceiver Icom or Yaesu FT817 for operation in the protocol Icom ACC or Yaesu B.Dat 1 pin. There are 2 options:

- **Icom**
- **Yaesu**

To calibrate Icom Transceivers as well as Yaesu, follow the instructions on the MAB screen. For this you must have the Transceiver connected to MAB. If MAB is running as Stack Match, you can not access this option.



MAB Mode : It allows to use MAB as normal switch, like SO2R or like Stack Match. There are 3 options:

- **Normal :** It allows MAB to function as a normal antenna switch, both in manual mode

and in automatic mode. Once you have selected MAB, you will be prompted to turn it off for a few seconds and then turn it on again as shown on the screen to operate in this mode.

- **SO2R** : It allows MAB to function as SO2R in both manual and automatic mode. Once selected MAB will ask you to turn it off for a few seconds and turn it on again as indicated on the screen, so that it works in this mode.
- **STACK MATCH** : It allows MAB to function as Stack Match in manual mode. Once selected MAB will ask you to turn it off for a few seconds and turn it on again as indicated on the screen, so that it works in this mode.



Icom Hex. : Allows you to change the hexadecimal address that each Icom transceiver uses for when MAB is in automatic mode.



Band limits : It allows to set the frequency limits for each band when MAB is used in automatic mode. Use the keyboard that MAB shows you to enter the frequencies for each band following the MAB instructions. If MAB is running as Stack Match, you can not access this option.



Internet. : View the status of MAB in Web.



Sounds. : Choose between 4 sounds for MAB and activate if sound is desired.



Colors Utilities : Change the color to everything related to Utilities.



Colors Message : It allows to change the color to everything referring to the messages of MAB.



Call : Change the call sign that will appear when MAB is turned on. Use the keyboard that MAB shows you to enter the name. A maximum of 10 characters is allowed. If the name contains the 10 characters it will be recorded automatically.



Language : Change the MAB language.

MAB LIKE ANTENNA SWITCH

DESCRIPTION OF SCREEN INFORMATION:



Using MAB as a normal antenna switch we have two ways to use it, manually and automatically, in one way or another, we will be shown on the screen both the active transceiver and the selected antenna.

At the bottom of the screen will indicate the status of MAB.



The message surrounded by Orange indicates that MAB is being used as a normal antenna switch. The message surrounded by Red indicates that it is in Manual mode, ie the user has control of both the Transceiver you want to use and the antenna you want to select. The message surrounded by Yellow tells us that the Transceiver 1 of the four that we can handle is the one that is active. The message surrounded by Green indicates that the antenna 1 of the four that we can handle, is the one that is active. If only we have selected MAB for a single relay box it will indicate the active antenna of all the enabled antennas. For example if we have enabled 6 antennas, we would indicate 1-6, where the first number is the active antenna number in this case 1 out of a total of 6 available. If we enable more than one relay box the first number will indicate the active antenna and the second will indicate which relay box it is.

If MAB is in automatic mode the message surrounded by Red, it would indicate Auto and the user only has the control of change of Transceiver that he / she wants to use, since the antenna would be selected by MAB, once the desired antenna has been assigned to each Band and the Transceiver is connected to MAB, either by CAT, ACC, CI-V, etc. , When reading the band of the Transceiver. Whether MAB is in Manual mode or in Automatic mode, you can always access the menus.

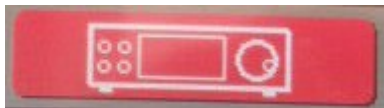
If MAB is in Automatic mode, in order to access the menus, you must leave the desired menu icon pressed for at least half a second.

In both Transceiver and antenna switching, when MAB reaches the last Transceiver or the last allowed antenna, pressing + will start again with the first Transceiver and the first antenna. If on the contrary we are in the first Transceiver or in the first antenna if we press in - it will return to the last Transceiver or last allowed antenna.

Before using the MAB automatic mode, it is necessary to configure how it will

communicate with the Transceiver, as well as the antenna that will be used in each band.

We will access the Transceivers Menu:



and select the protocol icon:



We will select the communication protocol between MAB and the transceiver.

Suppose we want to change the protocol of Transceiver 1. Suppose it is a Yaesu FT-1000MP and we want MAB to be connected to its BAND DATA. The communication protocol that we must use is Yaesu BCD, so we will select Yaesu BCD. As the Yaesu BCD protocol does not use the serial port, it does not need the baud rate, it does not need a hexadecimal address, nor define the data source, so there is no need to change anything else.

Now we must assign the antennas for each band. For this we will go to the Antenna Menu:



and select the Auto Config icon:



We will select the antenna that we want to use for the 160m band. To do this, use the + and - buttons on the screen to change the antenna number. If you do not want to assign any antennas to that band, select 0 NO ANT. . Once you have chosen the antenna to use press the icon



to validate it. Once validated it will pass to the band of 80 m and we will do the same

as for 160 m and so on until arriving at the last band that is the 4m.

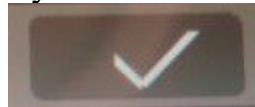
Once these two steps are done it is time to put MAB in automatic mode. To do this we go back to the Transceiver Menu:



and select the change icon from Manual to Automatic:



Selecting Auto. Once selected Auto you must validate it by pressing:



From this moment on, the transceiver 1 will always be in automatic mode, as long as it is not changed to manual and will use the Yaesu BCD protocol. The display shows the message that it is in Automatic.

MAB LIKE SO2R

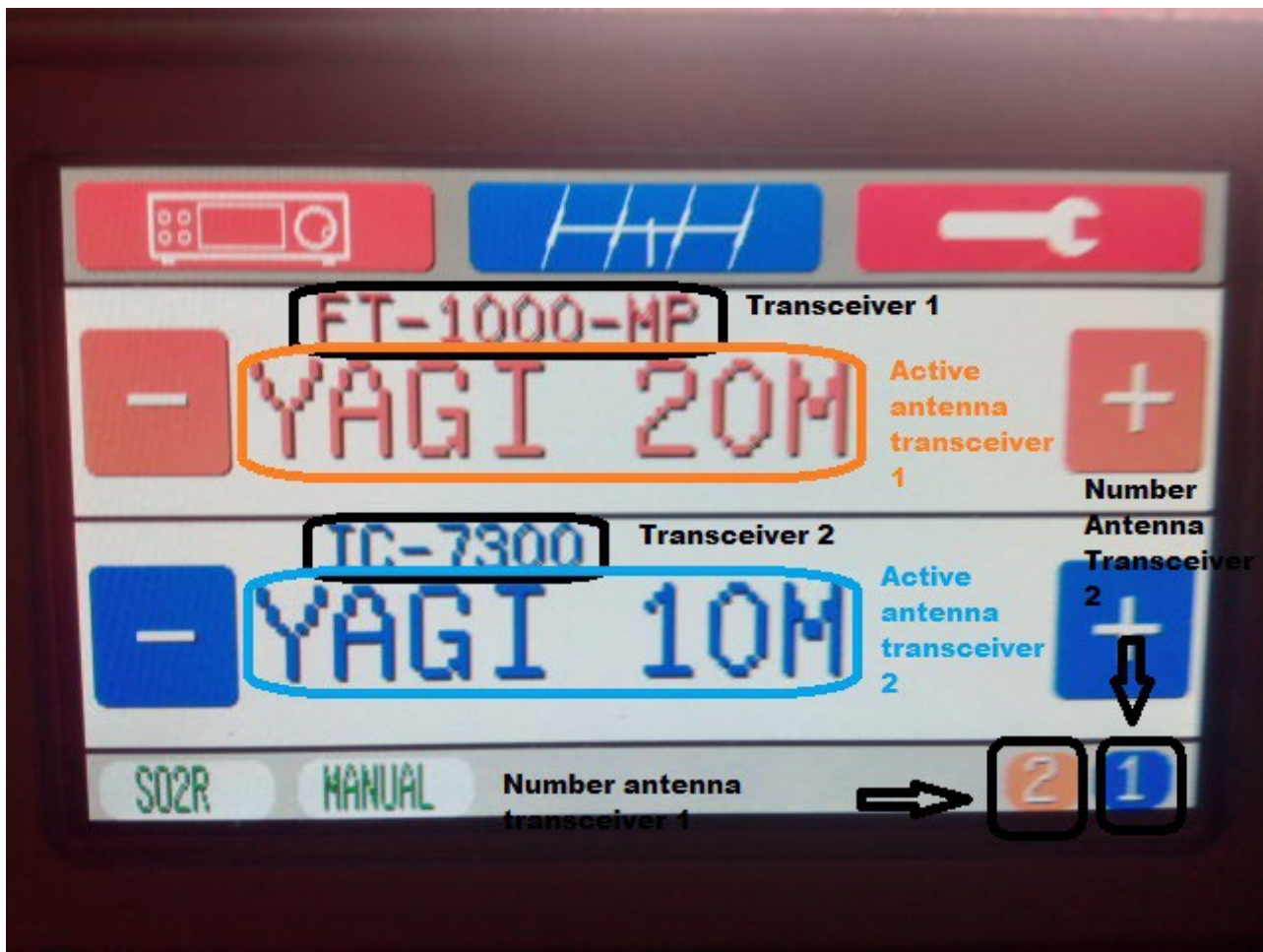
Using MAB as SO2R we have two ways to use it, manually and automatically, in one way or another, we will show both active transceivers as the selected antennas on the screen.

Both in manual mode and in automatic mode in SO2R, MAB does not allow the same antenna to be used for both transceivers. When an antenna is selected for one Transceiver, the other Transceiver can not access this same antenna. If it is in manual mode.

In automatic mode, if the Transceiver is in the 20m band that is assigned for example antenna two and we change the Transceiver two to the same band of 20m, MAB, will leave the Transceiver two without antenna. If we now change the Transceiver one for example to the 15m band, MAB will select the antenna corresponding to the band of 15 to Transceiver one and to detect that for the Transceiver two is already free the band of 20m will automatically activate the antenna assigned for that band , So that the Transceiver one will have the antenna assigned to 15m and the Transceiver two will have the antenna assigned to the 20m band. If we then change the Transceiver one to the 20 m band, as it was already occupied by the Transceiver two, MAB will leave the Transceiver one without antenna. In manual mode the behavior is different. If for example in the Transceiver we have the antenna two selected and in Transceiver two we want to select the antenna two, MAB does not allow the Transceiver two to access this antenna since it is selected for the Transceiver one so it selects the next antenna at two If the icon is pressed further or select the previous antenna if the icon is less.

The configuration in the SO2R function works in the same way as when the MAB functions as a normal switch and is totally independent, so that you can assign names to Transceivers, antennas, etc., just like when you operate as a normal switch. The only common information for MAB as a normal cinch as SO2R, is that of the band limits for when it is used in automatic mode. Just like when MAB works as a normal switch and allows each Transceiver to be in manual mode or in automatic mode, in SO2R or both Transceivers are in manual mode or both are in automatic mode.

DESCRIPTION OF SCREEN INFORMATION:



MAB LIKE SO2R :MANUAL MODE

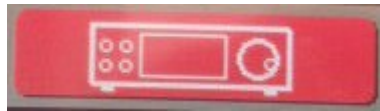
If in manual mode, MAB will never select the same antenna while being used by the other transceiver and will allow the previous or next to this, depending on the icon pressed for the antenna change.

To change the antenna you want to use for either transceiver, simply touch the + and - icons of each transceiver.

MAB LIKE SO2R : AUTOMATIC MODE

The configuration in the SO2R function works in the same way as when the MAB functions as a normal switch and is totally independent, so that you can assign names to Transceivers, antennas, etc., just like when you operate as a normal switch. The only common information for the two MAB operations is that of bandwidth limits when used in automatic mode. Before using the MAB automatic mode, it is necessary to configure how it will communicate with the Transceiver, as well as the antenna that will be used in each band.

We will access the Transceiver Menu:

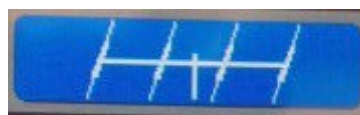


And select the protocol icon:



We will select the communication protocol between MAB and the transceiver.

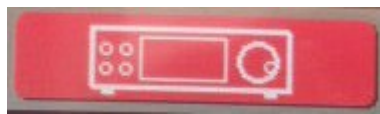
Suppose we want to change the protocol of Transceiver 1. Suppose it is a Yaesu FT-1000MP and we want MAB to be connected to its BAND DATA. The communication protocol that we must use is Yaesu BCD, so we will select Yaesu BCD. As the Yaesu BCD protocol does not use the serial port, it does not need the baud rate, it does not need a hexadecimal address, nor define the data source, so there is no need to change anything else. Suppose we want to change the protocol of Transceiver 2. Suppose it is a K3 and we want MAB to be connected to its BAND DATA. The communication protocol to be used is K3 BCD, so we will select K3 BCD and validate it with the Menu / OK button. Since the K3 BCD protocol does not use the serial port, it does not need the baud rate, it does not need a hexadecimal address, so there is no need to change anything else. Now we must assign the antennas for each band. For this we will go to the Antenna Menu:



And select the Auto Config icon:



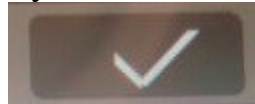
We will select the antenna that we want to use for the 160m band. To do this, use the + and - buttons on the screen to change the antenna number. If you do not want to assign any antennas to that band, select 0 NO ANT. . Once you have chosen the antenna to use press the icon. Once these two steps are done it is time to put MAB in automatic mode. To do this we go back to the Transceiver Menu:



And select the change icon from Manual to Automatic:



Selecting Auto. Once selected Auto you must validate it by pressing:



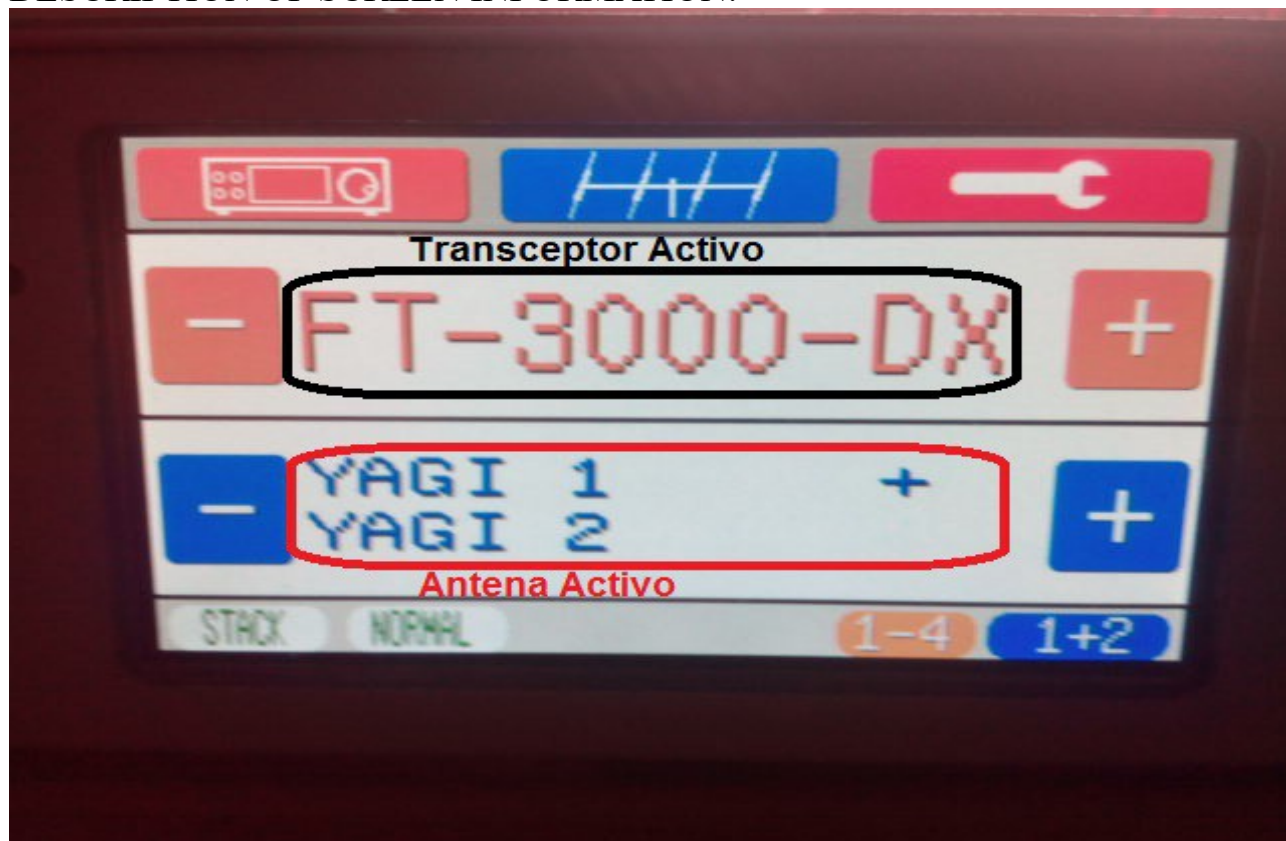
From now on, Transceiver 1 and Transceiver 2 will always be in automatic mode, as long as it is not switched back to manual and will use the Yaesu BCD protocol for Transceiver 1 and K3 Band Data protocol (BCD) for Transceiver 2. The display will show the message that it is in Automatic.

When MAB is in automatic mode the antenna change icons are disabled, only the menu icons are enabled.

If MAB is in Automatic mode, in order to access the menus, you must leave the desired menu icon pressed for at least half a second.

MAB LIKE STACK MATCH

DESCRIPTION OF SCREEN INFORMATION:



Using MAB as Stack Match, it can only be used manually and the display will show both the active Transceiver and the selected antenna or combination of antennas. It is not allowed to chain relay boxes. In this mode two options are allowed:

- **Normal** : Activates relays according to the following table: Ex: SJ2W

ANTENAS	ANT 1	ANT 2	ANT 3	BALUN
ANT 1	+V	0	0	+V
ANT 2	0	+V	0	+V
ANT 3	0	0	+V	+V
ANT 1+2	0	0	+V	0
ANT 1+3	0	+V	0	0
ANT 2+3	+V	0	0	0

ANT 1+2+3	0	0	0	0
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- **Invested** : Activates relays according to the following table: Ex 4O3A

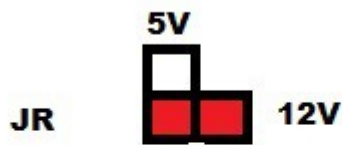
ANTENAS	ANT 1	ANT 2	ANT 3	BALUN
ANT 1	+V	0	0	0
ANT 2	0	+V	0	0
ANT 3	0	0	+V	0
ANT 1+2	+V	+V	0	+V
ANT 1+3	+V	0	+V	+V
ANT 2+3	0	+V	+V	+V
ANT 1+2+3	+V	+V	+V	+V

In both Transceiver and antenna switching, when MAB reaches the last Transceiver or the last allowed antenna, pressing + will start again with the first Transceiver and the first antenna. If on the contrary we are in the first Transceiver or in the first antenna if we click on - it will return to the last one.

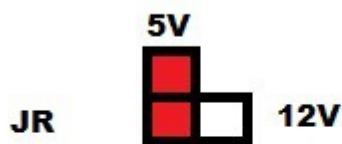
INTERNAL CONFIGURATION

The supply voltage for the antenna relays can be selected for 12V or 5V. To do this, we need to bypass the pins labeled JR and as it appears in the following red figures.

Feed relays of antennas to 12V. JR+12V Jumper



Feed relays of antennas to 5V. JR+5V Jumper



CONNENTION OF MAB

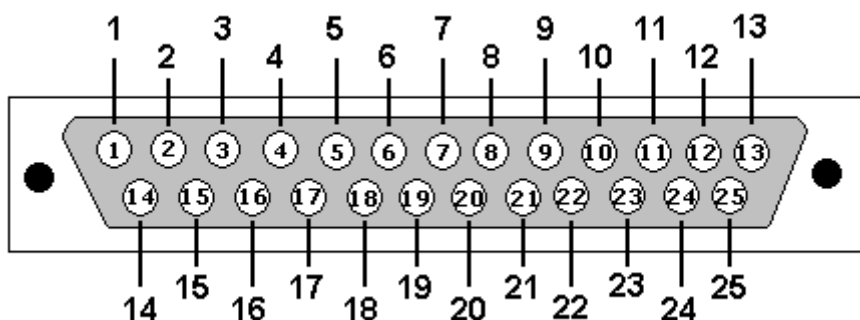
MAB has 3 connectors of 25-pin for connection of relay antennas, equipment relays, PTTs, as well as the connection of protocols for MAB to work in automatic mode.

The connector labeled 1-2 allows the connection of the different protocols, as well as the connection for PTT blocking, for Transceiver 1 and 2 used for automatic mode.

The connector labeled 3-4 allows the connection of the different protocols, as well as the connection for PTT blocking, for transceivers 3 and 4 used for automatic mode.

The connector labeled ANT + TRX allows the connection of the relays of the antennas to be selected, as well as the connection of the relays for Transceivers 1 to 4.

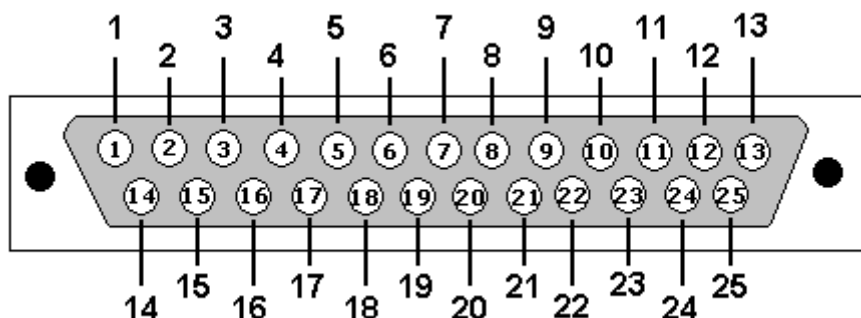
CONNECTOR LABELED 1-2:



PIN	DESCRIPCION	Transceiver
1	Band Data A Yaesu BCD – BAND0 OUT K3 BCD	1
2	Band Data B Yaesu BCD – BAND1 OUT K3 BCD	1
3	Band Data C Yaesu BCD – BAND2 OUT K3 BCD	1
4	Band Data D Yaesu BCD – BAND3 OUT K3 BCD	1
5	Band Data A Yaesu BCD – BAND0 OUT K3 BCD	2
6	Band Data B Yaesu BCD – BAND1 OUT K3 BCD	2
7	Band Data C Yaesu BCD – BAND2 OUT K3 BCD	2
8	Band Data D Yaesu BCD – BAND3 OUT K3 BCD	2
9	SERIAL TXD	1
10	SERIAL TXD	2
11	SERIAL RXD	2
12	SERIAL RXD	1
13	TTL TX	2
14	TTL TX	1
15	CIV ICOM-TTL RX	1
16	CIV ICOM-TTL RX	2
17	Do not use	1
18	Do not use	2
19	Do not use	
20	Do not use	
21	PTT to ground	1

22	PTT to ground	2
23	Icom ACC – Yaesu B.Dat	1
24	Ground	1 y 2
25	Icom ACC – Yaesu B.Dat	2

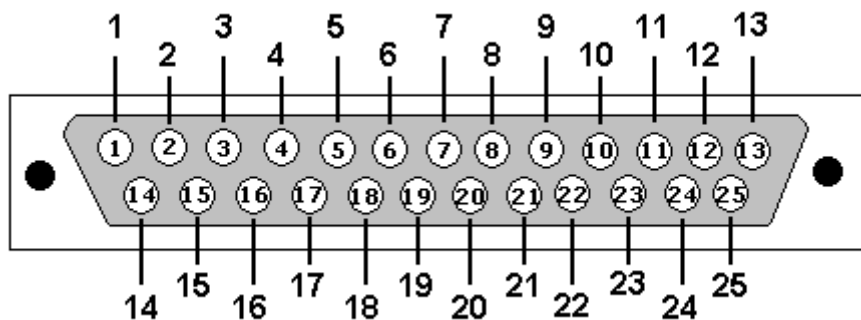
CONNECTOR LABELED 3 -4:



PIN	DESCRIPCION	Transceiver
1	Band Data A Yaesu BCD – BAND0 OUT K3 BCD	3
2	Band Data B Yaesu BCD – BAND1 OUT K3 BCD	3
3	Band Data C Yaesu BCD – BAND2 OUT K3 BCD	3
4	Band Data D Yaesu BCD – BAND3 OUT K3 BCD	3
5	Band Data A Yaesu BCD – BAND0 OUT K3 BCD	4
6	Band Data B Yaesu BCD – BAND1 OUT K3 BCD	4
7	Band Data C Yaesu BCD – BAND2 OUT K3 BCD	4
8	Band Data D Yaesu BCD – BAND3 OUT K3 BCD	4
9	SERIAL TXD	3
10	SERIAL TXD	4
11	SERIAL RXD	4
12	SERIAL RXD	3
13	TTL TX	4
14	TTL TX	3
15	CIV ICOM-TTL RX	3
16	CIV ICOM-TTL RX	4
17	Do not use	
18	Do not use	
19	Do not use	
20	Do not use	
21	PTT to ground	3

22	PTT to ground	4
23	Icom ACC – Yaesu B.Dat	3
24	Ground	3 y 4
25	Icom ACC – Yaesu B.Dat	4

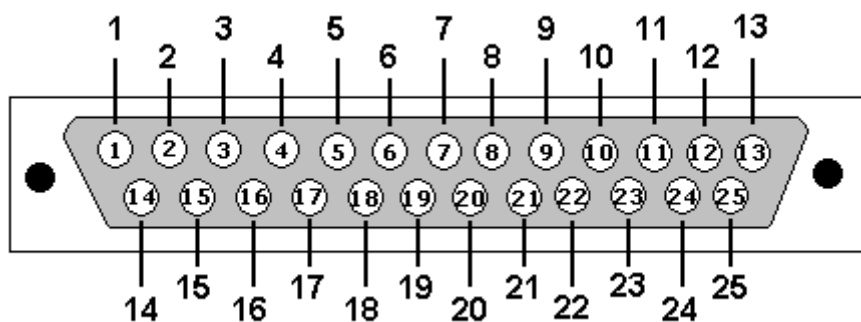
CONNECTOR LABELED ANT+TRX FOR NORMAL SWITCH:



PIN	DESCRIPCION
1	Antenna 8 +V
2	Antenna 7 +V
3	Antenna 6 +V
4	Antenna 5 +V
5	Antenna 4 +V
6	Antenna 3 +V
7	Antenna 2 +V
8	Antenna 1 +V
9	Transceiver 4 +V
10	Transceiver 3 +V
11	Transceiver 2 +V
12	Transceiver 1 +V
13	Ground
14	Antenna 12 +V
15	Antenna 11 +V
16	Antenna 10 +V
17	Antenna 9 +V
18	Antenna 13 +V
19	Antenna 14 +V
20	Antenna 15 +V
21	Antenna 16 +V
22	Do not use

23	Do not use
24	Do not use
25	Do not use

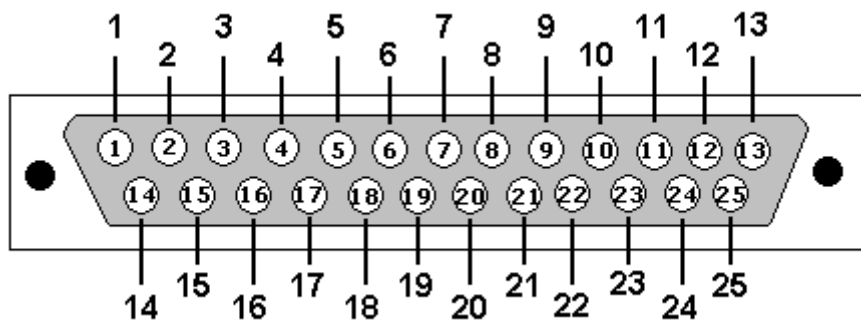
CONNECTOR LABELED ANT+TRX FOR SO2R:



PIN	DESCRIPCION
1	Antenna 8 +V for Transceiver 1
2	Antenna 7 +V for Transceiver 1
3	Antenna 6 +V for Transceiver 1
4	Antenna 5 +V for Transceiver 1
5	Antenna 4 +V for Transceiver 1
6	Antenna 3 +V for Transceiver 1
7	Antenna 2 +V for Transceiver 1
8	Antenna 1 +V for Transceiver 1
9	Do not use
10	Do not use
11	Do not use
12	Do not use
13	Ground
14	Antenna 1 +V for Transceiver 2
15	Antenna 2 +V for Transceiver 2
16	Antenna 3 +V for Transceiver 2
17	Antenna 4 +V for Transceiver 2
18	Antenna 5 +V for Transceiver 2
19	Antenna 6 +V for Transceiver 2
20	Antenna 7 +V for Transceiver 2
21	Antenna 8 +V for Transceiver 2
22	Do not use

23	Do not use
24	Do not use
25	Do not use

CONNECTOR LABELED ANT+TRX FOR STACK MATCH:



PIN	DESCRIPCION
1	Do not use
2	Do not use
3	Do not use
4	Antena 5 +V
5	Antena 4 +V
6	Antena 3 +V
7	Antena 2 +V
8	Antena 1 +V
9	Do not use
10	Do not use
11	Do not use
12	Do not use
13	Ground
14	Do not use
15	Do not use
16	Do not use
17	Do not use
18	Do not use
19	Not used.
20	Not used.
21	Not used.
22	Do not use

23	Do not use
24	Do not use
25	Do not use

SOFTWARE UPDATE

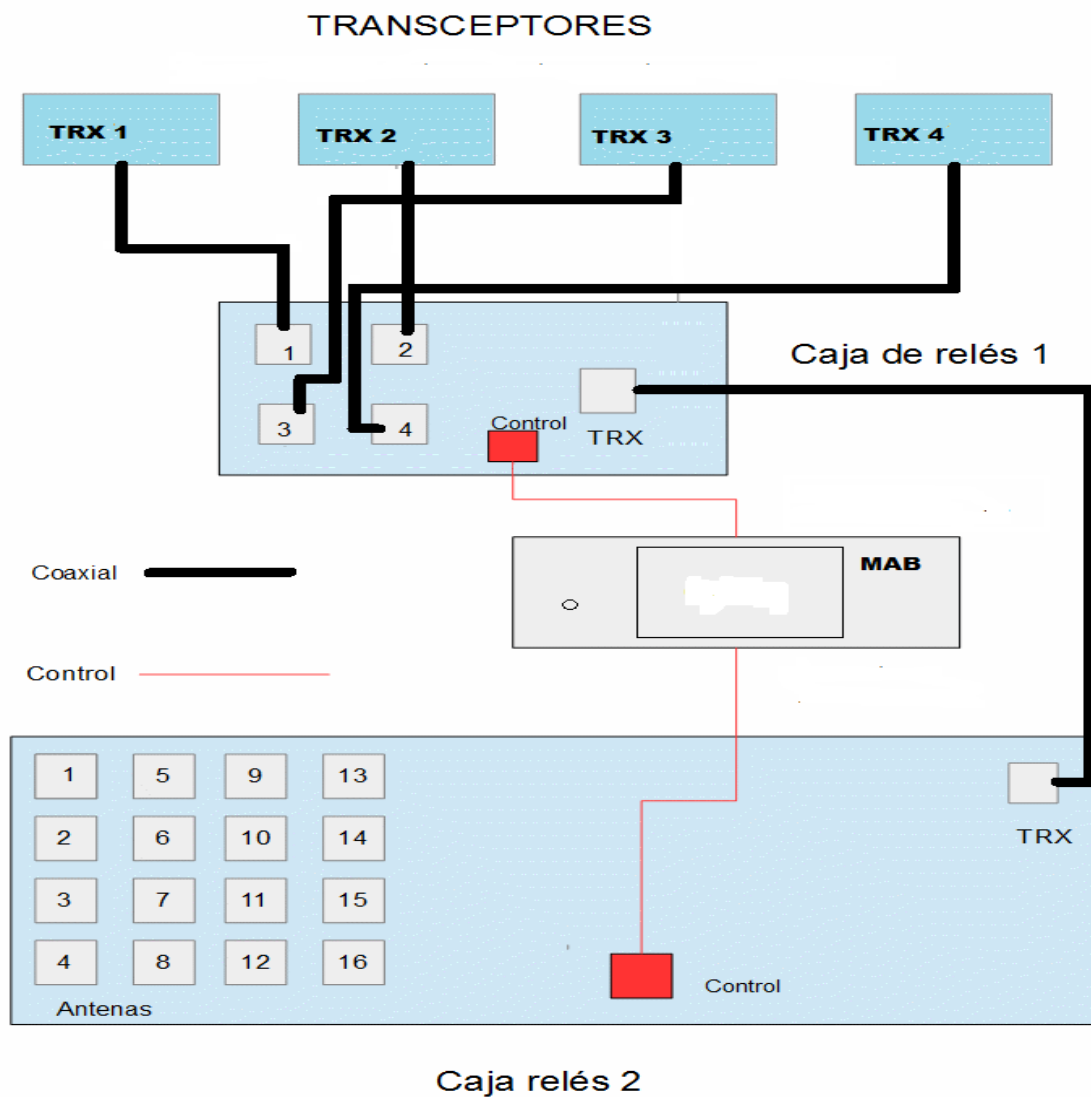
In order to record the MAB software updates on Arduino Mega 2560 and Arduino pro mini you will need to use additional software capable of recording the file in hexadecimal (.HEX) format. As examples you can use AXLOADER or XLOADER for Windows, which you can download easily from the Internet.

XLOADER, you can download it in this direction. <http://xloader.russemotto.com/>

XLOADER, you can download it in this direction. <http://www.softpedia.com/get/System/System-Miscellaneous/AX-Loader.shtml>

The operation of both programs is very simple and intuitive. First select the COM port to which your Arduino Mega 2560 is connected. Select the .HEX file to be uploaded on the Arduino Mega 2560 and press Upload. For the pro mini follow the same steps as for Arduino Mega 2560.

CONNECTING BOX RELAIS FOR 2, 3 OR 4 TRANSCEIVERS



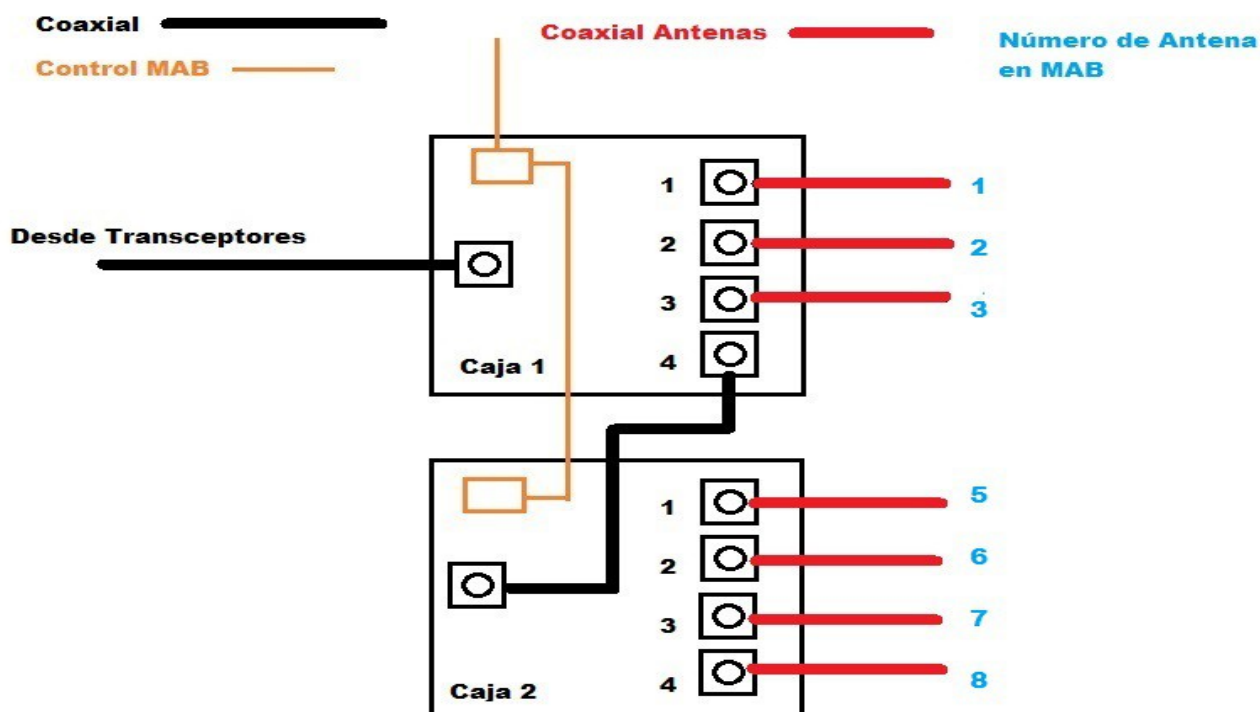
Control Box relais	Pin connector control MAB
Pin relay 1 +V (TRX1)	12
Pin relay 2 +V (TRX2)	11
Pin relay 3 +V (TRX3)	10
Pint relay 4 +V (TRX4)	9

LINKING BOXES

When using MAB as a standard antenna switch you have the option of being able to chain up to 4 relay boxes of antennas. When you chain boxes you should always keep in mind that the last antenna of each box will be connected to the next box so you should not connect any antenna to that output.

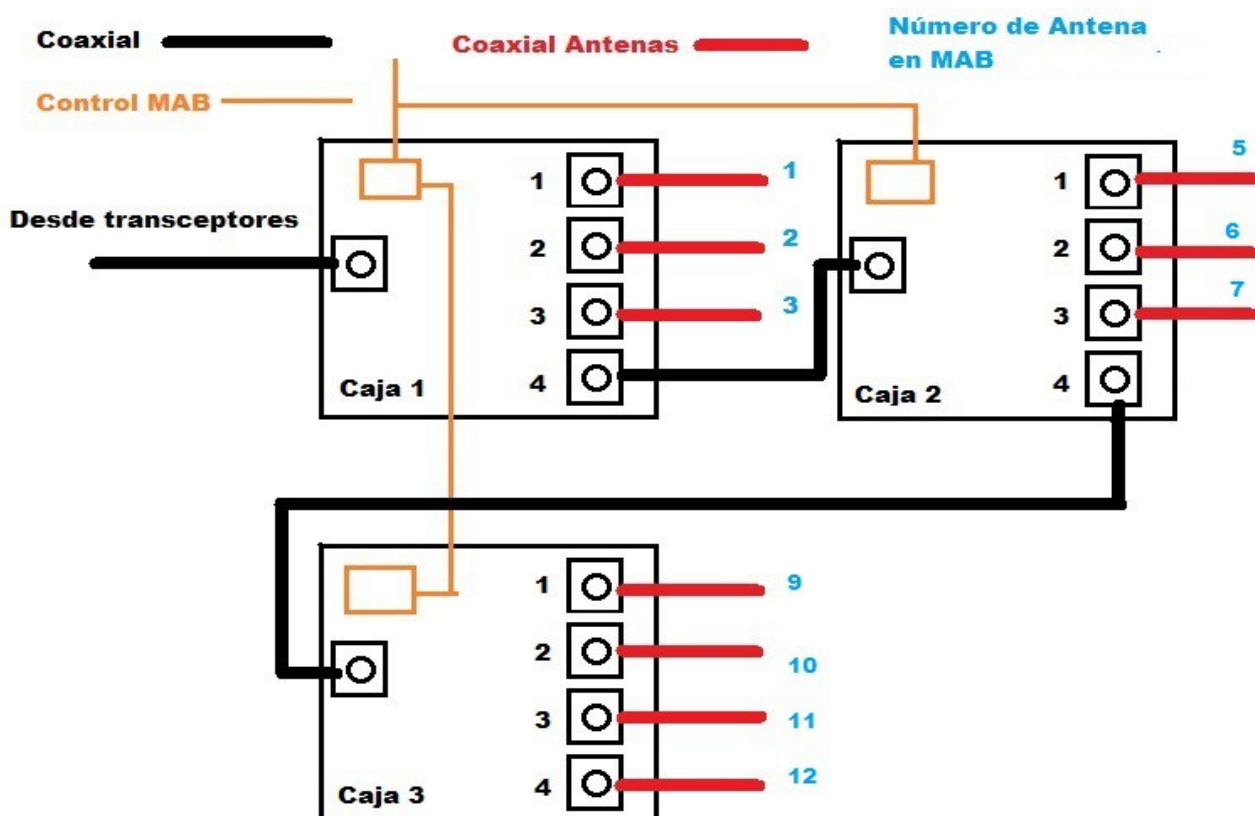
Samples:

If for example you decide to use 2 boxes of 4 relays, theoretically it has a maximum of 8 antennas, but they really are 7, since the antenna 4 of the first box is used to connect the second box. You can connect 3 antennas and in the second box you can connect the remaining four.



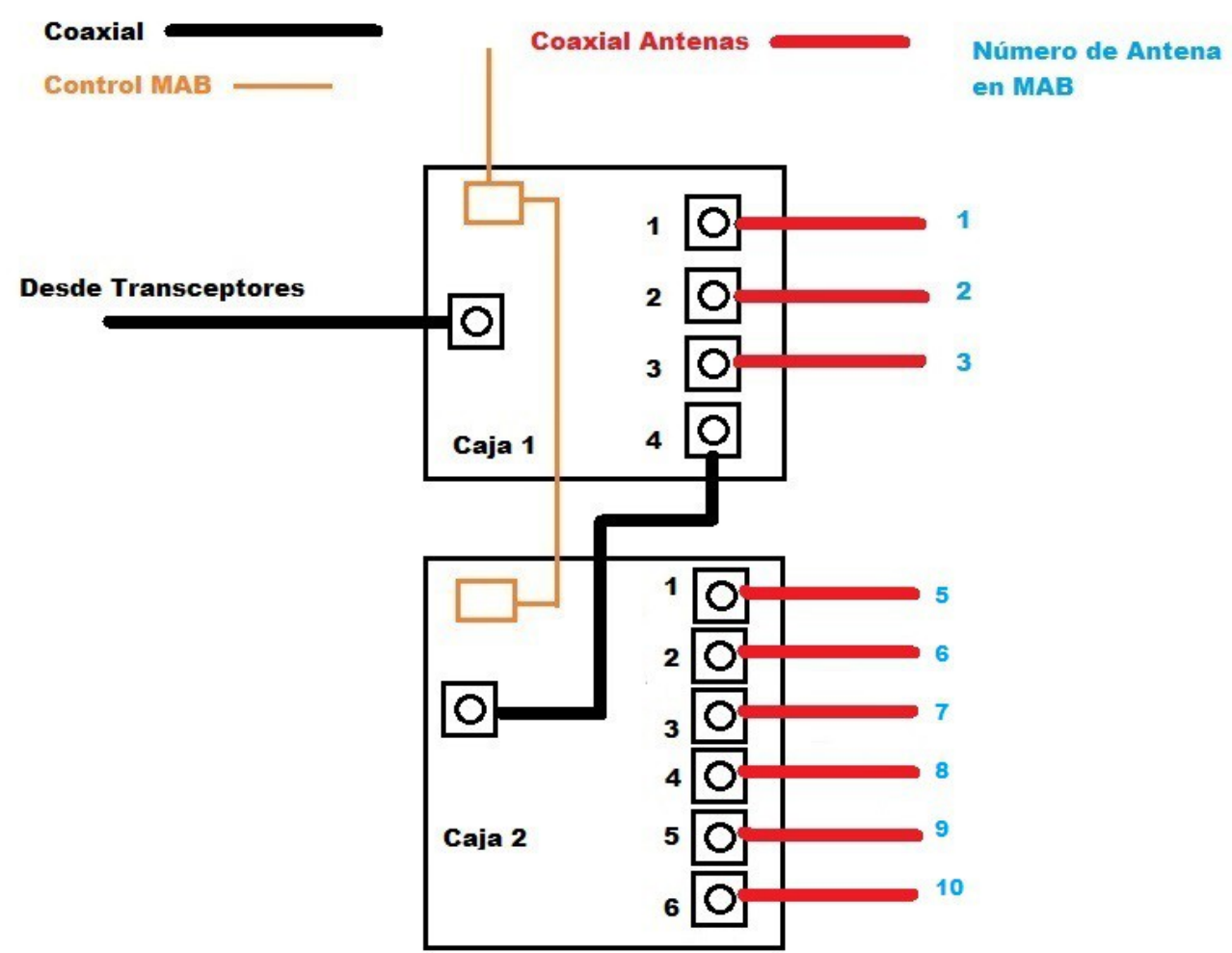
Box 1 (Caja 1)	Pin Control MAB	Box 2 (Caja 2)	Pin Control MAB
Pin relay 1	8	Pin relay 1	4
Pin relay 2	7	Pin relay 2	3
Pin relay 3	6	Pin relay 3	2
Pin relay 4	5	Pin relay 4	1

If for example you decide to use 3 boxes of 4 relays, theoretically it has a maximum of 12 antennas, but they really are 10, since the antenna 4 of the first box is used to connect the second box, so that of the first box Can connect 3 antennas. In the same way as in box 1, the antenna 4 is used to connect the second box, the antenna 4 of this second box will allow us to connect the third box, so that in the first box we can connect 3 antennas, in the second box Other 3 antennas and in the third box we can connect 4 antennas.



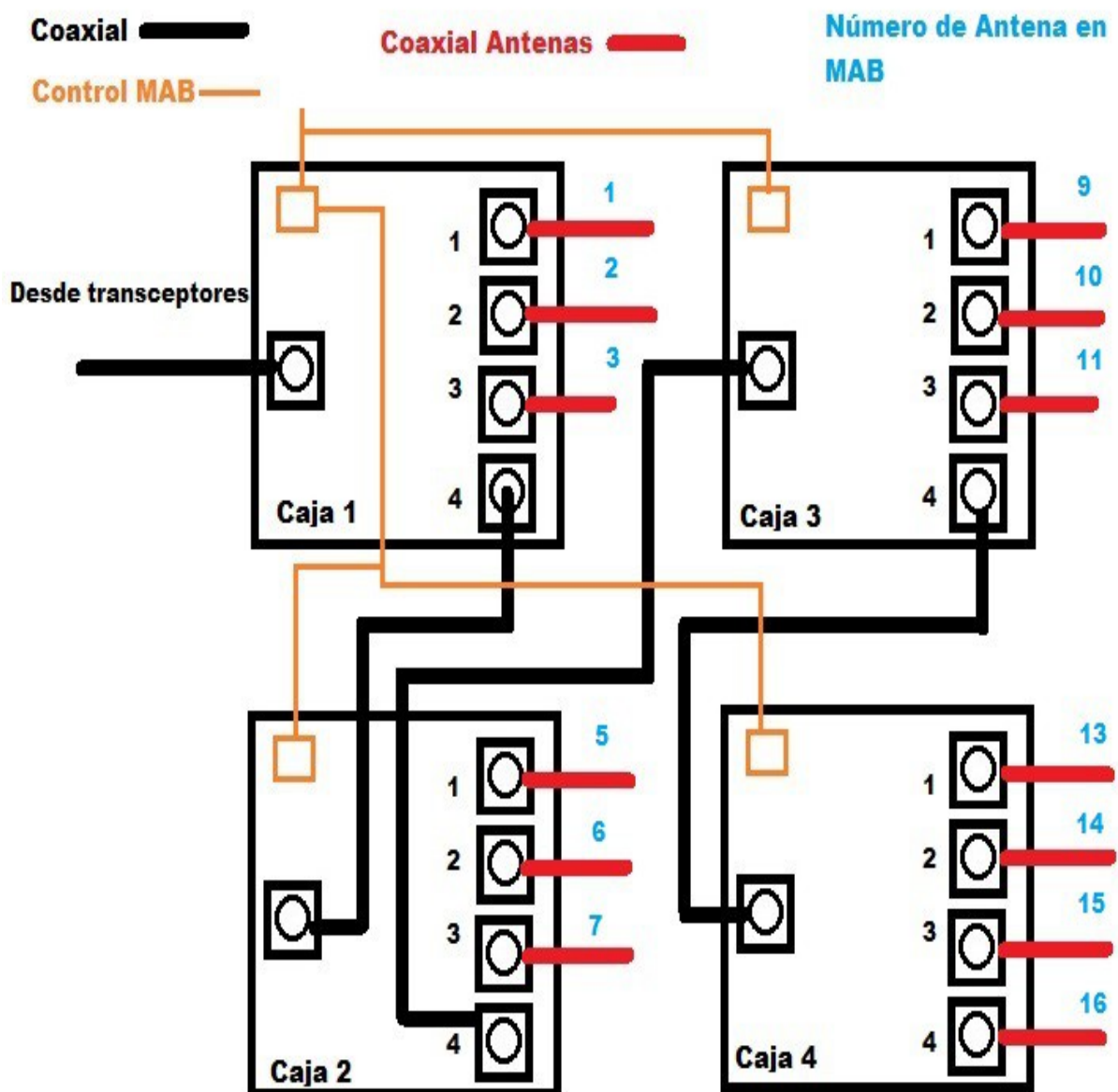
Box 1(Caja 1)	Pin MAB	Box 2(Caja 2)	Pin MAB	Box 3(Caja 3)	Pin MAB
Pin relay 1	8	Pin relay 1	4	Pin relay 1	14
Pin relay 2	7	Pin relay 2	3	Pin relay 2	15
Pin relay 3	6	Pin relay 3	2	Pin relay 3	16
Pin relay 4	5	Pin relay 4	1	Pin relay 4	17

If for example you decide to use 2 boxes of relays, one of 4 antennas as first box and one of 6 antennas as second box, theoretically has a maximum of 10 antennas, but they really are 9, since the antenna 4 of the first box is used to connect the second box, so that from the first box can connect 3 antennas and in the second box can connect the 6.



Box 1(Caja 1)	Pin control MAB	Box 2(Caja 2)	Pin control MAB
Pin relay 1	8	Pin relay 1	4
Pin relay 2	7	Pin relay 2	3
Pin relay 3	6	Pin relay 3	2
Pin relay 4	5	Pin relay 4	1
		Pin relay 5	14
		Pin relay 6	15

If, for example, you decide to use 4 boxes of 4 relays, theoretically it has a maximum of 16 antennas, but they really are 13, since the antenna 4 of the first box is used to connect the second box, so that of the first Box can connect 3 antennas. Just as in the case 1 the antenna 4 is used to connect the second box, the antenna 4 of this second box will allow us to connect the third box, and the antenna 4 of this third box will allow us to connect the fourth, so That in the first box we can connect 3 antennas, in the second box 3 other antennas, in the third 3 antennas and in the fourth box we can connect 4 antennas.



Box 1 (Caja 1)	Pin control MAB	Box 2 (Caja 2)	Pin control MAB
Pin relay 1	8	Pin relay 1	4
Pin relay 2	7	Pin relay 2	3
Pin relay 3	6	Pin relay 3	2
Pin relay 4	5	Pin relay 4	1

Box 3 (Caja 3)	Pin control MAB	Box 4 (Caja 4)	Pin control MAB
Pin relay 1	14	Pin relay 1	18
Pin relay 2	15	Pin relay 2	19
Pin relay 3	16	Pin relay 3	20
Pin relay 4	17	Pin relay 4	21

LIMITATIONS

Yaesu Transceivers manufactured before 2005 can not be used through the RS-232 port. The problem is that a large number of Transceivers do not use the same CAT codes to read the frequency and this would mean writing code for each Transceiver and being able to select it. As these Transceivers allows the Yaesu Band Data BCD protocol, they can also be used in automatic mode both operating as normal switch and SO2R function.

MAB, in case of being turned off does not save the last selected antenna. It is not due to the impossibility of programming the MAB software but to the Arduino EPROM memory which is limited to about 100,000 recordings. Since the MAB shutdown is complete, this information can not be recorded before shutting it down. You could choose to record this data from time to time, but you have the inconvenience that in case you will shut down MAB in that time interval, it would not record it correctly.

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