JC-5

4KW PEP , 1KW RMS AUTO ANTENNA COUPLER

1) **DIRECTLY CONTROLLED BY ICOM, ALINCO & KENWOOD.**
2) **INDEPENDENT CAPACITOR INPUT AND OUTPUT BLOCKS!**
3) **3 mm COIL WIRE & INTERNAL FAN FOR THE BIG COILS!**
4) **DIPPED SILVER MICA CAPACITORS ON THE INPUT CIRCUIT**
5) **CERAMIC DOORKNOB CAPACITORS (7.5 KV) ON THE OUTPUT!**
6) **10 VACUUM RELAYS (8 KV) & 19 SCHRACK RELAYS.**
7) **4KW SSB, CW (EXCEPT λ/2 ANTENNAS)**
8) **"TUNED" START UP AT THE LAST USED FREQUENCY!**
9) **50 MEMORY POSITIONS - NO INTERNAL BATTERY!**
10) **PROTECTION FROM STATIC DISCHARGE WHILE OPERATING!**
11) **INTERNAL 12 V- 1.6 A FUSE.**
12) **A TO D SWR CONVERSION FOR HIGHER TUNING ACCURACY!**

WHEN A SEPARATE POWER SUPPLY IS USED FOR THE COUPLER, WE MUST CONNECT THE (–) TERMINAL OF THE SUPPLY TO THE CHASSIS OF THE USED TRANSCEIVER TO CLOSE THE RETURN 12 V PATH VIA THE SHIELD OF THE COAXIAL CABLE.

1. BROWN (1)	**OPERATING VOLTAGE**	**+12V**
2. GREY (2)	**TUNE COMMAND TO COUPLER**	**START**
3. YELLOW (3)	**TX COMMAND TO TRANSCEIVER**	**KEY**
4. BLACK (4)	**0V ➔ MEM OFF , +12V ➔ MEM ON**	**MEM CONTROL**

A FEW WORDS ABOUT JC-5

JC-5 was designed to cover the needs of high power professional use and increased reliability. So, materials of the best in market were used, despite the high cost of some of them, due to their limited production! At the pictures you can take a look at the inside of the coupler. In the photos we can see mounted in a row the vacuum relays, by which the high voltage doorknob ceramic capacitors are selected. We can also see the high voltage copper wiring above the p.c. board. The reason we did not construct the high voltage paths on the board is that we don't consider the p.c. board reliable enough for withstanding voltages of the order of 8 KV that may appear at the output of the coupler when λ/2 or short vertical antennas are used!

TUNING PROCEDURE WITH THE CONTROL BOX

We set the switch of the control box to the M position if we intend to use memories or to the O position, if not. We set the transceiver to AM, FM, CW or RTTY mode with the output power adjusted in the range 10 – 20 W. We push the PTT and keep it pushed. We push the button until the LED is lit. We wait until the LED goes off and then we stop transmitting. If the LED quickly turns on and off at the end of the tuning procedure, the tuning procedure has failed and the coupler goes THROUGH. Starting up the coupler, if the switch is at the M position, it recalls the last used memorized frequency, otherwise it goes to the THROUGH state!
If the tune button is pushed for less then 0,25 seconde , in any case, the coupler goes **THROUGH** and the LED does not glow at all!

In case we use more that 50 W during the tuning procedure, the control box LED remains constantly lit and the coupler waits until input power falls below 50 W to complete the tuning process!
IF WHILE TUNING, THE RF POWER MOMENTARILY EXCEEDS 40 – 50 WATTS, THE LED ON THE CONTROL BOX GIVES THE DANGER CODE AND THE COUPLER FREEZES, PUTTING THE CONTROLLER TO THE "**POWERDOWN**" STATE. **THIS MEANS THAT THE USER MUST REMOVE THE 12 V SUPPLY FROM THE COUPLER FOR ABOUT 5 SECONDS !** THE REASON FOR THIS IS TO GIVE THE USER TIME TO REALIZE WHAT WENT WRONG AND **REMEMBER TO KEEP RF POWER AT THE RIGHT LEVEL WHILE TUNING . THE DUMMYLOAD (**USED INSIDE THE COUPLER WHILE TUNING) **AND THE RELAYS** WILL BE DESTROYED IF THE COUPLER IS FREE TO PERFORM TUNING WITH HIGH POWER! **THE RELAYS USED IN ALL OF OUR COUPLERS, ESPECIALLY THE VACUUM ONES,CANNOT TOLERATE HOT SWITCHING !**

To erase the memories, we set the switch of the control box to the M position, we press the button immediately and we set the switch to the O position. The LED starts blinking and when it stops, the memories have been erased! (The memory erasing process is carried out without transmitting!)

REMARKS:

1. **The closer we use an antenna to its resonant frequency (λ/4), the more power we can apply to it via a coupler, because in this condition the coupler is using the least of its components to match the antenna and there is no possibility of overheating inductors and capacitors!**
2. **The performance of the system depends on the used antenna and counterpoise. The role of the coupler ends when the SWR is reduced to the lowest in any case possible level.**
3. **In case we face problems, we act as follows:**

a. **We check /fix the counterpoise system.**
b. **We ensure that any wires, cables or metal posts are located far enough from the antenna and their directions are perpendicular to the antenna**.
c. **We use another transceiver which is in good condition to check the system.**

The counterpoise system is of utmost importance in antennas shorter or equal to λ/4. The shorter from λ/4 an antenna is, the more it depends on the counterpoise system. As a general rule we can assume that the electrical length of the counterpoise must be greater than that of the antenna. It is preferable to place a metal grid, or many wires just below the ground terminal of the coupler then a long piece of wire that is connected to some distant metal tube, water pipe or the actual ground (the earth).

ANTENNAS

1. **6.5 meters vertical for 3.5 – 29 MHz, performing better on 24 - 30 MHz.**
2. **12 meters vertical for 1.8 – 30 MHz, performing better on the lower bands.**
   DON'T USE MAXIMUM POWER WITH THESE ANTENNAS FOR f < 7 MHz!
3. **Horizontal wire 25 – 40 meters with a diameter at least 3 mm and a height about 10 m above the ground . For a real high performance, if we have the available space, it is very good to place the wire about 20 m above the ground, between two buildings. We note here that anything that exists right below the antenna is considered as ground. So don't go on believing that if the antenna is placed 5 meters up from the roof of a building 20 meters high, the antenna is 25 meters above the ground. The antenna considers the top of the building as ground!**

The counterpoise must be as close to the coupler as possible!

SPECIFICATIONS

Circuit type	**L or Π**
Input capacitance step	**25pF**
Output capacitance step	**12pF**
Inductance step	**0.04μH**
Total input capacitance	**3200 pf DIPPED SILVER MICA**
Total output capacitance	**1600 pf DOORKNOB CERAMIC 7.5 KV**
Total inductance	**40μH (3 mm WIRE)**
Used input relays (RX114012C)	**19 x SCHRACK (1KV withstanding voltage)**
Used output relays (GR6JNB218)	**10 x like GIGAVAC (8KV withstanding voltage)**
Operating frequencies	**1.8 to 30 MHZ**
Maximum power for 25 meters antenna	**4 KWpep => SSB & CW (1 KW => AM, FM, RTTY & ALL CARRIER MODES FOR A SHORT TIME!)**
ATMEL controller	**AT89C4051 - 24P**
Communication with RELAYS and memories	**I2C**
Maximum tuning power	**50 W CARRIER**
Typical tuning time	**1 – 4 sec.**
Maximum tuning time **Memory tune time**	**6 sec.** **0.02 sec**
D.C. supply voltage	**12 – 16 V**
Maximum supply current	**1 A**
Typical VSWR (in the tuner input)	**< 1.1 : 1**
Maximum VSWR (in the tuner input)	**< 2.0 : 1**
Protection	**Static discharge (NOT FOR THUNDER FALL!)**
Dimensions (without metal holder) **Weight**	**39.5 x 31 x 13.5 cm** **5 Kg**

STANDARD CONTROL BOX WIRES

LONG RED & BLACK	**=> 12 VDC TO TRANSCEIVER POWER SUPPLY**
SHORT BROWN	**=> +12 V TO COUPLER (PIN 1)**
SHORT GREY	**=> START TO COUPLER (PIN 2)**
SHORT YELLOW	**=> KEY TO COUPLER (PIN 3)**
SHORT BLACK	**=> MEMORY CONTROL TO COUPLER (PIN 4)**

*DIRECT COMMUNICATION WITH TRANSCEIVERS

<table>
<tr><th>YAESU</th><th>ALINCO</th><th>ICOM</th><th colspan="3">KENWOOD</th></tr>
<tr><td rowspan="2">YAESU does not use the KEY-START logic. They exchange data with their transceivers using a single wire. So the coupler can only cooperate with YAESU transceivers with the standard control box.</td><td>  </td><td>  </td><td>  </td><td> 
KEY</td><td> 
GND</td></tr>
<tr><td>SRT KEY +12V GND</td><td>GND +12V SRT KEY</td><td></td><td>
SRT</td><td>
+12V</td></tr>
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*****We connect +12V, START and KEY of the JC-5 with the appropriate connector. The GND of the transceiver's connector does not need to be connected to the COUPLER. It gets there from the shield of the coaxial line! The MENU of the transceiver must be programmed, if needed!
We recommend to connect the black cable to the +12v to switch the internal memories on.

If you connect the tuner direct to a radio like above you do not need the control box which is provided. The control box is only needed if you do NOT connect a radio like above.
You can use ANY HF radio with the control box.

We recommend that you first get familiar with the external control box how the system works.

NOW, GENERALLY SPEAKING, IT IS A GOOD PRACTICE, IF A LINEAR AMPLIFIER IS USED, **NOT TO CONTROL THE COUPLER DIRECTLY** FROM AN ICOM, KENWOOD OR ANY OTHER TRANSCEIVER USING THE "KEY – START LOGIC". BETTER USE THE MANUAL CONTROL BOX, SO THAT NOTHING STRANGE WILL HAPPEN DUE TO STRONG RF FIELDS, IN CASE TRANSMITTING ANTENNA IS VERY NEAR THE SHACK !

If you place the tuner outside please pay good attention to the connectors.
All connectors have to be protected with rubber tape to avoid water inside the connectors.
(Coax connector and 4 pin control connector)

TRANSCEIVER - COUPLER CONTROL CABLE: 4 x 0,75 mm or better. (Brown, Grey, Yellow and Black are the preferred colors but it makes no difference ofcours)
If you use a short control wire (< 25 meter) a normal UTP cable will do the job.
(But use all 8 wires)
But it is common sense that UTP cable is not produced for 12 Volt DC voltage power use.
UTP is used only for low current signals like a network.

IT IS ALSO VERY IMPORTANT TO ROOT THE CABLES FEEDING AND CONTROLLING THE COUPLER AS FAR AWAY AS POSSIBLE FROM THE ANTENNA FIELD, TO AVOID INTERFERENCE, ESPECIALLY IN THE KEY-START COMMANDS OF THE COUPLER. IT WOULDN'T BE BAD TO USE SHIELDED 4 WIRE CABLE FOR THE CONTROL AND EXPERIMENT FOR THE BEST POINT TO CONNECT THE SHIELD OF THE CABLE FOR BEST RESULTS ! (NEEDS SOME EXPERIENCE, OF COURSE)
(THERE ARE CASES THE COUPLER MAY GO **THROUGH** OR GET A **"START TUNING"** COMMAND UNEXPECTEDLY, WHILE TRANSMITTING WITH THE AMPLIFIER ACTIVATED, BECAUSE OF RF FEEDBACK !!!)
NEVER ATTEMPT TO CORRECT THE SWR USING AN INDOOR TUNER, ESPECIALLY IF THE EXTERNAL COUPLER UNEXPECTEDLY AND CONTINUOUSLY REFUSES TO KEEP THE SWR AT THE LEVEL <u>YOU KNOW IT CAN ACCOMPLISH</u>.

TAKE IT DOWN IMMEDIATELY AND CHECK IT, BECAUSE SOMETHING MAY BE BURNED INSIDE AND THE MORE YOU INSIST TRANSMITTING, THE MORE DAMAGE YOU MAY CAUSE !!!

IN ANY CASE, DO NOT CORRECT SWR WITH THE COUPLER THROUGH, USING AN INDOOR TUNER. AS THE ANTENNA FEED-POINT IMPEDANCE IS GETTING HIGHER THAN 50 OHMS (WITH ITS MAXIMUM VALUE NEAR λ/2) THE SAME AMOUNT OF POWER MUST BE SUPPLIED IN THE FORM OF LOWER CURRENT, BUT HIGHER VOLTAGE. SINCE THE INPUT CIRCUITS OF THE COUPLER WERE DESIGNED TO HANDLE POWER IN THE VICINITY OF 50 OHMS, THEY WILL BE DESTROYED !
IF THE USED ANTENNA IS NOT NEAR 50 OHMS AT THE OPERATING FREQUENCY, EVEN WITH MODERATE POWER LEVELS, THE COUPLER MAY SUFFER !!!

If you have any question please contact us.

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Nice solutions for hamradio

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