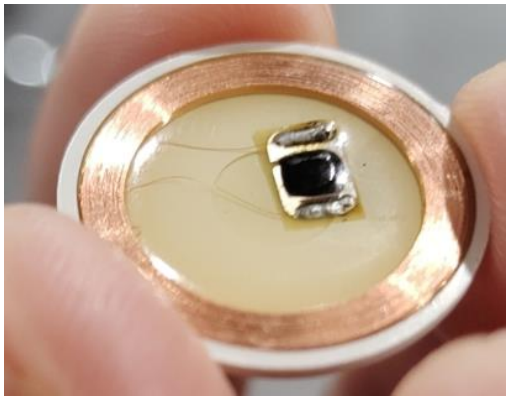
RFID ICs for Millennium RFID Chess Boards: Assembly Instructions

Important Notes: Risk of malfunction & limited warranty

Please read this instruction carefully before you are modifying your chess man.

1) Modification of existing Chess Man involves a risk of malfunction.
2) The materials used in your chess man may influence the performance of the RFID ICs strongly and even lead to complete failure.
3) Mistakes in the assembly process my damage the RFIDs.
4) You need to modify your chess man and drill a sink in the bottom to place the RFID. This process cannot be undone if you find afterwards that it doesn't work as expected.
5) Note that in all these cases, we do not take any liability, neither for malfunctioning Tags after the assembly process nor for destroyed Chess Man. The assembly of the Tags and customization of chess man is fully under your own risk.
6) We supply those RFID tags as a special service to our customers.
   Our warranty for those Tags is therefore valid only for unmounted tags.
7) Please also note that these unassembled tags are not made for play on their own. They need the surrounding chess man for protection of the IC.



RFID Tag, upside (towards the chess man)

RFID Tag, downside (towards the board)

Requirements for Chess Man to be modified

Your chess man can be customized if they meet the following requirements:

1) Chess Man must come with a base diameter not less then 26 mm.
2) The base must be high enough to allow to add the RFID IC.
3) Chess Man must have a RFID Signal compliant material and weight. Magnetic Materials like Iron, Steel and ferrite must be avoided, as they may kill the RFID Signal.
4) Flat weights on the bottom of the piece in any conducting material are a no-go.

Materials needed for Chess Man Modification

Please prepare the following stuff before you start to customize:

1) 22 mm – or slightly larger - Forstner bit
2) Glue, Silicone or Sticky Tape
3) Felt

Test 1: Testing the bare RFID Tags

Test the tags before you start. This way you can identify in the later process where potential problems might come from.

1) All Tags have been tested and programmed by us already.
2) Before you start to modify your chess man, test the set supplied to confirm proper function for yourself before you assemble your chess man.
3) To test them, enter the Position Setup Mode / Board Control mode of your Chess Computer or the ChessLink App.
4) Now place all RFID Tags on the board, and check if the pieces marked on the tags appear on your screen.
5) If this is confirmed, the Tags work fine and you can go ahead.

Note that our warranty ends at this stage. If you do not wish to continue, we recommend you order readymade full Chess Man Sets from the Millennium Webstore.

Test 2: Testing the RFID tags together with your chess man

Now get an indication how the tags might interact with your chess man.

1) Place ALL of the Chess Man you wish to modify carefully on top of the RFID Tags sitting on your chess board.
2) Monitor the Apps or Chess Computers screen carefully to see if all pieces are still on the correct position.
3) **Pay special attention to check if chess man disappear and reappear for short periods - socalled“flickering”.** If yes, then this is a clear sign that your chess man’s material (usually the weight used) is **not compatible to RFID technology**. In such cases, **DO NOT MODIFY YOUR CHESS MAN.**
4) If you do not see any negative effect by the chess man sitting on top of the Tags, then this is an indicator that the Chess Man might be OK to use. However please note: This is not a guarantee, as the distance between weight and tag also plays a huge role. And the distance will get shorter by drilling your chess man.

Drill the holes into the bottom of your Chess Man

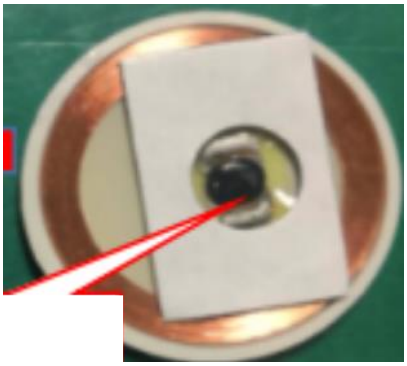
1) Use a 22 mm or larger Forstner bit to drill a hole to the bottom of your chess man:
    a. The hole needs to be between 2.0 mm to 2.8 mm deep.
        i. If you wish to install the Tags with the EVA protector (our recommendation), drill 2.5 – 2.8 mm deep.
        ii. If you have not enough space and wish to install without the EVA protector, drill 2 – 2.3 mm deep.
        iii. See page 4 for further information.
    b. The minimum wide of the hole must be 22 mm – the tag has a size of 20 x 1.7 mm..
2) Make sure, that the remaining wood on the side is thick enough. Chess Man with less then 26 mm base diameter can not be used. Check especially your pawns as they are typically the ones with the slimmest base. The thicker the base diameter is, the more robust the chess man will remain. We recommend **a minimum wall thickness of 2 mm around the drilled hole**.
3) If your hole is not deep enough, the Tag may look out of the hole at the bottom. This way, your Tag will go defective after same time of using due to the permanent shocks directly on the tag while moving the pieces. So be certain that the tags are **completely inside** the chess man.

Check the weight of your Chess Man

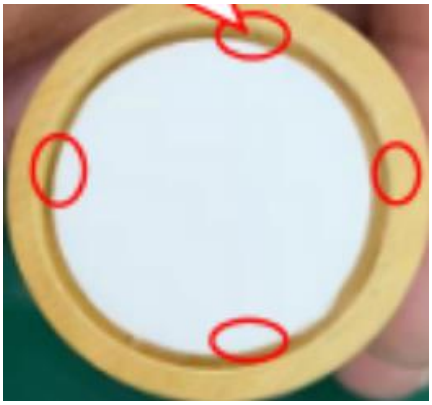
1) Now check if you see any weight inside the Chess Man. Note that the weight of your chess man must be non-magnetic. Magnetic material will disturb the RFID Signal, you may find malfunctioning pieces if you use such chess man.
2) Examples for chess man weight which can be used is cooper, brass or concrete.
3) Examples of chess man weight which you should avoid is Iron, Steel or Ferrite. They may work if those weights are rod shaped and not too thick and not close to the tag.
4) Rod Weights: Often weight is added as a rod in the middle of the chess man.
    a. If there is a weight rod inside your chess man, **the distance between the weight rod and the RFID must be at least the same amount as the diameter of the rod**. So if your chess man comes with a 6 mm thick brass rod, the distance between the bottom of this rod and the RFID Tag must be 6mm or more as well. This avoids RFID Signal disturbance.
    b. Note that heavier pieces like Queens, Rooks etc. often use thicker rods then Pawns, so check each piece individually.
    c. If you find that your weight is to long, you need to shorten it. If you find that your weight is not suitable, you must remove it or replace it by a suitable material.
    d. Now fill the little hole of the weight rod (if any) completely with glue or silicone. This prevents the weight rod to fall down over time onto the RFID. Let it dry carefully.

5) Flat Weights: Should your chess man use flat weights, the material of these weights is essential. Flat weights on the bottom of the piece **in any conducting material** are a no-go. We suggest you simply remove them completly.

Assembly of the RFID Tag



1) Place the RFID Tag into the drilled hole in the center. The side with the coil normally looks upwards. The side with the white plastics looks downwards to your board.
2) If you have enough space, add the EVA foam provided with the tags as showed in the picture (between the chess man and the IC). This puts additional protection to the RFID IC, however, it adds some height. If you don't have the height, you may leave it away.
3) Check again that the white plastic of the Tag does not look out of the Chess Man. If it does, repeat the process and drill the hole deeper.
4) Now it is the right time to test your piece again on your chess board. Does it appear constantly?
5) Now fix the tag with 4 glue spots. Let it dry carefully.
6) If the tag sits slightly to deep, fill the hole with silicone. 1-1.5 mm is no problem for the signal strength.
7) Apply a felt of your choice to the bottom of your chess man.
8) Your Chess Man is ready to play.
9) Repeat the process for the rest of the chess man.



Notes: Apply glue, silicone, or tape on to the plastic side of the tag only. Do not add any glue, sticky tape, or silicone on top of the IC.

Legal Information

Millennium 2000 GmbH hereby declares that the device conforms to the relevant EC directives (in particular those mentioned below), and that the series was manufactured accordingly:

- (EMC) Electromagnetic Compatibility 2014/30/EU
- (WEEE) Waste Electrical and Electronic Equipment 2012/19/EU
- (RoHS) Restriction of Hazardous Substances Directive 2011/65/EC

The certificate of conformity may be requested at info@millennium2000.de

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