Assembly Manual for ISDR-136-KIT

This SDR receiver kit is intended for the 136kHz band. The kit utilizes DIP IC components (no SMD) so that even a beginner can assemble the kit in a few hours. (FST3253 is converted to DIP as shipped, so you don't need to train yourself how to solder SMD.) The kit consists of an SDR main PCB and an I/F PCB for your easier assembly.

Specifications:

RX Coverage: 106kHz ~ 154kHz (when a 48kHz sound card is used.)
SDR Center Freq.：130kHz (8.32MHz ÷ 16 ÷ 4)
Operational Voltages： 9VDC ～ 13.8VDC

(The white connectors are not included in the kit. If needed, please prepare at end user's end.)

Case History

The built receiver has been used to run a 137,777kHz grabber at:
http://icas.to/argo

Parts List – SDR Main PCB

Marking	Value	Description	Remarks
D1	1N4004	Diode	
C1	0.01uF	Ceramic Cap.	
C2	4.7uF	Ceramic Cap.	
C3	0.1uF	Ceramic Cap.	
C4	330pF	Ceramic Cap.	
C5	330pF	Ceramic Cap.	
C6	0.1uF	Ceramic Cap.	
C7	0.1uF	Ceramic Cap.	
C8	0.047uF	Ceramic Cap.	
C9	0.01uF	Ceramic Cap.	
C10	4.7uF	Ceramic Cap.	
C11	0.1uF	Ceramic Cap.	
C12	0.1uF	Ceramic Cap.	
C13	4.7uF	Ceramic Cap.	
C14	0.01uF	Ceramic Cap.	
C15	4.7uF	Ceramic Cap.	
C16	0.1uF	Ceramic Cap.	
C17	0.1uF	Ceramic Cap.	
C18	0.1uF	Ceramic Cap.	
C19	0.1uF	Ceramic Cap.	
C25	0.047uF	Ceramic Cap.	
R1	10Ω	resistor	
R2	10Ω	resistor	
R3	100Ω	resistor	
R4	10k	resistor	
R5	1k	resistor	
R6	4.7k	resistor	
R7	4.7k	resistor	
R8	1k	resistor	
R9	100Ω	resistor	
R10	100Ω	resistor	
R11	10Ω	resistor	
R12	10Ω	resistor	
R13	10k	resistor	
R14	10k	resistor	
		Continued to next page	

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IC1	74AC74	4-time Divider	or 74HC74 maybe supplied
IC2	7805	5VDC 3-terminal regulator	
IC3	FST3253	already converted to DIP 16-pin adapter	
C4	NJM2068	OP Amp.	
F1	Fuse	Electronic Fuse 0.5A	
Socket		24-pin DIP IC socket, Wide	Needs to cut to 16 pins
Socket		8-pin DIP IC socket	
Pinheader Socket		10-pin female black 1pc 2-pin female black	
Switch		2P Toggle Switch	3P may be supplied
Connector		BNC connector, female	
Connector		Power Connector – a pair of Jack and Socket	2.1mmφ
Jack		3P mini-stereo jack	3.5mmφ

Assembly of SDR Main PCB

Start assembling in referring to the schematics which are attached at the last part of this manual.
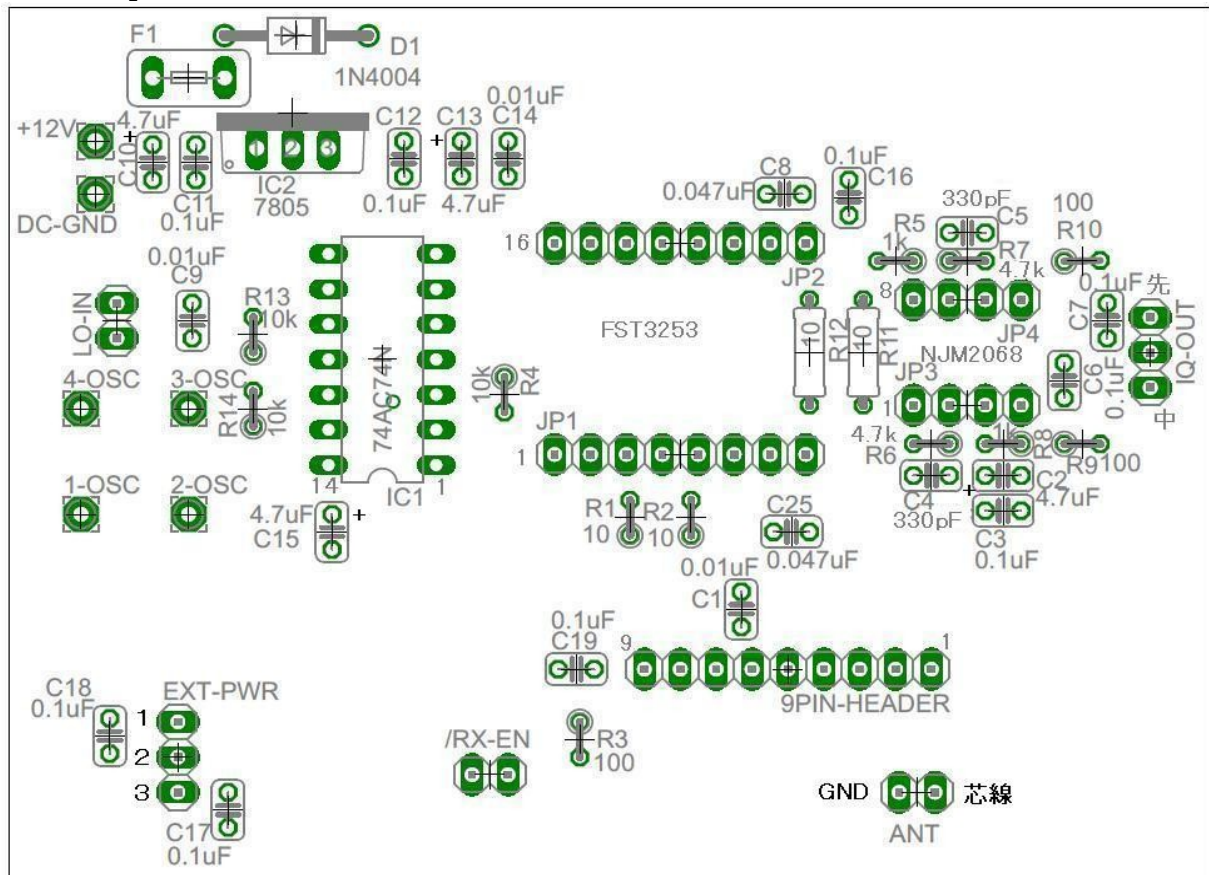
IC Sockets

Use the IC sockets if required. Maintenance will be easier if you use sockets.

IQ-OUT

"先" of IQ-OUT should be connected to the tip of 3P mini-stereo plug, and "中" to the ring of the plug respectively. The center of IQ-OUT should be connected to the ground of the plug.

9PIN-HEADER

10-pin black female socket should be soldered onto "9PIN-HEADER". Due to the availability of the socket, one pin is not needed, so only 9 pins will be used. (You had better pull out the right-most pin to make it a 9-pin socket.)

EXT-PWR

This is to provide a 5VDC power to the I/F PCB. Place the 2-pin black header pin socket on Holes 1 and 2, and solder. Hole 3 is not used. **Hole 3 supplies 12VDC, and is for future expansion use. Do not connect anything to Hole 3 unless you need to modify the circuit yourself.**

/RX-EN

Shorting the /RX-EN pins will activate RX. For general use, you need to have the /RX-EN pins shorted while in RX. When you use this receiver with a transmitter, the pins must be shorted while in RX, and had better be open while in TX.

LO-IN

If you prefer to use an external local oscillating frequency source instead of the bundled 8.32MHz OSC, you can provide the external signal from this terminal. Leave the terminal intact when you use the bundled 8.32MHz OSC.

1-OSC, 2-OSC, 3-OSC, 4-OSC

If you prefer to use a square OSC instead of the bundled 8.32MHz OSC, you can place such an OSC directly here. (No division will be made in that case.) Leave the terminal intact when you use the bundled 8.32MHz OSC.

Parts List – I/F PCB

Marking	Value	Description	Remarks
C1	0.022uF	Ceramic Cap.	
C2	0.047uF	Ceramic Cap.	
C3	0.022uF	Ceramic Cap.	
C4	0.1uF	Ceramic Cap.	
C5	0.1uF	Ceramic Cap.	
C6	0.1uF	Ceramic Cap.	
R1	10kΩ	resistor	not used
L1	68uH	Axial type Inductor	Blue-Grey-Black
L2	68uH	Axial type Inductor	Blue-Grey-Black
		Ferrite Core - FT50-61	Prim 28 turns - about 58cm Sec 16 turns - about 34cm x 2
OSC	8.32MHz	Oscillator	
IC1	74HC4060	Divider IC	Divided by 16
PIN-HEAD		Header Pin	9pins + 2pins
UEW		UEW Wire	required length

Assembly of I/F PCB

Start assembling in referring to the schematics which are attached at the last part of this manual.
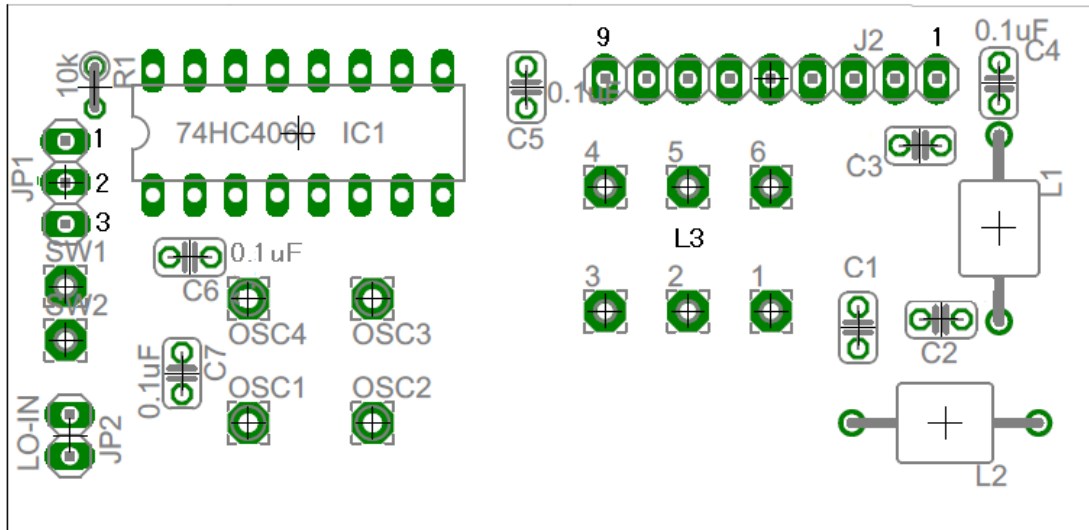
How to Wind L3:

When a wire goes through the core once, it is counted as one turn.

Example of "One Turn" (The core shown above is for reference only and does not represent the real core used in this kit.)

L3 consists of the primary winding (1-6) and the secondary windings (2-5 & 3-4)

First, you can start winding the primary 28 turns on the FT50-61 core.

(The above reference does not represent the actual core or winding, but for easier reference only.)
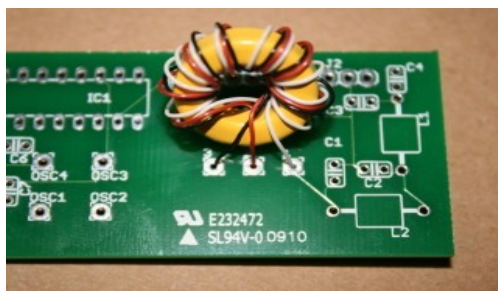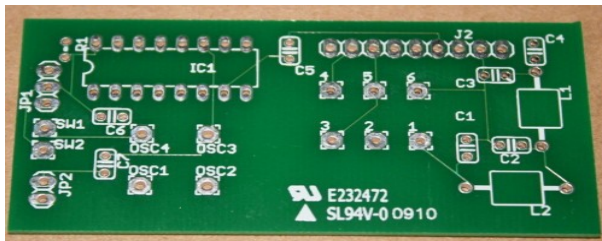
Next, prepare two wires and twist them once at centers of 2 to 3cm.

Over the primary winding, wind the secondaries 16 turns in the same direction.

You can refer to the following photos showing how to install the core onto the I/F PCB.

1-6 Primary, White, 28 turns
2-5 Secondary, Red, 16 turns (bi-filar)
3-4 Secondary, Black, 16 turns(bi-filar)

L1&L2

Wind 14 turns on FT37-43 core. (not used any longer for now)
Now, L1 and L2 use axial type inductors. The body looks like conventional resistors, but has green body color with color codes printed.

JP1

Underneath the PCB, place the 2-pin header pins onto the Holes 1 an 2 of JP1 and solder.
Hole 3 provides 12VDC for future use. Do not connect anything to this Hole 3 unless any modification is required.

JP2

This terminal can be used when you use an external LO source such as a USB synthesizer kit. Leave this intact when you use the bundled 8.32MHz OSC.

J2

Underneath the PCB, solder the 9-pin header pins.

(On the schematics, J1 does not exist. "J1" was deleted after modification was made.)

SW1/SW2

When you use an external signal source for LO, you can switch the terminal ON/OFF. When you use the bundled 8.32MHz OSC, just jumper here so the power is always connected to the OSC.

OSC

The Pin 1 of the 8.32MHz OSC should fit into the Hole OSC1. The OSC is of a 8-pin DIP IC type, so the Pin 1 is located left-most at the bottom when the orientation marking is placed at your left.
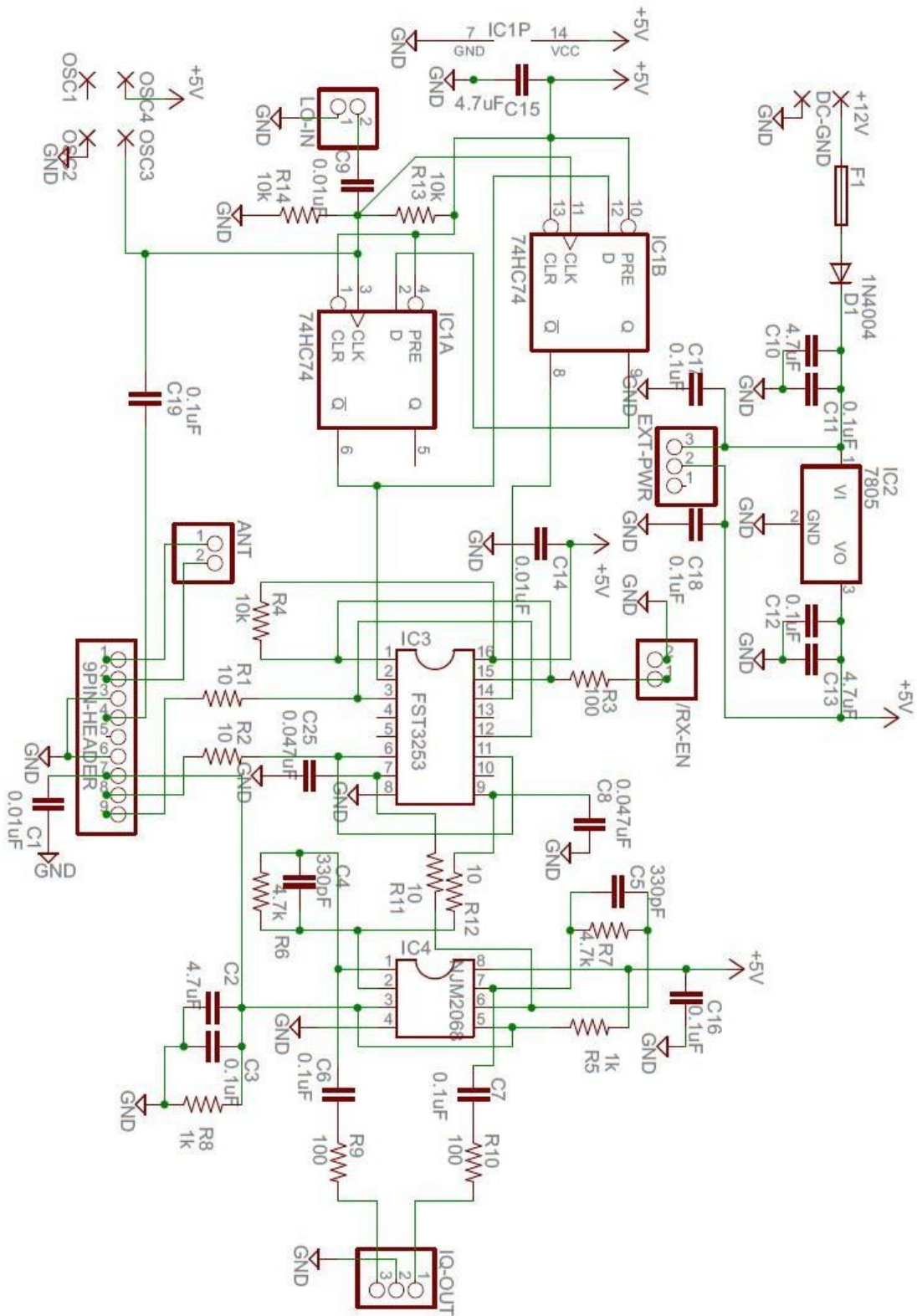
Assembly Completion

After the completion of the assembly, insert the I/F PCB onto the main SDR PCB.

Before casing, make sure that the kit works all OK.

Download your favorite SDR software and enjoy listening to the 2200m band!

ISDR-136-KIT – SDR Main PCB Schematics

136kHz I/F PCB Schematics　(R1 10kΩ is not used.)