

DP-666 High Sensitivity Color Screen Radio

Product Manual V1.1 (Based on Megatron Mod17 firmware)



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Product Introduction:

DP-666 is a high-sensitivity radio developed by DEEPELEC based on NXP's high-performance automotive-grade TEF6686 chip, which has excellent selectivity and ultra-high sensitivity. This automotive DSP tuner has a wide range of functions and advanced algorithms (CEQ, EMS, iMS and PACS, noise canceller...), SDR(software-defined radio) signal processing, especially for improvement of multipath, adjacent frequency interference, weak signals. There are significant advantages in processing and noise cancellation.

DP-666 is a radio built on PE5PVB's open source project TEF6686_ESP32. In addition to listening to radio stations, the project also supports a wealth of advanced features, such as: almost all RDS (Radio Data System) data display, automatic/manual station scanning, squelch function, battery voltage display, changeable themes, multilingual, station presets, and more.

We redesigned the circuit board with reference to the mature TEF6686 front-end receiving circuit, and equipped the DP-666 with a 2.8-inch LCD color screen with resistive touch based on the open source project. While ensuring the portability of the radio, it can display rich RDS information (RDS information requires local radio support); a numeric keypad is added to facilitate users to quickly input frequencies; and a large-capacity 5000mAH battery supports longer standby time.

In short, I hope you will be satisfied with this portable high-sensitivity travel radio!

As the firmware is still under development and new features will be introduced, this manual is bound to have omissions and errors. Please understand.

PE5PVB project : https://github.com/PE5PVB/TEF6686_ESP32

DP-666 project : https://github.com/flyoob/TEF6686_ESP32

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Basic Parameters:**Radio chip:** NXP TEF6686HN/V102, chip model F8602.**Main control chip:** ESP32-WROOM-32U, Flash 4MB, Wi-Fi + Bluetooth dual-core module.**Display technology:** 2.8-inch 320x240 resolution, IPS full-viewing angle LCD screen with resistive touch.**Control method:** Default numeric keyboard input and knob tuning, also supports third-party touch screen firmware.**Frequency range:**

FM	65-108MHz	Suitable for Russia/Eastern Europe
	76-95MHz	Suitable for Japan
	76-108MHz	Suitable for campus broadcasting
	87-108MHz	Suitable for Europe/Oceania/Africa/Asia
	87.5-108MHz	Suitable for China/United States
	OIRT default stepping is 30kHz, FM stepping is 50/100/200kHz, default is 100kHz	
SW	1700-27000kHz	Default stepping 5kHz
MW	522-1791kHz	Default stepping 9kHz
	520-1720kHz	Default stepping 10kHz
LW	144-513kHz	Default stepping 9kHz

Note: DP-666 does not support the AIR band. The AIR band that appears in the firmware requires an external downconverter to listen to. The downconverter needs to be purchased separately.

Receiving indicators:

	Telescopic antenna receiving sensitivity	Selectivity
FM	FM(S/N=30dB) $\leq 0.5\mu\text{V}$	FM $\geq 60\text{dB}(\pm 150\text{kHz})$
SW	SW(S/N=20dB) $\leq 10\mu\text{V}$	SW $\geq 60\text{dB}(\text{BW}=3\text{kHz}/\pm 5\text{kHz})$
MW	MW(S/N=20dB) $\leq 10\mu\text{V}$	MW $\geq 60\text{dB}(\text{BW}=3\text{kHz}/\pm 9\text{kHz})$
LW	LW(S/N=20dB) $\leq 10\mu\text{V}$	LW $\geq 60\text{dB}(\text{BW}=3\text{kHz}/\pm 9\text{kHz})$

Antenna interface: Full-band external antenna, standard SMA female connector.**Speaker output:** Using TI audio amplifier chip TPA6211A1, driving 45x45mm large-size sound cavity speaker, power 4 Ω /3W, lower output noise and less distortion.**Headphone output:** Using AD headphone amplifier chip MAX97220, standard 3.5mm audio connector output, independent dual amplifier design for speakers and headphones, optimized separately without affecting each other.**Battery:** 3.7V/5000mAh, 18.5Wh, lithium battery size 65x55x10mm.**Current consumption:** About 3.7V/350mA, using time about 15 hours.**Communication interface:** Built-in CH340 USB to serial port chip, through TYPE-C.**Dimensions and weight:** 142*30*80mm (excluding antenna connector and antenna), body weight 300g.

How to Operate:

Basic Operations:

Main Switch: The main switch of the unit, the OFF position disconnects the battery, and the ON position connects the battery. Please turn this switch OFF when the unit is not used for a long time to prevent the power from being turned on by mistake.

POWER: Power button, short press to switch the unit between on and off state.

TUNING Knob(Rotary): Rotate to adjust the frequency, short press to switch the steps, long press to lock or unlock.

VOLUME Knob: Volume adjustment

SQL Gear: Squelch level adjustment((Please refer to the menu description))

BW: Bandwidth selection

In FM mode, short press: Stereo/mono switch

In AM mode, short press: Bandwidth switch, switch between 3/4/6/8kHz

Long press: Open the shortcut page, short press to exit.

MODE: Tuning Mode

Short press: MAN (Manual frequency tuning), AUTO (Automatic search), MEM (Store operation)

Long press: Open the menu page, short press to exit.

BAND: Band Selection

Short press: Band switch, switch between LW/MW/SW/ FML(OIRT)/FM

Long press: Open the screen keypad page, short press to exit.

Press and hold for more than 3 seconds: Sleep or turn off the screen

How to store a station:

- (1) Tune to the station you want to store in a preset.
- (2) Toggle the MODE button until you see "MEM" highlighted.
- (3) Press the TUNING Knob button and "MEM" will turn red.
- (4) Select the desired memory channel.

You will see colors on the preset numbers: red means there are frequencies stored on this preset, green means there are no frequencies stored on this preset.

- (5) Press the TUNING Knob button again to store the preset.

Advanced Operations:

Change the encoder direction: Press and hold the BW button when powering on.

Rotate the screen: Press and hold the MODE button when powering on.

Restore default settings: Press and hold the BW and TUNING Knob button when powering on.

Select standard or optical encoder: Press and hold the TUNING knob while powering on.

Expanded keyboard:

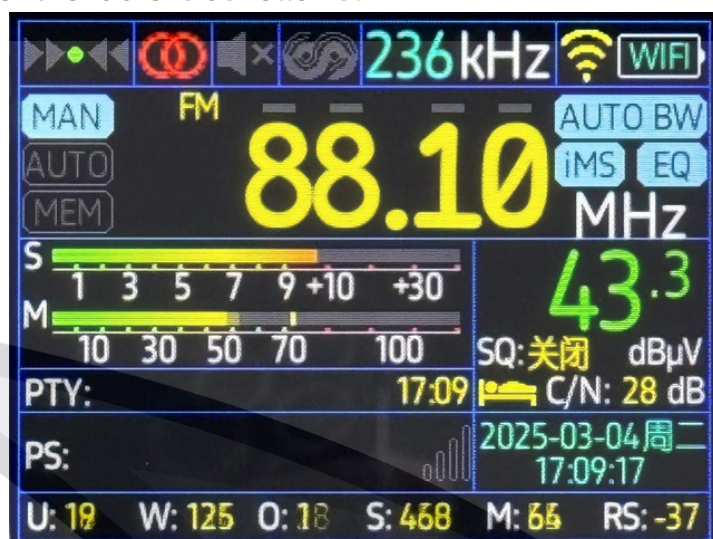
Number keys 0-9: Input the corresponding frequency value

DX button: Quickly save or delete the value being entered, long press to start scan

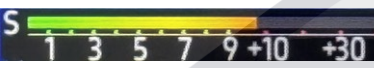
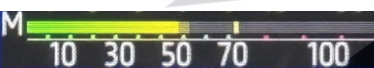
Enter key: Toggle step or confirm input

Main Interface and Icon Meanings:

The main interface of the radio is as follows:



Icon	Meaning	Touch Operation
	Frequency deviation status display	Enter or exit still screen mode
	Current stereo mode indication. 2 circles represent stereo mode, 1 circle represents mono mode.	Stereo/mono mode switch
	Mute status indicator, Highlight means muted.	Enter or exit mute mode
	The RDS icon is displayed, and a bright icon indicates that the RDS information is successfully demodulated.	Enter or exit the advanced RDS view
	Current demodulation bandwidth indication.	Demodulation bandwidth switch, switch between 56/64/72/84/97/114/133/151/168/184/200/217/236/254/287/287/311kHz/AUTO BW. If you do not understand this parameter, please select the default AUTO BW.
	WIFI status indication (WIFI function is under development)	
	Battery voltage/charge percentage indicator. Voltage detection is unavailable after Wi-Fi is turned on	Enter or exit screensaver mode

	Current tuning mode: MAN (Manual frequency tuning) AUTO (Automatic search) MEM (Store operation)	Select the corresponding tuning mode
	Current working mode, LW/MW/SW/ FML(OIRT)/FM	Open the screen keypad
	Current frequency, the small horizontal bar above the frequency number highlights the corresponding step value; All off means using the default step.	Open the screen keypad
	Demodulation bandwidth setting, manually select bandwidth or automatically adjust bandwidth.	Turn automatic bandwidth adjustment on or off
	FM Improved Multipath Suppression	Turn iMS on or off
	FM Channel Equalization	Turn EQ on or off
	Current signal strength meter	
	Current modulation level	
	Current signal strength value	Left half area: open the shortcut page Right half area: open the menu page
	Displays the squelch level. OFF means squelch is off.	Touch this area to activate the adjustment, label turns green to indicate that it is activated. At this time, rotating the TUNING can adjust the squelch level value.
	Sleep mode indicator	Turn sleep mode on or off
	Carrier-to-noise ratio	
	RDS Information, Programme Type	
	RDS Information, Programme Service Name	Left half area: turn down Right half area: turn up
	RDS Information, Programme Identification	Switch to display PI or time or date and time
	RDS Information, Radio Text	Switch to display RT or debug information

Shortcut page:

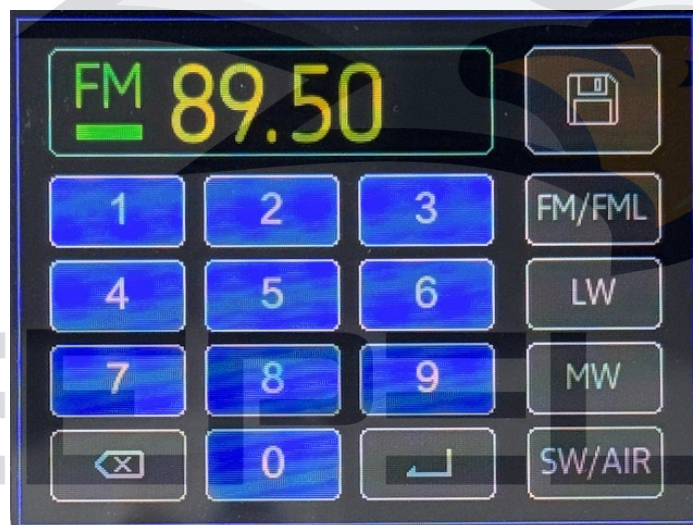


Used to quickly switch between various functions. It is still being improved. Currently, only Wi-Fi and cross icons are available in the first row of small icons.

For the meaning of each icon, please refer to [My Settings](#) -> My Quick Icons.

Short press the MODE button to exit the quick page.

Digital keypad(Screen keypad):



Simply click the corresponding number on the screen to enter the frequency, and short press the MODE button to exit the quick page.

Menu Description:

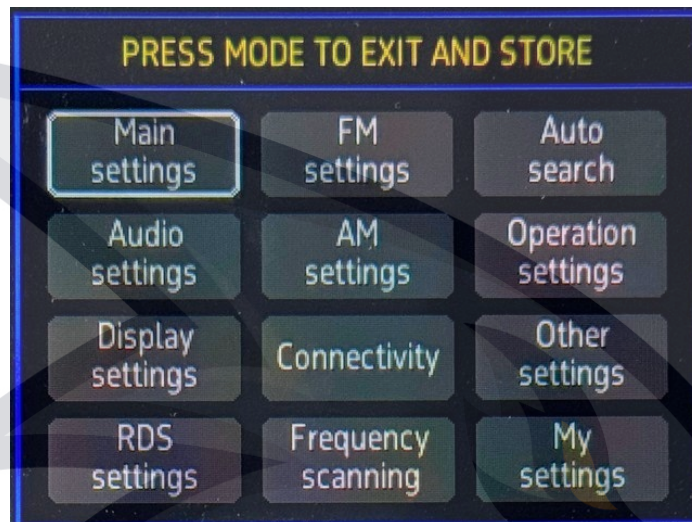
Open the menu page: Long press the MODE button

Exit the menu page: Short press the MODE button

Select menu content: Turn the TUNING knob

Confirm menu content: Short press the TUNING knob

You can also directly click on the corresponding menu content option on the screen, and click on the yellow font area to exit and save the menu.



The black font is the menu in simple mode, and the red font is the additional menu in advanced mode.

Main settings:

Model selector: Portable touch, Base, Portable

Set FM band: FM,FML, FML, FM, None

Set AM band: LW,MW,SW, LW,MW,SW,AIR, LW,MW,AIR, LW,SW,AIR, MW,SW,AIR, MW,SW, LW,SW, MW,SW, LW, MW, SW, AIR, NONE

Screensaver time: Off, 3 Sec, 10 Sec, 30 Sec, 60 Sec

Screensaver options: Screen off, 1% brightness, 25% brightness, 50% brightness

System usage mode: Simple mode, Advanced mode

Set first page: Main page, Open menu, Digital keypad, Shortcut page, Advanced RDS, AF Screen

Power Off timer: Off, Adjustable from 1 minute to 480 minutes

Dynamic SPI speed: Default 55MHz, 5-70MHz adjustable, Auto

Auto still screen: Off, On

Still screen timer: Adjustable from 0 to 120 seconds

Power off: BW key to reopen

Audio settings:

Set volume: TEF6686 internal DAC volume adjustment, -60dB to +24dB adjustable, default 0dB

Beep at band edge: Off, On

Audio output: Stereo, MPX

Stereo threshold: Off, 30 to 60dBuV adjustable

High cut corner: Adjustable from 1500 to 7000 Hz

High cut threshold: Off, 20 to 60 dBuV adjustable

FM deemphasis: 50us, 75us, Off

Use squelch: On, Off, Auto

Display settings:

Language: English, 简体中文

Set contrast: 1% to 100% continuously adjustable

Signal meter: On, Off

Signal refresh interval: 30 to 1000 ms

Signal meter unit: dBuV, dBf, dBm

Battery options: Show voltage, Show percentage, Off

Battery correction offset: Set the voltage display offset

Modulation meter: On, Off

Theme: Essence, Cyan, Crimson, Monochrome, Volcano, Dendro, Sakura,

Whiteout, Tangerine, Ocean, Indigo, Maroon, Chinese Red, Retro, GoldBrite

Frequency font: Aura2, Comic, Modern, Classic, Roubenstil, Motoya

Flip screen display: Click to flip the screen

Invert screen color: Click to invert color

Set UI round: Modify menu display style

Switcher display style: New2, Classic, New1

Color bar display mode: New, Classic

Show system clock: On, Off

Clock display mode: Time only, Date + Time

Time display format: 24 Hour, 12 Hour

Show debug info: Off, On

RDS settings:

Show RDS errors: Small, Large, All, Off

Region: Europe, USA(DB), USA, Canada

RDS Show underscore: Off, On

RDS filter: On, Off

Show PI errors: Off, On

Use AF: Off, On/REG On, On/REG Off

RT buffering: On, Off

Auto sort AF: On, Off

Fast PS: Initial, Always, Off

Show RDS clock: On, Off

Show long PS: On, Off

Disable all RDS: Off, On

FM settings:

Set converter offset: MHz

Set low band edge: The lowest setting is 65MHz

Set high band edge: The highest frequency can be set to 108MHz

Set level offset: -25 to +15dB adjustable

Set low level threshold: -15 to 30 dBuV adjustable

Softmute FM: Off, On

FM Noise blanker: Off, 50% to 150% adjustable

FM default step size: 100kHz, 200kHz, 50kHz

FM AGC: 92 to 84 dBuV adjustable

FMSI stereo improve: Off(This function is only available for 6687/6689)

Set FML band: 65-74MHz, 76-87MHz

AM settings:

Soft mute AM: On, Off

AM Noise blanker: Off, 50% to 150% adjustable

AM RF Level Offset: -50 to +15dB adjustable

Show SW wavelength: On, Off

CoChannel Detector sensitivity: Off, 50% to 150% adjustable

CoChannel Detector counter: 1 to 15 can be set

AM ATT: Off, 6dB, 12dB, 18dB, 24dB, 30dB, 36dB

AM AGC: 94 to 102 dBuV adjustable

MW default step size: 9kHz, 10kHz

AIR band Conversion: 81 to 135 MHz programmable

AIR start frequency: 118MHz, 108MHz

Connectivity:

USB mode: XDRGTK, RDS Spy

Wi-Fi active: Off, On

Configure Wi-Fi: Connect to radio hotspot for Wi-Fi configuration

Stationlist client IP:

Stationlist ID: 1 to 10 can be set

Screen off on XDRGTK: Off

Wi-Fi auto disconnect: Disable, 1 to 1440 minutes can be set

Bluetooth active: Off

Frequency scanning:

Start DX scanning: Click to start

Scanning band: FM, LW, MW, SW, AIR, Default, FML

Begin channels: Set the begin channel number

End channels: Set the end channel number

Wait time: Set the scan interval

Scanning method: Exclude, Only

Auto cancel mode: Signal, Off, Correct PI

Cancel scan mode: Stay, Break

Mute while scanning: On, Off

Screen off while scan: On, Off

Auto search:

Start Auto search: Click to start

Search & save mode: Overwrite, Append

Search band: FM, LW, MW, SW, AIR, FML

FM sampling times: 1 to 30 can be set

FM sampling hold: 10 to 1000 milliseconds adjustable

FM multipath limit: Configurable

FM scan sensitivity: 1 to 15 adjustable

AM sampling times: 1 to 30 can be set

AM sampling hold: 10 to 1000 milliseconds adjustable

AM scan sensitivity: 1 to 20 adjustable

Judgement mode: Quality priority, Quantity priority

Save bandwidth: Default, Current

Mute while search: Off, On

Screen off while search: Off, On

Save begin channel: 1 to 99 can be set

SW search start: 1800 to 27000 kHz adjustable

SW search stop: 1800 to 27000 kHz adjustable

Arrange stations: Defrag and sort, Only defrag

Delete stations: Click to delete

Operation settings:

Menu display style: New(Vertical), New(Horizontal), Classic

Quickly switch menu: On, Off

Touch Type: Int33, Int27, Off, Polling

Touch calibration: Click to start touch screen calibration

Touch interval: Default 300 Millis, Adjustable

How to use rotary: Classic, New

Rotary adjust squelch: On, Off(After turning it on, you can use the TUNING knob to adjust the squelch threshold)

Screen off rotating: On, Off

Reverse rotary: Click to change the rotary direction

Variable rotary speed: Fast, Off, Medium

Long press Rotary key: Lock&Unlock, Original operation, Open menu, Digital keypad, Shortcut page, Advanced RDS, AF Screen

Long press BW key: Shortcut page, Advanced RDS, AF Screen, Lock&Unlock, Original operation, Open menu, Digital keypad

Long press Mode key: Original operation, Open menu, Digital keypad, Shortcut page, Advanced RDS, AF Screen, Lock&Unlock

Long press Rotary key: Digital keypad, Shortcut page, Advanced RDS, AF Screen, Lock&Unlock, Original operation, Open menu

Keep BAND key 3 sec: Power off

Other settings:

Set date: Set year, month, and day

Set time: Set hours, minutes, and seconds

Set local time zone: Click to set time zone offset

NTP time sync: On, Off

RDS time sync: Off, On

Delete RDS dictionary: Click to delete

System information: Display memory usage information

Restore Defaults: Perform a factory reset

Firmware Version: Show firmware version

My settings:

My ATS scheme: Edit my search scheme, rotate the TUNING knob to select a different scheme, and press the TUNING knob to edit the sub-item.

Using ATS scheme: Select a scheme to search.

My Scan scheme: Edit my scan scheme, rotate the TUNING knob to select a different scheme, and press the TUNING knob to edit the sub-item.

Using Scan scheme: Select a scheme to scan.

My favorite theme: 4 themes can be set to automatically change.

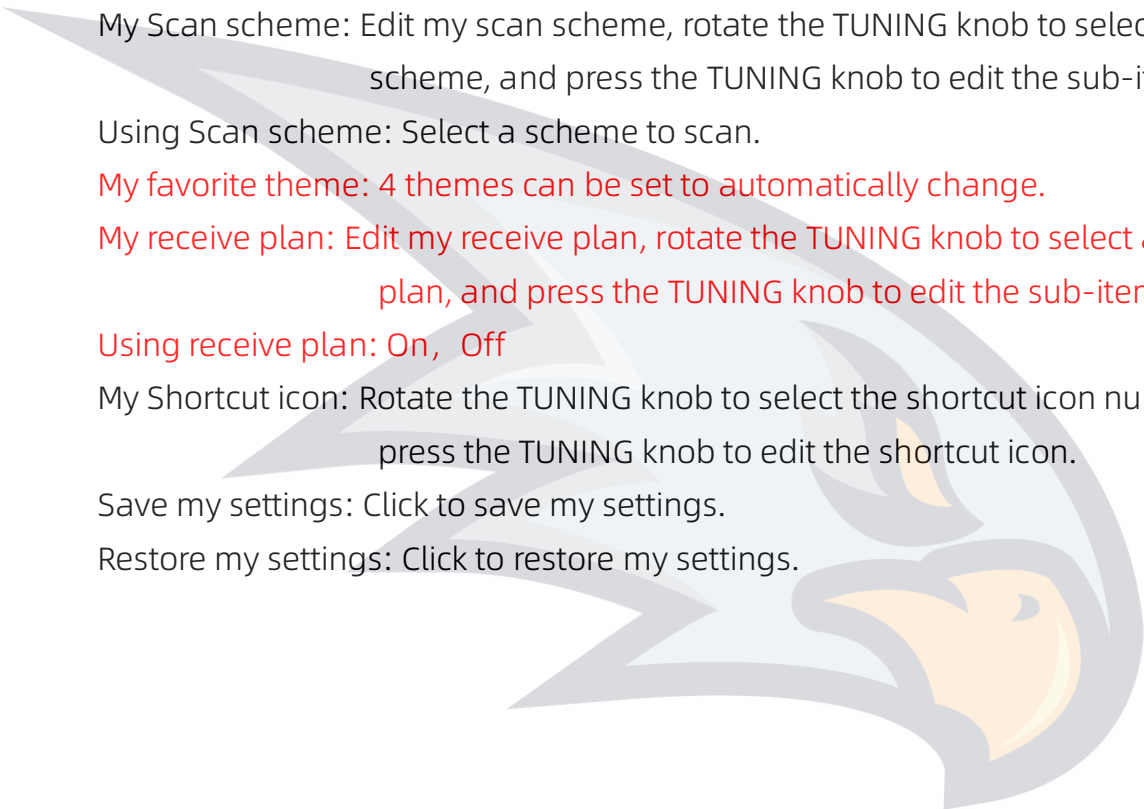
My receive plan: Edit my receive plan, rotate the TUNING knob to select a different plan, and press the TUNING knob to edit the sub-item.

Using receive plan: On, Off

My Shortcut icon: Rotate the TUNING knob to select the shortcut icon number, and press the TUNING knob to edit the shortcut icon.

Save my settings: Click to save my settings.

Restore my settings: Click to restore my settings.



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Charging Instructions:

This radio is charged via a TYPE-C port, and there is a charging LED above the TYPE-C port. Please use a charging head with a voltage of 5V and a current of 1A or above to charge the radio. The maximum charging power is 5W and fast charging is not supported.

It is recommended to charge with the device turned off.

The charging LED turns red 🌶️ when charging and turns green 🌿 when fully charged.

Packing List:

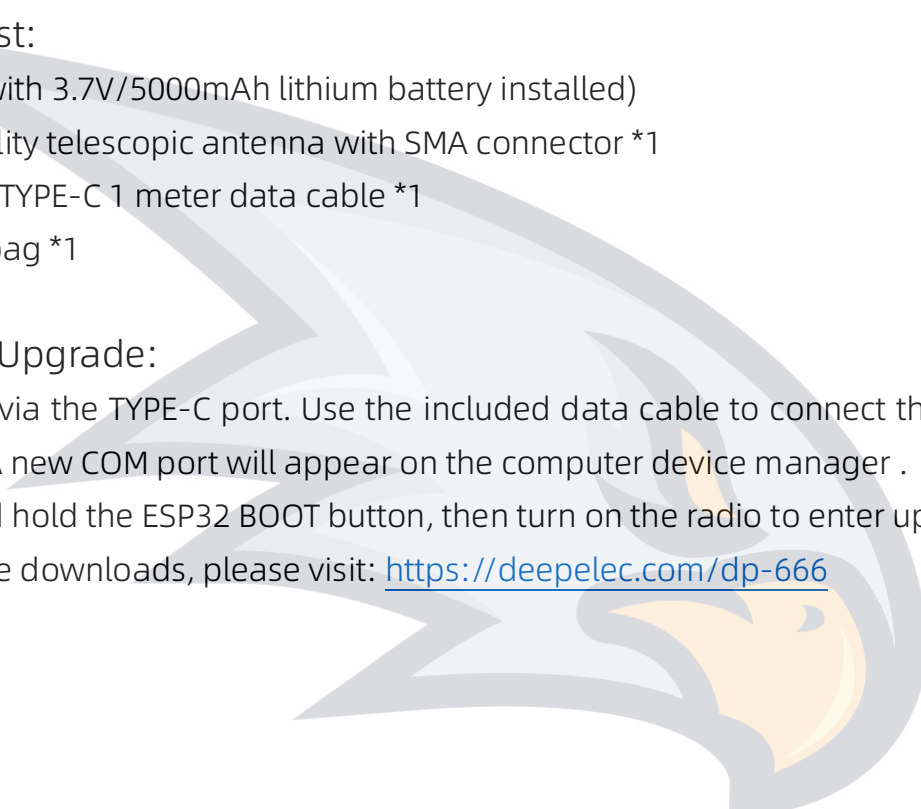
1. Host *1 (with 3.7V/5000mAh lithium battery installed)
2. High quality telescopic antenna with SMA connector *1
3. USB-A to TYPE-C 1 meter data cable *1
4. Storage bag *1

Firmware Upgrade:

1. Upgrade via the TYPE-C port. Use the included data cable to connect the radio to the computer. A new COM port will appear on the computer device manager .

2. Press and hold the ESP32 BOOT button, then turn on the radio to enter upgrade mode.

For firmware downloads, please visit: <https://deepelec.com/dp-666>



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