

FM Repeater Controller Ver0.1.3

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Settings and Audio Files Manual

Software version Ver0.1.3

This manual explains the PC settings program, the Web settings page, DTMF remote control, and the DFPlayer audio file structure. Settings have the same meaning in both interfaces unless stated otherwise.

PC Settings Tabs

Tab	Main Settings
Basic	Hang time, transmit timeout, CW speed, tone and message, SQL / VOX detection, end beeps, voice language, and LCD
Schedule	CW mode and interval, allowed hours for CWID and voice ID, voice content, and start-second adjustments
Time / Network	PC and RTC time, time zone, current IP and connected SSID, and the selected Wi-Fi connection method

Use the tabs to switch between settings in the PC program. The Schedule tab opens at startup. The Web version has no tabs; all settings appear on one page.

Connecting Loading and Saving

Operation	Description
COM port PC only	Connect the controller by USB and select its COM port. Close any Serial Monitor or other program using the same port.
Language	Select Japanese or English for the settings interface. This does not change Voice language. Save to store the display-language preference in the controller.
Web connection	On the same network, open <a href="http://<current-IP>/">http://<current-IP>/ in a browser. If mDNS is supported, http://fm-rep.local/ can also be used.
Load	Read the current controller settings. Click Load before making changes; do not rely on screenshot examples or values previously saved on the PC.
Save	Save the changes to the controller and check the success message. Changing Wi-Fi settings may require reconnecting.
Close or X	Close the PC program. This updates settings.ini on the PC but does not write settings to the controller.
Check after saving	Reset the controller, reconnect, and click Load to confirm that the changes were retained.

The ranges listed here follow the PC program. Use the same ranges in the Web version. Values shown in screenshots are examples.

Basic Settings

Setting	Values and Units	Description
Hang time HANG_TIME	0-30 sec	How long the repeater continues transmitting after reception ends.
Transmit time limit TOT_LIMIT	1-30 min	Maximum continuous transmission time. When this limit is reached, transmission stops and the timeout lockout begins.
Lockout time TOT_LOCK	1-30 sec	Lockout period after the transmit timeout stops transmission.
CW speed CW_WPM	5-40 WPM	CWID speed. Higher values produce faster Morse code.
CW tone frequency CW_FREQ	300-3000 Hz	Audio frequency of the CW tone.
CW message CW_MSG	Up to 19 ASCII characters	CW text to transmit. Enter the station callsign, for example DE JI1FGX/DU9. A blank message disables CWID.
SQL active level SQL_ACTIVE_LEVEL	LOW / HIGH	Active polarity of the SQL input. LOW is the normal setting for this board. In the current source, this polarity setting also applies to VOX mode.
PTT active level PTT_ACTIVE_LEVEL	LOW / HIGH	Active polarity of the ESP32 PTT control output. The optocoupler separates this from the voltage polarity at the radio PTT terminal.
Receive detection SQL_MODE	SQL input / VOX Web: DIGITAL / VOX	SQL input (DIGITAL) uses the external SQL (COR) signal. VOX detects received audio to start repeating.
SQL debounce SQL_STABLE	0-50 x 100 ms	Time the input must remain stable before it is accepted as active. 1 = 0.1 sec; 10 = 1 sec. Zero applies changes immediately. The inactive state is applied immediately.
VOX threshold VOX_THRESHOLD	1-4095 ADC counts	VOX detection threshold. Lower values are more sensitive. VOX remains active for about one second after the last detection.
End beep style HANG_BEEP_STYLE	OFF / 1Tone / 2Tone	Select the beep played at the end of a repeated transmission.
End beep frequency HANG_BEEP_FREQ	300-3000 Hz	Reference frequency of the end beep. In 2Tone mode, the second tone is 400 Hz below this value.
End beep duration HANG_BEEP_LEN	10-500 ms	Duration of each individual end-beep tone.
Voice language VOICE_LANG	English / Japanese	Language used for automatic voice ID and DTMF responses. This is independent of the Language selector for the settings interface.
Live VOX input VOX LIVE	Read only Web only	Shows the ADC level, applied threshold, input state, VOX state, and detection mode. Save to apply changes made in the input field.
LCD display LCD	OFF / ON PC only	Enable or disable the LCD. Firmware must be compiled with LCD support. This setting is not available on the Web page.

Transmission Schedule

Setting	Values and Units	Description
CWID mode CW_MODE	MODE_A / MODE_B	MODE_A waits for reception to begin after the interval has elapsed, then sends CWID. MODE_B sends periodically according to the RTC clock.
CWID interval CW_INTERVAL	0 / 1 / 5 / 10 / 15 / 30 / 60 min	CWID interval. Zero disables CWID, including manual CWID transmission.
CWID allowed from	0-24 hour	Start of the automatic CWID window. The start hour is included.
CWID allowed until	0-24 hour	End of the automatic CWID window. The end hour is excluded.
Voice ID mode VOICE_ID_MODE	OFF / ON / Test	OFF disables automatic voice ID. ON is normal operation. Test plays once per minute for checking. Allowed voice-ID hours also apply in Test mode.
Voice content	1 / 2 / 3	Select the playback content from the table below.
Announcement interval	30 / 60 / 120 / 180 / 240 / 300 / 360 min	Used only for option 3, Announcement only. Select 30 minutes or 1 to 6 hours.
Voice allowed from	0-24 hour	Start of the automatic voice-ID window. The start hour is included.
Voice allowed until	0-24 hour	End of the automatic voice-ID window. The end hour is excluded.
Voice ID start second DFPLAYER_START	0-59 sec	Second within the minute at which voice playback starts. Use this adjustment to align the time signal with the top of the hour.
CWID start second CWID_START	0-59 sec	Start second for MODE_B CWID. Adjust it to align transmission with the following minute.

Voice Content Options

Option	Playback
1. Time + announcement	Plays the time signal, hour announcement, and callsign every hour. Repeater guidance is added at odd-numbered hours, so it plays every two hours.
2. Time only	Plays the time signal and hour announcement every hour. Does not play the callsign or repeater guidance.
3. Announcement only	Plays the callsign and repeater guidance at the selected interval. Does not play the time signal or hour announcement.

0-24 means all day. Equal start and end hours disable automatic transmission. A range such as 22-6 crosses midnight. Announcement-only intervals start at the opening hour: for 8-20 with a 120-minute interval, playback occurs at 08:00, 10:00, 12:00, 14:00, 16:00, and 18:00.

Allowed hours control automatic transmissions. Manual ID buttons are outside these windows. Voice takes priority over simultaneous CW; MODE_B CW is deferred only while the required conditions remain valid.

Time and Network

Setting	Value or Display	Description
PC local time	Read only	Current local time on the PC or device running the browser.
RTC time PC: RTC time (on load)	Read only	Controller RTC time. The PC program shows the value received when Load was clicked.
RTC update on save	NTP first / Keep RTC Web only	Choose whether Save synchronizes the RTC. NTP is preferred; if unavailable, the browser device time is used.
Time zone TIMEZONE_MIN	UTC-12:00 to UTC+14:00 15-minute steps	UTC offset for the RTC and schedules. Japan uses UTC+09:00; the Philippines uses UTC+08:00.
Current IP	Read only	IP address currently used by the controller. The saved static IP may differ from the actual address assigned by DHCP.
Hostname HOSTNAME	Up to 31 ASCII characters	Controller hostname. Do not include .local in the field; enter fm-rep, for example.
Connected Wi-Fi SSID	Read only	Actual SSID of the connected router, not the saved network name. Click Load in the PC program or refresh the Web page. A dash means no existing Wi-Fi connection.

RTC Synchronization on Save

In the PC program, Save requests RTC synchronization after saving the settings. NTP is preferred; PC time is used if NTP is unavailable.

Settings storage and RTC synchronization have separate results. If the time update fails, check the message and RTC time.

Wi-Fi Connection Settings

Setting	Value or Display	Description
Wi-Fi connection	Existing Wi-Fi / Controller Wi-Fi	Connect to existing Wi-Fi joins a router. Use controller Wi-Fi lets a PC or phone connect directly to the controller. Save applies the choice. There is no automatic switching after a connection failure.
Get IP automatically STA_DHCP	Checked / unchecked	Checked: obtain an IP address from the router using DHCP. Unchecked: use Device IP on router and Router gateway.
Device IP on router STA_IP	IPv4 address	Controller IP when automatic IP is disabled. It must be a different host address in the same /24 network as the router gateway.
Router gateway STA_GW	IPv4 address	Gateway for the existing Wi-Fi connection, normally the router IP. Static connections use subnet mask 255.255.255.0.
Existing Wi-Fi name STA_SSID	Up to 31 characters	SSID of the Wi-Fi router to connect to. Required when Connect to existing Wi-Fi is selected. If connection fails, the controller does not switch automatically to its own Wi-Fi; use USB to correct the settings.
Existing Wi-Fi password STA_PASS	Up to 31 characters	Password for the existing Wi-Fi network. Use the adjacent checkbox to show or hide it.
Controller Wi-Fi IP AP_IP	IPv4 address	Controller IP when providing its own Wi-Fi network, for example 192.168.2.253.
Controller gateway AP_GW	IPv4 address	Set the same value as Controller Wi-Fi IP. The current implementation uses AP_IP as the access-point gateway independently of this field.
Controller Wi-Fi name AP_SSID	Up to 31 characters	Name of the Wi-Fi network provided by the controller, for example ESP32-S3.
Controller Wi-Fi password AP_PASS	Up to 31 characters	Password for the controller Wi-Fi network. Use at least 8 characters. In the current implementation, fewer than 8 characters creates an open network.
DTMF password	1-7 characters Web only	Password for DTMF remote control. The PC program has no field for this; change it through the Web page or the DTMF password-change command.

DTMF Commands

Send DTMF tones through the receiving radio for remote control. <PW> means the current DTMF password. The examples below use PW = 123.

Command Format	Example	Action	Saved
#<PW>50	#12350	Turn automatic voice ID OFF.	Yes
#<PW>51	#12351	Turn automatic voice ID ON.	Yes
#<PW>52	#12352	Set voice ID to Test mode.	Yes
#<PW>56	#12356	Select English for voice announcements.	Yes
#<PW>57	#12357	Select Japanese for voice announcements.	Yes
#<PW>90	#12390	Enable repeater operation.	No
#<PW>91	#12391	Disable repeater operation.	No
#<PW>99#	#12399#	Play the restart announcement, then restart the controller after about five seconds.	—
#<oldPW>80#<newPW>#	#12380#4567#	Change the password to 4567. The new password must contain 1-7 characters.	Yes

Do not add a trailing # to commands 50, 51, 52, 56, 57, 90, or 91. Restart command 99 and password changes require # at the positions shown in the table.

Input and Voice Responses

Item	Description
Starting input	The initial # starts command entry and suppresses repeated transmission of the command tones.
Key timing	Input is discarded and command-entry mode ends if more than three seconds pass after the last recognized key. Release each key before pressing the next.
Voice response	The selected-language callsign plays first, followed by the command guidance. Folder 05 is English and folder 06 is Japanese.
Voice ID set to OFF	DTMF response audio still plays when automatic VOICE_ID_MODE is OFF.
Retaining settings	Entries marked Yes under Saved survive Reset if saving succeeds. Repeater ON/OFF is not saved; repeater operation is enabled at startup.

The default DTMF password is 123. If it has been changed, substitute the current password.

Voice ID Audio Files

Create folders 01 through 06 directly in the root of the microSD card. Place the following audio files in them. English and Japanese use separate folders.

The controller selects DFPlayer audio by folder number and file number. Folder names and filenames are fixed and must not be changed. When replacing audio, keep the same folder and filename.

Folder	Language and Purpose	Filenames and Content
01	English time signal and hour announcements	001.mp3: time signal 002-025.mp3: English hour announcements
02	English voice ID	001.mp3: English callsign 002.mp3: English repeater guidance
03	Japanese time signal and hour announcements	001.mp3: time signal 002-025.mp3: Japanese hour announcements
04	Japanese voice ID	001.mp3: Japanese callsign 002.mp3: Japanese repeater guidance
05	English DTMF responses	001.mp3: English callsign 002-009.mp3: English DTMF guidance
06	Japanese DTMF responses	001.mp3: Japanese callsign 002-009.mp3: Japanese DTMF guidance

Use three-digit filenames such as 001.mp3. The time-signal file is 001.mp3, not 00.mp3. Examples: /01/001.mp3 and /04/002.mp3.

DTMF Guidance Files

Folders 05 and 06 use the same file numbers; only the spoken language differs.

Filename	Guidance or Content	Command
001.mp3	Callsign	Played first for every response
002.mp3	Repeater ON	90
003.mp3	Repeater OFF	91
004.mp3	Restart	99#
005.mp3	Command accepted	Password change with command 80
006.mp3	Voice ID ON	51
007.mp3	Voice ID OFF	50
008.mp3	Voice ID Test	52
009.mp3	Voice language selected	56 or 57

Hour Announcement Files and Checks

In folders 01 and 03, 002.mp3 announces midnight, 003.mp3 announces 01:00, and 025.mp3 announces 23:00. File 001.mp3 is the time signal.

Time	Filename	Time	Filename
00:00	002.mp3	12:00	014.mp3
01:00	003.mp3	13:00	015.mp3
02:00	004.mp3	14:00	016.mp3
03:00	005.mp3	15:00	017.mp3
04:00	006.mp3	16:00	018.mp3
05:00	007.mp3	17:00	019.mp3
06:00	008.mp3	18:00	020.mp3
07:00	009.mp3	19:00	021.mp3
08:00	010.mp3	20:00	022.mp3
09:00	011.mp3	21:00	023.mp3
10:00	012.mp3	22:00	024.mp3
11:00	013.mp3	23:00	025.mp3

Checks After Configuration

Symptom	What to Check
No CWID	Check for CW interval = 0, a blank CW message, or a time outside the allowed hours. MODE_A waits for reception to begin.
No automatic voice ID	Check Voice ID mode, allowed hours, RTC time, voice language, and the microSD file structure.
Different time-signal and guidance counts	Time + announcement plays the time signal every hour and repeater guidance at odd-numbered hours. Announcement interval applies only to Announcement only.
Save error	Do not treat an error as a successful save. Read the full error message and check retention with Load after Reset.
Cannot connect after Wi-Fi changes	Check the selected connection method and current IP. For existing Wi-Fi, check the router-assigned IP. For controller Wi-Fi, connect to its network and open its IP. Modes do not switch automatically.
Controller restarts after midnight	The current source includes a daily maintenance restart at 00:03:00 when neither voice nor CW is transmitting.

Operating descriptions are based on the Ver0.1.3 settings program, WebConfig.cpp, dtmf.cpp, Schedule.h, Cw.cpp, RepeaterCore.cpp, vox.cpp, ntp.cpp, and the main sketch.

Reference URL

<https://ji1fgx.com/261002.html>

PC Settings Screen Examples

Basic

FM Repeater Settings Ver0.1.3

COM portLanguageEnglish

BasicScheduleTime / Network

Hang time1sec

Transmit time limit3min

Lockout time5sec

CW speed20

CW tone frequency800

CW message

SQL active levelLOWHIGH

PTT active levelLOWHIGH

Receive detectionSQL inputVOX

SQL debounce1x100 ms

VOX threshold100ADC (lower = more sensitive)

End beep styleOFF1Tone2Tone

End beep frequency800

End beep duration80

Voice languageEnglishJapanese

LCD displayOFF (no LCD)ON (LCD fitted)

Load

Save

Close

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Schedule

FM Repeater Settings Ver0.1.3

COM portLanguageEnglish

BasicScheduleTime / Network

Set separate allowed hours for CWID and voice ID.

0-24 = all day. Start is included; end is excluded. Overnight ranges are allowed.

CWID modeMODE_AMODE_B

CWID interval1min (0 = CWID off)

CWID allowed from0hour

CWID allowed until24hour

Voice ID modeOFFONTest (every minute)

Voice content1. Time + announcement2. Time only3. Announcement only

Announcement interval120min (announcement only)

Voice allowed from0hour

Voice allowed until24hour

Voice ID start second50sec

CWID start second54sec

Load

Save

Close

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Time / Network

FM Repeater Settings Ver0.1.3

COM portLanguageEnglish

BasicScheduleTime / Network

PC local time2026-10-26 15:51:25

RTC time (on load)Not read (click Load)

Time zoneUTC+08:00

Wi-Fi connectionConnect to existing Wi-FiUse controller Wi-Fi

The selected method applies after saving. No automatic switching on connection failure.

Current IPNot read (click Load)

Hostnamefm-rep.local

Connected Wi-Fi SSIDNot read (click Load)

Get IP automaticallyAutomatic IP (DHCP)

Device IP on router

Router gateway

Existing Wi-Fi name

Existing Wi-Fi password

Controller Wi-Fi IP192.168.2.253

Controller gateway192.168.2.253

Controller Wi-Fi nameESP32-S3

Controller Wi-Fi password

Load

Save

Close

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Refer to the settings tables for details. Screenshot values are examples. COM port, Language, Load, Save, and Close remain available on every tab.

Web Settings Screen Example

FM Repeater Controller Settings

Current IP: 192.168.1.33 (Existing Wi-Fi / DHCP)

Language English

Hang time 3 sec Transmit time limit 3 min Lockout time 5 sec CWID mode ☐ MODE_A ☒ MODE_B CWID interval 30 min CW speed 20 CW tone frequency 700 CW message DE JP1YGB SQL active level ☒ LOW ☐ HIGH PTT active level ☐ LOW ☒ HIGH Receive detection ☐ DIGITAL ☒ VOX VOX threshold 100 ADC counts: lower = more sensitive (default 100) Live VOX input ADC level: 4 / Threshold: 100 / Input: LOW / VOX: OFF / Mode: VOX ADC level is the detector input; threshold is the applied value (save to apply edits). Audio is detected at or above threshold; VOX stays on for 1 second after the last detection. VOX is not the actual PTT state. Updated about twice per second. SQL debounce 1 x100 ms End beep style ☐ OFF ☐ 1Tone ☒ 2Tone End beep frequency 800 End beep duration 80 Voice ID mode ☐ OFF ☒ ON ☐ Test (every minute) Voice content 3. Announcement only Announcement interval 30 min CWID allowed from 7 hour CWID allowed until 23 hour Voice allowed from 0 hour Voice allowed until 24 hour Start is included; end is excluded. 0-24 means all day; equal hours disable automatic ID. Overnight ranges are allowed. The interval applies to announcement-only mode. Voice language ☐ English ☒ Japanese	PC local time 2026-10-26 16:17:24 RTC time 2026-10-26 16:17:21 RTC update on save NTP first, PC time if unavailable Time zone UTC+08:00 Hostname fm-rep .local Connected Wi-Fi SSID PLDTHOMEFIBRAF09D_2.4Ghz Wi-Fi connection Connect to existing Wi-Fi Choose the connection method. It will not switch automatically if a connection fails. Changes take effect after saving. Get IP automatically ☒ Automatic IP (DHCP) Device IP on router 192.168.1.253 Router gateway 192.168.1.1 Existing Wi-Fi name Existing Wi-Fi password Controller Wi-Fi IP 192.168.2.253 Controller gateway 192.168.2.253 Controller Wi-Fi name ESP32-S3 Controller Wi-Fi password ***** DTMF password *** Voice ID start second 57 sec CWID start second 59 sec Load Save
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