# R862 SKYWAVE

BROADCAST TRANSMITTER CONSOLE

User Guide

Version 1.2

PULSAR MODULAR

R862 SKYWAVE
Preface 4
PART I · STARTING 5
What R862 Is 6
1.1 The Station 6
1.2 Mono and Stereo 6
1.3 Design Philosophy 7
1.4 The Plant and the Operator 7
Five-Minute Walk 9
PART II · UNDERSTANDING THE CONTROLS 10
IN TRIM, OUT TRIM and MATCH 11
3.1 IN TRIM 11
3.2 OUT TRIM 11
3.3 The SHIFT Link 11
3.4 MATCH 12
DRIVE and DEPTH 13
4.1 DRIVE 13
4.2 MOD. % 13
4.3 DEPTH 13
4.4 MOD. m 14
4.5 ROTATOR 14
BIAS 15
5.1 What BIAS Does 15
5.2 BIAS in Stereo 16
TUBE MISMATCH 17
6.1 What TUBE MISMATCH Does 17
6.2 The MISMATCH Meter 17
SAG and PLATE kV 18
7.1 What SAG Does 18
7.2 PLATE kV 18
MIX 19
8.1 How It Blends 19
8.2 Using MIX 19
POWER and Bypass 20
9.1 The POWER Lamp 20

9.2 The Bypass Icon and the Host 20
9.3 What Bypass Does 20
The Meters and Lamps 21
10.1 The VU 22
10.2 CAL 22
10.3 The Peak Bars 22
10.4 The Limit Lamps 23
10.5 The Round Scope 23
10.6 The Correlation Meter 24
10.7 The Help Strip 24
PART III · WORKING WITH R862 25
A/B and Presets 26
11.1 The A/B Slots 26
11.2 The Preset Bar 26
11.3 The Browser 26
11.4 Where the Files Live 27
11.5 What a Preset Stores 27
11.6 The Default Preset 27
Sessions, Hosts and MIDI 29
12.1 What the Session Saves 29
12.2 Automation 29
12.3 MIDI Learn 30
12.4 The Menu 31
12.5 Window Size 31
12.6 Renders 31
PART IV · IN PRACTICE 32
Recipes 33
13.1 A Clean Station on the Mix Bus 33
13.2 Shaving the Peaks 33
13.3 Thick Bass 33
13.4 Warmth from the Pair 33
13.5 Let the Supply Breathe 33
13.6 The Parallel Transmitter 34
13.7 Thin the Center, Then Bring It Back 34
Gain Staging 35

14.1 Where It Sits in a Chain 35
14.2 Headroom and the Lamps 35
14.3 Feeding the Next Device 35
PART V · REFERENCE 36
Installation and the First Insert 37
15.1 Where Presets and Guides Live 37
15.2 What a Fresh Insert Gives You 38
15.3 License 39
15.4 Uninstalling 39
15.5 Linux 40
15.6 Specifications 40
Troubleshooting and FAQ 42
16.1 The Sound 42
16.2 The Panel 42
16.3 Presets and Sessions 42
16.4 Hosts and Renders 43
iPad and iPhone 44
17.1 Touch 44
17.2 Presets on iPad and iPhone 45
Appendix A. Credits and Independence 46
Independence 46
Credits 47

# Preface

I wasn't trying to build another radio effect.

Most radio sounds in a plug-in are about what went wrong on the way to the listener: static, fading, a narrow band, a distant station drifting at night. I wanted the opposite. I wanted to hear what the station itself put on the air.

So R862 starts where the sound started, in a high-power broadcast station. Your program arrives on the line, the way the studio fed the transmitter. It is encoded and driven through the modulator: RCA 862 tubes, giants about five feet long, run so hard that water flowed through their jackets to carry the heat away. The supply sags as the program draws current, and the loudest peaks meet the transmitter's own limits.

Then the signal goes out on the air, and R862 is also the receiver at the other end. It decodes what the station sent and hands it back to you.

What reaches you is the sound you would have heard from that station, without the weather, the clouds and the night between you and the mast. Think of it as physics with the friction taken out: the motion stays, the losses go.

In the 1930s that sound was heard clean in only one place: the station's own monitor, a few feet from the transmitter. And only the operator could shape it. Now you run it. Drive it hard, starve its tubes to save on the power bill, mismatch the pair, let the supply sag.

This is that station... and you own it!

Ziad Sidawi

Pulsar Modular

# PART I · STARTING

CHAPTER ONE

# What R862 Is

R862 Skywave is a high-power broadcasting station in a plug-in. Your audio is the program.

R862 encodes the program, drives it through the station's modulator, water-cooled RCA 862 power tubes, the giants of the high-power stations of the 1930s, and puts it on the air. R862 is also the receiver at the other end: it decodes the signal, so you hear what went out.

The receiver is perfect: no static, no fading, no tuning error and no narrow radio bandwidth. The character comes from the transmitter.

## 1.1 The Station

The program passes through the station in a fixed order:

1. **IN TRIM** sets the level into the transmitter.
2. **ROTATOR**, when it is in, rotates the phase of the program on the line (4.5).
3. **The transmitter.** DRIVE and DEPTH set how hard the program works it. The tube pair, set by BIAS and TUBE MISMATCH, does the amplifying. SAG sets how soft its power supply is.
4. **The receiver** decodes what went on the air.
5. **MIX** blends the air signal with your dry input.
6. **OUT TRIM** sets the final level.

## 1.2 Mono and Stereo

R862 runs on mono and stereo tracks, with matching input and output.

On a mono track the correlation meter goes, the L-R lamp stays dark and the round scope changes its job (chapter 10).

Surround and immersive buses are not supported. Use R862 on stereo pairs, stems and beds, and in mono on single channels.

On Linux the LV2 is stereo only. For the mono transmitter on a mono track, use the VST3 and keep the track's Strict I/O on (the default for new tracks in Ardour and Mixbus). Without Strict I/O, and in REAPER, the VST3 runs in stereo.

## 1.3 Design Philosophy

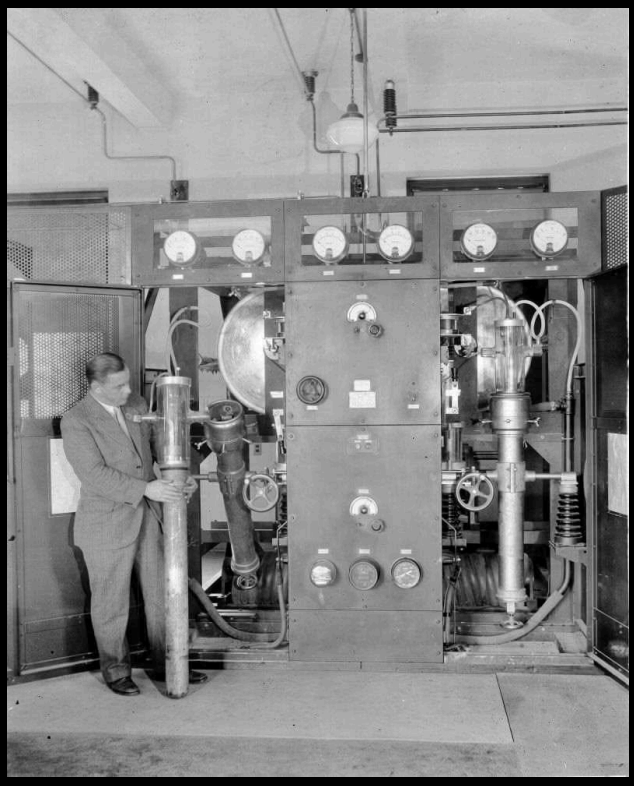
At the defaults the station runs at its nominal operating point and stays clean.

R862 does not widen, add reverb or imitate a radio receiver.

Driving the transmitter harder makes it dirtier, never louder (chapter 4).

## 1.4 The Plant and the Operator

R862 is both halves of a station: the plant that does the work, and the desk where the operator watches it.



**The plant.** An engineer inside an early high-power transmitter. Two water-cooled 862 tubes, each about five feet tall, sit on either side.

The lower part of the 862 is its anode. It sat in a water jacket, and flowing water carried the heat away. The big stations ran them in pairs, several pairs side by side.



**The operator.** The console of a broadcast transmitter. Funkerberg Radio Technology Museum.

The operator watched the meters and lamps and kept the station on the air. On R862 that desk is the top half of the panel: MOD. %, the VU, PLATE kV and the limit lamps (chapter 10).

CHAPTER TWO

# Five-Minute Walk

1. Put R862 on something broad: a mix bus, a drum bus, a stem or a bass.
2. Click the POWER lamp off and on while the music plays. This is the station at its default setting.
3. Watch the VU. If both needles pin at the right, click a higher CAL lamp under it until they swing around mid-scale.
4. Raise **DRIVE** until the MOD. % needle reaches the red and the 125 lamp blinks on peaks. The level does not rise; the peaks get rounder and denser.
5. Turn **BIAS** clockwise past the B mark. Quiet passages thin and grain appears on decays, and the level drops (chapter 5).
6. Let the music play for several seconds, then click **MATCH**. It sets OUT TRIM so the output plays as loud as your input. Chapter 3 explains it.
7. Set **TUBE MISMATCH** to 20-30, the top of the green zone on its meter, for warmth. Then turn **MIX** toward LINE to bring (blend) your dry signal back under the air signal.

TIP: If the MATCH lamp is lit, the level differs from the dry signal and you are judging loudness, not the station. Click MATCH to match the levels, then compare with the POWER lamp.

# PART II · UNDERSTANDING THE CONTROLS

CHAPTER THREE

# IN TRIM, OUT TRIM AND MATCH

## 3.1 IN TRIM

IN TRIM sets the level into the transmitter. Up the dial, the program reaches the transmitter's limits sooner. Down gives more room.

IN TRIM does not move the black PROGRAM needle or the IN peak bar.

## 3.2 OUT TRIM

OUT TRIM is the last stage and sets the final level, air and dry signal alike. It does not change how hard the station works.

## 3.3 The SHIFT Link

Hold SHIFT when you start dragging either trim: the other trim moves the same number of dB the other way. The drive into the transmitter changes and the trims' combined gain holds.

SHIFT counts only when the drag starts. Pressing it partway through does nothing. The link stops holding the level when the other trim reaches its end. Drag back, and both trims return to where they started. SHIFT and double-click on either trim returns both to 0 dB.

## 3.4 MATCH

BIAS lowers the level, and DRIVE, SAG and MIX can move it. MATCH puts it back, so you compare at equal loudness.

MATCH is the lamp between MIX and OUT TRIM, right of the MATCH print. It compares your raw input with the final output. One click adds the difference to OUT TRIM.

1. Play the music for several seconds, with the station on.
2. Click MATCH. The lamp blinks twice.
3. Click the POWER lamp off and on. The loudness stays the same.

The lamp shows the state:

- Lit: the levels differ by about a third of a dB or more. Click again.
- Dark: the levels match.

MATCH measures only while music plays, so a pause keeps the last reading. OUT TRIM stops at ±12 dB. Hover MATCH with the help strip on to read the difference in dB.

> NOTE: MATCH is not auto-gain. BIAS lowers quiet passages more than loud ones, so a riding gain would undo the sound. MATCH sets the level once, when you click.

CHAPTER FOUR

# DRIVE AND DEPTH

DRIVE sets how hard the program hits the transmitter. DEPTH sets how much of the transmitter's capacity the program uses. The meters above them show both. ROTATOR changes how the peaks arrive.

## 4.1 DRIVE

DRIVE is the small knob second from the left in the upper row, under MOD. %. The range is −40 dB to +24 dB. The default is 0 dB, the transmitter's nominal operating point. The readout shows dB without a unit.

DRIVE sets how hard the signal works the transmitter. Turn it up for more saturation and density; the output level does not rise.

Low settings keep the station clean, and at −40 dB it is effectively transparent. Higher settings shave the peaks more than the body: the sound gets denser and dirtier, never louder. The lamps under MOD. % show when the transmitter reaches its limits (10.4).

## 4.2 MOD. %

MOD. %, the second meter from the left, is a peak reading of how hard the program works the transmitter. Full scale is 125 %.

| Zone | Meaning |
|---|---|
| Green, 0 to 85 % | The clean range. The tubes work, nothing reaches a limit. |
| Amber, 85 to 100 % | Loud. The tubes start to lean on the peaks. |
| Red, 100 to 125 % | Only positive peaks get here, and the tubes round them off softly. Negative peaks stop at 100 % and light the −100 lamp. |

## 4.3 DEPTH

DEPTH is the small knob at the far left of the upper row, under MOD. m. The range is 0.50 to 0.95. The default is 0.95, where a real station parked.

At 0.95 you get the full sound; on bass it acts like a compressor, thick. Lower is gentler. At 0.50 to 0.60 the sound is very soft and low-level artifacts come up.

Lower DEPTH also leaves more room before negative peaks reach the floor. At the default, a peak below 0 dBFS reaches the floor only if IN TRIM or DRIVE push it there.

## 4.4 MOD. m

MOD. m, the meter at the far left, shows where DEPTH is set, not what the audio does.

| Zone | Meaning |
|---|---|
| Green, .85 to .95 | The full effect. |
| Amber, .60 to .85 | Milder. |
| Red, .50 to .60 | Soft, with low-level artifacts. |

## 4.5 ROTATOR

ROTATOR evens out the peaks of the program before they reach the transmitter. They hit the transmitter's limits less often, and softer when they do. The level does not change. It works by rotating the phase of the program, which gives the button its name.

DRIVE sets how hard the program hits the limits; ROTATOR sets how sharp the peaks are when they hit. With ROTATOR in, the 125 lamp lights less often at the same DRIVE, so you can push harder for density before the peaks turn rough.

What you hear:

- Bass attacks: rounder.
- Voices: fuller and less pinpoint.
- Peaks at the limits: softer.

With DRIVE low, ROTATOR mostly rounds the bass attacks.

ROTATOR is the lit button between the L-R lamp and the CAL lamps. Lit means in; the default is out. The switch glides over a quarter of a second, so you never hear a click.

> NOTE: With ROTATOR in, a voice can seem to fill more of the stereo field. The warm lower part of the voice arrives slightly after its bright consonants, so the ear hears it as larger and less pinpoint. The stereo image itself does not change, and the correlation meter reads the same.

CHAPTER FIVE

# BIAS

BIAS sets the condition of the plant, from a freshly calibrated transmitter to a cold, worn one. It is the big knob second from the left in the lower row, right of the POWER lamp.

The readout is the grid bias in volts:

| Mark | Position | Condition |
|---|---|---|
| +8V, AB | fully left, the default | Freshly calibrated. |
| B | a quarter of the way round, 0 V | Cutoff. |
| −6V | five eighths of the way round | The arc turns red. |
| −12V, C | fully right | Cold and worn. |

The arc round the knob is green to the B mark, amber to −6V and red beyond. Type a value in volts. Double-click to return to +8 V.

## 5.1 What BIAS Does

Colder settings add crossover distortion to quiet material: a grainy buzz on decays, cleaner attacks with fuzzier tails. On bass, near three quarters of the way round, the buzz is worth having. Past the B mark the low end gains movement at low levels.

Colder settings also lower the level, quiet passages more than loud ones. Click MATCH after you set BIAS (chapter 3).

## 5.2 BIAS in Stereo

On a stereo track BIAS works on the center of the mix: the center fades, the sides stay clean. On the round scope the vertical line shrinks and the horizontal one holds. On a mono track BIAS acts on the whole signal.

> NOTE: In the red zone of BIAS the stereo field loses its correlation, and part of it cancels when folded to mono. Watch the correlation meter (10.6). A little LINE refocuses it.

CHAPTER SIX

# TUBE MISMATCH

TUBE MISMATCH sets how unequal the two tubes of the pair are. It is the small knob at the far right of the upper row, under the MISMATCH meter. The range is 0 to 100. The default is 0, a perfectly matched pair.

## 6.1 What TUBE MISMATCH Does

Mismatch brings warmth and body, at every level.

The sweet spot is 20 to 30. Higher is thicker, and near the top it is rough.

## 6.2 The MISMATCH Meter

The meter at the far right shows where TUBE MISMATCH is set, not what the audio does.

| Zone | Meaning |
|---|---|
| Green, 0 to 30 | A good pair. The sweet spot, 20 to 30, is at its top. |
| Amber, 30 to 70 | A worn but serviceable pair. Thicker. |
| Red, 70 to 100 | Rough. |

CHAPTER SEVEN

# SAG AND PLATE kV

SAG sets how soft the transmitter's power supply is. It is the small knob second from the right in the upper row, under PLATE kV. The range is 0 to 100 %. The default is 0 %.

## 7.1 What SAG Does

Loud passages draw current and the supply dips, then recovers. The level breathes with the program. Quiet material is barely touched.

SAG needs DRIVE: the harder the transmitter works, the more room SAG has to move.

## 7.2 PLATE kV

PLATE kV, second meter from the right, shows the supply voltage on a scale from 11.2 to 12 kV. Its zero is suppressed, so small dips read large.

| Zone | Meaning |
|---|---|
| Green, 11.8 to 12 kV | A stiff supply. |
| Amber, 11.5 to 11.8 kV | Breathing. |
| Red, 11.2 to 11.5 kV | Heavy droop. |

The needle dips on loud passages. The deeper it swings, the more the level breathes. The needle also drifts slowly on its own, even at SAG 0 %; a bounce still repeats exactly.

CHAPTER EIGHT

# MIX

MIX blends the air signal with your dry input. It is the big knob in the lower row, right of the round scope.

The knob runs from AIR, fully left, to LINE, fully right. AIR is what the station put on the air. LINE is your clean input. The readout shows how much dry signal is in the blend: "0% D", the default, is all AIR; "100% D" is all LINE. Click the printed AIR or LINE under the knob to throw MIX to that end; the sound glides there rather than jumping.

## 8.1 How It Blends

The dry signal is your raw input, before IN TRIM, kept in time with the station. With ROTATOR in, the dry signal is rotated too, so AIR and LINE blend without thinning. OUT TRIM comes after MIX and sets the level of both.

At 100% D the whole station keeps running, so the meters still read it.

## 8.2 Using MIX

Use MIX like parallel compression. Once DRIVE pushes the transmitter into its limits, with WARN, −100 or 125 lighting, either blend in a little LINE (the dry signal), or take mostly LINE with a touch of the driven AIR signal under it.

It works the same with cold BIAS on a stereo track: a little LINE puts the center back (5.2).

CHAPTER NINE

# POWER and Bypass

Three switches take the station out of the path, and they are one switch.

## 9.1 The POWER Lamp

The POWER lamp sits between IN TRIM and BIAS, left of the POWER print. Lit: the station is on the air. Dark: bypassed. Click the lens to switch.

## 9.2 The Bypass Icon and the Host

The bypass icon at the far left of the top band drives the same switch. It is red while R862 is bypassed. Your DAW's own bypass button drives it too; in Pro Tools it is the plug-in's master bypass. With the LV2 on Linux, the host's bypass is a separate switch. It fades and stays in time like R862's own, but the bypass icon and the POWER lamp do not show it.

## 9.3 What Bypass Does

- The switch fades over 5 ms, so it never clicks.
- Bypassed, you hear your dry input, delayed by the plug-in's latency so it stays in time. IN TRIM, ROTATOR, MIX and OUT TRIM do not apply.
- The station keeps running underneath. The meters keep reading, and switching back is seamless.

Presets and the A/B slots handle Bypass differently (chapter 11).

CHAPTER TEN

# The Meters and Lamps

Five meters run across the top of the panel, the lamps sit under them, and the round scope sits in the center.

| Meter, left to right | Shows | Chapter |
|---|---|---|
| MOD. m | where DEPTH is set | 4 |
| MOD. % | how hard the program works the transmitter | 4 |
| VU | PROGRAM in, AIR out | this chapter |
| PLATE kV | the supply voltage | 7 |
| MISMATCH | where TUBE MISMATCH is set | 6 |

While you mix, watch these:

| Watch | It tells you | Then |
|---|---|---|
| MOD. %, −100, 125 | how close you run to the limits | −100 blinks only on peaks (14.2) |
| PLATE kV | how far SAG moves the supply | set DRIVE first (chapter 7) |
| VU, peak bars | the level in and out | CAL for the needles, OUT TRIM for level |
| Correlation, L-R | how the stereo folds to mono | check with BIAS past B (5.2) |
| MATCH lamp | a loudness difference | click MATCH before you judge (3.4) |

## 10.1 The VU

The wide center meter has two needles on one VU scale. The black needle is PROGRAM: your raw input, before IN TRIM. The red needle is AIR: the output, after MIX and OUT TRIM. When red sits on black, the levels match.

The needles move like a standard VU meter, and nothing changes that. Bypassed, AIR reads your dry signal.

## 10.2 CAL

CAL sets which input level reads 0 VU. Click one of the four lamps under the VU: −18, −14, −10 or −6 dBFS. The lit lamp is in use. The default is −18.

Loud modern mixes pin both needles at −18; pick a higher setting until they swing around mid-scale.

CAL moves both needles, nothing else. It is saved with the session, not in presets.

## 10.3 The Peak Bars

The two vertical bars at the edges of the VU window show sample peaks from −20 to 0 dBFS. IN, at the left, reads your raw input. OUT, at the right, reads the final output. Each holds its peak for a moment. Click a bar to clear it.

## 10.4 The Limit Lamps

The four lamps under MOD. % flash when the transmitter reaches a limit. Each flash is brief and restarts with every event, so a steady glow means a steady overload.

| Lamp | Lights when |
|---|---|
| WARN, by the thumbwheel | Negative peaks pass the thumbwheel setting, close to the −100 limit. |
| −100 | Negative peaks reach the floor and are clipped. An occasional blink adds grit and glue. Constantly lit, the signal is crushed: bring the level down. |
| 125 | Positive peaks reach the tubes' limit. The tubes round them off softly, never with digital clipping. |
| L-R | The stereo side signal overloads and may smear or distort. Lower the level or narrow the stereo width. Mono content never lights it. |

The thumbwheel left of the lamps sets how early WARN lights, from 80 to 95 % of the negative limit. Drag it up or down. Double-click to return to 95. It is saved with the session, not in presets.

## 10.5 The Round Scope

On a stereo track the scope is a goniometer: it shows how solid the mid is (a tall line) and how spread the side is (a wide cloud). A vertical line is mono. Two bright lines show the average center level (vertical) and side level (horizontal). The figure scales itself to fill the screen, so its size is not a level.

On a mono track the scope is a transfer display: it shows how much the station is coloring your sound. The more the line bends, the more color:

- a straight diagonal is clean;
- a bend at the top is saturation;
- a flat bottom corner is clipping at the floor;
- an S-shape in the middle is BIAS crossover;
- a moving line is sag.

On a stereo track, click the scope to step through its three views: X-Y DOTS, X-Y LINE and TRANSFER. Right-click steps back. X-Y DOTS and X-Y LINE are the goniometer's two styles: X-Y DOTS is the precise reading, and X-Y LINE draws the trace the way an analog scope does. TRANSFER shows the center of the mix, which is where BIAS works; the two bright lines and the correlation meter are hidden there. A new insert opens in the goniometer style you picked last.

## 10.6 The Correlation Meter

The bar along the bottom of the scope shows the mono compatibility of the output. Right of center, toward +1, is mono-safe. Around the center is wide. Left of center means out-of-phase content that cancels in mono.

## 10.7 The Help Strip

The text band at the bottom of the window explains what is under the pointer: a knob, button, lamp, meter or the scope. It is off by default. The TIPS icon in the top band, the Tooltip row in the menu, or a click on the band itself switches it for every R862 on the computer.

Preset and A/B messages appear in the band even with it off. License notices appear across the top of the panel (chapter 15). The version and build date are in About.

# PART III · WORKING WITH R862

CHAPTER ELEVEN

# A/B and Presets

Presets are files on disk. The A/B slots, in the top band, are working memory.

## 11.1 The A/B Slots

Click A/B to switch slots; the lit letter is the slot you hear. The slot you leave keeps its settings. The copy icon, right of A/B, copies the slot you hear over the other, with no undo.

A slot holds the eight knobs and ROTATOR, never Bypass, so a switch never turns the station off. Loading a preset or reopening a session fills both slots with the same sound. The slots are not saved.

## 11.2 The Preset Bar

The preset name sits in the top band, between two arrows. Click the name to open the browser. The arrows step through the presets of the current folder and wrap at the ends.

An amber dot by the name means a control has moved since the last load or save. INIT means nothing is loaded. "(deleted)" means the loaded preset's file was moved or deleted outside R862.

## 11.3 The Browser

The left list holds Favorites, Search and your folders; the right list holds the presets.

- Click a preset to load it; double-click to load it and close the browser.
- Click a preset's star to make it a favorite.
- Type in the search box to search names, folders, descriptions and tags. Start a word with # to search tags only.
- Drag a preset onto a folder to move it.
- Right-click a preset or a folder for load, save, rename, description and tags, delete, the startup default, and Reveal in Finder (Show in file manager on Linux).

The buttons are NEW FOLDER, SAVE, SAVE AS, RENAME, DELETE and CLOSE. SAVE overwrites the preset you loaded; SAVE AS names a new one. A preset holds a description of up to 200 characters and up to 12 tags.

## 11.4 Where the Files Live

All R862 copies on the computer share one folder. Each preset is one .R862Preset file named after the preset. Renames and moves in Finder, Explorer or a Linux file manager show up in the browser.

| Platform | Preset folder |
|---|---|
| macOS | /Users/Shared/Pulsar Modular/R862 Skywave/Presets |
| Windows | C:\Users\Public\Documents\Pulsar Modular\R862 Skywave\Presets |
| Linux | ~/.local/share/Pulsar Modular/R862 Skywave/Presets |

Open Preset Folder, in the menu, opens it. There is no import or export: copy preset files into the folder or out of it. Preset files travel between macOS, Windows and Linux; to back up, copy the folder. Delete moves files to the Trash (the Recycle Bin on Windows).

## 11.5 What a Preset Stores

| Stored | Never stored |
|---|---|
| The eight knobs and ROTATOR | CAL and the WARN thumbwheel |
| Bypass | The A/B slots |
| Name, description and tags | The window size, except in the Default |
| | MIDI mappings and the help strip switch |

A loaded preset applies its Bypass. A control missing from an older preset goes to its default, so an older preset loads with ROTATOR out. A preset sounds the same whatever was loaded before it.

## 11.6 The Default Preset

The preset named Default, at the top of the preset folder, loads on every new insert; in Pro Tools, when you first open the window. The installer writes it with the factory settings, next to the factory presets in the Bass, Brass, Bus, Drums, Guitar, Keys and Vocals folders. To change it, right-click a preset and choose "Save these settings as the startup default", or load Default and click SAVE.

Default cannot be renamed, deleted or moved. If it is missing, R862 writes a new one from the factory settings. A fresh insert never opens bypassed, even if Default was saved bypassed. An update with Presets selected replaces the Default and the factory presets, so keep your own versions under other names. On Linux an update never replaces a preset; it adds only the factory presets you do not have (15.5).

CHAPTER TWELVE

# Sessions, Hosts and MIDI

## 12.1 What the Session Saves

The session saves every control's value, so renaming or deleting presets does not affect it. It also saves CAL, the WARN thumbwheel, the scope's view, the window size and the loaded preset's name. It does not save the A/B slots, the MIDI mappings or the help strip switch. An older session opens with ROTATOR out.

Changing CAL, the thumbwheel or the scope's view marks the session as changed, so your DAW asks to save.

## 12.2 Automation

| On the panel | In the host's list |
|---|---|
| DEPTH | Depth |
| DRIVE | Drive |
| SAG | Sag |
| BIAS | Bias |
| TUBE MISMATCH | Tube Mismatch |
| IN TRIM | Input Trim |
| OUT TRIM | Output Trim |
| MIX | Mix |
| ROTATOR | Rotator |
| POWER | Bypass |
| MATCH, CAL, the thumbwheel | not parameters, no lane |

- Bypass lane steps are safe mid-take (9.3).
- To automate MATCH, automate Output Trim.

- Ignore Dump Info, a service parameter.

## 12.3 MIDI Learn

Any knob, the POWER lamp and ROTATOR can follow a MIDI controller.

1. Click the MIDI Learn icon in the top band, left of TIPS. It stays lit.
2. Click a knob, the POWER lamp or ROTATOR. It turns orange; its value does not change.
3. Move a control on your MIDI device. The CC is bound at once.
4. Click the icon again to leave Learn mode.

In Learn mode, mapped controls show their CC number. One control takes one CC; learning again replaces it. To remove a mapping, right-click the mapped control and choose MIDI Forget.

R862 listens on every MIDI channel and maps the full CC range, 0 to 127, over the full range of the control.

The mappings belong to the computer, not to a session or preset, and are saved as you make them. The MIDI page of the menu loads, saves and manages mapping files (.r862midi) and sets the default set.

A new R862 loads the current set. The default set is used only when there is no current set.

In Logic, R862 is a MIDI-controlled effect: choose the MIDI source in the plug-in header.

## 12.4 The Menu

The menu button, at the right end of the top band, opens:

- **About**: version, build date and license.
- **License Status**: the license window (chapter 15).
- **Manuals**: the Quick Guides on the web and this guide, Dark or Print.
- **MIDI**: load, save and manage MIDI mappings.
- **Tooltip**: the help strip, on or off (chapter 10).
- **Open Preset Folder** (chapter 11).
- **Set Default Size**: new inserts open at the current window width.

## 12.5 Window Size

Drag the corner to resize, from the design size to two and a half times that, at most 90 % of the display. The aspect ratio is locked. Each session keeps its own size.

On Linux the window goes down to half the design size. In Ardour and Mixbus, resize the VST3 from its corner; the window frame does not resize it. The LV2 resizes from the window frame (in REAPER, from its corner) and keeps the panel's proportions inside it.

On a high-resolution display the VST3 and the LV2 follow the DAW's own interface scale.

## 12.6 Renders

Offline bounces are repeatable, sample for sample: each one starts the station from the same state.

# PART IV · IN PRACTICE

CHAPTER THIRTEEN

# Recipes

Each recipe is a starting position. Click MATCH after every move that changes loudness, then judge.

## 13.1 A Clean Station on the Mix Bus

**Settings:** the defaults.

**You hear:** a clean transmitter at its nominal operating point.

## 13.2 Shaving the Peaks

**Settings:** on a full mix, raise DRIVE until the 125 lamp blinks on the peaks, then further.

**You hear:** the peaks shaved more than the body and a denser mix, with no pumping while SAG is at 0.

## 13.3 Thick Bass

**Settings:** on a bass track, BIAS well past the B mark.

**You hear:** a thick, compressed low end; clean attacks, tails that buzz as they decay.

## 13.4 Warmth from the Pair

**Settings:** TUBE MISMATCH at the top of its green zone.

**You hear:** warmth and body at every level.

## 13.5 Let the Supply Breathe

**Settings:** DRIVE up until MOD. % reaches the amber, then SAG up. Watch PLATE kV swing.

**You hear:** the level breathing with the loud passages, quiet material untouched.

## 13.6 The Parallel Transmitter

**Settings:** DRIVE into the transmitter's limits, then MIX mostly toward LINE, with a touch of AIR under it.

**You hear:** something like parallel compression.

## 13.7 Thin the Center, Then Bring It Back

**Settings:** on a stereo mix, BIAS past the B mark. Then turn MIX toward LINE.

**You hear:** the center fading, with grain on the decays and clean sides; in the red zone the stereo field loses its correlation. A little LINE refocuses it and puts the center back underneath.

CHAPTER FOURTEEN

# Gain Staging

## 14.1 Where It Sits in a Chain

A hotter upstream device works the transmitter harder. Set upstream gain first, then IN TRIM. Set the drive at the level the track really runs at, not on a soloed pass.

## 14.2 Headroom and the Lamps

IN TRIM, DRIVE and DEPTH decide how close the program gets to the transmitter's limits (chapter 4); the lamps show when it arrives (10.4).

Set IN TRIM so −100 blinks only now and then on the loudest peaks. Use DRIVE for character, not for level.

## 14.3 Feeding the Next Device

Set the level that leaves R862 with OUT TRIM. MATCH holds the loudness, not the peaks: a denser signal can peak differently at the next device. The OUT peak bar shows what leaves.

> TIP: Set drive by the lamps. Set level by OUT TRIM and the meter after R862.

# PART V · REFERENCE

CHAPTER FIFTEEN

# Installation and the First Insert

Install the format your DAW uses; the station is the same in each.

| Format | Platform | Installed at |
|---|---|---|
| VST3 | macOS | /Library/Audio/Plug-Ins/VST3/Pulsar Modular/R862 Skywave.vst3 |
| VST3 | Windows | C:\Program Files\Common Files\VST3\Pulsar Modular\R862 Skywave.vst3 |
| AU | macOS | /Library/Audio/Plug-Ins/Components/R862 Skywave.component |
| AAX | macOS | /Library/Application Support/Avid/Audio/Plug-Ins/Pulsar Modular/R862 Skywave.aaxplugin |
| AAX | Windows | C:\Program Files\Common Files\Avid\Audio\Plug-Ins\Pulsar Modular\R862 Skywave.aaxplugin |
| VST3 | Linux | ~/.vst3/R862 Skywave.vst3 |
| LV2 | Linux | /usr/lib/lv2/R862 Skywave.lv2 (package) or ~/.lv2/R862 Skywave.lv2 (archive) |

The installer offers the formats, the presets and the user guides as separate items. On Linux, the package or the archive installs all of them (15.5).

## 15.1 Where Presets and Guides Live

| Platform | Folder |
|---|---|
| macOS | /Users/Shared/Pulsar Modular/R862 Skywave/Presets and /User Guides |
| Windows | C:\Users\Public\Documents\Pulsar Modular\R862 Skywave\Presets and \User Guides |
| Linux | ~/.local/share/Pulsar Modular/R862 Skywave/Presets and /User Guides |

## 15.2 What a Fresh Insert Gives You

A new insert loads the Default preset (11.6). As installed, it gives:

| Control | Factory Default |
|---|---|
| DEPTH | 0.95 |
| DRIVE | 0 dB |
| SAG | 0 % |
| BIAS | +8 V |
| TUBE MISMATCH | 0 |
| IN TRIM, OUT TRIM | 0 dB |
| MIX | 0% D, all AIR |
| POWER | lit, on the air |
| ROTATOR | out |
| CAL | −18 |
| WARN thumbwheel | 95 |

## 15.3 License

Without an activated license, R862 plays a soft noise instead of your audio and the license window opens by itself. You can also open it from the menu, License Status:

1. Paste your license key.
2. Click Activate.

The status line turns green and your audio returns at once, with no restart.

| Button | Does |
|---|---|
| Activate | Activates this computer with the key. |
| Deactivate | Frees this computer's seat, even offline; the server hears at the next contact. |
| Refresh | Checks the license now. |
| Account | Opens your account page on the web, where you manage your computers. |

The license renews online by itself. R862 keeps playing offline for a while; when it needs the server, a line across the top of the panel says so. Click the line for Refresh or Account.

## 15.4 Uninstalling

To keep your presets, copy the R862 Skywave folder first. Then delete:

- the plug-in files in the first table;
- the R862 Skywave folder in /Users/Shared/Pulsar Modular, C:\Users\Public\Documents\Pulsar Modular or ~/.local/share/Pulsar Modular (presets and user guides);
- the settings (help strip switch, favorites): on macOS in your user Library under Application Support/Pulsar Modular/R862 Skywave; on Windows in your user application data under Pulsar Modular\R862 Skywave; on Linux under ~/.config/Pulsar Modular/R862 Skywave;
- the MIDI mappings: under Application Support/Pulsar Modular MIDI/R862 Skywave on macOS, Pulsar Modular MIDI\R862 Skywave on Windows, or ~/.config/Pulsar Modular MIDI/R862 Skywave on Linux.

If you are leaving the computer for good, deactivate the license first. Delete the Pulsar Modular folder too if it is left empty.

On Linux, remove the plug-in files with the package manager or the uninstall script (15.5) rather than by hand.

## 15.5 Linux

R862 runs on 64-bit Intel and AMD Linux systems (x86-64) with glibc 2.34 or newer: Ubuntu 22.04, Debian 12, Fedora 35, Linux Mint 21 and later releases. To check, run getconf GNU_LIBC_VERSION in a terminal. R862 comes in two forms. Install one of them, not both.

**Package (.deb).** For Ubuntu, Debian, Linux Mint, Pop!_OS and other Debian-based systems. Install it with sudo apt install ./r862-skywave_*_amd64.deb in a terminal opened in the download folder. The package sets up every user account on the computer at install time; for an account added later, run sudo dpkg-reconfigure r862-skywave once. Until then that account can use the LV2.

**Archive (.tar.gz).** For any distribution. It installs for your user only and needs no root: unpack it and run ./install.sh in a terminal opened in the unpacked folder.

Both install the VST3, the LV2, the factory presets and the user guides. Then rescan plug-ins in your DAW, or restart it; Ardour and Mixbus look for new plug-ins when they start.

In REAPER, use the VST3: REAPER cannot automate the LV2's controls. In Bitwig Studio, use the VST3. Ardour and Mixbus run both formats.

An update never overwrites a preset, edited or not; it adds the factory presets you do not have. It does replace the user guides with their new versions.

To uninstall, run sudo apt remove r862-skywave for the package, or ./uninstall.sh in the archive's folder. Both keep your presets, settings and MIDI mappings (15.4).

Deactivate the license before you reinstall Linux: R862 may count the new installation as a new computer.

## 15.6 Specifications

| Item | R862 Skywave |
|---|---|
| Formats | VST3, AU and AAX on macOS; VST3 and AAX on Windows; VST3 and LV2 on Linux; AUv3 and a standalone app on iPad and iPhone (17) |

| Item | R862 Skywave |
| --- | --- |
| Processing | 64-bit floating point |
| Sample rates | any |
| Channels | mono in to mono out, stereo in to stereo out. Surround and immersive layouts are not supported. On Linux the LV2 is stereo only. |
| Latency | reported to the host and compensated: 123 samples at 44.1 and 48 kHz, 99 at 88.2 and 96 kHz, none from 176.4 kHz up |

CHAPTER SIXTEEN

# Troubleshooting and FAQ

## 16.1 The Sound

**I hear a soft noise instead of my audio.** R862 is not licensed on this computer. Activate it (15.3).

**The level dropped when I turned BIAS.** Colder settings lower the level. Click MATCH (3.4).

**DRIVE does not make it louder.** By design (4.1). Use OUT TRIM for level.

**The mix sounds thin in mono.** In the red zone of BIAS the stereo field loses its correlation. Back BIAS off, or blend in a little LINE to refocus it (5.2).

## 16.2 The Panel

**The help strip is blank.** It is off by default. Switch it on with TIPS (10.7).

**The correlation meter is gone and the L-R lamp stays dark.** The track is mono (1.2). If only the correlation meter is gone, the scope is in TRANSFER; click it to step on (10.5).

**The needles pin at the right.** Pick a higher CAL setting (10.2).

**A Manuals row is gray.** That guide is not installed. Run the installer with User Guides selected. On Linux, reinstall the package or run install.sh again.

## 16.3 Presets and Sessions

**My preset switched the station off.** A preset stores Bypass and applies it on load (11.5). Re-save it with the station on.

**SAVE says there is nothing loaded to overwrite.** Use SAVE AS, or load a preset first. A fresh insert's Default is not a save target.

**"Changed on disk since you loaded it."** Another R862, or Finder, changed the file. Reload it, or use SAVE AS.

**"The startup Default could not be written."** R862 cannot write to the preset folder. Check that it exists and that you can write to it.

**Why are CAL and the thumbwheel not in my preset?** They are saved with the session (12.1).

## 16.4 Hosts and Renders

**Surround or immersive tracks.** Not supported (1.2).

**A mono track gives a stereo output.** R862 runs mono to mono or stereo to stereo only (1.2).

**Does R862 add latency?** Yes, compensated by the host (15.6).

**My MIDI controller does not move R862 in Logic.** Choose the MIDI source in the plug-in header (12.3).

**R862 does not appear in my Linux DAW.** Rescan plug-ins or restart the DAW, and check that the system has glibc 2.34 or newer (15.5).

**Ardour or Mixbus crashes while scanning plug-ins.** R862 may be installed twice, from the package and from the archive. Remove one of them (15.5).

**I cannot automate R862 in REAPER.** Use the VST3 (15.5).

**Crackles at small buffer sizes on Linux.** The DAW is probably running without real-time priority. Give your user real-time audio rights (your distribution's audio setup guide shows how), then log in again. On a laptop, also set the power profile to Performance.

CHAPTER SEVENTEEN

# iPad and iPhone

R862 is on the App Store for iPad and iPhone, iOS 15 or later. It has the same sound, controls and presets. One purchase gives you:

**AUv3 plug-in:** for Logic Pro for iPad, GarageBand, AUM, Cubasis and other AUv3 hosts.

**Standalone app:** processes the microphone or an interface. It starts with the input muted against feedback: tap Unmute Input.

## 17.1 Touch

**Adjust:** drag up or down. **Reset:** double-tap.

**Help:** with the help strip on (10.7), touch and hold a knob, lamp or meter; the strip explains it while your finger rests there.

**The scope:** a tap steps through X-Y DOTS, X-Y LINE and TRANSFER, as a click does (10.5).

**Touch and hold:** a preset or a folder in the browser opens its menu, the one a right-click opens on a computer (11.3). The startup default is set from there too (11.6). To move a preset or a folder, choose Move to folder... in that menu: on iPad and iPhone a drag in the browser only scrolls.

**Link In & Out Trim:** this menu entry takes the place of the SHIFT link (3.3). While it is on, either trim moves the other the other way, and a double-tap returns both to 0 dB.

**MIDI Learn:** tap the MIDI Learn icon, then a knob, the POWER lamp or ROTATOR (12.3). To remove a mapping, use Manage MIDI Mappings on the MIDI page of the menu.

Turn the device sideways for the largest view; held upright, the panel sits in the middle of the screen. The panel always fits the screen, so there is no window size to set (12.5). The App Store purchase is your license: there is nothing to activate, and the menu has no License Status, Open Preset Folder or Set Default Size. In the app, Manuals opens the Quick Guides and these guides on the web. In the plug-in, Manuals copies the link instead: paste it into your browser.

## 17.2 Presets on iPad and iPhone

Your presets live inside the app, shared by the plug-in and the app. Updates never touch them. EXPORT shares the selected preset through the share sheet; IMPORT brings one in from Files. DELETE removes a preset or a folder for good, after asking: iPad and iPhone have no Trash. Deleting the app deletes your presets: export them first.

# Appendix A. Credits and Independence

## Independence

**R862 SKYWAVE** is a Pulsar Modular product, named after the 862 power tube.

R862 is not affiliated with, and is not endorsed by, RCA or its successors. RCA and the 862 are named only to identify the tube and its published data. All trademarks belong to their respective owners.

R862 is not a model of any particular station or transmitter.

## Credits

R862 Skywave is a product of **Pulsar Modular**.

| | |
|---|---|
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Please kindly report any errors or omissions in this user guide to psupport@pulsarmodular.com.

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