PSEDYS | TECHNICAL REFERENCE MANUAL V3.0

Williams %R — Technical Reference Manual v1.0

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PSEDYS | Complete Edition
HH/LL Lookback · Inverted Scale · %R vs Stochastic · OB/OS · Momentum Burst · MTF · Bot vs TradingView

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1. What is Williams %R?

Williams %R was created by Larry Williams in 1973. It is essentially a **reversed Stochastic** — it measures how close the Close is to the highest High of the last N bars, expressed in negative percentages.

Philosophy: Close near the period High = bullish market (O). Close near the period Low = bearish market (-100).

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2. Calculation Formula — Complete

```
HH = max(High[i−period+1 .. i])   ← highest High in the window
LL = min(Low[i−period+1 .. i])    ← lowest Low in the window

%R[i] = (HH − Close[i]) / (HH − LL) × (−100)
```

Standard period: 14

Check bar 14:

```
HH = 107.71, LL = 99.57, Close = 107.49
%R = (107.71 − 107.49) / (107.71 − 99.57) × (−100)
   = 0.22 / 8.14 × (−100) = −2.70  ✓  (overbought)
```

Bar selection table 14–40:

Bar	Close	%R	Zone
14	107.49	**−2.70**	OB
18	106.35	−28.32	BULL
22	104.02	−94.28	OS
26	101.69	−94.99	OS
28	100.65	**−96.52**	OS
34	104.01	−29.70	BULL
38	106.54	−2.91	OB
40	107.01	**−2.58**	OB

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3. Mathematical Relationship with Stochastic %K

```
Stochastic %K = (Close − LL) / (HH − LL) × 100
Williams %R   = (HH − Close) / (HH − LL) × (−100)

Direct relationship:
  %R = %K − 100    (or %K = %R + 100)

Examples:
  %K = 97 → %R = −3   (overbought on both)
  %K = 3  → %R = −97  (oversold on both)
  %K = 50 → %R = −50  (neutral on both)
```

Mathematical conclusion: Williams %R and Stochastic %K are **identical** in terms of information — they differ only in scaling and direction. There is no additional information in %R compared to %K (or vice versa). The practical value of %R comes from Larry Williams' specific paradigm and traders' familiarity with its scale.

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4. Inverted Scale — Why %R ranges from 0 to −100

```
%R = 0:      Close = HH  → market has reached the period high → OVERBOUGHT
%R = −20:   Close near HH → strong bullish
%R = −50:   Close in the middle of the range → neutral
%R = −80:   Close near LL → strong bearish
%R = −100:  Close = LL → market has reached the period low → OVERSOLD
```

Standard levels:
- **%R > −20 (near 0):** Overbought — Close in the upper quarter of the range
- **%R < −80 (near −100):** Oversold — Close in the lower quarter

---

5. Lag and Warm-up

```
First value: bar period = bar 14
Warm-up: 14 bars (no additional smoothing)
Lag: (period−1)/2 = 6.5 bars
```

No smoothing. Raw %R is noisy — SMA(3) can be added for %D similar to Stochastic, but this is not standard.

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6. %R Levels — Interpretation

%R	Zone	Meaning
0 to −20	**Overbought**	Close in the upper quarter of the range
−20 to −50	Bullish	Bullish bias
−50	**Neutral**	Close in the middle of the range
−50 to −80	Bearish	Bearish bias
−80 to −100	**Oversold**	Close in the lower quarter of the range

7. Trading Signals

7.1 OB/OS Signals

```
%R exit from OB (%R drops below −20):
→ Bullish momentum weakens → possible pull-back
→ In bullish trend: opportunity for trailing SL tighten

%R exit from OS (%R rises above −80):
→ Bearish momentum weakens → possible bounce
→ In bullish trend: entry Long timing
```

7.2 Momentum Burst (Larry Williams Original)

Momentum Burst Bullish:

```
%R drops below −90 (extreme OS) BUT price does NOT make a new Low → bullish signal
→ Bears cannot push the price lower even if Close is near Low → bearish exhaustion
```

Momentum Burst Bearish:

```
%R rises above −10 (extreme OB) BUT price does NOT make a new High
→ Bulls cannot push the price higher → bullish exhaustion
```

7.3 −50 Centerline Cross

```
%R cross −50 bullish (from <−50 to >−50): Close moves to the upper half of the range
%R cross −50 bearish: Close moves to the lower half
```

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Similar to RSI cross 50 and Stochastic cross 50.

7.4 Filters

```
%R cross −80 bullish (exit OS) + EMA stack bullish + ADX > 18 = entry Long
%R cross −20 bearish (exit OB) + EMA stack bearish + ADX > 18 = entry Short
```

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8. %R vs Stochastic vs RSI

Aspect	Williams %R	Stochastic %K	RSI
Formula	(HH−Close)/(HH−LL)×(−100)	(Close−LL)/(HH−LL)×100	Avg Gain / Avg Loss
Scale	−100 to 0 (inverted)	0 to 100	0 to 100
OB	> −20	> 80	> 70
OS	< −80	< 20	< 30
Unique info vs Stoch	No — mathematically identical	Reference	Different
Smoothing	None	SMA (%D)	Wilder RMA
Advantage	Larry Williams familiarity	%D signal line	Divergences, trend filter

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9. Williams %R in Sideways and Trending Markets

Sideways: %R oscillates repeatedly between OB and OS — maximum utility for range trading at range extremes.

Bullish trend: %R stays near 0 (OB) for long periods — not a Short signal.

Bearish trend: %R stays near −100 (OS) — not a Long signal.

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10. MTF and PSEDYS

Standard MTF:

```
4H: %R > −50 (bullish bias) → macro filtering
15M: %R exit OS (−80→−60) → entry timing
5M: %R exit OS or cross −50 → entry execution
```

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PSEDYS:
Williams %R is used similarly to Stochastic for entry timing in pullbacks. Stochastic is preferable for signal consistency (%D available), but %R can be faster as a raw indicator.

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11. Bot vs TradingView Validation

Sources of divergence:

```
□ HH = max(High[i-period+1:i+1]) — inclusive window
□ LL = min(Low[i-period+1:i+1])
□ %R = (HH - Close) / (HH - LL) × (-100)  ← mandatory negative sign
□ HH = LL: %R = -50 (TradingView)
□ Tolerance: < 0.1 %R points
```

Python Script:

```
def williams_r(highs, lows, closes, period=14):
    n = len(closes)
    wr = [None] * n
    for i in range(period - 1, n):
        hh = max(highs[i-period+1:i+1])
        ll = min(lows[i-period+1:i+1])
        wr[i] = (hh - closes[i]) / (hh - ll) * (-100) if hh != ll else -50.0
    return wr
```

---

12. Practical Exercises

Exercise 1: %R vs Stochastic — which do you choose?

Situation: The bot has both %R and Stochastic(14,3). %R = −15. Stochastic %K = 85, %D = 82. Both OB. Which signal do you use?

Answer: Stochastic with %D signal line — the information is mathematically identical (%K = %R + 100 = 85), but Stochastic offers %D for signal crossover confirmation. Simple %R (without smoothing) has more noise. Use both as redundancy or choose Stochastic as the primary source.

Exercise 2: Momentum Burst Bullish

Situation: On 5M, %R = −93. Price makes a swing low (Low[current] > Low[previous] by 2%). ADX = 19. EMA 200 4H < price.

Answer: Momentum Burst Bullish signal — entry Long with reduced sizing (50%). %R at extreme OS BUT price did not make a new Low → bears exhausted. ADX = 19 (slightly below

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optimal threshold 20), reduced sizing. SL below current Low. TP at %R exit OS (−80) or %R = −50.

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13. Cheat Sheet — Quick Summary

Concept	Value / Rule
Formula	`(HH − Close) / (HH − LL) × (−100)`
HH	`max(High[i-period+1:i+1])`
LL	`min(Low[i-period+1:i+1])`
Standard period	14
Scale	−100 (OS) to 0 (OB) — INVERTED
OB	> −20 (near 0)
OS	< −80 (near −100)
Neutral	−50
Stoch relationship	`%R = %K − 100` or `%K = %R + 100`
Unique info vs Stoch	NO — mathematically identical
Warm-up	period = 14 bars
Lag	(period−1)/2 = 6.5 bars
Smoothing	None (raw)
Exit OS → Long	%R rises above −80 in bullish context
Exit OB → Short	%R drops below −20 in bearish context
Momentum Burst	%R extreme BUT price does not confirm new extreme
Bull trend	%R stays near 0 — no Short
Bot vs TV tolerance	< 0.1 points
HH=LL	%R = −50

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