

Gulf-Bandari 4/4 Method

Release v1.1 - Refined Practical and Analytical Timing Framework

Refined 1/32 Practical Notation - 1/128 Microtiming Analysis - 64-Step Two-Beat Cycle - Bandar Abbas / Hormozgan Reference

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Document status	Release v1.1 - refined, notation-corrected, fieldwork-informed version
Primary use	Notation, guitar arrangement, ensemble rehearsal, and DAW/MIDI production
Core model	0 / 13 / 23 / 32 per beat on a 1/128 analytical bar-grid
Complete cycle	0 / 13 / 23 / 32 / 45 / 55 / 64 over two beats; 64 is the loop boundary
Practical notation	3+3+2 on a 1/32 display grid; performer-readable approximation only
Exact analytical notation	13/128 + 10/128 + 9/128 per beat; shown separately from the practical layer
Reference context	Author field sampling, comparative listening, and practical testing in Bandar Abbas / Hormozgan
Scope	Practical translation method; not a private ownership claim over traditional Bandari heritage

Copyright / license: this release documents the author's explanatory text, notation logic, diagrams, guitar/DAW translation method, and analytical model. It does not claim private ownership over traditional Bandari, Gulf, or Southern Iranian rhythmic heritage. CC BY 4.0 is recommended for Zenodo upload; traditional heritage remains outside private ownership.

Abstract

This release presents a refined practical method for representing Gulf-Bandari / Southern Iranian Bandari rhythmic feel inside a 4/4 working environment. The method is designed for guitar, ensemble rehearsal, notation, and DAW/MIDI production. Release v1.1 is the refined version following the clarified v1.0 introductory release. It explicitly separates the performer-readable 1/32 notation layer from the exact 1/128 analytical timing layer.

The central analytical model is 0 / 13 / 23 / 32 inside each beat on a 1/128 bar-grid. A complete two-beat groove cycle is 0 / 13 / 23 / 32 / 45 / 55 / 64, where 64 is the loop boundary. The practical 3+3+2 notation is treated as a performer-readable approximation. The difference between the approximation layer ($12+12+8 = 32/128$) and the exact layer ($13+10+9 = 32/128$) is a systematic microtiming offset of +1/-2/+1 per beat.

1. Purpose and Release Position

Release v1.1 formalizes a practical translation system: how a traditional Bandari rhythmic feel can be represented in modern 4/4 notation, rehearsed by musicians, mapped to guitar and ensemble parts, and programmed or analyzed in DAW/MIDI environments. It follows the v1.0 clarified release, which was limited to an introductory pedagogical display.

Three-layer model:
Introductory display: 1/16 Long-Short-Short (pedagogical only)
Practical notation: 3 + 3 + 2 on a 1/32 display grid (performer approximation)
Analytical model: 0 / 13 / 23 / 32 per beat on a 1/128 bar-grid

Release v1.1 adds: (a) explicit microtiming arithmetic; (b) separate practical and analytical staff figures; (c) DAW-agnostic implementation guidance; (d) fieldwork-informed source framing; (e) methodological limitations and reference context.

2. Cultural, Prior-Art, and Fieldwork Position

Bandari is a traditional and popular performance practice associated with Southern Iran and the Persian Gulf, with strong cultural references in Bandar Abbas, Hormozgan, and related coastal communities. The rhythmic vocabulary also exists within a wider cross-Gulf circulation of maritime, trade, pearl-diving, migration, and performance exchange. This document uses Bandar Abbas / Hormozgan as a core regional reference area while avoiding any exclusive or ownership-based claim over the wider heritage.

The method does not claim that Bandari rhythm was invented by the author, nor that this is the first documentation of Bandari or Gulf rhythms. Existing books, recordings, workshops, and performance traditions are treated as related context and prior art. The contribution of this release is a practical framework for converting a specific Gulf-Bandari rhythmic contour into 4/4 notation, guitar mapping, ensemble rehearsal cues, and DAW/MIDI microtiming.

3. Traditional Reference Source Statement

The timing model in this release is informed by the author's own field sampling, comparative listening, and musician-to-musician verification in Bandar Abbas / Hormozgan. The reference material was personally collected or examined in performance-oriented contexts and compared against the practical knowledge of local Bandari musicians, performers, arrangers, and players. The source audio is not redistributed in this release.

Reference source: author field sampling and comparative listening, Bandar Abbas / Hormozgan
Reference function: timing comparison and performance-feel verification
Redistribution: source audio not redistributed
Published material: derived timing model, notation, diagrams, tables, and method text

4. Core Timing Model

The refined model is based on a three-attack-per-beat structure. In 4/4, this creates twelve principal attacks across a full measure. On a 1/128 bar-grid interpretation, each beat contains 32 analytical units.

Per beat: 0 / 13 / 23 / 32
Two-beat cell: 0 / 13 / 23 / 32 / 45 / 55 / 64
Full 4/4 bar: 0 / 13 / 23 / 32 / 45 / 55 / 64 / 77 / 87 / 96 / 109 / 119 / 128

Figure 1 - 1/128 Analytical Bar-Grid and 12-Attack 4/4 Measure

Beat	Attack 1	Attack 2	Attack 3	Boundary
Beat 1	0	13	23	32
Beat 2	32	45	55	64
Beat 3	64	77	87	96
Beat 4	96	109	119	128

Figure 1: Full-bar analytical model. The final 128 marker is the next bar boundary, not a thirteenth attack.

Mathematical confirmation: $13/128 + 10/128 + 9/128 = 32/128 =$ one quarter-note beat. A two-beat cycle spans $64/128 =$ one half-note. A full 4/4 bar spans $128/128 =$ one whole-note bar.

5. Practical and Analytical Staff Notation

The analytical 1/128 grid is not intended to be the primary performer notation. The system operates on two complementary layers, presented as two separate figures.

Layer	Purpose	Beat-level representation	Authority
Figure 2a - Practical	Reading, teaching, rehearsal, guitar mapping	3+3+2 on 1/32 display grid	Readable approximation
Figure 2b - Analytical	Microtiming, DAW/MIDI, research citation	13/128 + 10/128 + 9/128; onsets 0/13/23/32	Timing specification

The Microtiming Offset: Why 13 and Not 12

The practical 3+3+2 layer corresponds to $12/128 + 12/128 + 8/128 = 32/128$. The exact analytical layer is $13/128 + 10/128 + 9/128 = 32/128$. These are not the same. The structural difference constitutes a systematic microtiming offset:

Attack	Practical value	Exact value	Offset	At 93-98 BPM
Attack 1	12/128	13/128	+1/128	approx. +19-20 ms
Attack 2	12/128	10/128	-2/128	approx. -38-40 ms
Attack 3	8/128	9/128	+1/128	approx. +19-20 ms

The values 13 and 23 are author-derived clean analytical targets based on repeated listening, transient-onset inspection, and DAW-based timing comparison of field-collected or field-referenced Bandari material. They are not derived from a theoretical subdivision alone. The 1/128 layer functions as a microtiming specification layer, not as a direct performance prescription.

Related groove and timing literature is cited as context for microtiming, entrainment, and perceptual timing behavior, not as direct proof of this Gulf-Bandari numerical model.

Figure 2a - Performer-Readable Notation Layer

In Figure 2a, three notes per beat are beamed together as a single group. Notes 1 and 2 are dotted 16ths (3/32 each); note 3 is a plain 16th (2/32). This layer is recommended for teaching, rehearsal, guitar mapping, and printed performance material. It is not the exact microtiming authority.

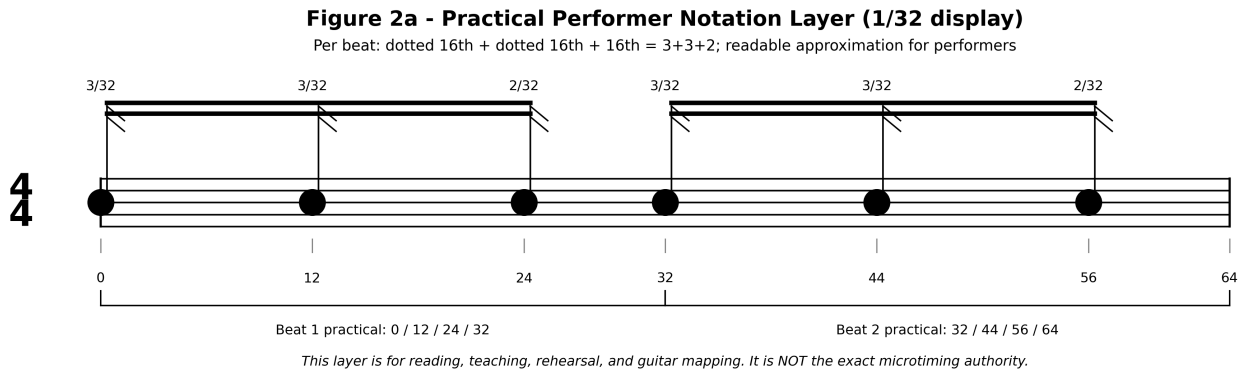


Figure 2a: Performer approximation. Beamed 3+3+2 notation on a 1/32 display grid. Three notes per beat are read and played as one continuous group. Durations: $\frac{3}{32} + \frac{3}{32} + \frac{2}{32} = \frac{8}{32} =$ one quarter-note beat. This layer is a readable approximation - see Figure 2b for exact analytical values.

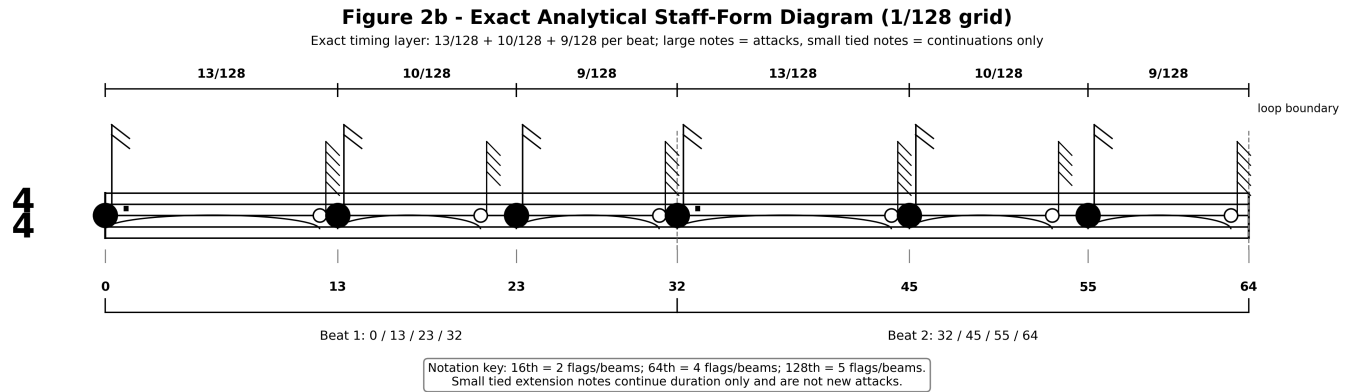
Teaching note: students may learn this layer first. It gives a playable map for guitar, percussion, DAW sketching, and ensemble rehearsal while avoiding unreadable high-resolution notation.

Figure 2b - Exact Analytical Staff-Form Diagram

In Figure 2b, each of the six attacks is shown as a principal notehead tied to a small extension notehead. The extension is not a new attack - it shows duration continuation only. Large noteheads mark the principal attacks; small tied noteheads show duration continuation only.

Duration	Conventional notation explanation	Analytical value
13/128	Dotted 16th tied to one 128th note	$12/128 + 1/128 = 13/128$
10/128	16th tied to one 64th note	$8/128 + 2/128 = 10/128$
9/128	16th tied to one 128th note	$8/128 + 1/128 = 9/128$

Notation key: 16th note = 2 flags/beams; 64th note = 4 flags/beams; 128th note = 5 flags/beams. This corrects the common visual mistake of under-counting the flags on 64th and 128th values.



Caption: Exact analytical staff-form diagram of the two-beat Gulf-Bandari cell. The practical 3+3+2 notation is a readable approximation.

Figure 2b: Exact analytical staff-form diagram of the two-beat Gulf-Bandari cell. The practical 3+3+2 notation is a readable approximation; the exact timing layer is 13/128 + 10/128 + 9/128 per beat. For performance use, refer to Figure 2a.

6. Why 1/128 Is Used: 1/64 and 1/32 Compared

The 1/128 analytical grid is the minimum integer-resolution grid that can represent the attack positions 13 and 23 exactly within a 32-unit beat. This is a mathematical requirement of the observed timing model, not merely a theoretical preference.

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1/128 per-beat model: 0 / 13 / 23 / 32
Converted to 1/64: 0 / 6.5 / 11.5 / 16
Rounded 1/64: 0 / 7 / 12 / 16
Equivalent on 1/128: 0 / 14 / 24 / 32
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Because 6.5 and 11.5 are non-integer half-grid positions, the model cannot be represented exactly on a strict 1/64 grid. The rounded 1/64 version shifts Attack 2 from position 13 to 14 and Attack 3 from position 23 to 24. This produces a useful approximation but not the clean reference model.

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1/128: precise analytical microtiming model (integer-exact)
1/64: practical approximation only (not integer-exact for this model)
1/32: performer-readable notation layer
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7. DAW-Agnostic Implementation

This method is not dependent on Cubase. The model is DAW-agnostic. The essential requirement is that the user can place MIDI events at proportional positions inside the beat. The per-beat positions expressed as percentages allow implementation in Studio One, Logic, Ableton Live, Pro Tools, FL Studio, Reaper, Cubase, or any comparable DAW.

Attack	1/128 position	Percent of beat	480 PPQ ticks	960 PPQ ticks	Function
1	0 / 32	0.000%	0	0	Beat anchor / low attack
2	13 / 32	40.625%	195	390	Inner response
3	23 / 32	71.875%	345	690	Closure / pickup
Boundary	32 / 32	100.000%	480	960	Next beat boundary

Formula for any DAW: $\text{event_tick} = \text{round}(\text{PPQ} \times \text{position} / 32)$. At 960 PPQ, attacks fall at 0, 390, 690 ticks per beat. Complete two-beat cycle at 960 PPQ: 0, 390, 690, 960, 1350, 1650; loop boundary: 1920.

8. Live Reference and Microtiming Tolerance

Selected live/recorded Bandari percussion references associated with the Bandar Abbas / Hormozgan performance context were examined for timing comparison. The observed live timing tends to cluster around the clean model but does not land on a single mathematical value every time.

Clean DAW/MIDI model: 0 / 13 / 23 / 32
Observed live reference: 0 / 13-14 / 23-24 / 32

At 93-98 BPM, each 1/128 analytical unit is approximately 19-20 ms. In practice, such a deviation may fall within a musically tolerable range, but its perceptual salience is context-dependent and may vary by timbre, tempo, listener, style, and ensemble texture.

9. Ensemble Percussion Source and Composite Groove Translation

In traditional Bandari performance practice, the rhythmic feel is often produced by an ensemble texture rather than a single isolated instrument. Instruments such as dohol, keser/kasr, pipeh/pipa, and other local percussion sources may each contribute a partial rhythmic function. This release translates the perceived composite ensemble result into a practical arrangement framework. The mapping below is a model, not a rule that every regional ensemble must follow identically.

Functional layer	Beat 1 positions	Beat 2 positions	Possible role
Dohol / low anchor	0	32	Low anchor or strong attack
Keser/Kasr / inner response	13	45	Internal response
Pipeh/Pipa / closure or high motion	23	55	Closure, pickup, high motion
Composite perceived groove	0 / 13 / 23	32 / 45 / 55	Six-attack two-beat cell

Figure 3: Possible functional view of ensemble-to-composite translation. Authentic practice may vary across performers, regions, songs, ceremonies, and arrangements.

10. Guitar, Ensemble, and DAW Mapping

Grid position	Percussion function	Guitar mapping	DAW/MIDI mapping
0	Low anchor / strong attack	Bass string or low muted stroke	Kick / low drum / bass accent
13	Inner response	Upstroke, high-string stroke, muted click	Snare ghost, clap, rim, shaker
23	Closure / pickup to next beat	High-string stroke, mute, percussive gesture	Shaker, hand perc, rim, ghost
32	Next beat anchor	Next bass-string anchor	Next kick / low anchor

Mapping guide only. Authentic feel depends on articulation, accent, velocity, instrument choice, dynamic shaping, and listening experience.

11. Accent and Fill Layer

Bandari accent gestures, fills, and ornamental strokes may add extra 16th-note or 32nd-note movements, especially near strong beats. These accents are important for style but must not be confused with the underlying three-attack-per-beat cell. The base cell is analyzed separately from the accent layer.

Base cell: 3 attacks per beat, 6 per two-beat cycle, 12 per 4/4 bar
 Accent/fill layer: optional extra strokes, ornaments, rolls, and regional gestures
 Rule: analyze the base cell first; add accents as a separate expressive layer

For teaching, the accent layer may be introduced only after the student can perform the base 3-attack-per-beat contour cleanly. For DAW arrangement, fills should be placed as a separate MIDI or percussion layer rather than changing the base quantize model.

12. Methodological Notes and Limitations

This release uses practical timing observation, DAW/MIDI logic, performer-readable notation, fieldwork-informed listening, and comparative musician knowledge. The following limitations apply and should be acknowledged in any academic citation or reuse.

Data and methods

The analytical model is based on repeated listening, transient-onset inspection, and DAW-based timing comparison of several two-beat Bandari groove segments recorded or examined in the Bandar Abbas / Hormozgan performance context. Onsets were marked by ear and eye on a fine-resolution DAW grid, then rounded to the nearest integer on a 1/128 bar-grid to obtain the clean reference values 0 / 13 / 23 / 32. This model represents a working clean target for arrangement and DAW use, not a statistical average over all possible Bandari performances.

Empirical basis

The timing values (0 / 13 / 23 / 32) represent a single-author analysis of a limited sample set. Inter-rater reliability testing, multi-session recordings with controlled microphone placement, and systematic onset detection using dedicated audio analysis software such as Sonic Visualiser, Melodyne, or MATLAB onset detection toolboxes would strengthen the empirical basis of the model significantly.

Live variability

Live performances cluster around but do not consistently produce the exact clean model values. The model represents a central tendency derived from the author's sample and practical testing, not a universal performance standard. The 13-14 and 23-24 ranges documented in this release should be understood as live-performance tolerance, not contradiction.

Regional scope and peer review status

The model is calibrated for a specific Gulf-Bandari 4/4 groove contour with reference to Bandar Abbas / Hormozgan performance practice. Bandari rhythmic vocabulary extends across the Persian Gulf region with regional variants; this model should not be generalized beyond its stated scope without further fieldwork. This document is a fieldwork-informed practical method and has not undergone formal peer review in a musicological journal.

13. Practical Implementation Checklist

For DAW/MIDI groove construction:

1. Work in 4/4.
2. Treat each beat as 32 analytical units.
3. Place the clean attacks at 0 / 13 / 23 / 32 per beat.
4. For a two-beat cycle, use 0 / 13 / 23 / 32 / 45 / 55 / 64.
5. For a full bar, use 12 attacks: 0 / 13 / 23 / 32 / 45 / 55 / 64 / 77 / 87 / 96 / 109 / 119.
6. Use 1/64 only as a rounded approximation.
7. Use 1/32 notation for readable performance material.
8. Add accent/fill layers separately, not as part of the base cell.

For guitar arrangement: map the low anchor to bass strings or low percussive strokes; map internal attacks to high-string strokes, mutes, upstrokes, or right-hand percussion; keep the 3-attack-per-beat contour clear; add Bandari accents and fills as a separate layer.

For teaching: begin with Long-Short-Short as a metaphor, then move to 3+3+2 performer approximation, and finally introduce 0 / 13 / 23 / 32 as the advanced timing model. The student should not be asked to read the analytical 128th-note layer as ordinary performance notation.

14. Appendix A - Timing Tables

Beat	Attack 1	Attack 2	Attack 3	Boundary
Beat 1	0	13	23	32
Beat 2	32	45	55	64
Beat 3	64	77	87	96
Beat 4	96	109	119	128

Two-beat cycle: Attacks 0/13/23/32/45/55 Loop boundary: 64
 Full 4/4 bar: Attacks 0/13/23/32/45/55/64/77/87/96/109/119 Bar boundary: 128
 Live range: 0 / 13-14 / 23-24 / 32
 Microtiming offset: practical 12/128 + 12/128 + 8/128; exact 13/128 + 10/128 + 9/128; offset +1 -2 +1
 Rounded 1/64 approximation: 0/7/12/16 = 0/14/24/32 on 1/128

15. Appendix B - Glossary

Term	Definition
Attack	A principal rhythmic onset, measured from the beginning of the transient.
Boundary	The end of one beat or cycle and the beginning of the next.
Composite groove	The perceived rhythmic result of several percussion parts working together.
1/128 analytical grid	A timing-analysis layer: 4/4 bar = 128 units; each beat = 32 units.
1/32 practical notation	Performer-readable approximation using 3+3+2 per beat.
1/64 approximation	Rounded working grid; cannot represent 0/13/23/32 exactly.
Microtiming offset	The systematic +1/-2/+1 difference between practical and exact layers.
Accent layer	Optional fills, ornaments, extra strokes added on top of the base cell.
DAW-agnostic	Implementable via MIDI percentages or PPQ ticks in any DAW.
Transient onset	The beginning of the attack waveform; the timing reference point.
Extension note	A small tied note used to continue duration; not a new attack.

Notation terminology note: this release uses “staff-form diagram” for the exact layer because the 13/128, 10/128, and 9/128 values are valid as tied conventional durations but too dense for ordinary performer reading. The practical score layer remains Figure 2a.

16. References / Related Literature

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Fieldwork-informed practical method. Traditional heritage remains outside private ownership.

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