

Chapter 7

Scale Systems, Scales, and Tunings

BALINESE gamelans follow various scale systems. According to the type of ensemble in which they are employed, instruments are constructed to sound, within the octave, a scale or *saih* (row, series) of four, five, or seven tones. Each scale form is complete in itself, a wide or narrow tonal world with its own particular music. No two gamelans are tuned exactly alike, and deviation in what is considered to be essentially the same scale can be great, so that one might with reason state that there are as many scales as there are gamelans. Some tunings (*patutan*¹) approach the Western tempered system, others veer off in intervals impossible to define except in terms of *Cents*.² Moreover, the scale of any gamelan can be altered at will on retuning, modified both in pitch and interval relation.

For the purpose of more precisely describing their formation, Balinese scales are considered here as they are found in instruments with fixed pitch, rather than as interpreted by the voice, or by the *suling* or *rebab*. Singers are not normally included in the tuned gamelan, and when present are heard only during intervals when the gamelan is silent. Both *suling* and *rebab* are rarely found in ensembles of tuned instruments, and when included are played with great freedom of intonation. However, two examples of the seven-tone scale as found in the *suling gambuh* are included, since the *gambuh* scale system was considered a main source for gamelan tunings in the past. The rest of the scales and tunings presented in the following pages have been taken from bronze ensembles. They demonstrate in concrete form the Balinese conception of their inherited scale systems, and how these can be endlessly modified in instrumental practice.

If there were any uniformity of pitch or final standard for interval structure in the tuning of the different gamelan types, the problem of defining the various scale forms would be relatively simple. But no theoretical treatise on scale formation or instrumental tuning is known.³ The distance between two tones may be described as "greater" or "smaller," but Balinese terminology contains no word for any actual interval other than the octave, *penangkep*. While the *pandé krawang* may own an inherited set of bronze or even wooden keys which preserve the scale from some vanished gamelan of the past, many gamelan clubs have their own tuners, who take their tunings from each other, copying or altering to suit themselves.

¹ From *patut*, right, correct.

² See page xiii, foot-note 2.

³ A Balinese manuscript in the Kirtya Liefrinck v.d. Tuuk collection at Singaraja, catalogued as No. IIIc, 1001, and entitled *Pepatutan gong gedé—Tuning of the gamelan gong gedé* proved on examination to contain merely directions for the arrangement of keys on the different instruments, but gave no information on either the pitch or the tuning of the gamelan.

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Despite their variability in tuning, all Balinese instrumental scales may be considered as belonging to either one or the other of two different tonal systems which in Java are known as *pélog* and *sléndro*. These names are not familiar to most Balinese, who have their own terminology. They are used in these pages for sake of reference to the two systems as found in Java.

Pélog may be defined as a seven-tone quasi-diatonic scale which is less of an actual scale than an instrumental system for the forming of different five-tone modal scales within the seven-tone scale. These five-tone *pélog* scales are characterized by their intervals of unequal size, and change in interval relation with each transposition of the five-tone series. *Sléndro* is an entirely different system, a completely different tonality, perhaps the result of a more sophisticated idea of instrumental tuning. It is essentially a pentatonic scale, with intervals tending toward a uniformity of size. Whereas in *pélog* distinguishable seconds and thirds occur, in *sléndro* the octave is divided more equidistantly. *Pélog* is believed by Western scholars to be the older scale form, introduced into Indonesia at some unknown pre-Hindu period. *Sléndro* appears to have been a later development.⁴ In Bali, both *pélog*- and *sléndro*-type scales are also found in four-tone form.

Balinese musicians generally refer to seven-tone *pélog* as the *saih pitu*, series or scale of seven. In five-tone form, *pélog* is usually referred to as the *saih lima*, series of five, although each five-tone scale of the *saih 7* has its distinguishing modal name. *Sléndro* is simply known as the *saih gendèr wayang*, scale of the special *gendèr* used for the *wayang* or shadowplay. In the *pélog* system the Balinese also distinguish a six-tone series, the *saih nem*. This, however, is no true scale at all, but simply an instrumental system, no longer used but formerly occasionally employed in the *gamelan Semar Pegunungan* for the purpose of performing two separate repertoires of music, one requiring the *trompong*, the other the *gendèr*, each having its own form of pentatonic scale.

While both *pélog* and *sléndro* systems as found in Bali are closely related to those of Java, they differ sufficiently in actual practice as to be considered here in their own purely Balinese context. Generally simpler than the intricate systems of Java today, they not only serve as the basis for a music which has become distinctly Balinese, but throw light, especially in the more archaic ensembles, on musical methods once known in Java but now completely forgotten.

In spite of its wider range, the seven-tone *pélog* gamelan has never been popular in Bali. Unlike Java, where such gamelans are widespread, the vast majority of Balinese gamelans have always been five- or four-tone. For most Balinese musicians, the *saih 7* is a revered mystery, a system reserved for ancient forms of court and sacred music. The essentially pentatonic character of Balinese scale formation is shown in the Balinese solfeggio system as found in

⁴ "There cannot be any doubt about the fact that *sléndro* came to Java and Bali a good many centuries after *pélog*. *Pélog* was perhaps already imported by Malay-Polynesian peoples who came to Java many centuries before our Christian era. *Sléndro* seems to have entered Java simultaneously with a later culture in the eighth century A.D., when the dynasty of the Çailéndras ruled the central parts of the island, and to have derived its name from that same royal family; *gamelan sléndro* = *gamelan Çailéndra*." J. Kunst, from a lecture, "The Music of Java," delivered at the Netherlands Legation in London on Oct. 22, 1934.

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the *saih* 7. Of the seven tones, five are named, *ding*, *dong*, *dèng*, *dung*, *dang*.⁵ The two remaining tones, which lie, respectively, between *dèng* and *dung*, and *dang* and the following *ding alit*, small *ding*, are simply known as the *penyorog* or inserted tone and the *pemèro* or false tone. Thus, in ascending order, the tones of any scale in the *saih* 7 system are found in the following sequence of five main and two secondary tones, the main tones indicated here by their respective vowels:

I O È p U A p la

The two secondary tones occasionally may serve as accessory or substituting tones. Their special use will be discussed in later chapters. *Pélog* in its five-tone form, however, is complete in itself, and holds no suggestion of missing tones. Occasionally a composition from some seven-tone repertory which may employ six or all seven tones is adapted to a five-tone ensemble by simply omitting the secondary tones.

The Balinese themselves consider all five-tone *pélog* scales as originating in the *saih* 7 of the *suling gambuh* (Fig. 25). In this form the scale is commonly known as the "*saih gambuh*," to distinguish it from the "*saih gambang*," the seven-tone system of the *gambang* and other sacred ensembles. The *saih gambang* has its own terminology, which will be discussed in the following chapter. The methods by which the different five-tone scales are formed within the seven-tone series can be more clearly demonstrated in the *gambuh* system.

In the *saih gambuh*, as found in the *suling gambuh*, four different scales are generally known, *Tembung*, *Selisir*, *Baro* and *Lebeng*. These are obtained by transposing the tonal series, *i o è u a*, from one position to another in the basic scale. The solfeggio shifts with each transposition. There is said to be a fifth scale, *Sunarèn*, but it is no longer used, and the method of locating it has been forgotten. To indicate playing in any given scale the word *tekep*, close or cover, is used, referring to the act of covering or closing the fingerholes of the *suling*. The terms *ambah* (take the way of), *jalan* (go), and *marga* (way), are also used, but more especially in the *gambang* ensemble. In referring to a particular scale one does not say *saih Tembung* (*Tembung* scale) but *tekep Tembung*, *Tembung* fingering, or *ambah Tembung*, take the way of *Tembung*.

The relation of these scales to each other within the seven-tone series is not entirely fixed, although fairly stabilized in the *suling*. But when the *saih gambuh* is transposed to the *gamelan Semar Pegulingan*, the relationship is found to change, as shown in the following table. The system now includes the fifth scale, *Sunarèn*, as well. It should be noted here that on an instrument with an extended range, each scale can retain its natural tonal sequence with transposition. On the one octave *saron*, only the scale *Tembung* can be produced without inversion.

It will be seen in the table on page 39 that both systems agree in the location of the first scale, *Tembung*, whose first tone, *ding*, is found on the first tone of the *saih* 7. On the *suling gambuh* the *Selisir* scale begins on *penyorog Tembung*, the fourth tone of the *saih* 7, although

⁵ In Balinese mystic writings and in religious ritual these five tones are correlated to the five ceremonial directions (the four cardinal points and center or up), the five sacred syllables, the five pitches on which *mantras* are chanted, and the five ceremonial colors.

<i>ding</i>	Shiva	center	five-colored
<i>dong</i>	Iswara	east	white
<i>dèng</i>	Mahadéwa	west	yellow
<i>dung</i>	Brahma	south	red
<i>dang</i>	Vishnu	north	black

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Saih 7 pegambuhan; suling gambuh

saih 7								upper register or pengelik						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Tembung	i	o	è	(p)	u	a	(p)							
Selisir				i	o	è	(p)	u	a	(p)				
Baro					i	o	è	(p)	u	a				
Lebeng						i	o	è	(p)	u	a	(p)		
Sunarèn				?										

Saih 7 Semar Pegulingan; trompong⁶

saih 7								upper register or pengelik						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Tembung	i	o	è	(p)	u	a	(p)							
Lebeng		i	o	è	(p)	u	a	(p)						
Baro				i	o	è	(p)	u	a	(p)				
Selisir					i	o	è	(p)	u	a	(p)			
Sunarèn						i		o	è	(p)	u	a	(p)	

Scale inversions in the one-octave saron⁶

saih 7	1	2	3	4	5	6	7
Tembung	i	o	è	(p)	u	a	(p)
Lebeng	(p)	i	o	è	(p)	u	a
Baro	u	a	(p)	i	o	è	(p)
Selisir	(p)	u	a	(p)	i	o	è
Sunarèn	o	è	(p)	u	a	(p)	i

the *Semar Pegulingan* versions of the first tone coincide with *dung Tembung*, the fifth tone of the *saih 7*. In all *gambuh* ensembles examined, the *Tembung-Selisir* relation remained as shown above in the *suling gambuh* system. In the *Semar Pegulingan* gamelans, the *Tembung-Selisir* relation remained as found in the *trompong* version shown above, while the location of the other scales sometimes changed.

Each of the five main tones of each scale can become the tonal center or tonic—the tone on which the composition opens and closes. A composition may also shift its tonal center at some time, starting on one tone and ending on another.

While the different scales all follow the same basic pattern of structure, their actual interval formation may undergo considerable change as the structure pattern is transposed. Yet it is not this change in intervals that distinguishes the scale so much as its change in register and timbre. The expressive character associated with each scale is best shown in the *gambuh* play, where the scale is changed with the entrance of each new character type.

⁶ As found in the gamelan *Semar Pegulingan* of *banjar* Tampak Gangsal, Badung, whose scale tuning is given in Chart 2, (no. 4). In Klungkung (Chart 2, no. 3), the scale Baro began on the 4th tone, Sunarèn on the 6th, while Lebeng was unknown.

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Tembung, lowest in register and dark in color, is used for characters of the vigorous (*kras*) type. *Selisir*, contrastingly high in pitch and of a brighter color, is reserved for characters of the gentle (*alus*) type, the high-born heroes and heroines. *Lebeng* is kept for secondary characters and scenes of conflict; while *Baro* is used for attendants and buffoons. Of all the scales, *Selisir* is considered the most expressive for music of a lyrical, *alus* character. It is precisely this scale, as found in the *suling gambuh* (see Chart 3), that is employed, though considerably modified through tuning, by the great majority of five-tone gamelans in Bali.

The scales and tunings presented in the charts given in this chapter are arranged in the following order:

- seven-tone *pélog* or *saih 7*, *gambuh* and *gambang* systems
- five-tone *pélog* or *saih lima*, *Selisir* form
- deviant examples of five-tone *pélog*
- four-tone *pélog*
- sléndro*
- four-tone *sléndro* or *saih angklung*
- unusual tunings of *saih angklung*

The different tunings were chosen to show both basic conformity and unusual deviation in the tuning of each scale type. All are taken from outstanding ensembles which were active in Bali in the thirties. Each tuning is expressed primarily in figures giving the pitch vibrations of the different scale tone, as measured with a monochord tuned to International Pitch (A—435v.). The distances between the successive tones are expressed in terms of *Cents*.

While vibration numbers and *Cents* figures are sufficient to describe any scale, alone they convey little to the mind unaccustomed to thinking in these terms. For this reason, and for purposes of identification with the musical examples found in later chapters, the scale tones in the following charts are shown in reference to neighboring tones in the Western tempered system, International Pitch. Their proximity to, and their distance from any Western series of scale steps, and the deviation in each compared scale of the same type, can thus be estimated at a glance. As a further visual aid, the charts have been prepared on squared graph paper, each square representing a quarter-tone, or 50 *Cents*.

In Chart 1, which serves as introduction to the system, a seven-tone *pélog* scale is shown, together with its vibration numbers, in ascending diagonal alignment, to give a sense of the ascent of the scale. In a column to the left are given, for quick reference, the vibration numbers of the equal-tempered twelve-tone scale as it ascends from approximately the same degree of pitch. Below, in horizontal alignment, the intervals of the Balinese scale shown above are measured in *Cents*, and at the same time shown against the Western equigrade system. The relative pitch of each scale-tone and the actual distances between tones are thus immediately apparent.

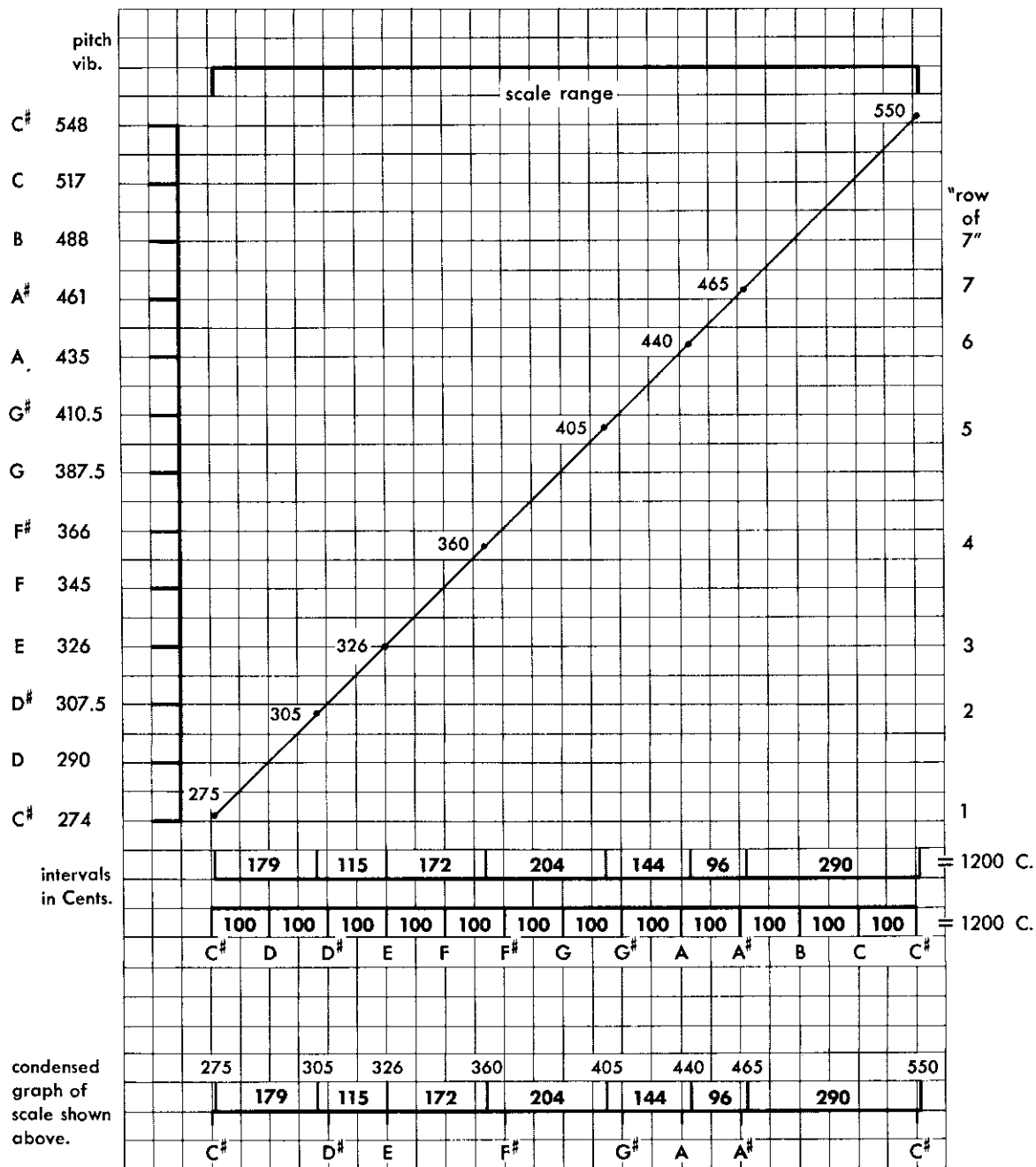
A condensed graph, shown below, retains all the essential information, but reduces the chart to a single horizontal line. It illustrates the method employed in the succeeding charts.

Chart 2 contains six examples of seven-tone *pélog* or *saih 7*. The first two are versions of the *saih gambang*, and are taken from two different types of sacred ensemble, each with its own special form of music. The following examples, however, are all variants of the *saih gambuh*

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Chart 1. Balinese *saih* 7 scale; Krōbōkan village

Western
equigrade
scale,
C[#] to C[#]



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Chart 2. Six saih pitu scales compared

a) krawang ensembles

1.
gamelan
luang

	276		305		345		372		410		466		505	
		173		215		129		171		220		138		154
banjar Sèséh	D ^b		E ^b		F		G ^b		A ^b		B ^b		C	D ^b
	274		307.5		345		366		410		461		517	

2.
gamelan
gambang

	275		305	326		360		405		440	465			
		179		115		172		204		144	96		290	
Kröbökan village	D ^b		E ^b	F ^b		G ^b		A ^b	A [♯]	B ^b				D ^b
	274		307.5	326		366		410	435	461				

3.
gamelan
Semar
Pegulingan

	325		360		402	437		490		564		614	
		177		191		145		198		243		148	98
Klungkung	E		F [♯]		G [♯]	A		B		C [♯]		D [♯]	E
	326		366		410	435		488		548		615	

4.
gamelan
Semar
Pegulingan

	310		337	365		425	457	485		560			
		144	138		264		126	102		249		177	
Tampak Gangsal	D [♯]		E [♯]	F [♯]		A	A [♯]	B		C [♯]		D [♯]	
	307.5		345	366		435	461	488		548			

b) suling pegambuhan

5.
suling
gambuh
Tabanan

		211		232		250		280		303	325	345		
			165		129		196		137		121	105		347
	G [♯]		A [♯]	B		C [♯]		D [♯]	E	F				G [♯]
	205		230.5	244		274		307.5	326	345				

6.
suling
gambuh
Batuan
village

		202		220		237.5		266		290	315	330		
			148		132		196		152		141	81		350
	G		A	B ^b		C		D	E ^b	F ^b				G
	194		217.5	230.5		258.5		290	307.5	326				

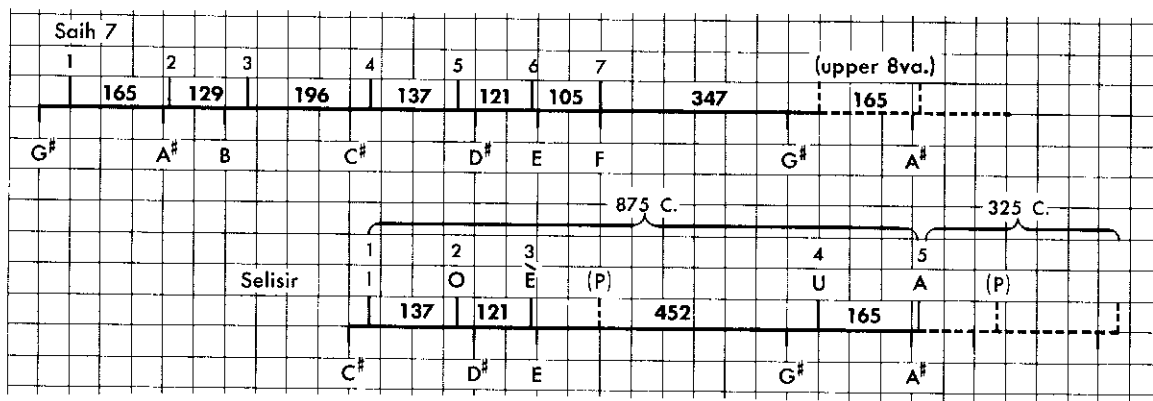
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system as found in the *Semar Pegulingan* and *gambuh* orchestras. Despite their differences in pitch and interval structure they represent a single scale system. Because of the fixed specifications for the making of the *suling gambuh*, its scale remains fairly standardized. But as found in the few *Semar Pegulingan* gamelans surviving in the thirties, the *saih gambuh* was interpreted with great freedom. In each case the original seven-tone series was transposed to begin approximately a fourth or fifth higher. The lowest five-tone scale, *Tembung*, was now raised to the *Baro* or *Lebeng* register of the *suling*, and the other scales transposed correspondingly higher, possibly to suit the requirement of the *trompong* which replaced the *suling* as leading melodic instrument. In addition, each of the five-tone scales showed little resemblance in interval structure to the corresponding scales of the *suling*. Yet in spite of these differences, the same repertory of music was performed by *gambuh* and *Semar Pegulingan* ensembles alike.

In the following chart, the two *suling gambuh* scales complement each other. While neither can be considered as final, they establish between them a general standard in pitch and interval formation. The Tabanan *suling*, starting a near semitone (84 C.) higher than that of Batuan, shown below it, remains consistently higher throughout, although a slight relative flattening of the fifth, sixth and seventh tones produces somewhat different intervals, at most, however, in the case of the sixth interval, a difference of 24 Cents—a barely perceptible eighth-tone.

Today the *Semar Pegulingan* has vanished, but the *gambuh* ensemble continues to preserve its traditional scale system of the past. Whether this system dates, as the Balinese believe, to an ancient pre-bronze period in Indonesian music remains an open question. For the Balinese, however, the *saih gambuh* does preserve a certain standard, perhaps the only one, for the formation of *pélog* scales. Most five-tone *pélog* gamelans today still conform very closely, both in general pitch and in interval formation, to the *Selisir* scale of the *suling gambuh*, the scale most suitable for *alus* music, whose lowest tone, *ding*, is located on the fourth step of the seven-tone series. In Chart 3, this scale, as found on the *suling gambuh*, is shown in its basic five-tone form in relation to the full seven-tone *saih gambuh*, Tabanan version (Chart 2, no. 5), which is given above it. The distance covered by the five main tones, or from *ding* to *dang*, is seen to be 875 C. (the sum of the five intervals), or a major sixth minus 25 C. The remaining

Chart 3. The *saih* 7 pegambuhan of the Tabanan *suling*, showing the location of the scale, *Selisir*

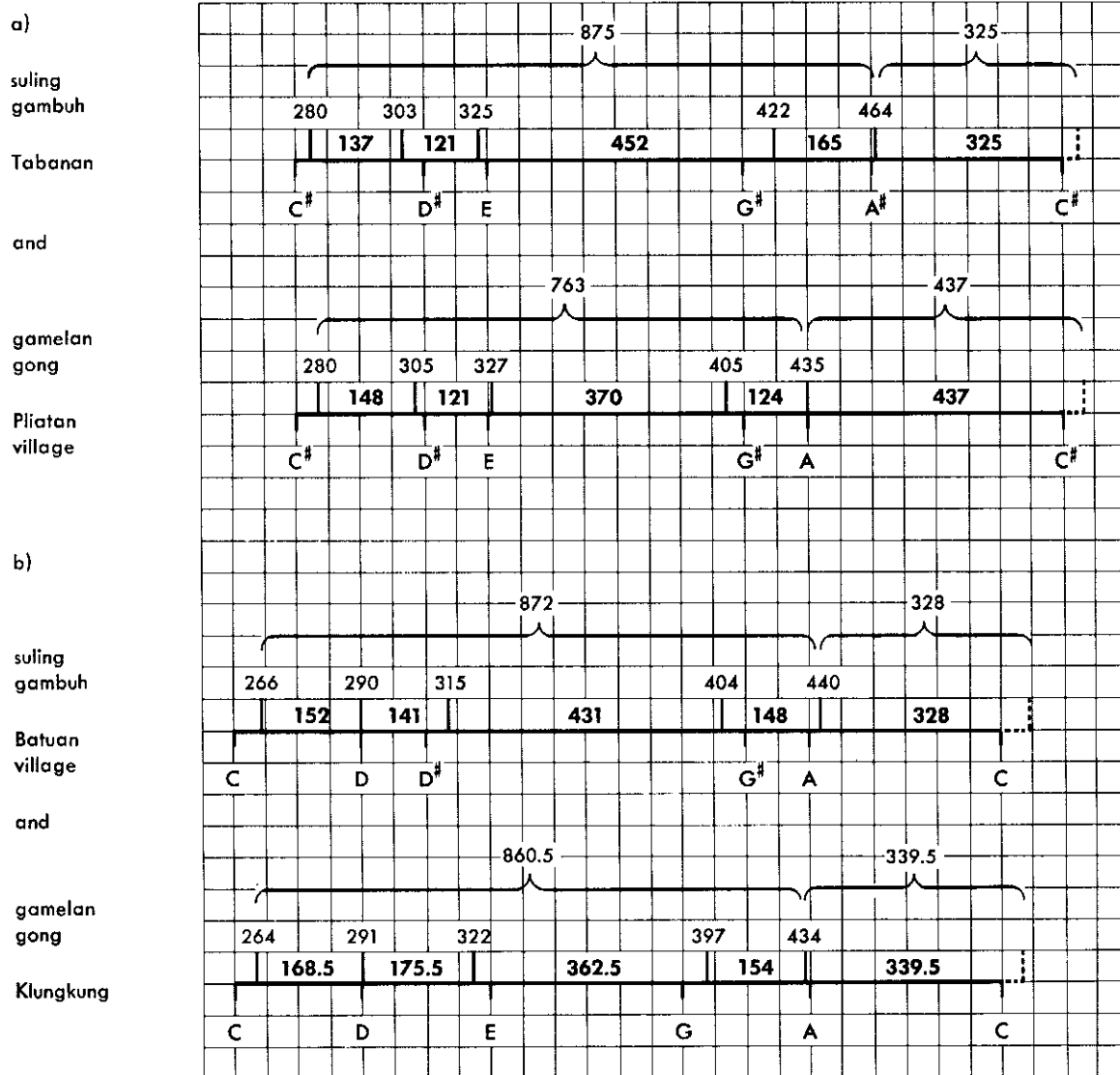


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interval completing the octave, lying between *dang*, last of the five-tone series, and the adjacent *ding* which is the starting point for the series in the octave above, is a complementary 325 C., or a minor third plus 25 C. Attention is called to these two distances since they undergo considerable modification when the scale is transferred to a bronze ensemble. Since the only interval that remains fixed in the Balinese scale system is that of the octave, it will be

Chart 4. Four Selisir scales compared

Selisir pegambuhan
and
Selisir gong



Order of tones in all four scales:
ding dong dèng dung dang (upper ding)

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seen that the size of the interval between *dang* and upper *ding* is conditioned by the sum of the intervals lying between the five basic tones, in other words the interval which frames these tones. Just how these two structural intervals can vary in relation to each other is shown in subsequent charts.

When the *Selisir* scale of the *suling gambuh* is transferred to the *gamelan gong*, it is commonly known as "*Selisir gong*." In Chart 4, two examples of *Selisir gong* are compared with two examples of *Selisir gambuh*, as found in the *sulings* of Tabanan and Batuan.

In the first pair of scales, the *Selisir* scale of the Tabanan *suling* is given above that of the *gamelan gong* of Pliatan, a modern ensemble which is always kept well in tune.⁷ The two villages lie some twenty miles apart but are in close musical communication. The Pliatan scale is given here because of the pitch coincidence of its lowest tone (280 v.) with that of the Tabanan scale. The interval modification which occurs is common enough in the tuned gamelan to establish the Pliatan scale as a perfectly normal interpretation by gamelan of *Selisir gambuh*.

What happens in this transference?

The three lower tones are seen to coincide closely with those of the *suling* scale shown above it. The two upper tones, however, are found to be relatively lower in pitch, reducing the distance between the two *suling* tones *ding* and *dang* a near semitone of 112 C., and at the same time augmenting the distance between *dang* and upper *ding* by 112 C. This reduction of the distance between the two outer tones of the basic scale to an interval of less than 800 C., a tempered minor sixth, is so prevalent in Balinese five-tone *pélog* gamelans that tunings showing distances of 800 C. or more become increasingly exceptional as the distance widens.

In the second pair of scales included in the same chart the *Selisir* scale of the Batuan *suling* is compared with that of the *gamelan gong* of Klungkung, an old-style court orchestra heard only on state occasions. Both scales are seen to begin at almost the same pitch, an approximate semitone below the two scales shown above. The Klungkung scale differs, however, from that of Pliatan by closely matching the *suling* in its unusually large distance of 860.5 C. between the two outer tones of the basic scale and the correspondingly reduced distance between *dang* and upper *ding*. The scale is given here as an unusual tuning of *Selisir gong*. To the Western ear at least it creates a very different tonal atmosphere from that of the *Selisir* scale as found in the Pliatan gamelan.

Chart 4 thus offers two markedly contrasting examples of *Selisir* as found in the *gamelan gong*. That of Klungkung seems to follow the *suling gambuh*; while that of Pliatan clearly modifies the *suling* scale. Their greatest difference is seen by comparing the distances which in each scale lie between *ding* and *dang* and between *dang* and upper *ding*.

Klungkung:	860.5	339.5 C.
Pliatan:	763	437 C.

In Chart 5, four more examples of *Selisir gong* scales are given for comparison, without further reference to the *suling gambuh* and with the Pliatan tuning serving as point of departure. The first three show approximately the same distances between *ding* and *dang*,

⁷ This orchestra toured Europe and the United States in 1952-53.

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change which can occur in each interval. In Scale No. 2 for example, the second interval, a near semitone of 111 C., becomes augmented in Scale No. 3 to a near major second of 197 C. Further examination will reveal other changes in interval relation, changes sufficient to cause each scale to be considered significantly different, by Western standards in its melodic implications. Yet, as previously stated, the different tunings are no more than variants of a single scale whose norm remains undetermined. In the last analysis, the tones *ding*, *dong*, *dèng*, *dung* and *dang* are not fixed tones at all, but tonal zones which allow for endless modification of pitch when it comes to tuning the gamelan.

Despite the differences in their intervals, the four scales just compared show a basic similarity in their sequences of seconds and thirds. Nos. 3 and 4, particularly the latter, approach so closely to Western tempered tuning that, for the purposes of the present book, the scale *Selisir gong* can be represented in Western notation, closely enough, by the tone symbols:



The *Selisir* scale is so commonly employed by the gamelans in Bali that it may be considered the most representative form of Balinese five-tone *pélog*. It is the one scale of the *gambuh* system which appears to be known everywhere, both instrumentally and vocally.

Far more irregular in formation than the *Selisir gong* scales of Chart 5 are the four examples of five-tone *pélog* found in Chart 6. Each was selected to show some unusual interpretation of the *pélog* scale. While the scales given in Chart 5 were all taken from the *gamelan gong*, the following scales are from three different gamelan types, the *Semar Pegulingan* in its five-tone form, *gamelan pelègongan*, and *gamelan barong*. It should be noted here that in spite of the pronounced differences in their scales, these three ensembles shared a common basic repertory of compositions deriving from the wider repertory of the *gambuh* theater.

Each scale has its special name, but with the exception of *Selisir pelègongan* (*lègong Selisir*), the other names were unusual in their particular applications, and could not be satisfactorily accounted for by the musicians themselves. They cannot be considered as final, or as part of a standardized system to distinguish different scale forms.

The first scale was described to me by Gusti Putih, the leader of the gamelan from which it was taken, as "*Tembung chenik*," small (high-pitched) *Tembung*, perhaps because it is in the general register of *Selisir gong*. It is a scale of indescribable tonal beauty, remarkable for the unusual minor third occurring between *dèng* and *dung*, and the resulting near-major second found between *dung* and *dang*. My informant considered this tuning as exceptionally "sweet" (*manis*), partly because of the relatively lower pitch of the tone *dung*, a modification which produced a subtle but profound change in the tonal color of the gamelan. This unusual scale (or tuning) occasionally heard in older Balinese gamelans, is preserved in three Beka recordings of the gamelan in which it was found.⁸

The second scale in the following chart was taken from my five-tone *Semar Pegulingan* in Sayan. The tuning was copied at my request from a rarely heard *gamelan pelègongan* I discovered in the fishing village of Sanur. This gamelan had an unusual tonality of great appeal,

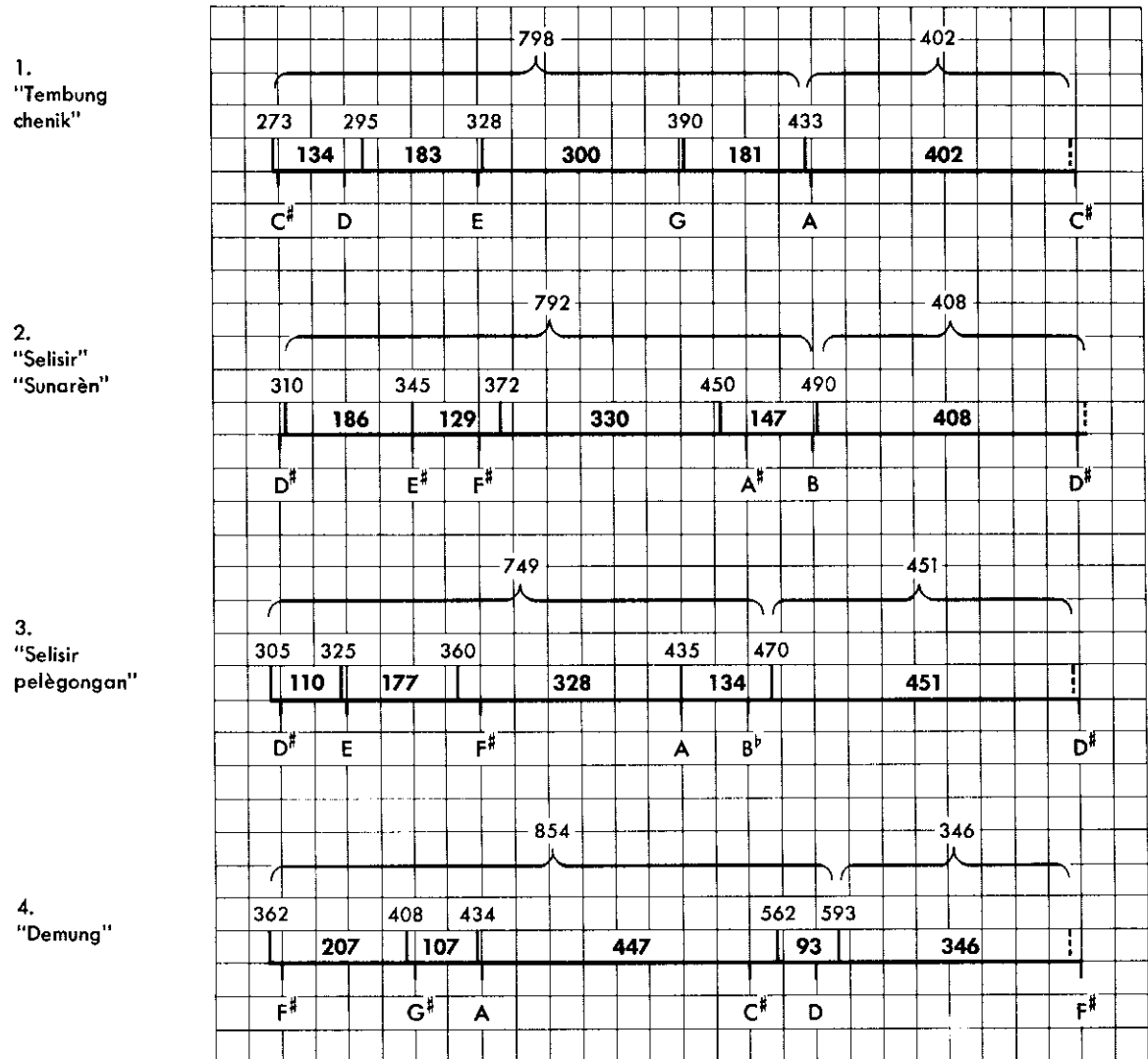
⁸ See Appendix 6, Recordings, *gamelan Semar Pegulingan*.

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partly because of its relatively high pitch, but (for me) chiefly because of the near-major second lying between the first and second tones of its scale. While the Sanur men considered this scale to be *Selisir*, the *pandé krawang* who tuned my instruments pronounced it as *Sunarèn*. But on comparing it with the *Sunarèn* scale as found in the seven-tone *Semar Pegulingan* I could discover no similarity in either pitch or interval structure. Once again, Balinese musicians described this tuning as remarkably "sweet," though few could say exactly why. Most

Chart 6. Away from standardization?

Four deviant five-tone pélog scales



Order of tones: *dìng* *dòng* *dèng* *dung* *dang*

1. gamelan Semar Pegulingan; banjar Titih, Badung.
2. gamelan Semar Pegulingan; Sayan village.

3. gamelan pelègongan; Anggabaya village.
4. gamelan barong; banjar Taman, Sanur village.

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in the *sléndro* system there is one basic repertory only, existing primarily for the shadowplay. This repertory is given endless variation in tonal color as it is performed by ensembles with widely divergent tunings.

Chart 11. Three additional *sléndro* tunings

1.	gendèr										
	dasa	175		200		225		260		300	
		231 204 250 248 267									
	Singaraja (banjar Panataran)	F		A ^b		B ^b		C		E ^b	F
2.	gendèr										
	dasa	172		200		225		257.5		305	
		261 204 233 293 209									
	Singaraja (banjar Lod Peken)	F		A ^b		B ^b		C		E ^b	F
3.	gendèr										
	dasa	167.5		191.5		220		248		290	
		232 240 208 270 250									
	Sawan village	F		G		A		B		D	F

Order of tones in all three scales:
dong dèng dung dang dīng

As in *pélog*, each of the five tones of the *sléndro* scale can in turn become the tonic or tonal center around which the composition revolves. It is interesting to note that despite the tonal differences of the two systems, for Balinese musicians there does exist a sufficient relationship between *sléndro* and *pélog* to allow for an occasional tone-for-tone transposition of a composition from one scale to the other. While transposition from *pélog* to *sléndro* is rare, the reverse is sometimes resorted to when, for instance, a composer wishing to create new music for a *pélog* gamelan draws from the *sléndro* repertory.

Chart 12. *Pélog* and *sléndro* scales compared

	<i>pélog</i>	134		172		412		82		400	
	Gianyar	C [#]	D	E		G [#]	A		C [#]		
	<i>sléndro</i>	195		205		272		259		269	
	Kuta*	C [#]	D [#]	E [#]		G [#]	A [#]		C [#]		

*Transposed to start from dīng, Gianyar pitch.

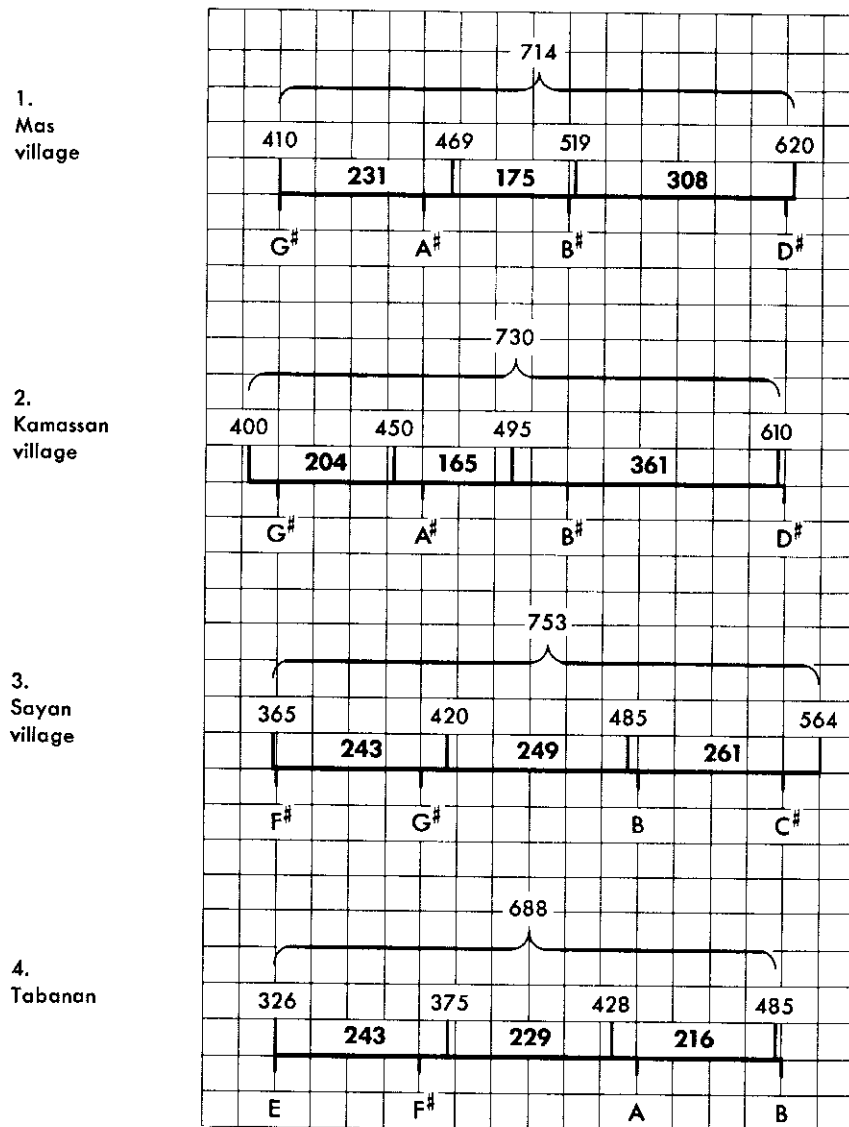
SCALE SYSTEMS, SCALES, AND TUNINGS

What little the two systems have in common may be seen when a *pélog* scale and a *sléndro* scale are shown side by side, at which time the similarity and the contrast between the two are immediately apparent. In Chart 12 the *pélog* scale of the *gamelan gong* of Gianyar (Chart 5, No. 4) is shown with the *sléndro* scale of the Kuta *gendèr wayang* (Chart 10, No. 1). The *sléndro* scale has been arranged so as to start with *ding*, the first tone of the *pélog* series, and at the same time has been transposed so as to coincide in point of departure with the *pélog* scale.

The four-tone scale with *sléndro*-like intervals is known generally as the *saih angklong*, or

Chart 13. Four-tone sléndro

4 saih angklong tunings compared



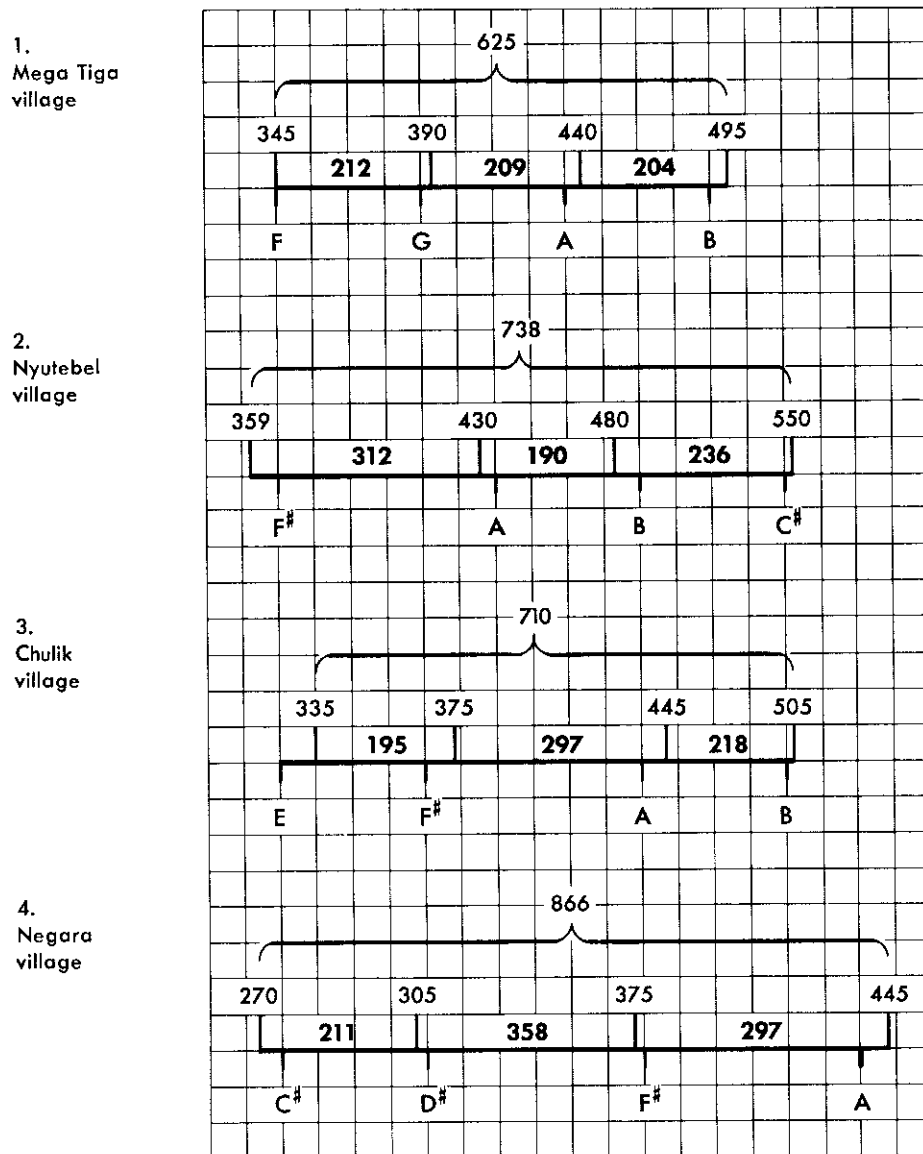
Order of tones in all four scales:
dèng dung dang ding

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angklung scale, since it is employed exclusively by the four-tone orchestra known as the *gamelan angklung*. The Balinese consider this scale to be closely related to five-tone *sléndro*. In fact, it is said to be the *saih* of the *gendèr wayang*, except that it "lacks *dong*." In some districts the *gamelan angklung* is known as the *gamelan kembang kirang*, *gamelan* "lacking a flower," in reference to the "lacking" tone.

The *saih angklung* is by no means a curtailed scale, but a four-tone system complete in

Chart 14. *Saih angklung*; four unusual tunings



Order of tones in all four scales:
dèng dũng dang dĩng

SCALE SYSTEMS, SCALES, AND TUNINGS

itself. Unlike other scales, it never extends instrumentally to a second octave. All instruments of the gamelan are limited to a single octave, and the melodic line is confined to four tones whose normal range extends to around 700 C., or a fifth.

In Chart 13, containing four characteristic *saih angklung* tunings, the distance between the two outer tones is shown to be fairly consistent, although the inner tones move about with the freedom typical of Balinese instrumental scales.

The *gamelan angklung* is found in almost every village in Bali, and while tunings will be found to vary in endless ways, the four scales shown in Chart 13 are sufficient to establish the general character of the *saih angklung*. The general pitch area for the scale lies between Nos. 1 and 4, and ensembles whose tunings are outside this area are rare.

Chart 14 presents four individual and most unusual forms of *saih angklung*. With these this survey of Balinese scales is concluded. Each came from remote villages in the Karangasem district of east Bali, where many archaic gamelans survive. Of special interest are the first and fourth scales—the former for its contracted range and its correspondingly contracted intervals consisting of three near whole-tones; and the latter for its unusually extended range of 866 C. and the curious position of the scale tones which create a scale consisting of a near major second followed by a neutral and a near minor third.

From the variability in the scales shown in the preceding charts, the impossibility of defining with finality the actual interval structure of any scale type is evident. Only the systems can be described and actual tunings given. Seven-tone *pélog* is found to be a scale with no fixed interval structure, whose tones are nameless until some five-tone scale has been established. Five-tone *pélog* and *sléndro* scales are found to be linked together by a common pentatonic solfeggio system which can only serve, however, to indicate a tonal sequence and the relative pitch of the scale tones. Nevertheless, this solfeggio system is useful here in furnishing an abstract key to the relation of the different scale systems.

5-tone pélog:	ding	dong	dèng	dung	dang	
4-tone pélog:		dong	dèng	dung	dang	
5-tone sléndro:		dong	dèng	dung	dang	ding
4-tone sléndro:			dèng	dung	dang	ding

The following pages will describe how these scale systems actually work.