REPRESENTATION

****pcset** — Fortean pitch-class set representation

DESCRIPTION

The ***pcset* representation provides a means for indicating pitch-class sets. The representation is based on a simple extension of the system devised by Allen Forte (see REFERENCE). Fortean set names consist of two numbers separated by a dash, with an optional up-case letter 'Z' preceding the second number. The first number indicates the pitch-class *cardinality* — that is, the number of unique pitch-classes in the set. For example, all major and minor chords have a cardinality of '3' since all such chords consist of three unique pitch-classes. (Inversionally-related pitch-class sets have the same set designation.)

The number following the dash simply distinguishes different pitch-class sets having the same cardinality. The letter 'Z' is used to indicate that the set shares the same interval-class content as some other set. (said to be Z-related sets). For example, sets 4-Z15 and 4-Z29 are said to be Z-related since they both exhibit the same interval-class content. (See `**iv` representation.)

Barlines are represented using the "common system" barlines described in Section 2 of this *Reference Manual*.

FILE TYPE

It is recommended that files containing predominantly `**pcs` data should be given names with the distinguishing '.pcs' extension.

SIGNIFIERS

The following table summarizes the ***pcset* mappings of signifiers and signifieds.

0-9	pitch-class set labels; measure numbers
.	null token
–	dash; separates cardinality for set number
=	barline; == double barline

*Summary of **pcset Signifiers*

EXAMPLES

The following sample document shows a pitch-class representation for the opening measures of Schoenberg's "Sommermüd" from *Three Songs*, Opus 48. The right-most spine shows a `**pcset` representation identifying the pitch-class content of each sonority. (The `**pcset` spine might be generated using the **pcset** command, after the `**pc` pitch-class spines are *filled-out* using the **fill** command.)

```
!! Arnold Schoenberg, "Sommermued" (1933)
**pc      **pc      **pc      **text      **pcset
*Ipiano   *Ipiano   *Ivoice   *Deutsch    *
*M4/4     *M4/4     *M4/4     *M4/4       *
*MM72     *MM72     *MM72     *MM72       *
=1        =1        =1        =1          =1
r         r         r         .           .
(7        (11       .         .           2-4
8')       .         1         Wenn        3-4
r         .         .         .           2-4
r         r         .         .           1-1
(9        (11       2         du          3-7
8')       .         0         schon       3-4
r         .         .         .           2-5
=2        =2        =2        =2          =2
r         r         (0        glaubst ,   1-1
9         (7        [6        |           3-2
(9'       8         .         .           3-2
11)       .         .         .           3-7
r         .         .         .           2-2
r         7')       6])       |           2-1
[11       .         3         ist         3-8
=3        =3        =3        =3          =3
*-        *-        *-        *-          *-
```

PERTINENT COMMANDS

The following humdrum commands accept ***pcset* encoded data as inputs:

iv	determine interval vectors for successive vertical sonorities
nf	determine normal form for successive vertical sonorities
pcset	convert pitch and pitch-class information to set-theoretic representations
pf	prime form representation

The following Humdrum command produces ***pcset* data as output:

pcset	convert pitch and pitch-class information to set-theoretic representations

TANDEM INTERPRETATIONS

The following tandem interpretations can be used in conjunction with ***pcset:*

meter signatures	*M6/8
key signatures	*k[ ]
key	*c#:
tempo	*MM96.3
timebase	*tb32

*Tandem interpretations for **pcset*

SEE ALSO

barlines (2), ****iv** (2), **iv** (4), ****nf** (2), **nf** (4), ****pc** (2), **pc** (4), **pcset** (4), ****pf** (2), **pf** (4), **reihe** (4), ****semits** (2), **semits** (4)

REFERENCES

Forte, A. *The Structure of Atonal Music*. New Haven: Yale University Press, 1973.

APPENDIX

The following table provides an extended list of all possible Fortean-type pitch-class set names. The corresponding pitch-class set and interval vectors are also shown.

Fortean set-name	pitch-class set	interval vector	Fortean set-name	pitch-class set	interval vector
0-0	(empty)	<000000>	12-1	(0,1,2,3,4,5,6,7,8,9,10,11)	<12,12,12,12,12,12>
1-1	(0)	<000000>	11-1	(0,1,2,3,4,5,6,7,8,9,10)	<10,10,10,10,10,10>
2-1	(0,1)	<100000>	10-1	(0,1,2,3,4,5,6,7,8,9)	<988888>
2-2	(0,2)	<010000>	10-2	(0,1,2,3,4,5,6,7,8,A)	<898888>
2-3	(0,3)	<001000>	10-3	(0,1,2,3,4,5,6,7,9,A)	<889888>
2-4	(0,4)	<000100>	10-4	(0,1,2,3,4,5,6,8,9,A)	<888988>
2-5	(0,5)	<000010>	10-5	(0,1,2,3,4,5,7,8,9,A)	<888898>
2-6	(0,6)	<000001>	10-6	(0,1,2,3,4,6,7,8,9,A)	<888889>
3-1	(0,1,2)	<210000>	9-1	(0,1,2,3,4,5,6,7,8)	<876663>
3-2	(0,1,3)	<111000>	9-2	(0,1,2,3,4,5,6,7,9)	<777663>
3-3	(0,1,4)	<101100>	9-3	(0,1,2,3,4,5,6,8,9)	<767763>
3-4	(0,1,5)	<100110>	9-4	(0,1,2,3,4,5,7,8,9)	<766773>
3-5	(0,1,6)	<100011>	9-5	(0,1,2,3,4,6,7,8,9)	<766674>
3-6	(0,2,4)	<020100>	9-6	(0,1,2,3,4,5,6,8,10)	<686763>
3-7	(0,2,5)	<011010>	9-7	(0,1,2,3,4,5,7,8,10)	<677673>
3-8	(0,2,6)	<010101>	9-8	(0,1,2,3,4,6,7,8,10)	<676764>
3-9	(0,2,7)	<010020>	9-9	(0,1,2,3,5,6,7,8,10)	<676683>
3-10	(0,3,6)	<002001>	9-10	(0,1,2,3,4,6,7,9,10)	<668664>
3-11	(0,3,7)	<001110>	9-11	(0,1,2,3,5,6,7,9,10)	<667773>
3-12	(0,4,8)	<000300>	9-12	(0,1,2,4,5,6,8,9,10)	<666963>
4-1	(0,1,2,3)	<321000>	8-1	(0,1,2,3,4,5,6,7)	<765442>
4-2	(0,1,2,4)	<221100>	8-2	(0,1,2,3,4,5,6,8)	<665542>
4-3	(0,1,3,4)	<212100>	8-3	(0,1,2,3,4,5,6,9)	<656542>
4-4	(0,1,2,5)	<211110>	8-4	(0,1,2,3,4,5,7,8)	<655552>
4-5	(0,1,2,6)	<210111>	8-5	(0,1,2,3,4,6,7,8)	<654553>
4-6	(0,1,2,7)	<210021>	8-6	(0,1,2,3,5,6,7,8)	<654463>
4-7	(0,1,4,5)	<201210>	8-7	(0,1,2,3,4,5,8,9)	<645652>

4-8	(0,1,5,6)	<200121>	8-8	(0,1,2,3,4,7,8,9)	<644563>
4-9	(0,1,6,7)	<200022>	8-9	(0,1,2,3,6,7,8,9)	<644464>
4-10	(0,2,3,5)	<122010>	8-10	(0,2,3,4,5,6,7,9)	<566452>
4-11	(0,1,3,5)	<121110>	8-11	(0,1,2,3,4,5,7,9)	<565552>
4-12	(0,2,3,6)	<112101>	8-12	(0,1,3,4,5,6,7,9)	<556543>
4-13	(0,1,3,6)	<112011>	8-13	(0,1,2,3,4,6,7,9)	<556453>
4-14	(0,2,3,7)	<111120>	8-14	(0,1,2,4,5,6,7,9)	<555562>
4-Z15	(0,1,4,6)	<111111>	8-Z15	(0,1,2,3,4,6,8,9)	<555553>
4-16	(0,1,5,7)	<110121>	8-16	(0,1,2,3,5,7,8,9)	<554563>
4-17	(0,3,4,7)	<102210>	8-17	(0,1,3,4,5,6,8,9)	<546652>
4-18	(0,1,4,7)	<102111>	8-18	(0,1,2,3,5,6,8,9)	<546553>
4-19	(0,1,4,8)	<101310>	8-19	(0,1,2,4,5,6,8,9)	<545752>
4-20	(0,1,5,8)	<101220>	8-20	(0,1,2,4,5,7,8,9)	<545662>
4-21	(0,2,4,6)	<030201>	8-21	(0,1,2,3,4,6,8,10)	<474643>
4-22	(0,2,4,7)	<021120>	8-22	(0,1,2,3,5,6,8,10)	<465562>
4-23	(0,2,5,7)	<021030>	8-23	(0,1,2,3,5,7,8,10)	<465472>
4-24	(0,2,4,8)	<020301>	8-24	(0,1,2,4,5,6,8,10)	<464743>
4-25	(0,2,6,8)	<020202>	8-25	(0,1,2,4,6,7,8,10)	<464644>
4-26	(0,3,5,8)	<012120>	8-26	(0,1,2,4,5,7,9,10)	<456562>
4-27	(0,2,5,8)	<012111>	8-27	(0,1,2,4,5,7,8,10)	<456553>
4-28	(0,3,6,9)	<004002>	8-28	(0,1,3,4,6,7,9,10)	<448444>
4-Z29	(0,1,3,7)	<111111>	8-Z29	(0,1,2,3,5,6,7,9)	<555553>
5-1	(0,1,2,3,4)	<432100>	7-1	(0,1,2,3,4,5,6)	<654321>
5-2	(0,1,2,3,5)	<332110>	7-2	(0,1,2,3,4,5,7)	<554331>
5-3	(0,1,2,4,5)	<322210>	7-3	(0,1,2,3,4,5,8)	<544431>
5-4	(0,1,2,3,6)	<322111>	7-4	(0,1,2,3,4,6,7)	<544332>
5-5	(0,1,2,3,7)	<321121>	7-5	(0,1,2,3,5,6,7)	<543342>
5-6	(0,1,2,5,6)	<311221>	7-6	(0,1,2,3,4,7,8)	<533442>
5-7	(0,1,2,6,7)	<310132>	7-7	(0,1,2,3,6,7,8)	<532353>
5-8	(0,2,3,4,6)	<232201>	7-8	(0,2,3,4,5,6,8)	<454422>
5-9	(0,1,2,4,6)	<231211>	7-9	(0,1,2,3,4,6,8)	<453432>
5-10	(0,1,3,4,6)	<223111>	7-10	(0,1,2,3,4,6,9)	<445332>
5-11	(0,2,3,4,7)	<222220>	7-11	(0,1,3,4,5,6,8)	<444441>
5-Z12	(0,1,3,5,6)	<222121>	7-Z12	(0,1,2,3,4,7,9)	<444342>
5-13	(0,1,2,4,8)	<221311>	7-13	(0,1,2,4,5,6,8)	<443532>
5-14	(0,1,2,5,7)	<221131>	7-14	(0,1,2,3,5,7,8)	<443352>
5-15	(0,1,2,6,8)	<220222>	7-15	(0,1,2,4,6,7,8)	<442443>
5-16	(0,1,3,4,7)	<213211>	7-16	(0,1,2,3,5,6,9)	<435432>
5-Z17	(0,1,3,4,8)	<212320>	7-Z17	(0,1,2,4,5,6,9)	<434541>
5-Z18	(0,1,4,5,7)	<212221>	7-Z18	(0,1,2,3,5,8,9)	<434442>
5-19	(0,1,3,6,7)	<212122>	7-19	(0,1,2,3,6,7,9)	<434343>
5-20	(0,1,3,7,8)	<211231>	7-20	(0,1,2,4,7,8,9)	<433452>
5-21	(0,1,4,5,8)	<202420>	7-21	(0,1,2,4,5,8,9)	<424641>
5-22	(0,1,4,7,8)	<202321>	7-22	(0,1,2,5,6,8,9)	<424542>
5-23	(0,2,3,5,7)	<132130>	7-23	(0,2,3,4,5,7,9)	<354351>
5-24	(0,1,3,5,7)	<131221>	7-24	(0,1,2,3,5,7,9)	<353442>
5-25	(0,2,3,5,8)	<123121>	7-25	(0,2,3,4,6,7,9)	<345342>
5-26	(0,2,4,5,8)	<122311>	7-26	(0,1,3,4,5,7,9)	<344532>
5-27	(0,1,3,5,8)	<122230>	7-27	(0,1,2,4,5,7,9)	<344451>
5-28	(0,2,3,6,8)	<122212>	7-28	(0,1,3,5,6,7,9)	<344433>
5-29	(0,1,3,6,8)	<122131>	7-29	(0,1,2,4,6,7,9)	<344352>
5-30	(0,1,4,6,8)	<121321>	7-30	(0,1,2,4,6,8,9)	<343542>
5-31	(0,1,3,6,9)	<114112>	7-31	(0,1,3,4,6,7,9)	<336333>
5-32	(0,1,4,6,9)	<113221>	7-32	(0,1,3,4,6,8,9)	<335442>
5-33	(0,2,4,6,8)	<040402>	7-33	(0,1,2,4,6,8,10)	<262623>
5-34	(0,2,4,6,9)	<032221>	7-34	(0,1,3,4,6,8,10)	<254442>

5-35	(0,2,4,7,9)	<032140>	7-35	(0,1,3,5,6,8,10)	<254361>
5-Z36	(0,1,2,4,7)	<222121>	7-Z36	(0,1,2,3,5,6,8)	<444342>
5-Z37	(0,3,4,5,8)	<212320>	7-Z37	(0,1,3,4,5,7,8)	<434541>
5-Z38	(0,1,2,5,8)	<212221>	7-Z38	(0,1,2,4,5,7,8)	<434442>
6-1	(0,1,2,3,4,5)	<543210>	6-Z26	(0,1,3,5,7,8)	<232341>
6-2	(0,1,2,3,4,6)	<443211>	6-27	(0,1,3,4,6,9)	<225222>
6-Z3	(0,1,2,3,5,6)	<433221>	6-Z28	(0,1,3,5,6,9)	<224322>
6-Z4	(0,1,2,4,5,6)	<432321>	6-Z29	(0,1,3,6,8,9)	<224232>
6-5	(0,1,2,3,6,7)	<422232>	6-30	(0,1,3,6,7,9)	<224223>
6-Z6	(0,1,2,5,6,7)	<421242>	6-31	(0,1,3,5,8,9)	<223431>
6-7	(0,1,2,6,7,8)	<420243>	6-32	(0,2,4,5,7,9)	<143250>
6-8	(0,2,3,4,5,7)	<343230>	6-33	(0,2,3,5,7,9)	<143241>
6-9	(0,1,2,3,5,7)	<342231>	6-34	(0,1,3,5,7,9)	<142422>
6-Z10	(0,1,3,4,5,7)	<333321>	6-35	(0,2,4,6,8,10)	<060603>
6-Z11	(0,1,2,4,5,7)	<333231>	6-Z36	(0,1,2,3,4,7)	<433221>
6-Z12	(0,1,2,4,6,7)	<332232>	6-Z37	(0,1,2,3,4,8)	<432321>
6-Z13	(0,1,3,4,6,7)	<324222>	6-Z38	(0,1,2,3,7,8)	<421242>
6-14	(0,1,3,4,5,8)	<323430>	6-Z39	(0,2,3,4,5,8)	<333321>
6-15	(0,1,2,4,5,8)	<323421>	6-Z40	(0,1,2,3,5,8)	<333231>
6-16	(0,1,4,5,6,8)	<322431>	6-Z41	(0,1,2,3,6,8)	<332232>
6-Z17	(0,1,2,4,7,8)	<322332>	6-Z42	(0,1,2,3,6,9)	<324222>
6-18	(0,1,2,5,7,8)	<322242>	6-Z43	(0,1,2,5,6,8)	<322332>
6-Z19	(0,1,3,4,7,8)	<313431>	6-Z44	(0,1,2,5,6,9)	<313431>
6-20	(0,1,4,5,8,9)	<303630>	6-Z45	(0,2,3,4,6,9)	<234222>
6-21	(0,2,3,4,6,8)	<242412>	6-Z46	(0,1,2,4,6,9)	<233331>
6-22	(0,1,2,4,6,8)	<241422>	6-Z47	(0,1,2,4,7,9)	<233241>
6-Z23	(0,2,3,5,6,8)	<234222>	6-Z48	(0,1,2,5,7,9)	<232341>
6-Z24	(0,1,3,4,6,8)	<233331>	6-Z49	(0,1,3,4,7,9)	<224322>
6-Z25	(0,1,3,5,6,8)	<233241>	6-Z50	(0,1,4,6,7,9)	<224232>