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## NAME

**reihe** — output specified row variant for a given prime row

## SYNOPSIS

```

reihe -[I|i] n [-a] [-m n] primefile
reihe -[P|p] n [-a] [-m n] primefile
reihe -[R|r] n [-a] [-m n] primefile
reihe -[R|r] primefile
reihe -[RI|ri] n [-a] [-m n] primefile
reihe -[S|s] n primefile

```

## DESCRIPTION

The **reihe** command outputs a specified row variant for a given prime row input. Normally, **reihe** is used to generate tone-row variants for 12-tone rows. However, the “tone-rows” can consist of any number of pitch-classes and need not be based on modulo-12 class-equivalence. In certain circumstances the “prime row” may consist of non-numeric or non-pitch-related data — such as articulation marks or dynamic marks. In addition to the traditional set-theoretic transformations, **reihe** also permits cyclic rotation (shifting) of set elements.

The input to the **reihe** command is interpreted as a *prime* or basic set of elements from which a transformed set is to be derived and output. Four traditional types of set-transformations can be generated by specifying the appropriate option: **-P** (prime), **-I** (inversion), **-R** (retrograde), and **-RI** (retrograde-inversion). Either upper- or lower-case characters can be used when specifying these options.

Following each option is a numerical parameter. For prime and inversion forms, the numerical parameter indicates the pitch-class value for the first “note” of the output form. For example, **-P 0** specifies the prime form beginning on pitch-class 0; **-P 1** specifies the prime transposed so that it begins on pitch-class 1. For retrograde and retrograde-inversion forms, the numerical parameter specifies the *last* value of the output row.

Positive integers greater than 11 are permitted in the input — but are treated as modulo-12 equivalent (unless the **-m** option specifies a different modulus). In the case of **\*\*pc** inputs, the upper-case letters A and B are accepted as aliases for pitch-classes 10 and 11 respectively. Following the Fortean practice, pitch-classes 10 and 11 may alternatively be represented in the input by the upper-case letters T (ten) and E (eleven) — although this latter convention is discouraged.

In addition to the traditional set-transformations of transposition, inversion, retrograde, and retrograde-inversion, **reihe** also provides for rotation — where the set elements are cyclically *shifted* by a specified number of positions. For example, **-s 3** causes each set

element to be shifted forward by 3 positions. The shift transformation can be combined with each of the other traditional transformations only by invoking the **reihe** command twice in succession.

Normally, **reihe** is used to transform numerical data (typically pitch-class values). However, the retrograde (**-r**) and shift (**-s**) operations can be performed on any data (including non-numeric data — such as articulation marks). For non-numeric data, the retrograde option must be invoked without a numerical parameter. Attempting to transpose non-numeric data will result in an error.

The prime-form input file must contain a single spine. For untransposed retrogrades and rotational shift transformations, any single-spine Humdrum input will be accepted. If the **-m** option is invoked, any input interpretation will be accepted provided all data tokens contain numbers only. In the case of transposed prime, inversion, and retrograde transformations, the input must conform to the Humdrum pitch-class (**\*\*pc**) representation. In all cases, comments, null tokens, and tandem interpretations in the input spine are ignored and are not echoed in the output. In the case of **\*\*pc** inputs, barlines and rests are also ignored. Output interpretations always echo the input interpretation.

By way of example, consider the following input file `webern`:

```
!! Anton von Webern
!! Klavierstueck, opus posthumous
**pc
=1
9
10
.
11
8
7
=2
1
2
3
r
6
5
4
=3
0
*-
```

Executing the command:

```
reihe -p 1 webern
```

produces the following output:

```

**pc
1
2
3
0
11
5
6
7
10
9
8
4
*_

```

Notice that the comments, barlines, rests, and null tokens have been eliminated from the input file. This leaves the output in a form better suited to pattern matching using the **patt** or **pattern** commands.

Similarly, executing the command:

```
reihe -r 1 webern
```

produces:

```

**pc
1
5
6
7
4
3
2
8
9
0
11
10
*_

```

## OPTIONS

The **reihe** command provides the following options:



<b>-a</b>	for <b>**pc</b> inputs, output alphanumeric representation (where A=10, B=11)
<b>-h</b>	displays a help screen summarizing the command syntax
<b>-I <i>n</i></b>	output inversion set-form starting on pitch-class <i>n</i>
<b>-i <i>n</i></b>	same as <b>-I</b> option
<b>-m <i>n</i></b>	calculate according to modulo <i>n</i> arithmetic
<b>-P <i>n</i></b>	output prime set-form starting on pitch-class <i>n</i>
<b>-p <i>n</i></b>	same as <b>-P</b> option
<b>-R</b>	output retrograde of input row
<b>-R <i>n</i></b>	output retrograde set-form ending on pitch-class <i>n</i>
<b>-r</b>	same as <b>-R</b> option
<b>-r <i>n</i></b>	same as <b>-R <i>n</i></b> option
<b>-RI <i>n</i></b>	output retrograde-inversion set-form ending on pitch-class <i>n</i>
<b>-ri <i>n</i></b>	same as <b>-RI</b> option
<b>-S [<math>\pm</math>]<i>n</i></b>	output set-form shifted <i>n</i> elements forward (+) or backward (-)
<b>-s [<math>\pm</math>]<i>n</i></b>	same as <b>-S</b> option

Options are specified in the command line.

When the **-a** option is invoked, pitch-class inputs (**\*\*pc**) will produce pitch-class outputs using the alias values 'A' for pitch-class 10, and 'B' for pitch-class 11. (See the **\*\*pc** representation.)

By default, the **reihe** command assumes modulo 12 arithmetic for prime, inversion, retrograde, and retrograde-inversion transformations. In other words, transposing the numerical value '11' up three pitch-classes results in an output value of '2.' The **-m** option can be used to specify some other modulo value. If this option is invoked with **\*\*pc** input, the alias values (A=T=10; B=E=11) are disabled and only numerical data can be processed and output. The **-m** and **-a** options are thus mutually exclusive.

## EXAMPLES

The sample document given below shows a 5-tone row used in Igor Stravinsky's "Dirge-Canons" from *In Memoriam Dylan Thomas*.

```
!! I. Stravinsky, 5-tone row
**pc
2
3
6
5
4
*_
```

The command: `reihe -s -1 igor` would result in the following output:

```
**pc
3
6
5
4
2
*—
```

The command: `reihe -a -i 2 igor` would result in the following output:

```
**pc
2
1
A
B
0
*—
```

The command: `reihe -ri 0 -m 7 igor` would result in the following output:

```
**pc
5
4
3
6
0
*—
```

## PORTABILITY

DOS 2.0 and up, with the MKS Toolkit. OS/2 with the MKS Toolkit. UNIX systems supporting the *Korn* shell or *Bourne* shell command interpreters, and revised *awk* (1985).

## SEE ALSO

**\*\*iv** (2), **iv** (4), **\*\*nf** (2), **nf** (4), **patt** (4), **pattern** (4), **\*\*pc** (2), **pc** (4), **\*\*pcset** (2), **pcset** (4), **\*\*pf** (2), **pf** (4), **recode** (4), **semits** (4)