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- `beat` = Humdrum Extra program for rhythm analysis uses.
 - `rcheck` = Program for rhythm error checking in `**kern` data.
 - `scordur` = Extra program for listing
 - `minrhy` = Extra program for finding minimum rhythmic value
 - `timebase` = Toolkit program for making all lines in data have the same duration
 - `assemble` = Toolkit program for joint parts into a score (opposite of *extract*)
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beat

Show the metrical beat position of each line in a Humdrum file with `**kern` data:

```
beat -p chor001.krn
```

`-p` option “prepends” the data to the original data, use `-a` to “append” or nothing to not include original data in output.

Add up the duration between each barline in the music:

```
beat -p -s chor001.krn
```

```
beat -s chor001.krn | rid -GLid
```

This is useful for error-checking parts for missing/extra beats before creating scores.

Extract the rhythmic duration of each line of data:

```
beat -p -d chor001.krn
```

```
beat -d *.krn | grep -v = | rid -GLid | sort -n | uniq -c | sort -nr
```

Absolute beat: the number of quarter notes from the start of the music:

```
beat -p -t chor001.krn
```

20936	0.5
6036	1
2147	0.25
824	2
283	3
51	4
10	1.5
10	0.125
6	0.75
3	0.166667
2	8

rcheck

Shows the absolute beat, duration, and metrical position for every line in data. Output is not a legal Humdrum file (primarily useful for debugging strange rhythmic errors in data).

```
rcheck chor001 | less
```

scordur

Useful for calculating the total duration (in quarter notes) of a file:

```
scordur chor001.krn
```

```
thru chor001.krn | scordur
```

minrhy

Finds the smallest rhythmic unit with which all rhythm values in the file can be represented with integer multiples.

```
minrhy chor001.krn
minrhy *.krn | grep chor | sed 's/.*:/' | sort -n | uniq -c
```

timebase

Use in combination with minrhy before using assemble. Causes each data line to have the same rhythmic duration.

Extract beat location lines in chor001.krn (deleting off-beat lines):

```
timebase -t 4 chor001.krn
```

More commonly, add null-token lines without deleting datalines:

```
timebase -t 16 chor001.krn
timebase -t 16 chor001.krn | beat -d | rid -GLId | grep -v = | uniq -c
```

assemble

Use to combine parts into a score. Example:

<pre>**kern *M2/4 8C 4C 8C *_</pre>	<pre>**kern *M2/4 6c 12c 12c 6c *_</pre>
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```
minrhy file1 file2          # returns the answer "24"
timebase -t 24 file1       > tb1
timebase -t 24 file2       > tb2
assemble tb1 tb2 | rid -d > finalscore.krn
```

- Warning on grace notes.

Some other programs:

- meter == extract the *Mx/y meter interpretation records into spines.
- rhylev = extract the rhythmic level for each line of data.
- themebuilder2 -r == extract various rhythmic information strings from musical incipits.