**CPK PLOT**

**PURPOSE**
Generates a subsample $C_{pk}$ versus subsample index plot.

**DESCRIPTION**
The subsample $C_{pk}$ index is the $C_{pk}$ index of the data in the subsample. The Cpk plot is used to answer the question: “Does the subsample $C_{pk}$ index change over different subsamples?” The plot consists of:
- **Vertical axis** = subsample $C_{pk}$ index;
- **Horizontal axis** = subsample index.

In addition, a horizontal line is drawn representing the full sample $C_{pk}$ value. As usual, the appearance of the 2 traces is controlled by the first 2 settings of the LINES, CHARACTERS, SPIKES, BARS, and similar attributes.

The $C_{pk}$ statistic is used as an alternative to the $C_P$ statistic when the specification limits are not symmetric about the mean.

**SYNTAX**

```plaintext
CPK PLOT <y> <x> <SUBSET/EXCEPT/FOR qualification>
```

where `<y>` is the response (= dependent) variable;
- `<x>` is the subsample identifier variable (this variable appears on the horizontal axis);
and where the `<SUBSET/EXCEPT/FOR qualification>` is optional.

**EXAMPLES**

```
CPK PLOT Y X
CPK PLOT Y X1 SUBSET X1 > 3
```

**NOTE 1**
The process capability index measure the performance (i.e., the capability) of an industrial process and is defined as follows:

$$CPK = \frac{\text{MINIMUM}(USL - M),(M - LSL))}{3S}$$

where $M$ is the sample mean, $S$ is the sample standard deviation and where USL and LSL are user specified upper and lower specification limits. The specification limits define the range within which a product is considered acceptable (values outside this range indicate that a product is defective). Values less than 1 indicate that there are still some defectives.

**NOTE 2**
Recall that Chebychev’s theorem states that at least 75% of the variables data must fall within plus or minus 2 standard deviations of the mean and that at least 88% must fall within plus or minus 3 standard deviations. This is for any distribution. For a normal distribution, these numbers are 95.4% and 99.7% respectively.

**NOTE 3**
The upper and lower specification limits must be specified by the user as follows:

```plaintext
LET LSL = <value>
LET USL = <value>
```

**DEFAULT**
None

**SYNONYMS**
None

**RELATED COMMANDS**
- **CHARACTERS** = 
- **LINES** = 
- **CAPABILITY ANALYSIS** = 
- **CPK** = 
- **CP PLOT** = 
- **EXPECTED LOSS PLOT** = 
- **PERCENT DEFECTIVE PLOT** = 
- **BOX PLOT** = 

Sets the type for plot characters.
Sets the type for plot lines.
Performs a capability analysis.
Computes the $C_{pk}$ statistic.
Generates a $C_p$ plot.
Generates an expected loss plot.
Generates a percent defective plot.
Generates a box plot.
XBAR CHART = = Generates an xbar control chart.
PLOT = = Generates a data or function plot.

APPLICATIONS
Quality Control

IMPLEMENTATION DATE
93/10

PROGRAM
SKIP 25
READ GEAR.DAT DIAMETER BATCH
TITLE CASE ASIS
LABEL CASE ASIS
TITLE Gear Diameter Analysis
Y1LABEL CPK
X1LABEL Batch
LEGEND 1 Process Capability
LEGEND 2 CPK Plot
XTIC OFFSET 0.5 0.5
CHARACTER X BLANK
LINE BLANK SOLID
LET LSL = 0.98
LET USL = 1.02
CPK PLOT Diameter Batch