AUTOCORRELATION

PURPOSE
Compute the lag 1 autocorrelation of a variable.

DESCRIPTION
The lag 1 autocorrelation of a variable is the correlation between X_i and X_{i+1}. The autocorrelation is often used as a simple measure of randomness (a random variable should have an autocorrelation close to zero) or for detecting time dependencies. It has the formula:

$$r_1 = \frac{\sum_{i=1}^{N-1} (x_t - \bar{x})(x_{t+1} - \bar{x})}{\sum_{i=1}^{N} (x_t - \bar{x})^2} \qquad \textbf{(EQ 2-1)}$$

SYNTAX
LET \<par\> = AUTOCORRELATION \<y\>   \<SUBSET/EXCEPT/FOR qualification\>
where \<y\> is a response variable;
         \<par\> is a parameter where the computed autocorrelation is stored;
and where the \<SUBSET/EXCEPT/FOR qualification\> is optional.

EXAMPLES
LET A = AUTOCORRELATION Y1
LET A = AUTOCORRELATION Y1 SUBSET TAG > 2

NOTE
It is possible for higher lags (i.e., x_i vs. x_{i+k}) to have non-zero values even if the lag 1 value is zero. Thus it is usually better to look at all of the autocorrelation values. This is done by generating an autocorrelation plot. The internal variable YPLOT contains the numerical values of the autocorrelation. The following generates a plot of all the autocorrelations and prints the lag 3 autocorrelation.

AUTOCORRELATION PLOT Y1
LET A = YPLOT(3); PRINT "THE LAG 3 AUTOCORRELATION IS ^A"

DEFAULT
None

SYNONYMS
None

RELATED COMMANDS
AUTOCORRELATION PLOT	=	Generate an autocorrelation plot.
AUTOCORRELATION STAT PLOT	=	Generate a lag 1 autocorrelation versus subset plot.
AUTOCOVARIANCE	=	Compute the autocovariance.
CORRELATION	=	Compute the correlation between two variables.
YPLOT	=	Internal variable that contains the y coordinates of the most recent plot.

REFERENCE
"Time Series Analysis: Forecasting and Control," Box and Jenkins, Holden-Day, 1976 (page 32).

APPLICATIONS
Time Series Analysis, Exploratory Data Analysis

IMPLEMENTATION DATE
Pre-1987

PROGRAM
SKIP 25; READ LEW.DAT BEAM
LET A1 = AUTOCORRELATION BEAM