ARM Action Codes

"ARM Action Codes" is a data entry field in the assessment editor used to define customized ARM actions for information in that data column. This field is present in all standard and customized study definitions, although the list of ARM actions may vary between different corporate ARM customizations.

An important feature to remember is that ARM Action Codes can be "stacked" with several codes to combine actions. For example, a data transformation can be combined with APC or APOC, such as: `TL[1] APC` to calculate Abbotts value on the transformed means.

There are several categories of possible ARM actions. Examples below are from standard "GDMdef" study definitions:

1) "Rating Limits" that identify valid ranges for assessment data.

C	Rating scale of 0 to 10
P	Rating scale of 0 to 100 (e.g. % control or injury)
R	Rating scale of 1 to 5
I	Rating scale of 1 to 6 (e.g. Iowa Corn Rootworm)
S	Rating scale of 0 to 5 (e.g. Idaho SB Root Maggot)
B	Rating scale of 1 to 9 (e.g. turf, sheath blight)
M	Rating scale of 0 to 9 (e.g. mole crickets)
+	Only positive values (0 to 3.402823E38)
Y	Yes/No rating scale of 1 or 0, where 1=Yes and 0=No (e.g. EPPO taint test)

Rating limit codes can be entered before, during, or after entering assessment values into a data column. When entered into an existing data column, all current values are checked against the specified limit. All assessments that are outside the specified limits display in this dialog:
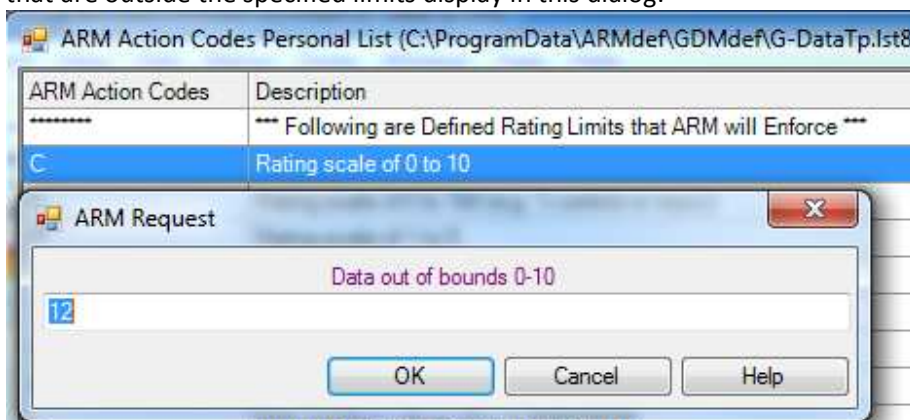
Either edit the value that is out of range and select OK, or select Cancel to stop the data limit check and keep the incorrect assessment value.

The supported data limits can vary with different customizations.

2) "Non-Analyzable Data (or Treatments)" for Summary reports.
Note: These action codes apply across all customizations, since they are built directly into the ARM program:

EC	Do not analyze untreated check, and report check treatment mean on AOV Means Table
ES	Automatically exclude (remove) this data column from all Summary reports
EST	Automatically exclude (remove) this data column from all ARM ST (Summary Across Trials) summaries

N	Do not analyze data (no statistics or mean comparisons), and report data from first replicate on Summary reports
NM	Do not analyze data (no statistics or mean comparisons), and report treatment means on Summary reports
NT	Non-analyzable text (1-4 characters per cell)

These codes identify that:

    i)   Untreated check treatments identified in Treatments tab of Settings dialog should be automatically excluded (dropped) when analyzing data columns containing the EC code in ARM and ST.

    ii) Data columns containing the ES and/or EST codes should be automatically excluded (dropped) from ARM summary reports (ES) or ST summaries (EST).
        Note: Both ES and EST can be included in the same data column, but the second must be manually typed. When selecting from validation list, selected EST will replace the ES.

    iii) Data columns containing the N, NM, or NT codes should never be analyzed, but should be included on a summary report as descriptive information. Typical uses are:
        (1) As textual assessments of response characteristics: + or ++ or - or -- (for N or NT).
        (2) To enter mean comparison test letters for a table of treatment means that are manually entered into ARM from an external trial report (for N or NT).
        (3) For non-analyzable numeric data for which treatment means should be calculated on a summary report, but the data should never be statistically analyzed.
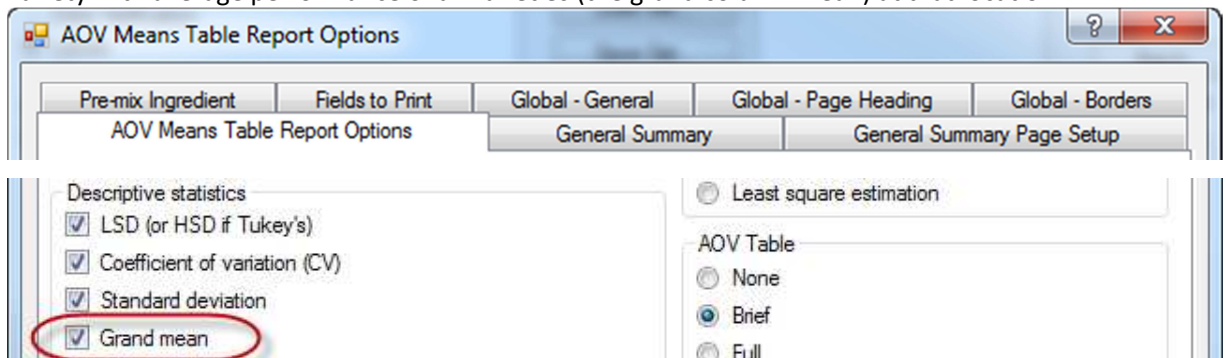
3)   Perform special automatic calculations on AOV Means Table.
    Note: These action codes apply across all customizations, since they are built directly into the ARM program:

APC	Automatic percent control (Control forced to 0% on AOV Means Table)
APOC	Automatic percent control (Control forced to 100% on AOV Means Table)
APOTM	Automatic percent of trial mean for summarized treatments (Trial Mean = 100%)
AS	Automatic square root transformation of X+0.5
AL	Automatic log transformation of X+1
AA	Automatic arcsine square root % transformation

These codes identify that:

    i)   An automatic percentage calculation of treatment mean relative to untreated check/control treatment(s) identified in Treatment tab of Settings should be listed below each treatment mean (APC or APOC). Note that APC is an Abbott based on treatment means.

    ii) An automatic percentage calculation of treatment mean relative to trial grand mean should be listed below each treatment mean (APOTM). This is the trial grand mean listed as descriptive statistic when "Grand mean" is selected on AOV Means Table Report Options.
        Because of location effects for variety comparison trials, APOTM is frequently used to compare each variety with average performance of all varieties (the grand column mean) at that location.

iii) Apply an automatic in-place data correction transformation on raw assessment data, calculate treatment mean from the transformed data, and de-transform the treatment mean on report. Analysis gives exactly the same result as when analyzing a transformed data column. For example, AA performs automatic arcsine square root % transformation when analyzing data, the same as for an arcsine square root % transformed data column TA[n].

4) Transformation ID codes for built-in ARM transformations (not user formulas).

Note: These action codes apply across all customizations, since they are built directly into the ARM program:

TS[n]	Square root transformation of X+0.5 (n=column)
TL[n]	Log transformation of X+1 (n=column)
TA[n]	Arcsine square root % transformation (n=column)
TAS[n]	Average subsamples per plot (n=column)
TSS[n]	Sum of subsamples per plot (n=column)
TIO[n]	% Incidence from subsamples per plot where 0 = 'no infestation' (n=column)
TII[n]	% Incidence from subsamples per plot where 1 = 'no infestation' (n=column)
TAB[n]	Abbott %-of-untreated transformation (untreated=0%, n=column)
THT[n,m]	Henderson-Tilton transformation (n=pre-treatment, m=post-treatment column)
TSO[n]	Schneider-Orelli transformation (n=column)
TIN[n,r1,r2]	Count subsamples per plot within the range r1 to r2 (n=column)
TST[n]	Standardize data column according to collection basis and sample size (n=column)
TCW[n]	Check Weighted Means conversion for multi-check trials (n=column, uses multiplier to adjust)
TCC[n]	Check Corrected Means conversion for multi-check trials (n=column, uses additive method to adjust)
Tn	User-defined transformation formula "n"
TYn	Yield conversion formula "n", created by ARM from Yield Conversion dialog

Note: For a very experienced ARM user it may work to select all except "Tn" and "TYn" from validation list if the column numbers are *manually entered* after they are selected. However, it is much safer to specify the transformation ID's by defining on the Data Transformation or Yield Conversion dialogs than by selected from validation list!

See "Repeated Seed Check Demo.dat8" for an example showing TCW and TCC transformations. These transformations have sometimes been called "nearest neighbor", although there are other statistical analyses that are also called "nearest neighbor".

5) Mean comparison ID codes for Standardized Summaries.

Note: A Standardized Summary report is a special AOV Means Table report on which ***the only mean comparison tests*** are for assessment data columns that ***include*** a standardized summary mean comparison test ID code. No mean comparison test is applied for any data columns that do not have a mean comparison ID! The ***advantage*** of a Standardized Summary is that different mean comparison tests can be applied in one AOV report.

D01	Perform 1% Duncan's New mean separation on Standardized Summary
D01E	Perform 1% Duncan's New mean separation on Standardized Summary, and exclude untreated treatments from AOV
D05	Perform 5% Duncan's New mean separation on Standardized Summary
D05E	Perform 5% Duncan's New mean separation on Standardized Summary, and exclude untreated treatments from AOV
D10	Perform 10% Duncan's New mean separation on Standardized Summary

D10E	Perform 10% Duncan's New mean separation on Standardized Summary, and exclude untreated treatments from AOV
K01	Perform 1% Tukey's HSD mean separation on Standardized Summary
K01E	Perform 1% Tukey's HSD mean separation on Standardized Summary, and exclude untreated treatments from AOV
K05	Perform 5% Tukey's HSD mean separation on Standardized Summary
K05E	Perform 5% Tukey's HSD mean separation on Standardized Summary, and exclude untreated treatments from AOV
K10	Perform 10% Tukey's HSD mean separation on Standardized Summary
K10E	Perform 10% Tukey's HSD mean separation on Standardized Summary, and exclude untreated treatments from AOV
L01	Perform 1% Least Significant Difference mean separation on Standardized Summary
L01E	Perform 1% Least Significant Difference mean separation on Standardized Summary, and exclude untreated treatments from AOV
L05	Perform 5% Least Significant Difference mean separation on Standardized Summary
L05E	Perform 5% Least Significant Difference mean separation on Standardized Summary, and exclude untreated treatments from AOV
L10	Perform 10% Least Significant Difference mean separation on Standardized Summary
L10E	Perform 10% Least Significant Difference mean separation on Standardized Summary, and exclude untreated treatments from AOV
R01	Perform 1% Dunnetts' vs. Reference mean separation on Standardized Summary
R01E	Perform 1% Dunnetts' vs. Reference mean separation on Standardized Summary, and exclude untreated treatments from AOV
R05	Perform 5% Dunnetts' vs. Reference mean separation on Standardized Summary
R05E	Perform 5% Dunnetts' vs. Reference mean separation on Standardized Summary, and exclude untreated treatments from AOV
S01	Perform 1% Student-Newman-Keuls mean separation on Standardized Summary
S01E	Perform 1% Student-Newman-Keuls mean separation on Standardized Summary, and exclude untreated treatments from AOV
S05	Perform 5% Student-Newman-Keuls mean separation on Standardized Summary
S05E	Perform 5% Student-Newman-Keuls mean separation on Standardized Summary, and exclude untreated treatments from AOV
S10	Perform 10% Student-Newman-Keuls mean separation on Standardized Summary
S10E	Perform 10% Student-Newman-Keuls mean separation on Standardized Summary, and exclude untreated treatments from AOV
U01	Perform 1% Dunnetts' vs. Control mean separation on Standardized Summary
U01E	Perform 1% Dunnetts' vs. Control mean separation on Standardized Summary, and exclude untreated treatments from AOV
U05	Perform 5% Dunnetts' vs. Control mean separation on Standardized Summary
U05E	Perform 5% Dunnetts' vs. Control mean separation on Standardized Summary, and exclude untreated treatments from AOV
W05	Perform Waller-Duncan K-100 mean separation on Standardized Summary
W05E	Perform Waller-Duncan K-100 mean separation on Standardized Summary, and exclude untreated treatments from AOV

6) Index calculations on EPPO class assessment rating scales for 2 to 12 classes, with class 1=no incidence.
   Note: All EPPO index calculations are for a series of consecutive data columns containing 1 value per plot that is the total number (count) of subsamples per class, and the scale total columns must be consecutively ordered in ascending class order.

   All class assessments must be selected from the ARM Action Codes validation list, and the class 1 data column number must be entered as the "n" in [n] portion of the formula.

   For relative "R" formulas, the scale total columns must be immediately left of the column containing the relative formula. For example, for a 1-2 class assessment, if data column is the count of class 1 assessments per plot for a series of subsamples, then column 2 must be the count of class 2 assessments per plot, and column 3 must have the @EC12R action code.

   Supported formulas are:

@EC12[n]	EPPO Rating Scale 1 to 2 (n=scale 1 total column)
@EC12R	EPPO Rating Scale 1 to 2 (scale totals are immediately left of this index column)
@EC13[n]	EPPO Rating Scale 1 to 3 (n=scale 1 total column)
@EC13R	EPPO Rating Scale 1 to 3 (scale totals are immediately left of this index column)
@EC14[n]	EPPO Rating Scale 1 to 4 (n=scale 1 total column)
@EC14R	EPPO Rating Scale 1 to 4 (scale totals are immediately left of this index column)
@EC15[n]	EPPO Rating Scale 1 to 5 (n=scale 1 total column)
@EC15R	EPPO Rating Scale 1 to 5 (scale totals are immediately left of this index column)
@EC16[n]	EPPO Rating Scale 1 to 6 (n=scale 1 total column)
@EC16R	EPPO Rating Scale 1 to 6 (scale totals are immediately left of this index column)
@EC17[n]	EPPO Rating Scale 1 to 7 (n=scale 1 total column)
@EC17R	EPPO Rating Scale 1 to 7 (scale totals are immediately left of this index column)
@EC18[n]	EPPO Rating Scale 1 to 8 (n=scale 1 total column)
@EC18R	EPPO Rating Scale 1 to 8 (scale totals are immediately left of this index column)
@EC19[n]	EPPO Rating Scale 1 to 9 (n=scale 1 total column)
@EC19R	EPPO Rating Scale 1 to 9 (scale totals are immediately left of this index column)
@EC110[n]	EPPO Rating Scale 1 to 10 (n=scale 1 total column)
@EC110R	EPPO Rating Scale 1 to 10 (scale totals are immediately left of this index column)
@EC111[n]	EPPO Rating Scale 1 to 11 (n=scale 1 total column)
@EC111R	EPPO Rating Scale 1 to 11 (scale totals are immediately left of this index column)
@EC112[n]	EPPO Rating Scale 1 to 12 (n=scale 1 total column)
@EC112R	EPPO Rating Scale 1 to 12 (scale totals are immediately left of this index column)
@DIP12[n]	Percent Incidence for EPPO 1-2 disease scale from ratings summarized at plot level in separate columns (n=scale 1 total column)
@DIP13[n]	Percent Incidence for EPPO 1-3 disease scale from ratings summarized at plot level in separate columns (n=scale 1 total column)
@DIP14[n]	Percent Incidence for EPPO 1-4 disease scale from ratings summarized at plot level in separate columns (n=scale 1 total column)
@DIP15[n]	Percent Incidence for EPPO 1-5 disease scale from ratings summarized at plot level in separate columns (n=scale 1 total column)
@DIP16[n]	Percent Incidence for EPPO 1-6 disease scale from ratings summarized at plot level in separate columns (n=scale 1 total column)

@DIP17[n]	Percent Incidence for EPPO 1-7 disease scale from ratings summarized at plot level in separate columns (n=scale 1 total column)
@DIP18[n]	Percent Incidence for EPPO 1-8 disease scale from ratings summarized at plot level in separate columns (n=scale 1 total column)
@DIP19[n]	Percent Incidence for EPPO 1-9 disease scale from ratings summarized at plot level in separate columns (n=scale 1 total column)
@DIP110[n]	Percent Incidence for EPPO 1-10 disease scale from ratings summarized at plot level in separate columns (n=scale 1 total column)
@DIP111[n]	Percent Incidence for EPPO 1-11 disease scale from ratings summarized at plot level in separate columns (n=scale 1 total column)
@DIP112[n]	Percent Incidence for EPPO 1-12 disease scale from ratings summarized at plot level in separate columns (n=scale 1 total column)

7) Index calculations for non-EPPO assessment scales that begin with 0 (0=no incidence).

Formulas described as "for subsamples" calculate the index from 1 original data column that contains all disease scale assessments entered as subsamples for each plot. The formulas automatically calculate the count per plot for number of subsamples in each scale.

Formulas described as "from ratings summarized at plot level in separate data columns" are structured for scale totals entered in separate columns, as for the EPPO formulas described in the previous point.

@DS05[n]	Disease Severity from subsamples for 0-5 scale (n=column)
@DS05R	Disease Severity from subsamples for 0-5 scale (scale rating immediately left of this severity column)
@DI05[n]	Percent Incidence from subsamples for 0-1, 0-2, …, up to 0-5 scales (n=column)
@DI09[n]	Percent Incidence from subsamples for 0-1, 0-2, …, up to 0-9 scales (n=column)
@DI09R	Percent Incidence from subsamples for 0-1, 0-2, …, up to 0-9 scales (scale totals are immediately left of this incidence column)
@DIP05[n]	Percent Incidence for 0-5 disease scale from ratings summarized at plot level in separate columns (n=scale 0 total column)
@DIP06[n]	Percent Incidence for 0-6 disease scale from ratings summarized at plot level in separate columns (n=scale 0 total column)
@DIP07[n]	Percent Incidence for 0-7 disease scale from ratings summarized at plot level in separate columns (n=scale 0 total column)
@SG06[n]	Stover-Gauhl disease severity from subsamples for 0-6 scale (n=column)
@TH02[n]	Townsend-Heuberger 0-2 disease scale from ratings summarized at plot level in separate columns (n=scale 0 total column, 0=no attack)
@TH03[n]	Townsend-Heuberger 0-3 disease scale from ratings summarized at plot level in separate columns (n=scale 0 total column, 0=no attack)
@TH04[n]	Townsend-Heuberger 0-4 disease scale from ratings summarized at plot level in separate columns (n=scale 0 total column, 0=no attack)
@TH05[n]	Townsend-Heuberger 0-5 disease scale from ratings summarized at plot level in separate columns (n=scale 0 total column, 0=no attack)
@TH06[n]	Townsend-Heuberger 0-6 disease scale from ratings summarized at plot level in separate columns (n=scale 0 total column, 0=no attack)
@TH07[n]	Townsend-Heuberger 0-7 disease scale from ratings summarized at plot level in separate columns (n=scale 0 total column, 0=no attack)

8) General calculations (not fitting into any category above):

Notice the **alternative methods to calculate Abbott** values.
a) Per plot from mean of untreated check plots.
b) Per treatment from treatment means.
c) From paired plots where column "n" is the treated plot and column "m" is the adjacent untreated plot.

@UTAB[n]	Abbott per plot from mean of untreated treatment (n=column)
@UTABR	Abbott per plot from mean of untreated treatment (transforms data column immediately left of this Abbott column)
@TTAB[n]	Abbott per treatments calculated from treatment means (n=column)
@TTABR	Abbott per treatment calculated from treatment means (transforms data column immediately left of this Abbott column)
@PUAB[n,m]	Abbott per plot from paired untreated plots (n=data column of treatment assessment, m=data column of paired untreated plot assessment)
@APMAB[n,m]	Adjusted percent mortality using Abbott adjustment for natural check mortality (n=observed mortality data column, m=number treated data column)
@UPOC[n]	Percent of control (like APOC) relative to untreated treatment (untreated is 100%, change 'n' to data column to transform)
@UPOCR	Percent of control (like APOC) relative to untreated treatment (untreated is 100%, transforms data column immediately left of this POC column)
@TUPOC[n]	Percent of control per treatment (=APOC) relative to untreated treatment mean (untreated is 100%, change 'n' to data column to transform)
@TUPOCR	Percent of control per treatment (=APOC) relative to untreated treatment mean (untreated is 100%, transforms data column immediately left of this POC column)
@POR[n]	Percent of reference treatment (reference is 100%, change 'n' to data column to transform)
@PORR	Percent of reference treatment (reference is 100%, transforms data column immediately left of this POR column)
@GMHA[n]	Gross Margin per hectare of crop (change 'n' to yield column, requires cost entries in treatment editor)
@NIAC[n]	Net Income per acre of crop (change 'n' to yield column, requires cost entries in treatment editor)
@TTHT[n,m]	Henderson-Tilton per treatment (n=pre-treatment column, m=post-treatment column)
@HB011[n]	Percent using Horsfall-Barrett 0 to 11 rating scale from subsamples (0=0%, 11=100%, n=column)
@HB011B[n]	Percent using Horsfall-Barrett 0 to 11 rating scale from subsamples (0=1.17%, 11=98.82%, n=column)
@HB112[n]	Percent using Horsfall-Barrett 1 to 12 rating scale from subsamples (1=0%, 12=100%, n=column)
@AVR[n]	Average per treatment (n=column)
@AVRR	Average per treatment (transforms column immediately left of current column)
@DETA[n]	De-transform a TA (arcsine square root percent) transformed data column (n=column)
@DETAR	De-transform a TA (arcsine square root percent) transformed data column (transforms column immediately left of current column)
@AVGNOT0[n]	Average per plot of all subsample values greater than 0 (n=original subsample data column number)
@AVGNOT0R	Average per plot of all subsample values greater than 0 (transforms data column immediately left of this calculated column)

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