KIM Immunochemical Processing

KIM Reports

KIM Immunochemical Processing is a comprehensive software solution for processing microplates.

Daniel Kittrich, Copyright © 2001. Web: www.ok.cz/dkitt e-mail: daniel@ok.cz

This is an official documentation to KIM.

It was released with Kim32 v. 5.15, Jan 19, 2001

It is valid for versions 5.xx.

Questions and comments will be appreciated.

Use e-mail, to contact the author.

daniel@ok.cz

Contents

Overview

Users often have very specific requirements on their data presentation. While Kim offers standard outputs for data presentation, which can be used immediately, it also gives a user an extremely powerful tool for highly sophisticated reports. The user is limited by his imagination only and by his decision on how much effort he wants to spend in preparing professional presentations.

Fundamental elements

A report consists of textual and graphical elements. Each element has its own set of attributes such as position, dimensions, color, etc…

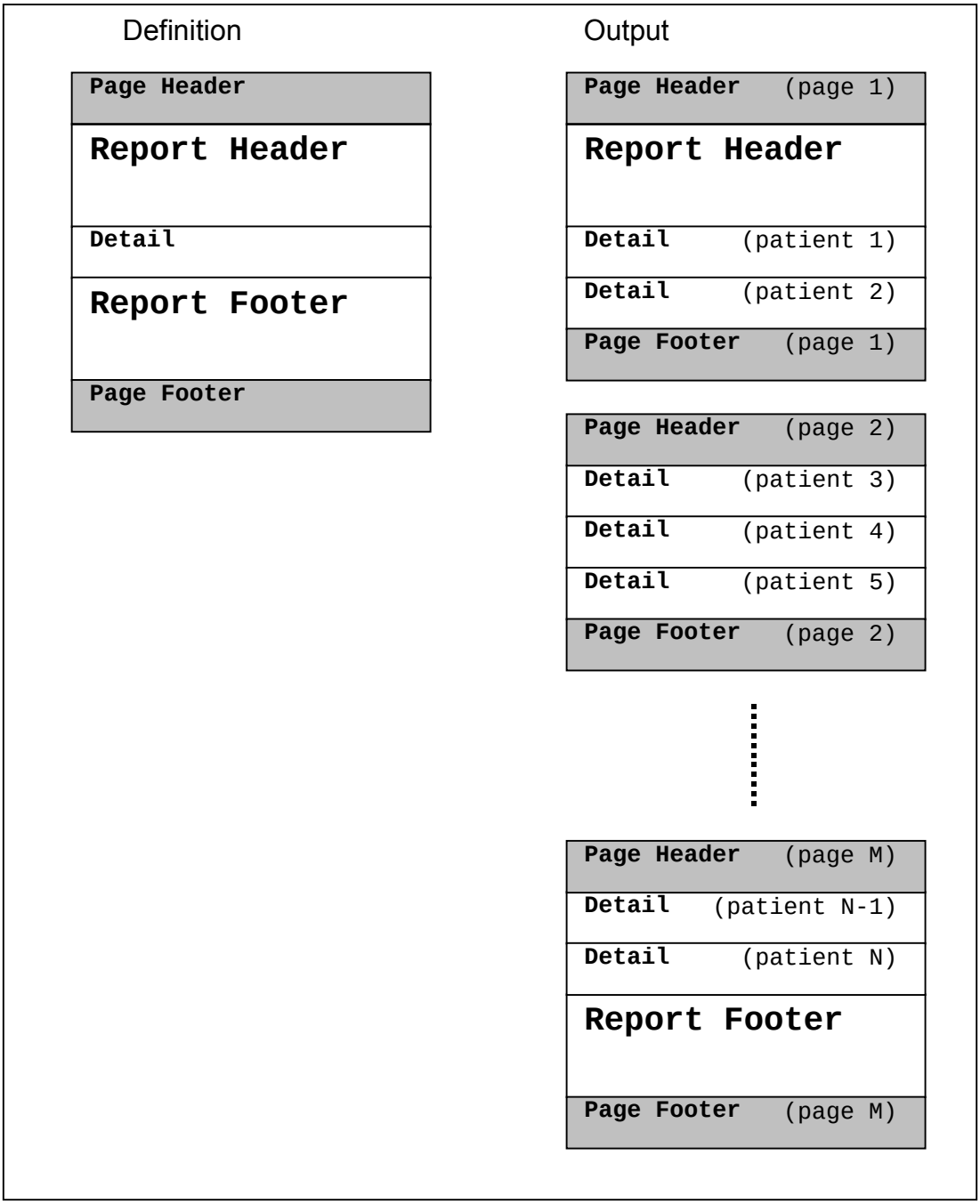
- **Text box** - this element presents textual information to the user. It may show either a fixed text or a calculated text. The user has full control over fonts in individual elements.
- **Rectangle** - a simple graphical element that may be used to visually put together related pieces of information.
- **Line** - yet another graphical element.
- **Graph** - an X-Y plot of a calibration curve.
- **Picture** - an arbitrary picture generated in another application may be inserted in a report. A logo of a company is a good candidate for this type of element.
- **Page break** - this element does not show up in the report, instead, it may be used for explicit control of pagination.

Sections

Elements are grouped in sections. The concept of sections helps in automation of sample result presentation and in flexible pagination schema. Sections are optional. User may select which type of sections will be used.

- **Page header** - this section repeats on the top of every page. It should be used for page numbers, printing date, etc...
- **Page footer** - this section repeats at the bottom of every page. It may be used for a similar type of information as the page header.
- **Report header** - this section appears just once at the beginning of a report. It should contain some global information - test name, time of measurement, validity of a test, plate data in a matrix format, calibration curve, etc...
- **Report footer** - this section appears just once at the end of a report. It may be used for a similar type of information as the report header.
- **Detail** - this section repeats for each patient sample on a plate. This section should contain data and results related to individual patients. Detail sections may be organized in single or multicolumn output format. In multicolumn format it is usually possible to fit the whole report on a single sheet of paper.

Following picture shows the relation between a definition and an interpretation (output) of a report. There you see, that, while there is only a single page header and a single page footer in a definition, more those sections will be generated on output (depending on actual number of generated pages). Similarly, there is a single detail section in a definition, while there will be more detail sections on output (depending on actual number of patients in a test).



Context

Some calculated fields may depend on context in which they are used. As an example, consider two calculated text box elements with following contents:

1. **`=today`**
2. **`=smplid`**

Both texts start with an equal sign. This means, that Kim will interpret the text after the equal sign as an expression. In other words: In the output, not a word **today** will be printed, instead, the system will find a variable of that name, and will print current date in a general format. There is no other information needed, in all cases a date will be printed.

With the "=smplid" expression, the situation becomes a bit tricky. Generally speaking, the **smplid** is a variable that contains an identification of a sample. The question remains: Which of many samples on a plate are we talking about? A context is used to answer this question:

The default interpretation of **smplid** variable is as follows:

As noted above, Kim generates a detail section for each patient sample on a plate. If **smplid** is used in a detail section then a corresponding patient ID will be printed. In other sections, the **smplid** will be interpreted as an empty text (no characters will be printed). This was the default interpretation.

To be able to specify a different context, user may choose from following explicit contexts for any element of a report:

- **Default** ... this is the usual interpretation - expression in a detail section is interpreted in a context of associated sample, in other sections - global context is assumed.
- **Cell** ... expression is interpreted in a context of a specific cell of a plate.
- **Sample** ... expression is interpreted in a context of a specific sample.
- **Global** ... overrides a sample context in a detail section.

The default context will be used for the majority of elements, while the cell context will be used for elements organized in a plate matrix format. Other types of contexts will be used very seldom.

Handling Reports

Report definitions are stored in a common report library file. User may insert new reports, update or delete existing ones in the report list. Each report is identified by its name in the report list.

Associating Plates with Reports

Each method (each plate) may have a specific report associated with it. The association is made by a report name as it appears in the report list. There is no fixed connection between a plate and a report. When the user wants to printout a report, the associated report (if any) is offered as a default choice, but the user may also select any other report.

Reports in Individual Files

In addition to keeping reports in a single report library file, it is possible to store a report in an external file. Those files can be used for exchanging report definitions between Kim installations.

Report Example

As our first example we will use files that came with Kim default installation. To get most of the example, the user should start Kim and follow instructions found in this text. We will try to present a detail description so that one can get an insight even if Kim is not available.

Start **Kim** either from Windows Start/Programs menu or by double clicking **Kim** icon on the desktop.

Click the **Open** button (menu: **File/Open**). In the File Open dialog, browse to `examples` folder and open `p72211.plt` plate file. A plate with measured data and evaluated samples will show up in a plate matrix format. This is a situation similar to what a user sees after he measured a plate and sample results were calculated.

Click the **Report preview** button (menu: **File/Report preview**). A report selection dialog will show up with `TEST1` report pre-selected. Click the **Preview** button in the dialog to confirm the choice of a report. A preview of a report will be generated. User may zoom in the picture and browse through pages.

In the preview, we see the result of a report design. Following text will describe step by step how that report was constructed.

Plate Method Definition

In most cases a report has to be constructed with a particular plate method in mind. This is a consequence of wide variability of different tests. On the other hand, it may be possible to prepare a single report that can be used for a whole family of tests. Before we proceed to a report definition, we should understand how a plate test was defined.

Press ESC key or the **Close** button to switch back to plate matrix view.

On the plate layout we see three negative controls (Neg) and three positive controls (Pos). Each patient sample is represented by a Qv symbol. Samples are used in singlets - one sample in a plate per one patient.

The test is built on a calculation of a single cut-off value, which is derived from absorbances of positive and negative controls. Samples with absorbances bellow the cut-off value are considered as negative, while samples with absorbances above the cut-off are considered as positive. This is the basic discrimination schema. In addition to that, a "gray zone" is introduced, which spans a range +/- 10% of the cut-off value. Samples with absorbances that fall within the "gray zone" range are considered questionable - test should be repeated for those patients.

Choose **Definition/Advanced calculations** menu command to see details of a test definition.

Select the **Calculations** tab. There you see a list of definitions:

```
AVGN = avg( neg )
AVGP = avg( pos )
CUT  = AVGN + AVGP/3.5
LOLIM = 0.9 * CUT
HILIM = 1.1 * CUT
```

When Kim processes a test, it calculates an average value of negative controls, creates a variable `AVGN` and assigns the average value to it (line 1). Similarly it creates an `AVGP`

variable and assigns the average of positive controls to it (line 2). It then combines values found in AVGN and AVGP variables and creates a third variable of CUT that will hold a test cut-off value (line 3). The "gray zone" limits will be assigned to variables LOLIM and HILIM (lines 4,5) - notice: 0.9*CUT is a value 10% below and 1.1*CUT is a value 10% above the cut-off value - see test method description above.

Please note that after processing expressions on the Calculations page a set of 5 variables will be generated (AVGN, AVGP, CUT, LOLIM, and HILIM). Those variables will be globally accessible in all subsequent expressions and in all contexts.

Select the **Evaluations** tab in the Calculation dialog. There you see a list of definitions:

```
description = category("neg", LOLIM, "gray", HILIM, "POS", qv )
absorbance = str( qv, 0, "F", 5, 3 )
result = absorbance + " ... " + description
```

In contrast to expressions found in Calculations page, these expressions will be calculated repeatedly for each patient sample on a plate. Consequently, each patient sample will have its own set of three variables (description, absorbance, and result). Those variables can later be used in a detail section of a report - there, a single detail section is generated for each patient and such a section then refers to a set of variables that belong to that patient sample.

We will briefly analyze the list of expressions.

A variable named description (line 1) will be created for each patient and will be assigned one of texts: "neg", "gray" or "POS" depending on a sample absorbance qv and LOLIM and HILIM category limits.

Note: In this example a variable qv is used to refer to a sample absorbance. It is because samples are represented by Qv in the plate layout (Kim is case-insensitive - Qv is considered the same variable as qv, QV, etc...). It would be also possible to use Od variable instead of Qv. Od stands for absorbance(s) of a sample without respect to its name. The full description of category function can be found later in this document or in the Kim help system.

A variable named absorbance (line 2) will be created for each patient sample. It will contain sample absorbance formatted as text in fixed decimal point notation with 3 digits after a decimal point.

A variable named result (line 3) will be created for each patient. It will contain a concatenation of three texts (three individual texts put together to produce a new entity): a formatted absorbance, three dots with spaces before and after it, and a verbal description of sample negativity/positivity. Note that the value of result variable appears in the list of results in the sample list view. It is considered a result of single patient sample evaluation because it is the last variable in the list.

Note: The choice of names for user defined variables is completely under the control of a user. We tried to choose highly descriptive names. One should not put any additional meaning. For example: The result of patient evaluation is the value found in the last variable in the list. It is only a coincidence, that we named that variable as result.

Using Automatic Expression Generator

In our example we studied the details of a test definition. Expressions and variable names were entered manually to reflect a description found in the test leaflet. A casual user would often choose using an automatic expression generator (a wizard). It is accessed under **Definition/Calculations** menu command. User then fills in a series of forms and the system automatically generates corresponding expressions. This approach is simpler to specify a test for a casual user but it leads to a series of expressions that are a bit harder to follow. Regardless of whether a test definition was entered manually or using the automatic generator, all the details can be found under **Definition/Advanced calculations**.

When we have a basic overview of a plate test definition we will proceed to a report specification.

Report Design Interface

Without closing the `p72211.plt` plate file we will start defining a new report.

Choose **Definition/Reports** menu command. A "Report List Manipulation" dialog appears. Click the **New** button to start a new report definition from a scratch. As the first step, the system offers a "Report Sections" dialog. There you can choose which sections will be used. In our example we will use all but the Report footer section. Make sure, that the **Report footer** section is unchecked while other sections are checked. Click **OK** button to confirm the layout.

A window shows a layout of a report. A smaller floating window shows attributes of currently selected object or a section. When nothing is selected, the floating window presents attributes of a report. The **Attributes** button on the left speed bar hides or shows the floating window.

Modes of Operation

While the **Pointer** tool button is depressed, it is possible to use the mouse to make selections, to size and to position objects. Pressing the <Tab> key moves current selection between objects and sections. The <Esc> key clears selections.

While the **Text box** tool button is depressed, it is possible to insert new text box object. A text box can display a text exactly as entered or it can display a calculated value. System makes the distinction based on a text box contents. If a text starts with an equal sign (=), then it is considered as an expression. The system first calculates the expression and prints out the result. If a text does not start with an equal sign, it is printed exactly as entered.

While the **Rectangle** tool button is depressed, it is possible to insert a rectangle. It is a graphical element that can be used to decorate a report.

The **Line** tool represents yet another graphical element.

The Graph tool inserts a graph of calibration curve together with standard points. When used in a detail section, it draws a patient sample against a calibration curve.

The **Picture** tool inserts a drawing created in any application that can handle graphics. This way it is possible to produce extremely attractive reports.

Page break does not produce a visible object. It only forces a new page in the output.

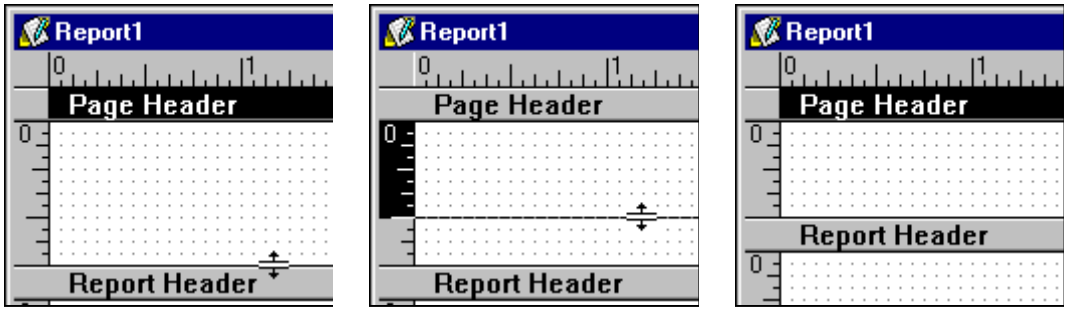
The state of the **Lock** button modifies behavior of object insertion tools (mentioned above). By default, when a new object is inserted, the system switches to sizing and selection mode (see **Pointer**). It is then necessary to click a specific tool button before inserting any new object. When the **Lock** button is depressed, then a specific tool button remains active, and it is possible to insert a series of objects quickly.

All the above tool buttons are also accessible under the **Tools** submenu (while a report definition window is active).

Working with Sections

It is often necessary to adjust sizes of individual sections. A good strategy is to start with bigger sections, to make room for moving and sizing objects, and to adjust exact sizes of sections after all objects were placed in their final positions.

Each section has its own height. All sections share the same width - the report width.



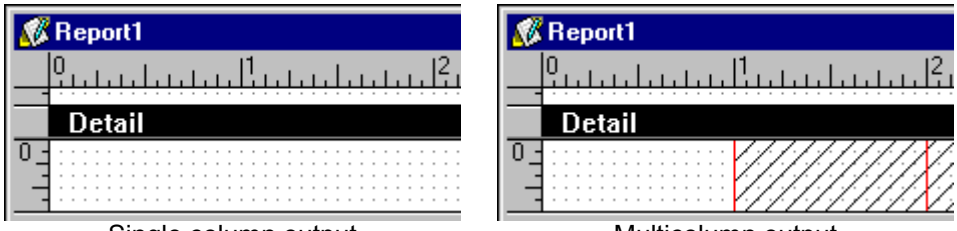
Cursor to bottom | During drag | After mouse release

Click inside the Page Header section to select it. The floating property window changes to show attributes of currently selected section. It is possible to enter a section height directly in the Height field in the property window. Alternatively, it is possible to adjust a section size using the mouse.

Move the mouse pointer to the bottom of page header section until it changes shape. Press the mouse left button and without releasing, drag it, until the marker on the vertical ruler shows 0.5-inch height. Release the mouse button. The section gets a new height.

Splitting the Detail Section

The system will generate many detail sections in the output - one detail section for each patient in a plate. By default, all sections are tiled vertically and the system generates new pages as necessary to print all of them. In some situations this may lead to much of unused space on a page. Detail sections may be organized in multicolumn output - just like pages in newspapers.



Single column output | Multicolumn output

Click inside the **Detail Section** to select it. A floating property window presents its attributes. The **Columns** field specifies how many detail sections will be placed in a row. When you enter N columns in the **Columns** field, the system divides the width of a report evenly and allocates 1/N to a single detail. Objects must be placed in the leftmost detail rectangle. Objects outside of it will be clipped (not shown in the report output).

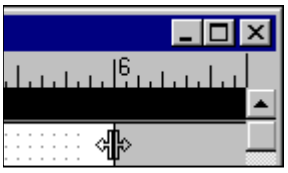
Note: When entering number of columns in the **Column** field, the system will accept the new value after moving to another field.

When working with more than one column, it is also possible to specify whether patients will be ordered in rows or in columns (as in a phone book). To order patients in rows, "Horizontal" must be selected in the **Output Order** field. Else "Vertical" should be selected.

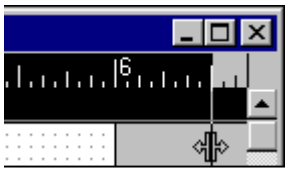
Setting Report Width

Press <Esc> key (several times) or click outside of any section to remove any selection(s). The floating property window will present attributes of a report. It is possible to enter a report width in the **Width** field. The width of a report is always expressed in inches (with arbitrary decimal digits). As with other dimensions, it is also possible to specify it in different units by supplying a suffix to a number as in the following example. All examples express a width of 6 inches:

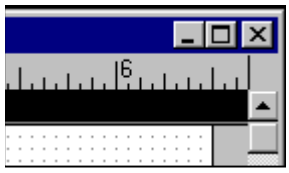
```
6        ... default - inch is assumed
6 in     ... same as above
432 pt   ... typographical points (1 inch = 72 pt)
152.4 mm ... millimeters (1 inch = 25.4 mm)
15.24 cm ... centimeters (1 inch = 2.54 cm)
```



Move to margin



During drag



New width accepted

To set a new width using mouse, move the mouse pointer to the right margin of a report until the pointer changes its shape. Press the left mouse button, and without releasing it, drag the mouse to a new position. System will accept a new width at the position where the left mouse button was released.

Report Design Grid

Whenever mouse is used to size and position objects, the system anchors edges to a grid. Press <Esc> key (several times) to remove any selection. The floating property window will show a report width field and two other fields that control the design grid. Value in
X Granularity field defines number of grid points per inch in horizontal direction.
Y Granularity defines number of points in vertical direction.

The grid is used for mouse operations only. When a position or a dimension is entered in a property window field from a keyboard, then grid settings are ignored.

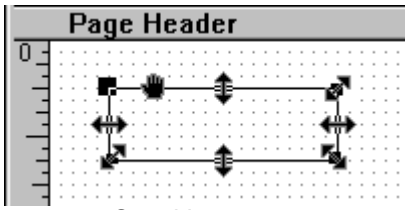
Working with Elements

By placing individual elements (text boxes and graphical elements) the user specifies the output of a report. Each element has is own settings of attributes. Every element type has a set of attributes. Some attributes are common to all element types; some are specific to a certain element type. E.g., a position is used with all elements, while a font attribute has a meaning for text boxes and graphs only. Depending on which element is currently selected, the floating property window shows relevant set of attributes. To learn working with elements and their attributes, we start with a rectangle.

Inserting an Element

Click the **Rectangle** tool button (menu: **Tools/Rectangle**). Move the mouse cursor to any report section. The cursor changes its shape to a rectangle to reflect new mode of operation. Click the left mouse button (press and release the button) inside a section. A rectangle with default attributes will be inserted. The new rectangle will be selected and the mouse changes to sizing/selection tool (if the system is not in the *lock mode* of operation - see later).

While the element remains selected it is possible to change its size and position.

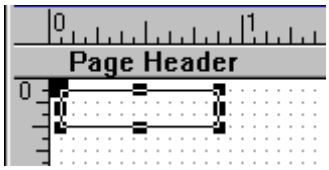


Sensitive areas

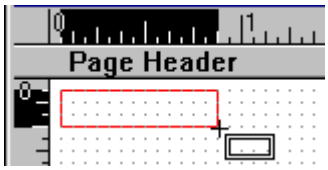
Small black pads mark areas that can be used for sizing and moving. While you move the mouse cursor over them, the cursor changes shape to indicate what action may follow. To resize in both directions, move the mouse cursor to the bottom right pad and press the left mouse button and without releasing it, move the mouse to a new bottom right corner position.

It is usually more effective to introduce a new element and to set its size in a single action - not in two steps as above.

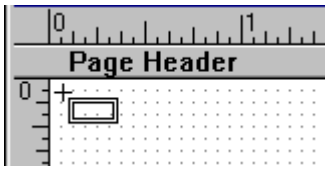
Click the **Rectangle** tool button once again to introduce a second rectangle. Move the mouse cursor to any report section and press the left mouse button where you want to insert the new rectangle. Without releasing the button, drag (move) the mouse. While you drag, the system draws a rectangle that indicates final dimensions of an object. Release the mouse button when you are satisfied with dimensions.



Release the mouse

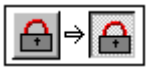


Indicate dimensions



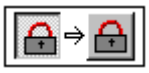
Move to a start position

In the following paragraph we will test two insertion modes.



Click the **Lock** button (menu: **Tools/Lock**) to change the insertion mode. The button remains depressed. In this mode, the system will not switch to sizing/moving tool after an object was inserted, instead, current tool remains active.

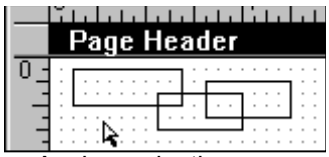
Click the **Rectangle** tool button while the system is in the lock insertion mode and insert several rectangles in succession to see the different behavior of the system.



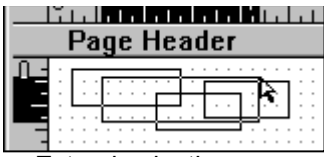
Click the **Lock** button to release the lock insertion mode.

Working with Multiple Elements

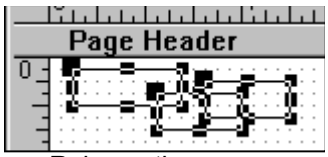
Make sure that the system is in normal mode (**Pointer** button is depressed). We assume that several rectangles were inserted in a report section. To select several objects, move the mouse cursor close to objects you want to select and press the left mouse button. Without releasing the button, drag the mouse over objects. System indicates a rectangular area starting at the initial point up to current mouse position. Objects that intersect the indicated area will be selected. Release the mouse button when the selection area is wide enough to intersect all objects.



Anchor selection area



Extend selection area



Release the mouse

When the three (in our case) rectangles become selected, the floating property window changes its title to "Multiple selection (3)" - the number says how many objects are currently selected. The window shows only those attributes that are common to all object types in current selection. (E.g., consider when a picture and a text box were selected - then only few attributes that are common to a graph and to a text box would be shown). Attributes that have same values for all selected objects are shown in respective fields, while remaining fields are left empty. When you type any attribute (either to an empty or to a non-empty field), that value will be assigned to all selected objects.

While more objects are selected it is possible to use mouse to move or resize the whole group of selected objects. Move the mouse cursor any sizing/moving area as you did with a single object and see what happens when you drag the mouse from there. All objects will size/move simultaneously. The only exception is the upper left corner pad of an object. When you start moving an object from that point, other objects stay at their positions.

To cancel a selection, click somewhere outside of any object. Then objects will loose their selection. You can also press <Esc> on the keyboard to cancel any selection.

Deleting Elements

To delete an element or a group of elements, it is necessary to select it (see above) and to press <Del> on the keyboard or choose the **Edit/Delete** menu command.

Starting Our First Design

After we learned some basics of using report design tools, we start building our first example. We will learn more tricks while defining the report. We start with a minimal report, to see a result quickly, and we will refine it in steps.

- Let each page of a report printout contains a page number and a name of plate file (a file, where a reported plate was stored) - **Page Header/Footer**.

- Let the first page of a report contains a test name (a name of a method used to process reported plate) and a time of measurement - **Report Header**.
- For each patient, let the report printout contains patient ID and a result - **Detail**.

Page Header / Page Footer

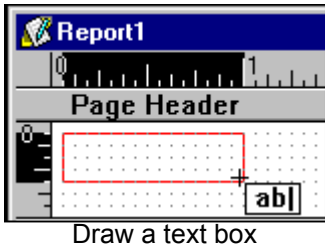
On each page of a report printout we want to see page numbers in a form of "Page 1", for the first page, "Page 2" on the second page, etc... Please note that the text consists of a fixed part "Page", which is repeated on every page, and of a page number, which changes between pages. To achieve this outcome, we may choose between two solutions:

a) We insert two text boxes, one with a fixed text "Page" and a second one, which calculates a page number.

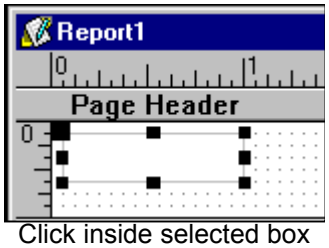
b) We insert a single calculated text box, that produces texts "Page 1", "Page 2", etc...

For learning purposes, we will test both versions. The construction will be placed in a **Page Header** section of a report. This way, elements will be calculated and repeated on top of every page in the printout.

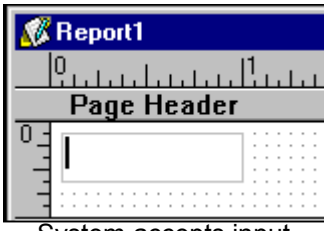
Click the **Text box** tool button and draw a bounding rectangle of a new text box. After you release the mouse button, a text box remains selected. Click inside the text box rectangle. A blinking cursor appears, indicating that the system is waiting for a text entry.



Draw a text box



Click inside selected box

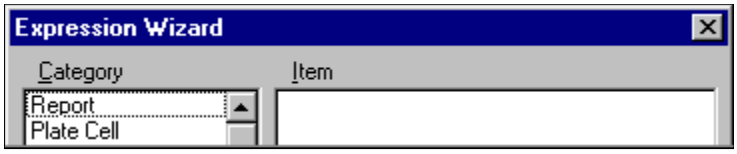


System accepts input

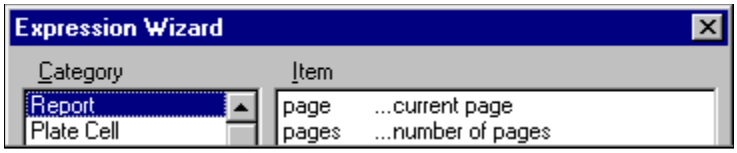
Type in the text **Page** and press <Enter> to confirm it.

Click the **Text box** tool button once again and insert a second text box rectangle. The new text box will contain an expression that will evaluate to a page number. You can type the expression directly if you know the expression or you can open the **Expression Wizard** to get assistance.

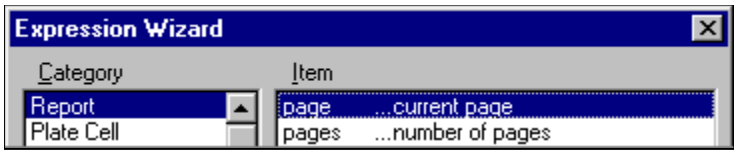
Click inside the new text box rectangle as if starting an entry as in the previous case. When the cursor is blinking and the mouse pointer is inside the text box, click the right mouse button. The **Expression Wizard** opens. Click on "Report" category to select it and click on "page" item to select it. The variable **page** appears in an insertion input field and its explanation in the bottom pane.



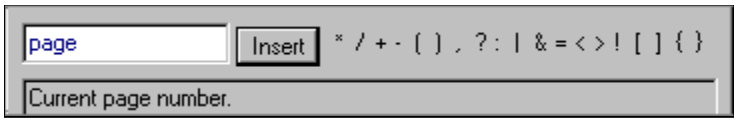
Open the **Expression Wizard** by clicking the left mouse button while mouse pointer is inside a text box rectangle.



Click on **Report** category to select a list of variables and functions specific to a report definition.

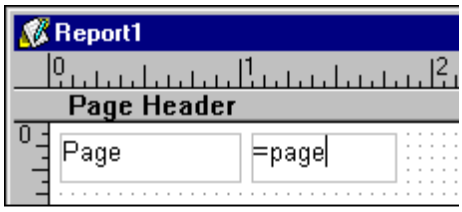


Click on **page** variable to select it for insertion and to get an explanation.

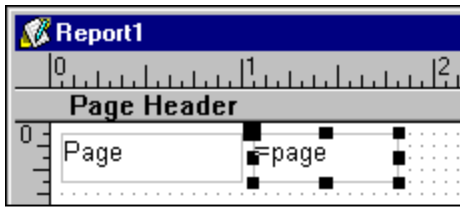


The variable **page** appears in the insertion field. Click the **Insert** button to move it to the text box.

After **page** was selected it appears in the insertion field. Click the **Insert** button (or press <Enter> on the keyboard) to move it into the text box. As we are finished with our simple expression, close the **Expression Wizard** by clicking the **Close** button or by <Esc> on the keyboard. The report section now looks as follows:



After the **Expression Wizard** was closed, we are in direct entry mode.



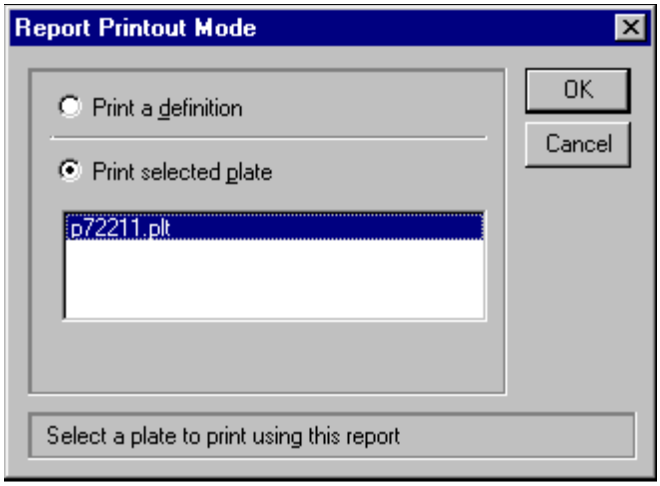
Press <Enter> on the keyboard to confirm the text box entry.

Please notice the difference between the two text boxes. The left box contains a word Page without an equal sign (=) prefix, it will be printed exactly as entered. The contents of the right box starts with an equal sign. This is a hint to the system that an expression follows. When it is printed, the system evaluates the expression and prints the result of evaluation. On the first page, the **page** variable has a value of 1, so "1" will be printed on the first page. On the second page, the variable has a value of 2, so "2" will be printed on the second page, etc...

Although we are pretty far from a reasonable report, we can already test our definition and watch how the system interprets it.

Click the **Report preview** button (menu: **File/Report preview**). A report selection dialog appears. The dialog gives an option to select among currently opened plates (plates on Kim desktop). The report we are currently working on will be used to format data of a plate. Please, recall that a report is NOT a part of any plate method. Instead, a single report may be used with different plates. It is also possible to print a report definition only. When printing a definition, the system does not interpret expressions but prints them as they were entered during a report design phase.

Click on P72211.PLT in the list (the only plate currently opened) and press <Enter>, or click the **OK** button, to start a report interpretation.



Click on P72211.PLT plate to select if for reporting.

The system opens a preview window. There you can see exactly how the output would look like on a sheet of paper.

A report preview window.

Click the **Zoom-In** button to see more details of a report. The red lines mark current page margins. You may use mouse to adjust margins – just move the mouse pointer over a margin line, until the cursor changes shape. Then press the left mouse button, and without releasing it, drag the margin to a new position.

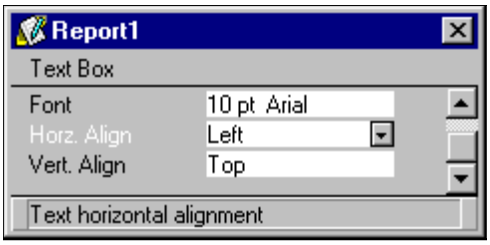
Close to upper and left margins you see a text **Page** and a number **1**. Those are our two text boxes we inserted in a page header. The text **Page** is a bit far from the number **1**. It is because of text alignment – we will deal with that later.

The current page indicator shows 1/13. It tells us, that page 1 out of 13 is currently on screen. Click the **Next page** button move to a second page. The indicator shows 2/13 and close to upper and left margins you see a text **Page** followed by a number **2**. The system interprets our page header definition on each page individually. While the **Page** text does not change, the expression "=page" evaluates to page numbers.

Note: You may wonder, why the system generated so many pages of a report. The reason is, that the plate P72211.PLT contains 90 patient samples and for each sample, the system generated a detail section. We do not see them because we did not put any elements into a detail section yet. Depending on a detail section height and on current margins, you may see a different number of pages (than 13). By shrinking detail height and/or by choosing multicolumn output, we can reduce number of pages of a report.

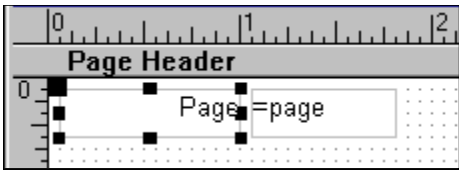
Click the **Close** button or press <Esc> to cancel the preview window.

In the preview we were not satisfied with relative positioning of the **Page** text and the page number. Click on the text box with **Page** contents to select it. The floating window shows attributes of that text box. Scroll down the list of attributes if necessary, to see **Horz. Align** attribute and click on it with mouse to select it.



Select **Horizontal Alignment** attribute.

Current settings is "Left" – any output in currently selected text box will start with the left border of the text box. Press <Space> several times to toggle between options and stop when "Right" appears. To have the new settings reflected in the text box, you may press <Enter> or move to another attribute. With "Right" alignment, texts in the current text box will end with the right border of the text box.



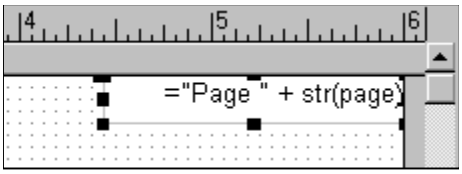
Left box is now right aligned.

It is a common situation when we have a fixed text (a label) and a related calculated value. Such situation leads to two separate text boxes, one with a fixed text and the other containing an expression. There exists an alternative approach – put the two pieces into a single expression. We will demonstrate that alternative method in page numbering.

Insert a text box and enter following expression into it:

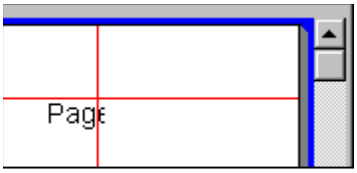
```
="Page " + str(page)
```

The expression is a concatenation of two strings. A fixed string "**Page** " and a numerical value **page**, which is converted to a string using the str() function. Concatenation simply means - take two strings, append the second one to the first one and produce a new single string. In Kim, the **+** (plus) sign, when it appears between two strings, means just that (when it appears between two numbers, then it means addition). Please also note a space between **Page** and the closing quotation mark. That space is significant. If it were not present, then the page number would be touching the text **Page** – it would not be very nice.

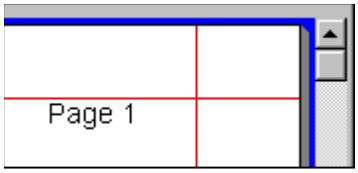


Right aligned expression positioned at the right margin of a repor.

You may again open a report preview window to see interpretation of our design. Please take care about paper printing margins and a report layout. We specify a report width in absolute units. On the output, the report will be placed starting with the left printing margin; extending to the right. It may happen, that with a particular paper width and margins, the printing area may be too narrow to accommodate the report width. In that case, use mouse to modify margins in the print preview window. The following two pictures are self explanatory:



Right margin clips the output.



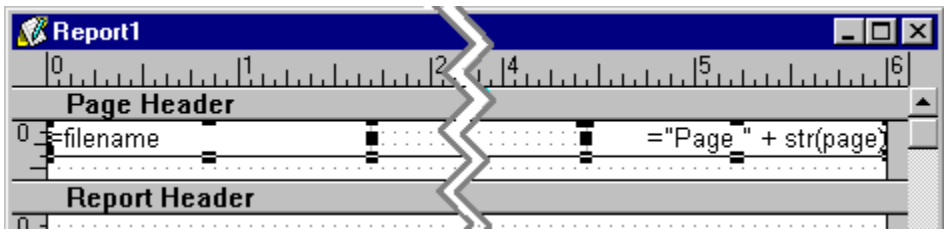
Printing area enlarged.

Click the **Close** button or press <Esc> to cancel the preview window.

To complete our page header design, insert a text box with plate file name variable and a horizontal line.

Use the **Line** tool button to place a line that extends along the width of a report. You may wish to draw a horizontal line in the page footer as well.

As a last step, reduce the height of a page header so that not much space is wasted at the top of each page. The complete page header design should like follows:



Final Page Header design.

Report Header

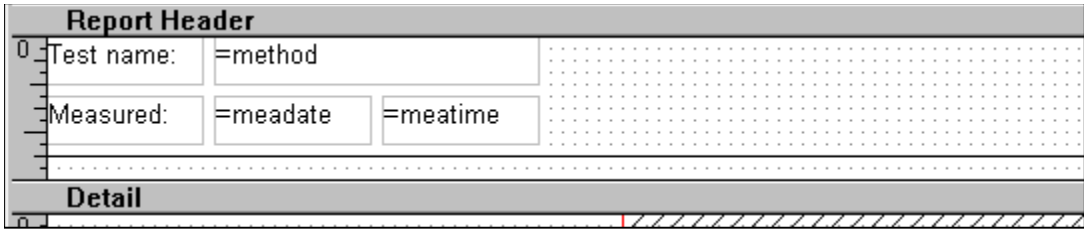
As was stated at the beginning of this chapter we want to have a test name (name of a test method) and a time of measurement on the report header – on the first page of a report. As we have already learned basic design techniques (more will come later) we will proceed a bit faster. We assume that user knows how to insert a text box, how to modify its attributes and how to use expression wizard to insert expressions into text boxes.

The report header will contain textboxes with following contents:

```
Test name:      ...   fixed text (a label)
=method         ...   expression – name of test method
Measured:       ...   fixed text (a label)
=meadate        ...   expression - date of measurement
=meatime        ...   expression - time of measurement
```

Bellow text boxes we put a horizontal line that will visually separate information describing the test from data of individual patient samples.

The graphical arrangement may be as follows:



Arrangement of text boxes in a report header.

Detail

In detail section we specify an arrangement that will be repeatedly processed for each patient sample on a plate. We insert text boxes with following contents:

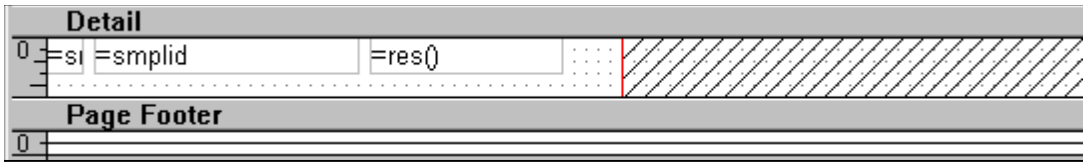
```
=smplseq + "."   ...   expression – sample number and a dot
=smplid          ...   expression – sample identification
=res()           ...   expression – evaluation result
```

Note: Do not be confused by the first expression – we do not combine a numerical value (smplseq) with a text ("."). The variable smplseq is actually a text – so we concatenate two texts. You find about data types of variables and functions in the help system and in referential part of the Kim documentation.

By default, the system generates a detail section for each patient that occupies the whole width of a report – single column output. To pack the whole report into a single page, we can save space by requesting a two-column output.

Reminder: Click on **Detail** bar to select it. The floating window shows attributes of a detail section. Enter 2 in **columns** field and confirm it by pressing <Enter> or by moving focus to another field.

The graphical arrangement should look as follows:



Arrangement of a detail section.

The diagonal pattern at the right half of the detail section indicates that it will not be used in two-column output.

In the above picture, you can see that we reduced the height of page footer and inserted a horizontal line there.

Our first simple report is now ready and it is possible to see the result of our effort. Choose **Report preview** button (menu: **File/Report preview**), select P72211.PLT plate and watch the output. You may also print from the preview window.

The report will probably fit in two pages. If you set the detail height to 3/16 inch, it could fit into a single A4 sheet.

Do not be confused by the fact, that you do not see date and time of measurement in the report header. It is because the P72211.PLT plate was actually never measured – instead, data were simulated by direct entry from a keyboard.

Also note, that until now, we did not include anything that depends on a particular test method. Consequently, the report, we have just created, may be used with any plate. Once we prepare a more deliberate report design, we may include items that are specific to a certain test type. Such report would be useable with only certain types of tests.

The report is rather simple at this stage. We will extend it later while we learn additional techniques - presenting plate data matrix (absorbances and the layout), inserting pictures, copying and pasting, conditional output, etc....

While the report is simple, we will exercise how to save it and how to use it with example plates.

Saving a Report Design

As we briefly mentioned at the beginning of this document there are two places where a report may be stored. While we are still working on the report design, it may be convenient to save it into a separate file. Later on, we can open the file and continue editing it. Once we are satisfied with a report and we want to release it for a routine laboratory usage, it is more convenient to save it in a report library file. When a report is in a library, it is easy for a laboratory staff to measure a plate and have it reported. Even if the report is in a library file, it is still possible to open it in a design view (this is how we worked with our report example until now), edit it, and save it as new report or replace the original one.

Saving an Individual Report in a File

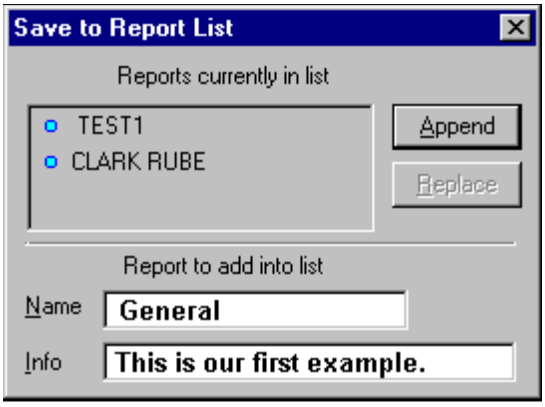
While we have our new report in design view on Kim desktop and it is the active window, click the **Save** button (menu: **File/Save**). A usual **Save As** dialog appears (note: When any document was not stored in a file yet, the **Save** command behaves the same way as **Save As** command – this is usual in Windows environment). Enter a file name under which you want to save the report.

The system uses "**Report (*.krp)**" as the file type for storing individual reports. To open a report stored in a file, use the usual **Open** command (menu: **File/Open**) and select "**Report (*.krp)**" as the file type to see your report files.

Saving a Report in a Report List

The system maintains a single report library file that stores a list of reports. When a report is stored in the library file an association between a particular plate test method and a report may be created. The association makes it much more convenient for a laboratory staff to process a plate and to report it.

While the report design view is the active window, choose **File/Save in report list** menu command. The system opens a dialog showing a list of reports currently stored in a report library file. Enter a name General in the **Name** field and, optionally, a comment into the **Info** field. Then click the **Append** button. The system will add our new report into the report library and the report design window disappears.



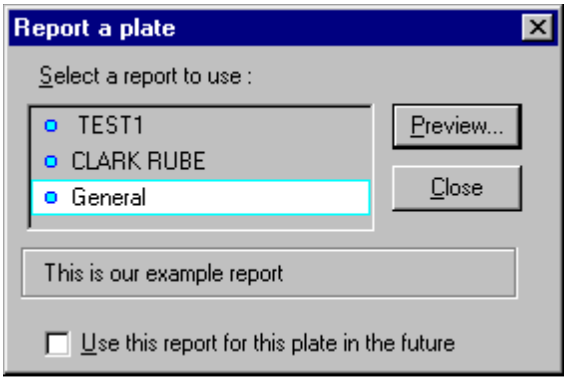
Fill in fields and click **Append**.

Making Report Associations

Please note that the name we assigned to our report when saving it in a report library has nothing to do with a file name under which we stored it previously. The name of a report in the report list is a means of how to identify a particular report in a report library file. That name is also used in associations between a plate test method and a report. Lets see, how report is used in a laboratory routine.

After the report window disappeared, the P72211.PLT plate remained the active (and only) window on the Kim desktop. It contains complete data as if the plate was just measured and the test was calculated. Let's assume that the user wants to report the results.

Click the **Report preview** button (menu: **File/Report preview**). A report selection dialog appears. It offers TEST1 report pre-selected ; this is because P72211.PLT plate came with TEST1 report already associated.



Click on General in the report list.

Click on our General report to select it. At the same time, watch the status of **Use this report...in the future** check box. It was checked when TEST1 was selected and was unchecked when we selected General. If we wanted to associate the P72211.PLT plate with our General report permanently, we would have to check the **Use this...in the future** box now. Click the **Preview** button to see P72211.PLT plate reported using our General report.

Reasoning: It is assumed that there may be situations when the same plate is reported using different reports for different purposes (a doctor may get results in one format while we want a different format for our archives).

Summary: To associate a test method with a report, it is necessary to open a plate based on that method and report it. While selecting the report, the **Use this report...in the future** box has to be checked. After reporting, it is necessary to actualize the test method in the list of methods by saving the plate using **File/Save as method** menu command.

Enhancing the Report

In this chapter we deal with advanced tools and techniques used in a report design. We will learn more about special contexts and about conditional presentation. We will study powerful object duplication tool and copy and paste operations. We will also briefly talk about using pictures.

We will continue working with our example while learning new features. We assume the P72211.PLT plate is still open (to have data for testing our design) and that we stored our initial report design in the report library file.

Choose the **Definition/Reports** menu command. In the **Report List Manipulation** dialog, click on our General report in the list to select it and click the **Edit** button (you may also double-click the General report – the system will open it for editing by default).

Introducing Plate Data Matrix

It is a usual requirement to include measured data (absorbances) together with patient sample result in a single report. Kim does not offer a special element to present plate absorbances in a matrix format. Instead, it is necessary to use a single text box for each plate cell. An absorbance of a cell is contained in a variable called **cur** (mnemonics: current cell value). A variable **cur** alone has no global interpretation. It is necessary to assign a source cell of a text box – a text box is connected to a particular cell of a plate. The connection between a (source) cell (of a plate) and a text box is called a context of that text box. Once the context of a text box is known, the system knows how to interpret the **cur** variable – absorbance of which plate cell to substitute for it. The cell context has to be applied when we want to present a plate layout, etc.... The concept of a context will be clearer when we follow the example bellow.

We explained how to present a single plate cell. One might be scared when he considers that it is necessary to construct a text box for each of many cells of a plate. To automate this process, Kim offers a powerful object duplication tool. It is then enough to fully describe a single plate cell first and to let the object duplication tool repeat the construction for the rest of cells on a plate. Not only that. Once we have a plate matrix format that suits our needs, we may use copy and paste technique to copy our design between reports.

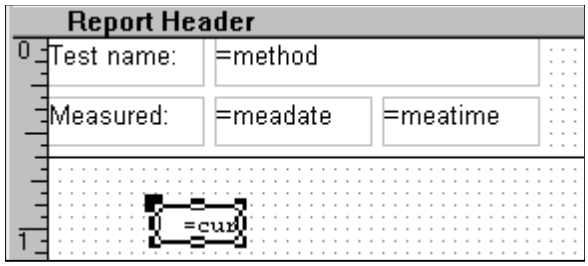
Reasoning: As it is difficult to anticipate all possible presentations a user may wish to have, Kim offers elementary building blocks to design a plate presentation. While this approach is a bit difficult at the beginning, it gives a user an unlimited freedom to create specific plate presentations.

Using Object Duplication

Enlarge the **Report Header** section a bit and insert a text box just bellow existing elements. Make it 7/16 inch wide 3/16 inch height (one grid dot is 1/16 inch by default).

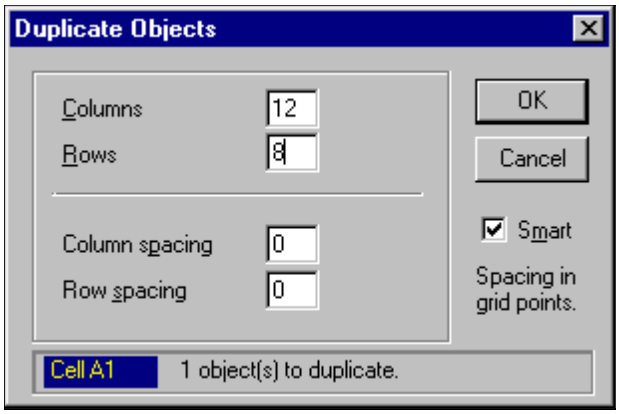
In the floating attribute window, fill in certain fields with following values. We only mention those fields that are different from defaults. With some fields you need to click the three dot button to open additional window where you enter the value.

Contents:	**=cur**	together with context – it represents an absorbance
Format:	**Fixed 3**	fixed format with 3 decimal digits
Source:	**Cell:A1**	context is the A1 plate cell
Border style:	**Normal**	the border will be drawn
Border Width	**1 pt**	1/72 inch (hairline may be poor on laser printers)
Font:	**8 pt Courier New**	a font with fixed spacing
Horz. Align	**Right**	right alignment is a reasonable choice for numbers
Vert. Align	**Base**	will align with row titles (of different font size)



A text box presenting an absorbance in A1 cell.

While the text box is selected click the **Duplicate objects** button (menu: **Edit/Duplicate objects**).



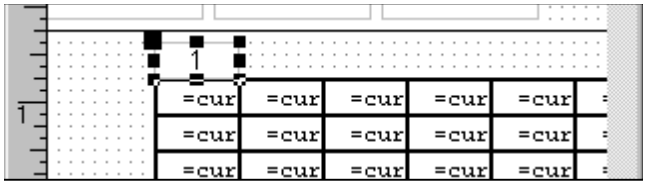
Enter 12 columns, 8 rows and press <Enter>.

The **Duplicate Objects** dialog controls parameters of duplication. Copies of selected object(s) will be placed in a matrix with specified number of columns and rows. When spacing is set to 0 then generated objects will touch at their borders. If we want objects to be separated by some distance it is possible to enter the distance in units of current grid points (grid spacing can be set as an attribute of current report).

"**Cell A1**" is shown at the bottom left. By this, the system says that currently selected object has a special context – a plate cell A1. If the **Smart** box is checked at the same time, then generated objects will have its context shifted in respective directions. The "smart" option works not only with a single cell context. If current selection contains more than one object and those objects belong to the same column (but different rows) then the context will be shifted by columns only (and similarly with same rows and different columns).

After you confirmed 12 columns and 8 rows by clicking the **OK** button or by pressing <Enter>, the system will generate a full matrix of text boxes. Click on an arbitrary text box to select it and watch its context. Please also note that the system extends height or width of a section if newly generated objects would not fit into current dimensions.

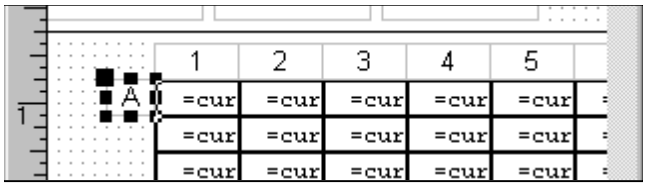
Now we need to specify column and row labels. Again we will use the powerful object duplication tool. Insert a text box containing a single number 1 and set its horizontal alignment to central.



Insert a text box with "1" centered.

Now start the object duplication tool once again. This time, the dialog indicates a single selected object to duplicate with no special context. Enter 12 into **Columns** fields and leave 1 in the **Rows** field. Confirm that **Smart** is checked. The smart option will now not be used for a context shift as previously (no special context is present). The smart option analyzes the contents of a single selected object and if it finds a text that can be read as a number, it will generate a sequence of numbers.

To introduce row labels we start by inserting a single text box with contents of "A".



A text box as a label for the first row.

Open the object duplication tool and leave 1 in **Columns** field and enter 8 into **Rows** field. The **Smart** option has to be checked. This time the system will generate a sequence of characters, starting with A, B, C.... If **Smart** were not checked, then all generated objects would have been exact copies of the first one – all will contain "A".

You may now want to preview or print the report to see results of our effort. You may also wish to save the report in the list of reports. Choose **File/Save in report list** menu command and click the **Replace** button while General was the selected item in the current list of reports.

Summary: To construct a plate matrix presentation, start with formatting the first cell and use object duplication to extend it. The cell does not need to be represented only by a single text box with an absorbance. It may be a collection of text boxes with absorbance, sample name, patient identification, sample evaluation, etc....
Note: When you have a matrix of text boxes and you want to change its format slightly, it is often more productive to delete all but cell A1 design, modify it and use object duplication.

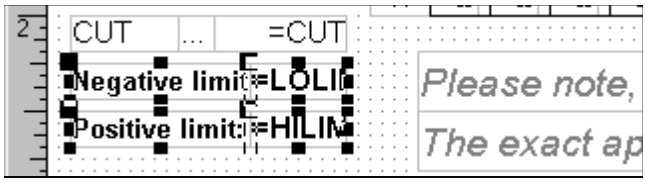
The matrix construction may be considered rather complex. To save our work, we can use copy and paste to re-use matrix design. We will see an example of copy and paste in the following paragraph.

Using Copy and Paste

Copy and paste is a usual technique frequently used in Windows application. Recall working with your word processing program (e.g. MS-Word). You select a part of a text and issue a copy command. System stores a copy of the selected text into system wide repository – the clipboard (in Windows terminology). You can then move to a different location in your text and issue a paste command. System will insert a copy of original text into a new location. You can use pasting within the same document, between two documents, even between applications. When designing a report in Kim, you can use copying and pasting to copy elements within a single report or between two reports. You can also copy and paste pictures generated in other Windows applications. We will demonstrate copying a group of elements between two reports.

Open TEST1 and General reports to have both on the Kim desktop (menu command: **Definition/Reports**).

Select a group of elements in the TEST1 report as shown in the picture:

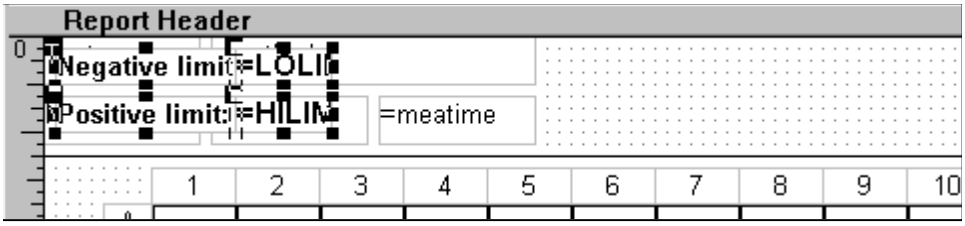


Select 4 text boxes in the TEST1 report.

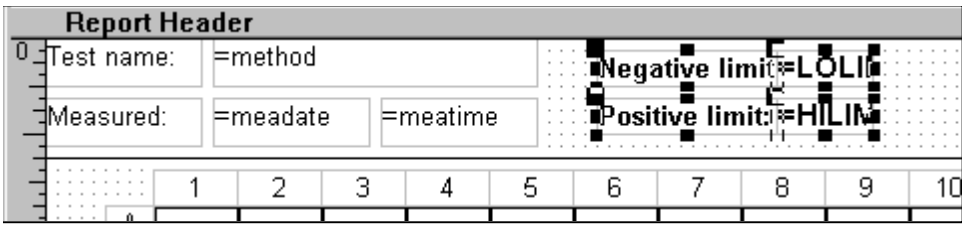
Click on the **Copy** button (menu: **Edit/Copy**). A copy of selected elements will be stored in Windows clipboard.

Now click on the General report window to activate it and click inside its **Report Header** section (system will paste into that section, which is currently selected or where it finds a selected element).

Click on the **Paste** button (menu: **Edit/Paste**). A copy of elements selected in TEST1 report will be inserted in the General report inside its **Report Header** section. Move elements into its final location.



Objects were inserted inside the Report Header section.



You have to move elements into more appropriate location.

Working with Pictures

To further enhance your data presentation you may insert pictures. A logo of your company may a candidate for inserting a picture into a report. Kim handles graphics, which in Windows terminology is called either a Picture or Windows Metafile. You can use your picture drawing application to generate a picture, move it into a clipboard by **Copy** operation and insert it into Kim report by **Paste** operation. You can also insert a picture from a file (files with WMF extension).

Pasting Pictures

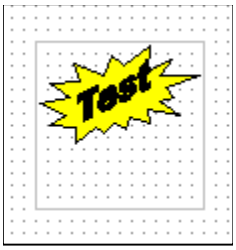
First, it is necessary to generate a picture and to copy it into a clipboard. You may use your favorite drawing application (even MS-Word can be used to generate line-art pictures), select the drawing and issue the **Copy** command in the picture drawing application. Then you move to Kim report and issue the **Paste** command in Kim.

Inserting a Picture from a File

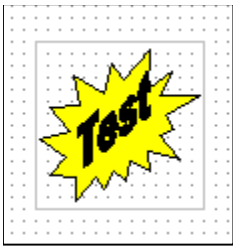
Click on the **Picture** tool button (menu: **Tools/Picture**). Use the mouse cursor to drag a rectangle inside a report. After you release the mouse button an **Insert Picture** dialog appears. There you choose inserting from a file. A file open dialog appears. There you choose a WMF file to read a picture from.

Zooming Pictures

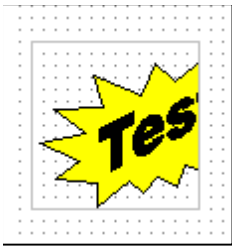
Kim offers three modes of presenting pictures. You select the mode by setting the **Size Mode** attribute of a picture (The example is from TEST1 report):



Zoom



Stretch



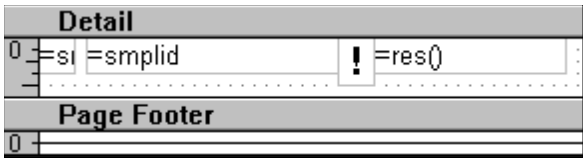
Clip

- Zoom Picture will fit into a rectangle, X to Y ratio will not change.
- Stretch Picture will scale to fill its bounding rectangle.
- Clip Original size will be used, drawing outside a rectangle will be clipped.

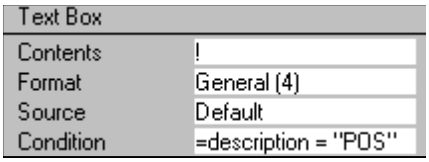
Conditional Output

Until now, all elements we introduced in the report design were printed under any circumstances – they were printed unconditionally. This is the Kim default. Each element in a report has **Condition** field in the attributes window. All elements we saw had a constant expression of 1 in the Condition field. So the condition was always true (in Kim, 0 is considered logical false, anything else is considered as logical true).

As an exercise, rearrange the contents of the **Detail** section by inserting a text box with enlarged and bold exclamation mark. When you recall the P72211.PLT evaluation, there you find a variable `description`, which contains either "neg", "gray" or "POS" depending on its absorbance. Insert a condition that is true when that variable equals "POS".



Insert a text box with exclamation mark.



Insert a **Condition**.

When you now preview a report, you will see an exclamation mark with positive samples.

You are not limited to specifying condition with text boxes. Consider effects you may achieve when using condition with pictures, etc....

Kim reports may be either simple or very rich. Kim is giving you a powerful set of tools and options. Your imagination is the only limit.

--- current end of document ---