PYRAMIDE

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This is the second draft of a translation of the French manual of TRIDIM into English.

I have added the graphics, and tidied up some of the English. There are still a few French words that did not translate, and parts where the original was unreadable.

Note that for Yes/No questions in the program, that Yes in French starts with a ‘O’

TRIDIM

Tridim is software for the creation and representation of objects in three dimensions. Before use you must copy the ORIGINAL in mdv1 and run the CLONE program. Then choose the media for copying to. After that TRIDIM's start-up is simple:

1 - RESET your QL.
2 - place the copy in mdv1 or flp1 as appropriate.
3 - Place the ORIGINAL cartridge in MDV2.
4 - press F1 or F2.
5 - Once the loading is complete. Carefully put the ORIGINAL cartridge away.

After this there appears on the screen, in the top window a first menu representing the main functions of TRIDIM.
It is in this window that all the important menus will appear. The bottom window is used to enter data to create an object or to represent an object. To select one of the functions available, simply press the first letter of the function. To exit a secondary menu and return to the main menu, press ESC.

IMPORTANT: Never press the CTRL and ESCAPE keys at the same time, because the blocking of the program would be immediate and all information would be lost !!

Let's now look at the different options in the main menu.

1 INVERTER

The INVERTER command is the main object creation command. It is through this that you must go through systematically to create a new object. Indeed the choice of INVERTER erase the object currently stored in memory. Once this option is selected a new menu appears. It is shaped by six new options. Let's look at the possibilities of creating INVERTER.

1.1 CREATING CHANNELS

This option is the simplest, indeed it is enough simply to give the coordinates of a sequence of points (maximum 15). During the REPRESENTATION these points will be linked together. The coordinates relate to a conventional orthonormal index OXYZ (see FIG. 1). The number of 15 points per string may seem insufficient, but you should know that you can create up to 54 different strings. The first thing you are asked for is the number of points on the string you want to create. Then you enter the coordinates of each of the points one after the other. Then the program asks if there is an error. In this case, the string is exited and you must re-enter it by the same method as before. To add parts to your object, select the unmounted option. Otherwise, by pressing ESC you will return to the main menu.

1.2 FRAGMENTER

TRIDIM allows you to represent objects in 3 dimensions. Now, when you look for example a rule of very near and a little crooked, you see it curved. There is indeed in your eye the projection of a world in three dimensions- (Your retina is only a 2-dimensional plane). It is therefore necessary if you look at an object very closely. to fragment the near segments so that you can see them curved and not as a straight line.

The use of FRAGMENTER is very simple. Indeed it is enough to give the coordinates of beginning and end of the segment to be fragmented. By this method the program limits you to objects formed of 54 segments.

Once the segment is fragmented. The return to the INVERTER menu is immediate.

1.3 CIRCLE

This option creates a circle. Now a circle is defined by its centre, its axis and its radius. So the program asks you for these elements. First, it is co-ordinated from the centre of the circle: then its axis: for this it needs the azimuth which is the angle in degrees between the axis OX and the projection of the axis of the circle on the plane OXY: and the site which is the angle in degrees between the plane OXY and the axis of the circle (see FIG. 2). Lastly, it is no more than the introduction of the radius of the circle. This circle thus created uses an entire string.

Once the circle is completed, the return to the INVERTER menu is immediate.

1.4 CONNECTING CIRCLES

This function is one of TRIDIM's most powerful, because it allows you to draw a series of circles and then connect them together. Thus the fuselage of the CONCORDE or the GLASS were created entirely with the aid of this function.

It must be known that all these circles have an axis which is parallel to the axis OX. And that for each circle the means of determining its axis is to give the coordinates of the intersection of this axis with the plane OYZ (see FIG. 3).

The program asks you first the number of meridians, that is to say the number of segments that will connect the circles. Then you must enter the coordinates of the trace of the axis of the first circle, then its abscissa (ie the distance to the plane OYZ), and finally the radius. Once this first circle is defined, the program asks you if you want another circle, and then if you keep the same trace for the next circle. The following circles are defined in the same way as the first circle. When the number of circles you return to the menu of INVERTER by answering by N a the question: "Another?". The number of channels used is equal to the sum of the number of

circles and the number of meridians.

For an object like a glass, it appears that all the traces are the same. On the other hand, for the nose of CONCORDE. The trace is distinct for each defining it.

1.5 CONNECTING CHANNELS

The CHANNEL BINDING function is very similar to the CIRCLE BINDING function. The first thing to do is to give the constant number of points that will be in each of the chains to be connected. Then you must enter the coordinates of the points of the first string. Then if there is an error you can correct by typing O to the question: "An error?"; in this case re-enter the coordinates of the points of the chain. You can then choose to quit or continue with another string, the process then being the same as for the first string. Once you have finished entering the string series, answer by N when the program asks you if you want another string. You will then return to the INVERTER menu. The number of strings used is then equal to the number of points per string plus the number of strings entered. To see the example of the use of CONNECT, look at the CONCORDE wings that have been realized with this option, in fact 7 profiles have been entered and then linked by this option (see FIG. 4).

1.6 CIRCLE ARC

This option, as the name suggests, allows you to draw circular arcs. To determine this arc, the program first asks for the coordinates or centre of the circle that contains the arc of a circle. Then the ray of this same circle. And finally the axis of this circle. The axis can only be one of the 3 principal axes, ie: OX, OY or OZ. To choose the axis, simply type: X, Y or Z. To finish determining the arc of the circle, the angle in degrees of the starting point of the arc of the circle must be given, angle in degrees of the point of arrival of the arc of circle (see FIG. 5).

2 MODIFY

When you have entered an object it is possible that there is an error on one of the points, or on one of the strings. This is why the EDIT option was created. Once you select EDIT, a new menu appears. It gives you the choice between editing a point or a complete string. To select one of these two options simply press the first letter i.e. P or C.

OPTION POINT:

With this option you can change the coordinates of a single point. To read it, it is enough to give the index of the chain and the index of point, that is to say the number of the chain where is the point, and the number of order of the point in the chain. If your point is in the first string, for example, its string index will be 1; and the number of chains are in the order of their creation. The principle of the point index is the menu, in fact if the point is the first one returns in a given string its index of point will be 1. Once you have entered the 2 indices of a point, the program gives you the current coordinates, and asks for the new coordinates. When you have finished renaming the new coordinates, the program asks if you want to change another point. In the negative case, you return to the main menu. Otherwise, the program starts the sequence menu previously.

CHAIN OPTION:

With this option you can completely change a string. The first thing to do, is to give the index of the string to be changed: this index is the same as that defined in the POINT option. Once the index is entered, the program gives you the same as INVERTER. All you have to do is choose the type of string you want to create. You can also rewrite it as much as you want (within the limit of the possible 54). When you create a string, you re-write over the old one. When you are finished, the program asks if you want to delete the next chain or keep it. Whichever you choose, the program returns to the main menu.

3 ADD

This option is very useful, indeed when you have created an object and you realize that it is not complete, it is necessary to add strings to it. If you have left the INVERTER menu, you can not reselect this option, because automatically when INVERTER is selected, the channel monitor is reset to zero and the already commuted object is parted. So it is essential to have an option that offers you the same possibilities as INVERTER, without losing the channels already introduced. This is the case of ADD. In fact, when you choose this option, the program gives you the same menu as INVERTER, but without resetting the channel counter, you can then freely add strings to your object, in the same way as if you were in the option INVERTER.

4 TRANSFORMER

When you have finished creating your object, you may find it is not large enough, or if you created a glass using the CIRCLE BINDING option, you need to straighten it. For all these operations consisting of transforming an object, not adding or deleting chains this option will quickly become indispensable.

So when you select TRANSFORMER, a new menu appears. It is composed of 6 options, which we study. To select one of these options, simply press the first letter when you have finished using one of these options, you can either choose a new one by pressing the corresponding key or return to the main menu by pressing ESC.

4.1 TRANSLATION

It happens that you loved that your object is me; position in relation to the centre of the marker. Indeed if you want to use the option FUSION as we will see later it is preferable that the objects do not overlap So to avoid this, you have to move the object. The only thing you ask about the program is the "translation vector".

The translation vector is in the roof, the displacement of the object by 3 axes. For example, you want to advance your object from 100 on the OX axis, move it from 500 on the OY axis and descend it 150 on the OZ axis: the coordinates of the translation vector will then be 100, -500 and -150 As you see it's very simple. When you have finished entering the coordinates, the program performs the translation and then returns directly to the TRANSFORMER menu.

4.2 ROTATION

As you have seen, using CIRCLE BINDING, the axis of these circles are parallel to the axis OX. This may be a problem if you create a glass as you would surely see it standing, rather than laying. Therefore, in order to remedy this problem, it is necessary to straighten the glass by means of a rotation about an axis parallel to the axis OY.

This is one of the uses of the ROTATE option. But this option allows you to rotate around the 3 main axes: OX, OY and OZ.

The first thing you ask for the program, is precisely to select one these 3 axes. To do this, simply type X, Y or Z: if you type ESC, you will return to the TRANSFORMER menu. Once the axis has been selected, the axis of rotation must be indicated. The coordinate principle of the trace is the same as for the CIRCLE RELAY option. It remains only to give the value of the rotation, this value being able to be positive as well as negative. The positive sense is given by the reference, but the simplest is to consult the figures 6.a, 6.b and 6.c.

Once you have rotated your rotation, you can reselect another rotation by pressing the corresponding key. However, pressing ESC returns you to the TRANSFORMER menu.

4.3 SYMMETRY

Suppose you have to create an aeroplane. When you have completed one of the wings, it is very practical to use SYMMETRY,

to create the other wing: it would be a waste of time to re-enter coordinates to create the other wing.

SYMMETRY makes it possible to make the symmetries with respect to the 3 main planes, which are: OXY, OYZ and OXZ. The program then asks you simply to select one of the 3 planes, pressing X for OYZ, Y for OXZ and Z for OXY. The program then performs the symmetry and automatically reverts to the TRANSFORMER menu

4.4 AFFINITY

An affinity allows you to stretch or contract an object along one of the usual principal axes: OX, OY or OZ. For example, you have created one it seems too short and not enough tapered. With the AFFINITY option, it is enough to give the axis of the plane (which must be one of the 3 main axes), and to give a multiplier coefficient called coefficient of the affinity.

The use is therefore simple, it is enough to give the axis of the affinity by typing X, Y or Z. Then to give the coefficient of the affinity If you give, for example, 2 for the coefficient, the object will be 2 times longer on the axis selected, 0.5 will give an object 2 times shorter on the axis selected.

Once your choice ends, the program automatically returns to the TRANSFORMER menu. As usual you can select another transformation, or return to the main menu by pressing ESC.

4.5 DILATION

This option is an extension of the previous one, because it allows you to shrink or magnify an object. For this it is sufficient to give the coefficient of expansion. As before, 2 will give an object 2 times larger, 0.25 an object 4 times smaller (indeed 0.25 = 1/4).

4.6 HOMOTOPY

A homotopy is a progressive deformation of the exponential type. For example, a plane becomes a hump when it undergoes homotopy. This deformation can be looped along one of the 3 axes: OX, OY and OZ. Then we must also define the maximum value that the deformation will take at the level of the axis, and the radius of the circle on which the deformation will have. Once these three elements are defined. the program deforms and returns to the TRANSFORMER menu.

5 FUSION

By using TRIDIM, one quickly realizes that creating a complex object is not always an easy thing. So the CONCORDE was not created in a single stream. The fuselage was first drawn then the wings, and finally the rudder These objects were backed up separately on cartridge, then merged into a single object, called CONCORDE. It is therefore advisable for a complex object, to create it piece by piece and then to group them into a single object. This is the purpose of the MERGE option.

The program first asks you if the first object is in memory, if it is not, it asks you its name (eg mdv1_VERRE), then asks you for the name of the second object and the third... etc. The program stops when you answer NO. It merges all these objects and asks you the name under which you must save this set. This name as above must be preceded by the device name, for example: MDV1_VERRE or FLP1_CONCORDE. All backup devices are allowed. There is indeed a condition on the merged object: it must not exceed the 54 chains. Do not worry too much, the program will see that you have not given objects too long. After executing the merge, the program automatically returns to the main menu.

6 SAVE

When you have finished creating an object, or when you have just finished a morceau of this object, you may need to save it on magnetic media. This is what the backup option is used for. The program then asks you the name you want to give to your object and also the name of the device. You enter this in the form mdv1_name or flp1_name or even ram1_name for those who have a virtual disk routine and also enough memory. After the backup is complete. the program returns to the main menu.

7 LOAD

This function, unlike the previous one, makes it possible to recall an object into memory. The syntax is the same, i.e. for example mdv1_name.. etc. But beware, when you load an object, the object that was in memory is lost because the program resets the string counter to zero before loading the new object. When the program has finished loading, it automatically returns to the main menu.

8 BLOCK

As you have seen, the FUSION function is very useful, but it has the disadvantage of being limited by the barrier of the 54 chains. There is a way to circumvent this disadvantage, this is to create a BLOCK. A block is a set of predefined object names of the name of the device on which they are stored (for example, flp1_name). One can thus create a block containing as many objects as one wants. The only disadvantage is that one can not transform a block as a whole, or transform objects one by one. When using a BLOCK (for example to draw it), of course, all the objects in the BLOCK must be in the device with which they are associated. But reassure you that a single cartridge can already save many objects.

When choosing BLOCK, a menu appears. Let's study its 2 options.

OPTION FORMING A BLOCK:

This option allows you to create a form and object names file. The first thing the program asks you is the number of objects that will be in your block. Then you only have to enter the sequence of names in the usual form: device_name. Once this list has been entered, the name of the block must be given, always in the device_name form. After that, the program returns to the BLOCK menu.

OPTION LIST A BLOCK:

This function allows you to see the names of the objects contained in a block, you just have to give the name of a block in the usual form: device_name. the return is then automatic to the BLOCK menu.

9 REPRESENT

Using this function, you will be able to draw on the screen the objects you have created. The TRIDIM representation system is based on human vision. It also takes into account the deformations that our eye records with respect to reality.

The program asks you first if you want to change the standard view settings. You answer with O or N.

If so the first thing you then ask the program is the desired angular aperture. The angle of vision of the eye is 60 degrees, which is 30 degrees on both sides. These 30 degrees form the angular aperture. But with 30 degrees, deformation begins at the edge of the image. A value that involves virtually no deformation is 15 degrees, but be careful you have to move your eye away to have the same field again. You can however have a "fish-eyes" type of vision, as in photography, giving 90 degrees of angular aperture. Attention,

it will be necessary to bring the point of view closer or the object will be miniscule on the screen.

The program then needs the coordinates of the point where your eye is located, this is called the point of view. Now you only have to give the coordinates of the centre of the screen. Attention these coordinates must be different from those of the point of view and must also be different from the coordinates of the points of your object. So the coordinates of the centre of the image will give the direction of sight (see FIG. 7).

The program, even if you have not changed the standard parameters, then proposes 3 possibilities, which we will study.

OPTION MEMORY OBJECT:

This option is chosen when you want to represent the object that is in memory. The program then moves to the menu giving the 3 screen modes that we will detail later.

OPTION DRAWING BY ELEMENT:

It is possible to represent several objects. For this they must all be recorded on one of the peripherals. the program asks you here how many objects you want to represent. Then you must give it the list of objects in the usual form: device_name. Finally, it must be ensured that all the objects cited are in their associated peripherals. Then the program gives you the choice between the 3 modes that we will see later.

OPTION DRAWING A BLOCK:

It is finally possible to draw all the objects included in a block. Simply choose this option and then give the name of the block you want to draw. The name of the block must be in the usual form: device_name. It is also essential that the objects making up the block are all in their associated device. The program then goes to the menu offering the 3 modes of representation that we will study.

OPTION FULL SHEET:

When you choose this option, the program draws on a sheet that completely occupies the screen. When the program has finished drawing, you can go white on a black background and vice versa by pressing the N button. You can exit this option and return to the menu giving the 3 representation systems by pressing ESC.

HALF-LEVEL OPTION:

This option is the same as the previous one, except that it uses only the bottom window. You also have the opportunity to change background. And you return to the menu of 3 systems by pressing ESC.

SYSTEM OPTION 4 VIEWS:

This system of representation is the most complete. Indeed, it allows to make a perspective view, plus 3 projections as in industrial design. For the perspective view, the program asks if you want to change the standard parameters for the 3 projections. The three views in projection have their axes arranged as shown in fig. 8. The required scales correspond to the scales on the axes as shown in fig. 9. The coordinates requested are those of the centre of the image. Indeed the scale on the axes is not enough, it is necessary to also give an origin for the 3 axes (see FIG. 10). After that the program draws the 4 views. You can then, as in the 2 other options of REPRESENT, exchange the ink and paper by pressing N. Even to find the menu of the 3 options, press ESC.

To exit the REPRESENT option, press ESC again.

10 DIRECTORY

As its name implies, this function is used to give the directory of a device, for example mdv1_, flp1_ or even for those who have a virtual disk system: ram1_. After the directory, just press a key to return to the main menu.

11 CLEAR

This function allows you to erase an object on a device. To do this, simply give the name of the object to erase, this with the usual syntax: device_name. After deleting the object, the program asks if you want to erase another object. If so, the procedure is the same as above. Otherwise, the program returns to the main menu.

12 EXIT

There are 2 ways to leave TRIDIM. The first is to exit the program completely. In this case it is necessary to make a RESET. The second, is to change HANDLING program ?? high-speed object manipulation optimizes to work as fast as possible. Therefore, when using the HANDLING option, the program asks you on which peripheral is the copy of TRIDIM. We will discuss further the possibilities offered by HANDLING. If you have selected QUIT by mistake. you can return to the main menu by pressing ESC.

Example of creating an object

We will now create step-by-step a bottle. First select the INVERTER option by pressing I. Then press 4 to enter the CHAIN BINDING option. The program then asks you the number of meridians, choose for example the maximum, by giving 14. Then give 0,0 for the coordinates of the trace of the axes of the bottle. Indeed there is no need to shift the axis of the doubt with respect to the axis OX.

Now give the abscissa and the radius of the first circle. To do this, type 0 and 0: indeed, the first circle must have a zero radius for the bottom of the bottle to be closed. Then, when you want to continue, type O for the question "another?". On the other hand the axis has not to change. You answer N to the question "do you

want to change the trace?". This series of answers is repeated until the last circle. Here is a list of the abscissa and radius of the following circles:

Abscissa	Ray
0	100
500	100
700	30
800	30

After entering this data, type N at the question "another?". You can count the number of chains used. Indeed we have 5 circles and 14 meridians: we used 5 + 14 = 19 chains.

Then press ESC to go to the main menu. Our bottle is now created but it is lying on the OX axis. To raise it, it is necessary to make it undergo a rotation of axis OY and angle -90. To do this, type T for TRANSFORM, then R for ROTATION. Then select the OY axis by typing Y, then give zero coordinates for the trace of the axis of rotation. Finally, give -90 degrees for the value of the rotation.

It would be interesting to draw the bottle together with the glass. For this you have to shift the bottle, otherwise they will be drawn on top of each other. Then type T to perform a translation, then give 0,500,0 for the coordinates of the translation. Then press ESC to return to the main menu. It is now time to save your object, so type S, and give it for example the name: mdv1_bottles.

We will now draw the glass and the bottle. To do this, select REPRESENT by typing R. We will change the standard parameters. To do this type 0. We will enter a small value for the angular opening: 15. Then we will place ourselves at the coordinate point 1500, 1500, 1500. And finally we will locate the centre of the image at a point which is near the middle of the two objects. The coordinates are: 0,300,0

↓ for downward translation
↑ for upward translation
N for a negative zoom
P for a positive zoom

The ESC key allows you to change a new object.

After that, choose the option DRAW BY ELEMENT by typing 2. Give the number of objects that is 2. Then enclose the names of the objects that are: mdv1_glass and mdv1_bottles. Finally, choose to draw on the entire page by pressing the l key. The drawing is then realized.

HANDLING

HANDLING is started from TRIDIM, by pressing Q to EXIT then M For HANDLING. Or by typing a device_MANIPULATION. In the 2 of these, the original cartridge does not need to be in mdv2_

HANDLING is software that allows you to quickly manipulate an object. The first thing to do is to change an object drawn with TRIDIM. Then you can manipulate it by pressing a few keys. You must know that the OX axis is perpendicular to the screen and directed towards you, the axis OY is horizontal and directed from left to right, the axis OZ is vertical and directed from bottom to top.

You then press the following keys
X then + for a negative rotation on the OX axis
X then + for a positive rotation on the OX axis
Y then + for a negative rotation on the OY axis
Y then + for positive rotation on the OY axis
Z then + for a negative rotation on the OZ axis
Z then + for a positive rotation on the OZ axis
+ for left-hand translation
+ for translation to doite

Fig 1

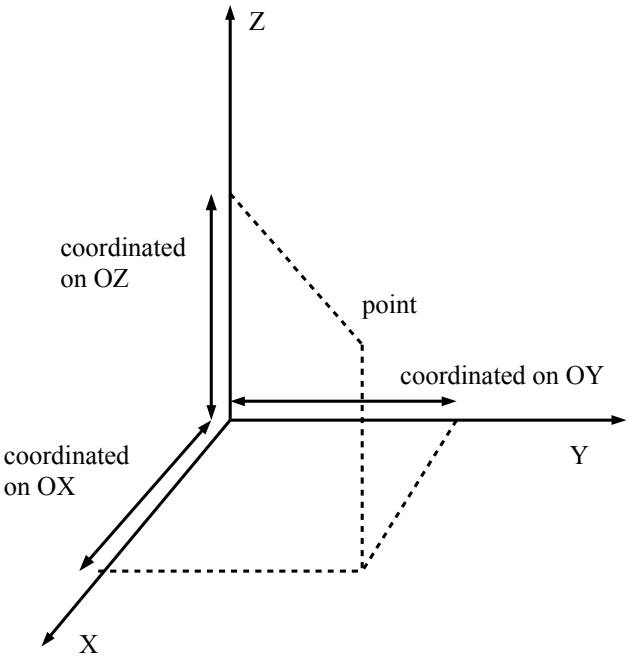

Z
coordinated
on OZ
point
coordinated on OY
coordinated
on OX
Y
X

Fig 2

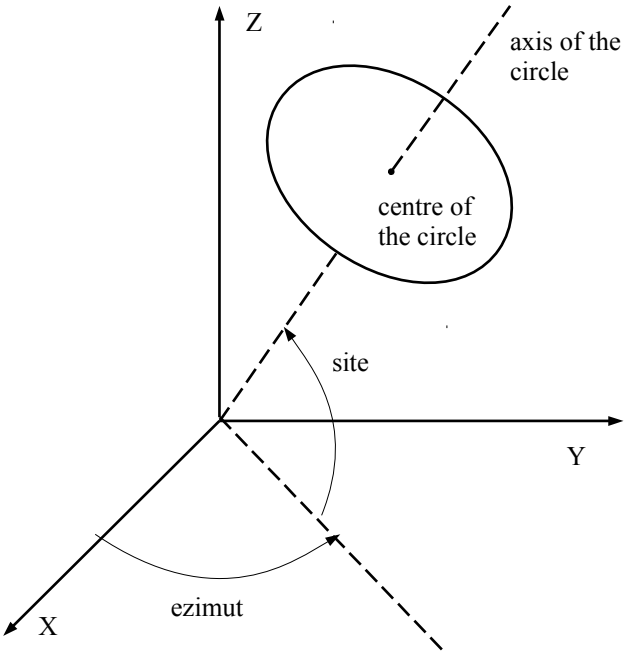

Z
axis of the
circle
centre of
the circle
site
Y
ezimut
X

Fig 3

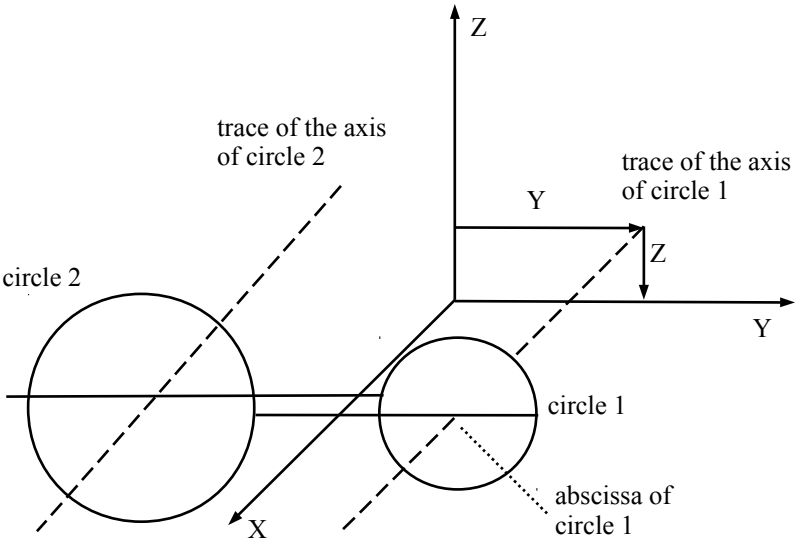

Z
trace of the axis
of circle 2
trace of the axis
of circle 1
Y
Z
circle 2
Y
circle 1
abscissa of
circle 1
X

Fig 4

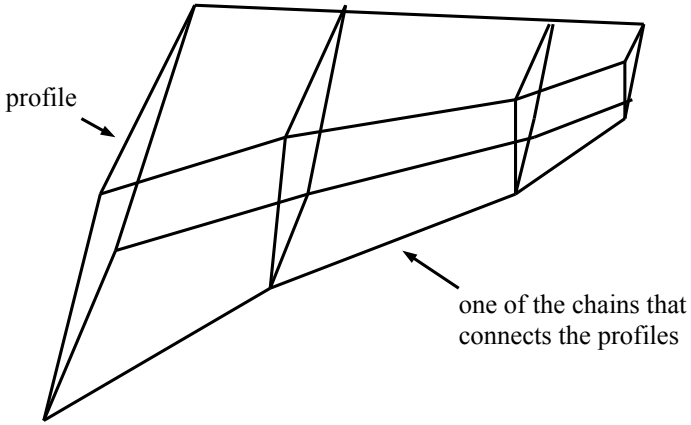

profile
one of the chains that
connects the profiles

Fig 5

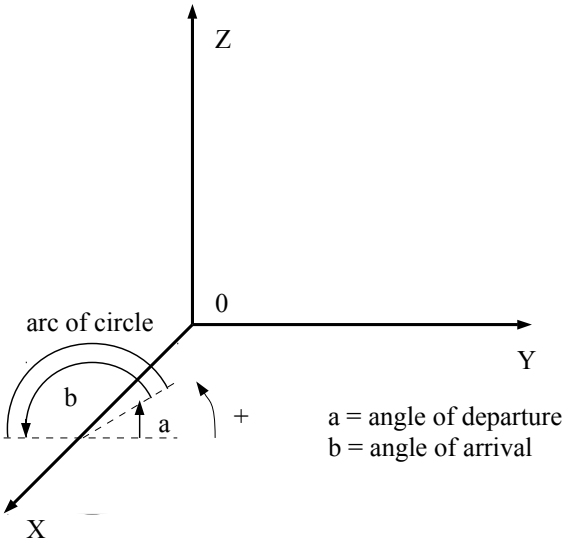

Z
0
arc of circle
Y
b
a
+
a = angle of departure
b = angle of arrival
X

Fig 6a

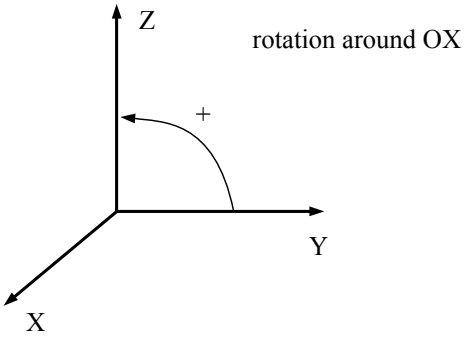


Fig 6b

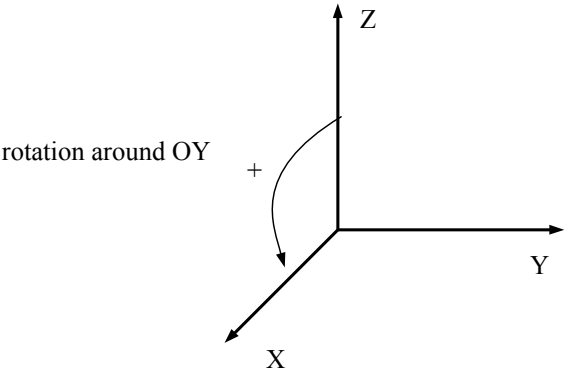


Fig 6c

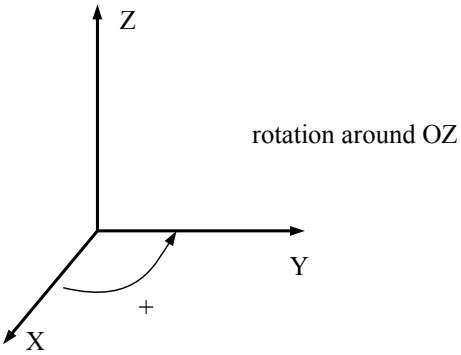


Fig 7

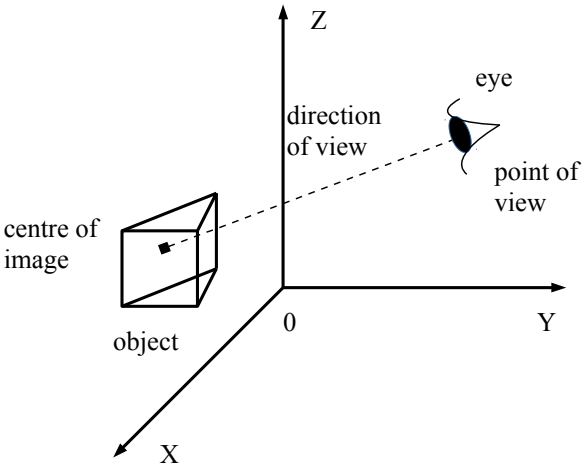

Z
eye
direction
of view
point of
view
centre of
image
object
0
Y
X

Fig 8

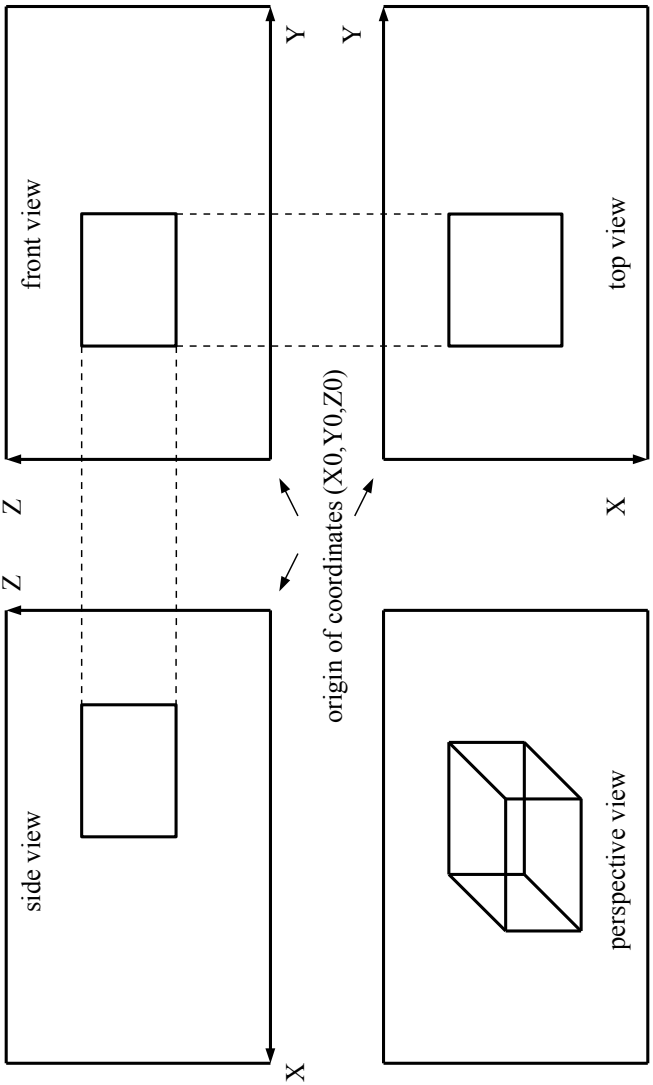

front view
Y
Z
top view
Y
X
origin of coordinates (X0,Y0,Z0)
Z
side view
X
perspective view

Fig 9

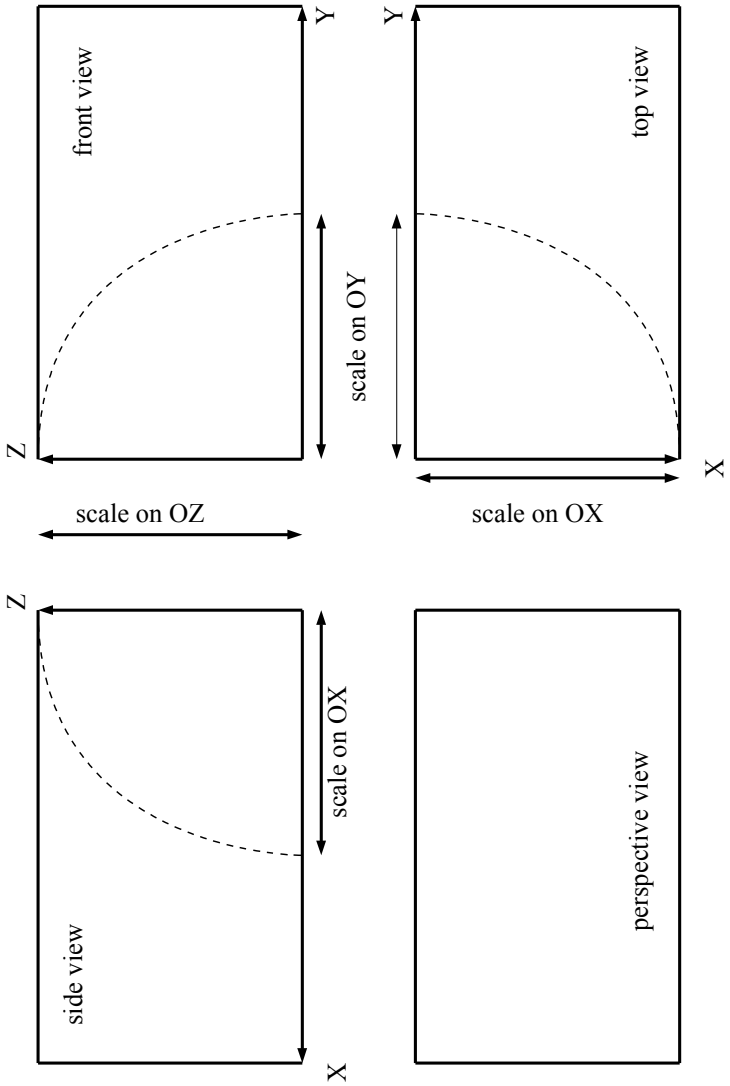
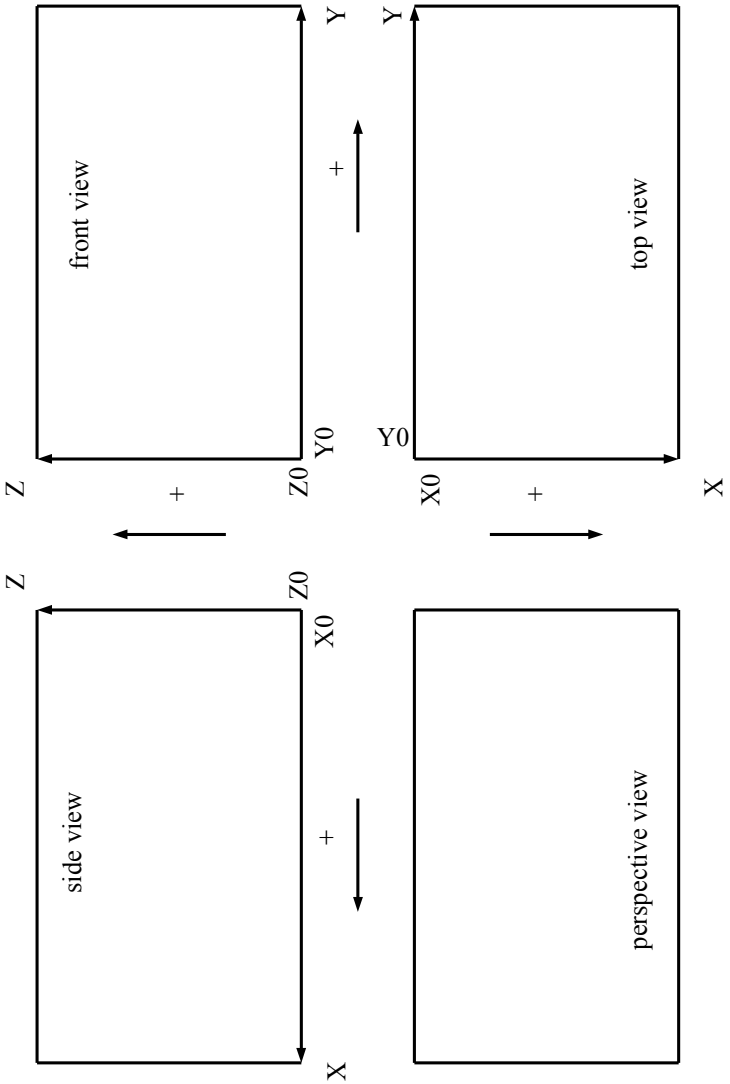

front view
Y
Z
scale on OY
scale on OZ
top view
Y
X
scale on OX
side view
Z
scale on OX
X
perspective view

Fig 10



X0, Y0 and Z0 are the coordinates of the centre of the system 4 view

PYRAMIDE SOFT

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