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1) The front view of a line AB measures 65 mm and makes an angle of 45^0 with xy. A is in the HP & the VT of the line is 15 mm below the HP. The line is inclined at 30^0 to the VP. Draw the projections of the line & find its true length & its inclinations with the HP & also locate its HT

(Page 215- 9th problem of text book)

Ans) Given data:

Front view **(FV)**	**= 65**
FV Angle (α)	**= 45^0**
End **A** from HP ***(a')*** ***(in HP)***	**= 0**
VT (below xy as it is below HP)	= **15**
Line angle to **VP** (**TL** with **VP**) (**Φ**)	= **30^0**

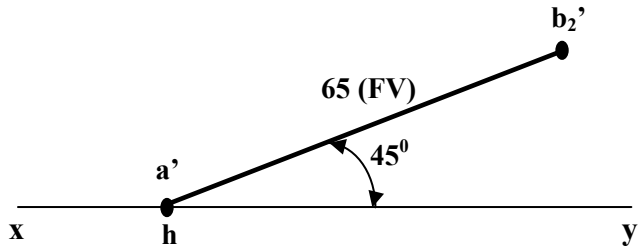
Logic:

- → Whenever data about the other trace is not known, then there is a small deviation that is used in the procedure to draw traces.
- → Join ***(h, VT)*** & locate v. Since **β** is not known & also HT is not known, we use the deviation of **drawing the TL line making angle Φ from v.**
- → ***The FV is rotated about VT*** to bring it to **same level as VT** and projected onto TL line which is at angle **Φ from v.**
- → **The locus of B is found** & then the projections are obtained using the standard rules of rotation of FV or TV.

Steps:

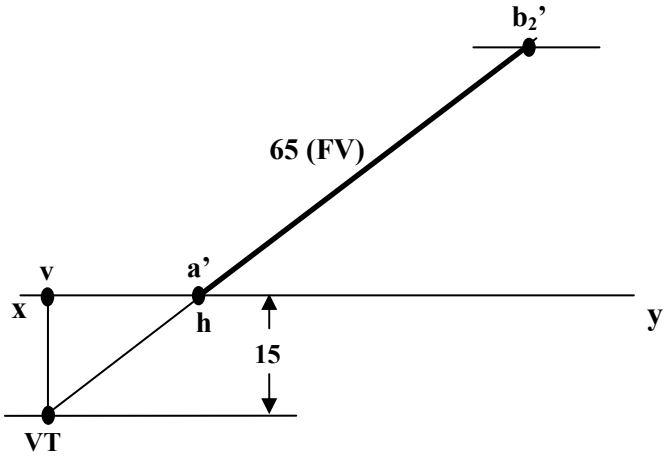
i) **Draw x-y line, mark a' on xy and draw the FV (a' b_2') 65 mm at 45^0.**

ii) **Mark h where FV cuts xy. Here h=a'.**

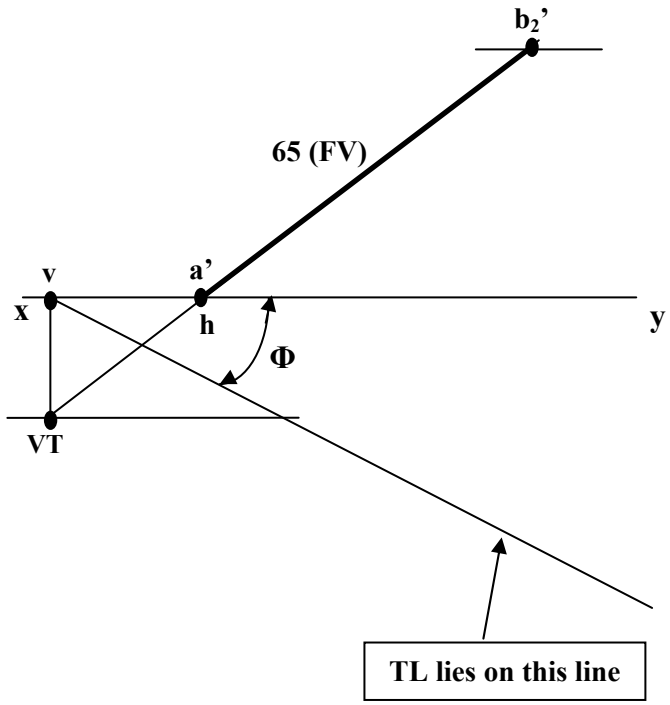


(iii) Below x-y, draw a line ‖ to x-y at 15 mm & the point where it cuts the line through (h, FV), mark VT. h, VT & FV are on the same line.

(iv) On VT, draw a ⊥ on xy to get v.



(v) Since data on HT or β is not given, we take the deviation of drawing TL at angle Φ from v itself. Actually, we know that TV at angle β should pass through v or HT. Here, we draw TL at Φ from v.



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(vi) Now, a 2nd deviation is used in getting the locus lines of end B.

The locus line of B lies on line through v but FV is on VT line, we use (v, VT) as base points for drawing the arcs

This is explained as below:

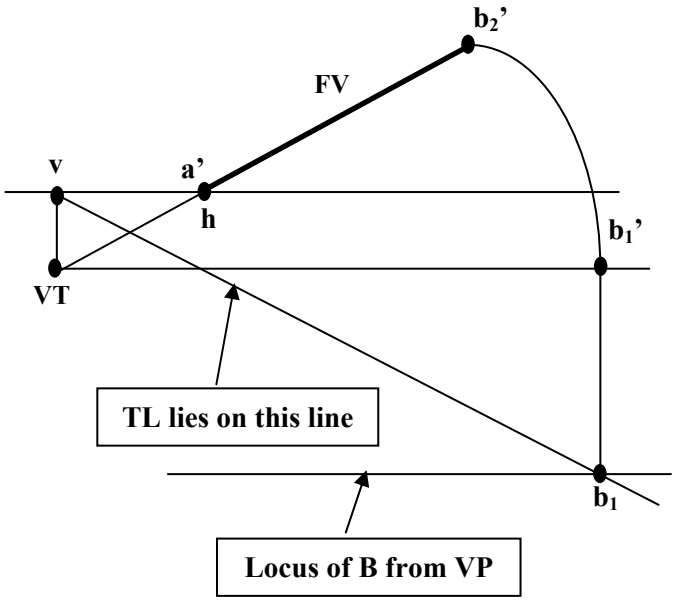
To get TL from FV, we know that FV has to be rotated about a' to same as a' level & projected onto the TL line to get the locus of B.

et b_1.

Here, we rotate FV about VT instead of a'.

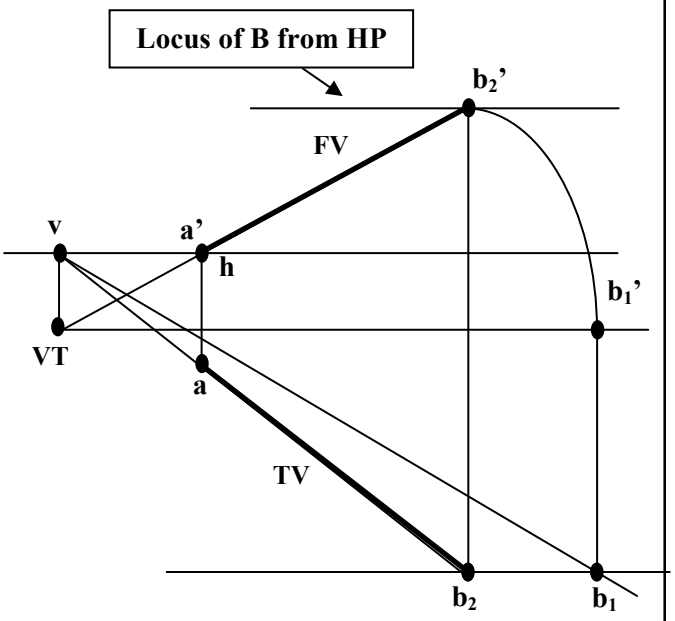
With VT as centre & VT- b_2' as radius, draw an arc to VT level at b_1' & project onto TL line through v to get b_1.

On b_1, draw a line ‖ to xy to get the locus of B.



(vii) Now to get the TV, project b_2' on locus of B to get b_2.

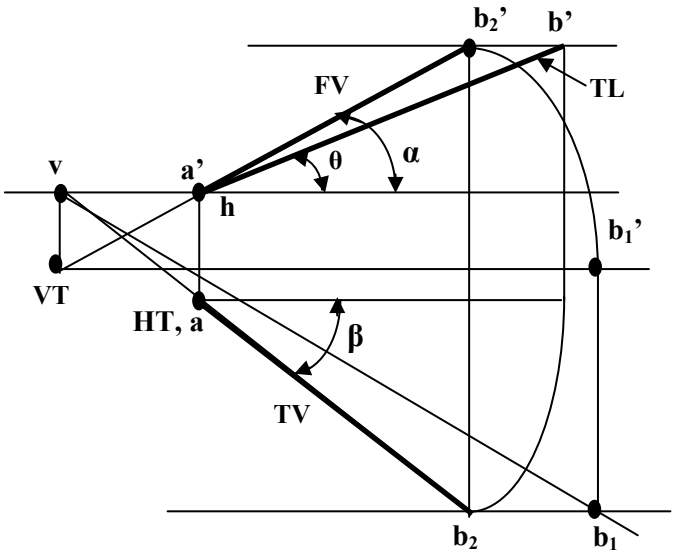
Join v-b_2 and draw projector from a' to get *a* on v - b_2. HT lies on *a* itself as a-b_2 is the TV. a-b_2 represents the Top View TV at angle β.



Thus, in this problem, there are 2 lines passing through v instead of 1 in usual case.

Finally the true length has to be shown from a'. To get the TL, rotate the TV a-b_2 about a & project onto locus line through b_2' to get b'.

a' b' is the TL at angle θ.



The answer is as follows:

TL = 74 mm; θ = 38^0; β = 41^0; HT=12 below xy.

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This is Prob 10, pg 215 of text book

2) A line AB is in the 1st quadrant. Its ends A & B are 20 mm & 60 mm in front of VP respectively. The distance between the end projectors is 75 mm. The line is inclined at 30^0 to the HP & its HT is 10 mm above xy. Draw the projections of AB & find its True length & the VT.

Ans) Given data:

Distance of end A from VP **(a)**	**= 20**
Distance of end B from VP **(b/ b_2)**	**= 60**
Distance between projectors (d_p)	**= 75**
HT (above xy)	= 10
TL angle to Hp **(θ)**	= 30^0

Logic:

→ Whenever data about the other trace is not known, then there is a small deviation that is used in the procedure to draw traces.

→ Join ***(v, HT)*** & locate h. Since **α** is not known & also VT is not known, we use the deviation of **drawing the TL line making angle θ from h.**

→ ***The TV is rotated about HT*** to bring it to **same level as HT** and projected onto TL line which is at angle **θ from h.**

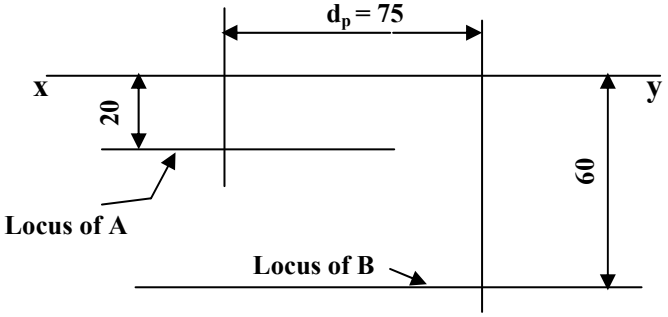
→ **The locus of B is found** & then the projections are obtained using the standard rules of rotation of FV or TV.

→

Steps:

i) Draw x-y line & draw 2 lines ‖ to xy at 20 mm & 60 mm below xy to represent the locus of a & b.

ii) At any point, draw d_p lines 75 mm apart which are ⊥ to x-y .

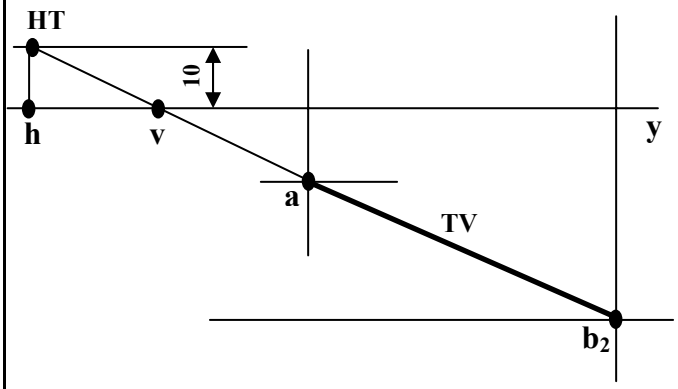


iii) The points where the locus of A & B cut the projector lines gives us the end points of top view, namely a & b_2. Join a-b_2 to get the top view (TV).

iv) Extend TV to cut xy at v.

v) Since TV, v & HT lie on the same line, extend TV further above xy to cut locus of HT at 10 mm above xy. Mark HT at 10 mm above xy on TV line.

vi) Project HT on x-y to get h.



Now, all the details regarding the TV, HT, β & v have been obtained.
Consider the upper part now. We need h, FV, VT or FV angle α to complete the projections.

But no data related to the trace VT is given.

Since only TL angle θ is given, we draw it from h even though only FV should pass through h.

This is the first deviation in this problem.

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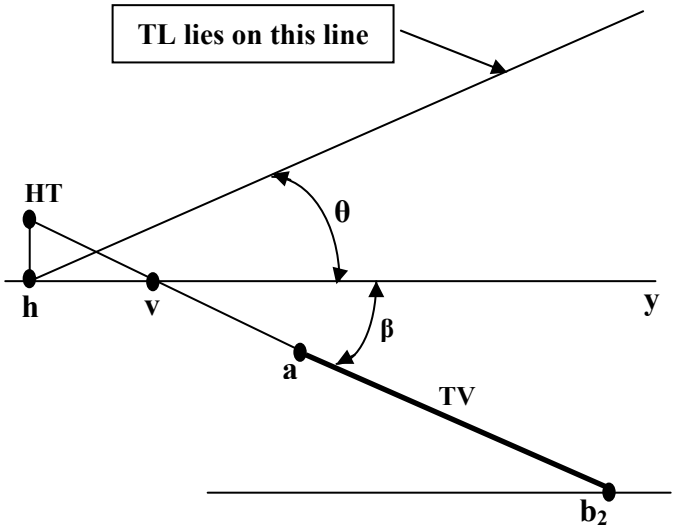
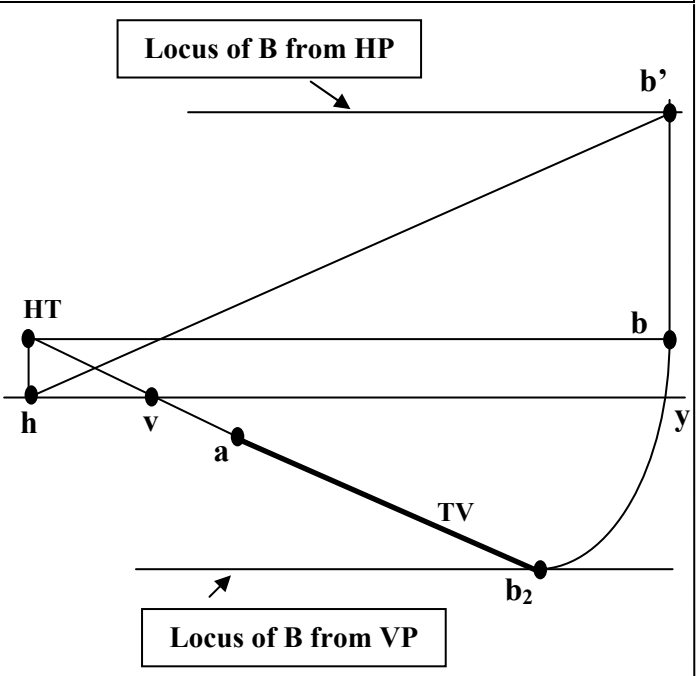
(vii) Draw the TL line of some length at angle θ passing through h.





(viii) Now, a 2nd deviation is used in getting the locus lines of end B in Front view.

The locus line of B lies on line through h but TV is on HT line, we use (h, HT) as base points for drawing the arcs.

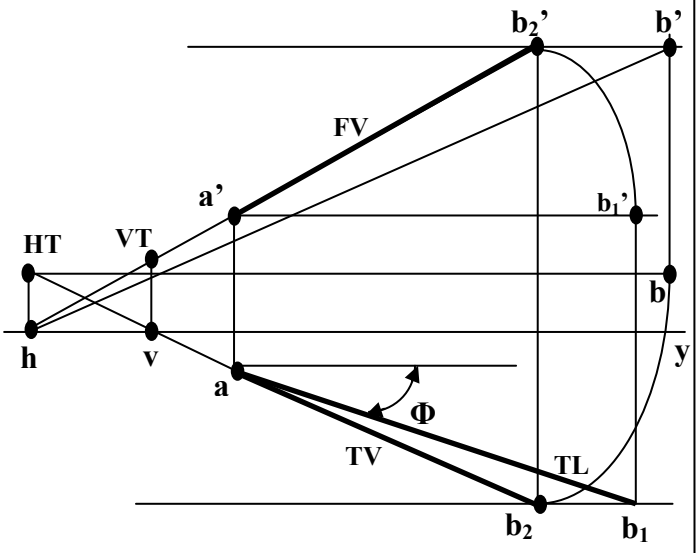
This is explained as below:

To get TL from TV, we know that TV has to be rotated about a to same as a level & projected onto the TL line to get the locus of B.

Here, we rotate TV about HT instead of a.

With HT as centre & HT- b_2 as radius, draw an arc to HT level till b & project onto TL line through h to get b'.

→ On b', draw a line ‖ to xy to get the locus of B.
→ Project b_2 (TV) to get b_2' on locus line B above.
→ Join h & b_2' and project from a on it to get a'.
a' b_2' is the FV. Rotate it to a' level & get b_1. a b_1 is the true length & Φ is its angle with VP.



Some of the last construction steps are not shown in detail as it is assumed that you know how to convert TV into TL by rotations of arcs. Project v on FV to get VT.

The answer is as follows:

TL = 100 mm; Φ = 23^0; α = 34^0; β = 28^0; θ=30^0; VT=13 mm above HP.

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(Page 201- Problem 10.19 of text book)

3) A line AB inclined at 40^0 to the VP has its ends 50 mm & 20 mm above the HP. The length of its front view is 65 mm & its VT is 10 mm above the HP. Find the true length of AB, its inclination with HP & its HT.

Ans) Given data:

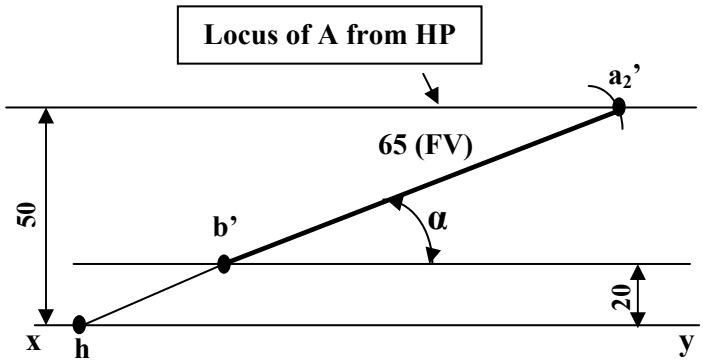
Front view **(FV)** = **65 mm**
Locus of end A above HP (a_2'/ a') = 50 mm
Locus of end B above HP (b') = 20 mm
VT (above xy as it is above HP) = **10 mm**
Line angle to **VP** (**TL** with **VP**) (**Φ**) = 40^0

Logic:

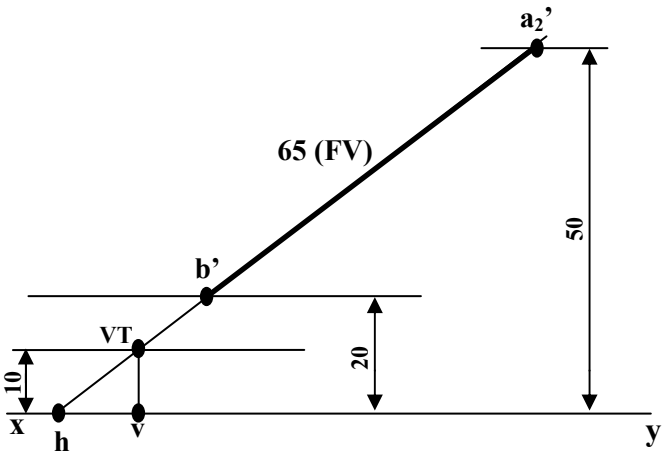
- → Whenever data about the other trace is not known, then there is a small deviation that is used in the procedure to draw traces.
- → Join ***(h, VT)*** & locate v. Since **β** is not known & also HT is not known, we use the deviation of **drawing the TL line making angle Φ from v.**
- → ***The FV is rotated about VT*** to bring it to **same level as VT** and projected onto **TL** line which is at angle **Φ from v.**
- → **The locus of B is found** & then the projections are obtained using the standard rules of rotation of FV or TV.

Steps:

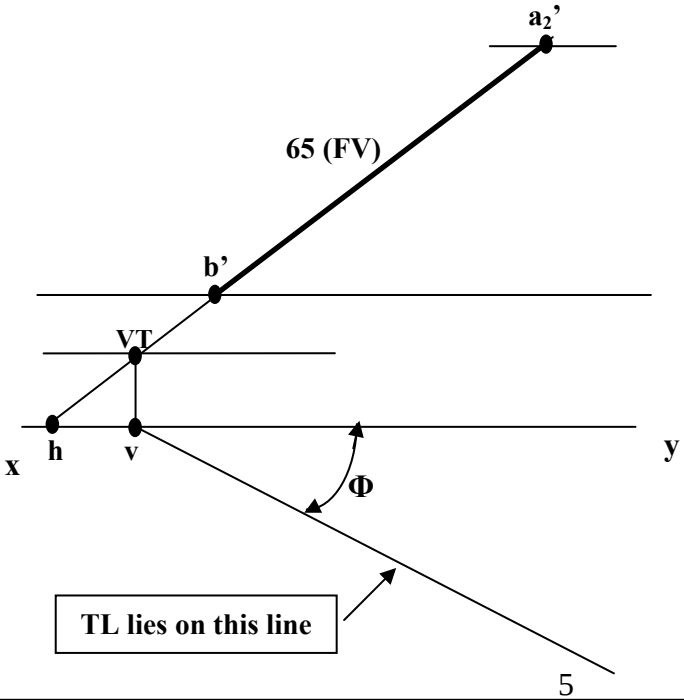
(i) Draw x-y line, draw 2 lines ‖ to & above xy to get locus of A & B at (50, 20).
(ii) Mark b' anywhere on 20 mm line above xy & draw the FV (b' a_2') 65 mm.
(iii) Mark h where FV cuts xy.
(iv) The angle made by FV with HP (α) is found.



Above x-y, draw a line ‖ to x-y at 10 mm & the point where it cuts the line through (h, FV), mark VT. h, VT & FV are on the same line. On VT, draw a ⊥ on xy to get v.



Since data on HT or β is not given, we take the deviation of drawing TL at angle Φ from v itself. Actually, we know that TV at angle β should pass through v or HT. But, here, we draw TL at Φ from v.



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(vi) Now, a 2nd deviation is used in getting the locus lines of end B.

The locus line of B lies on line through v but FV is on VT line, we use (v, VT) as base points for drawing the arcs

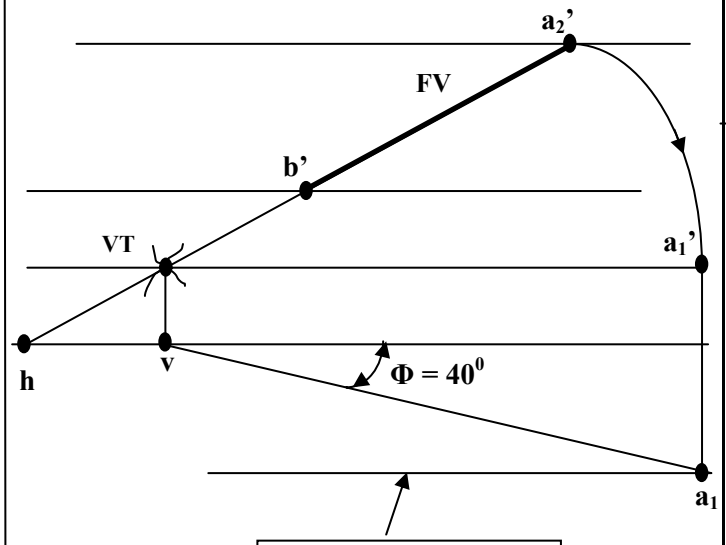
This is explained as below:

To get TL from FV, we know that FV has to be rotated about b' to same as b' level & projected onto the TL line to get the locus of A.

Here, we rotate FV about VT instead of b'.

With VT as centre & VT- a_2' as radius, draw an arc to VT level at a_1' & project onto TL line through v to get b.

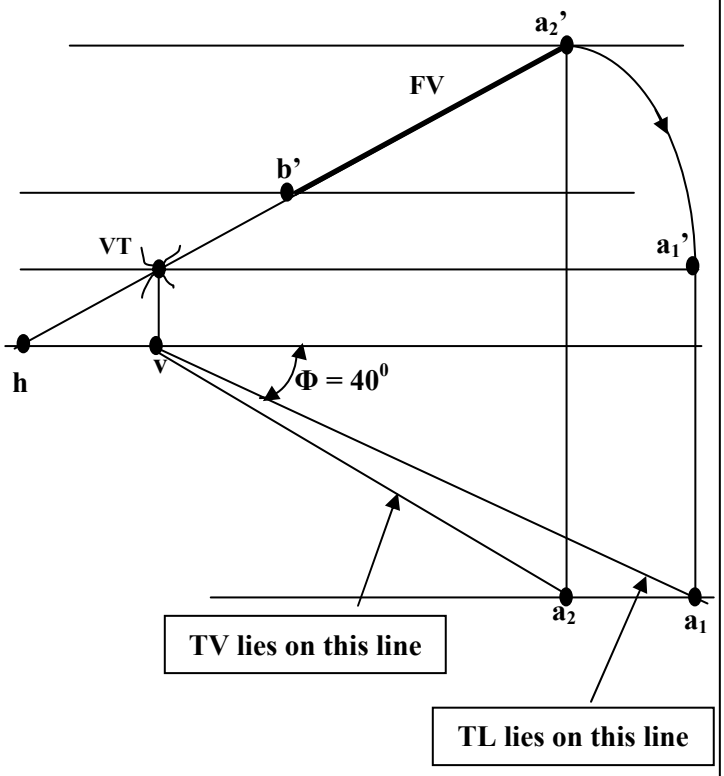
On b, draw a line ‖ to xy to get the locus of B.

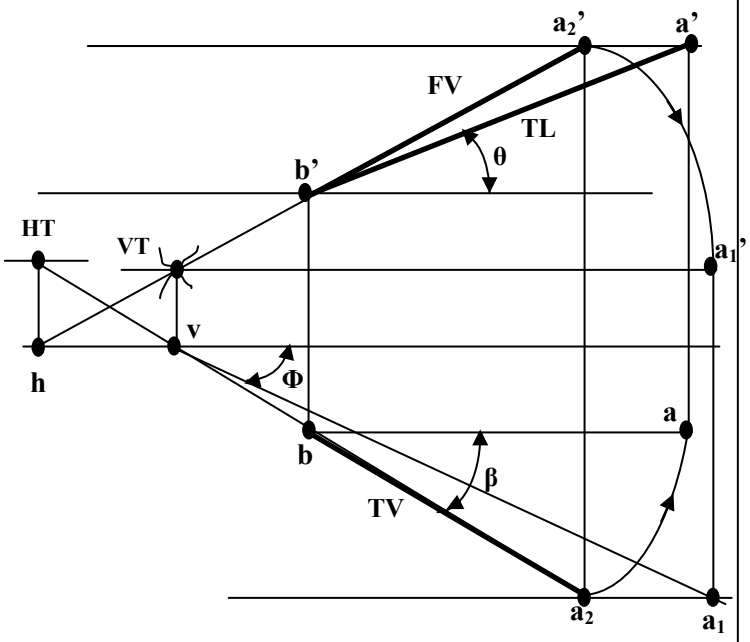


(vii) Now to get the TV, project a_2' on locus of B to get a_2.

Join v-a_2 and draw projector from b' to get b on v - b_2. b-a_2 is the TV.
a-b_2 represents the Top View TV at angle β.

To get TL b'-a', rotate TV b-a_2 about b to a level & project to locus line of A in HP to get a'.





Join b'-a' to get TL at angle θ with HP.
To get HT, project from h onto TV extended.