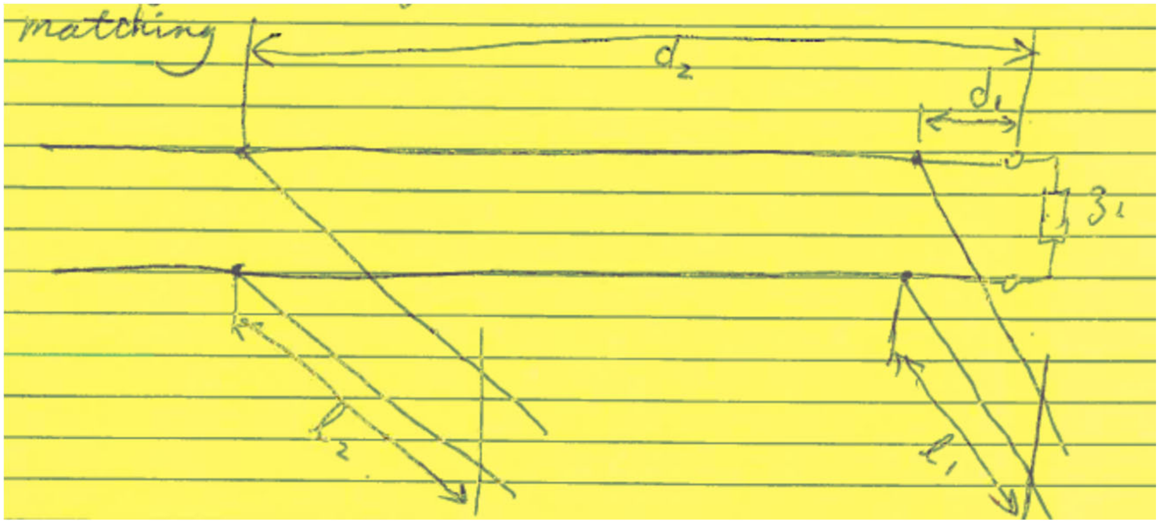
Double-Stub Matching

Take good notes. Content not in textbook.

The positions of the two stubs, d_1 and d_2, are fixed.

We adjust the two stub lengths, l_1 and l_2, to achieve matching.



General strategy:
First, adjust l_1 to get $y(d_2) = 1 + jb_2$.

And then?

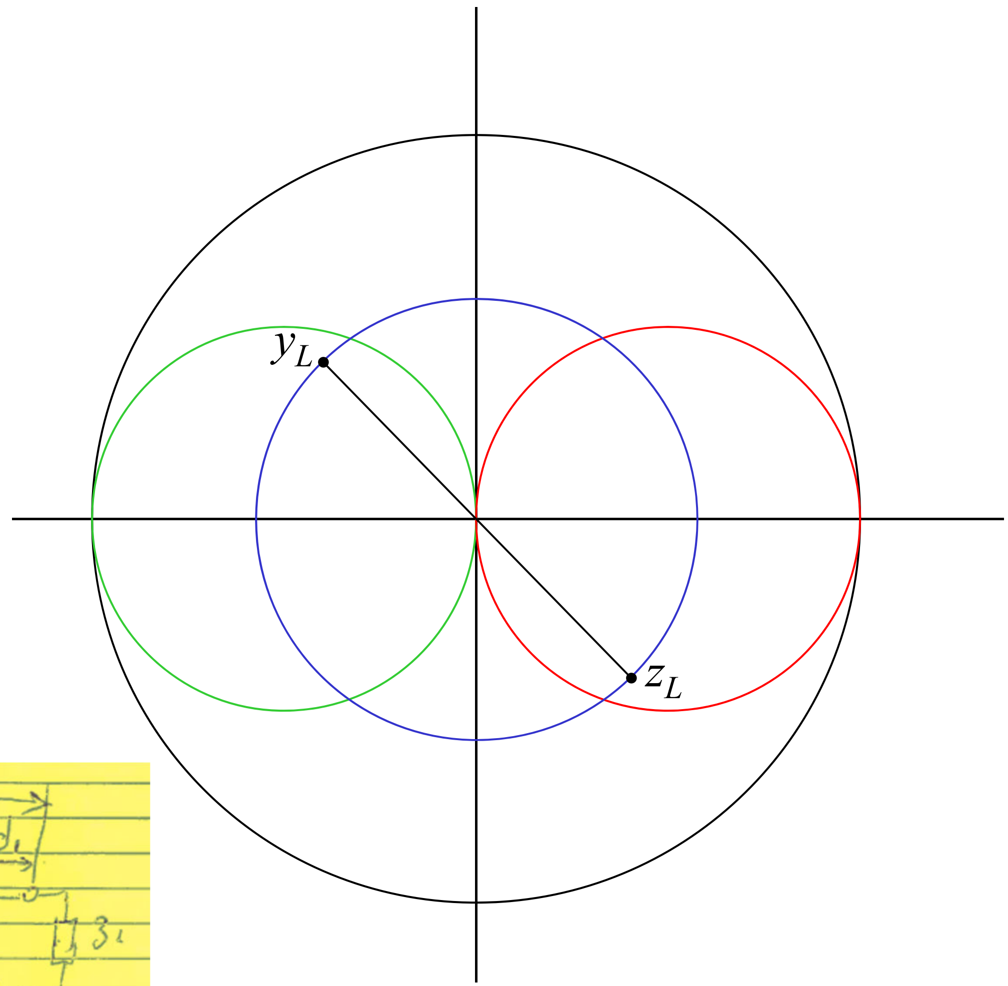
The 2nd step is trivial; we focus on the 1st step.

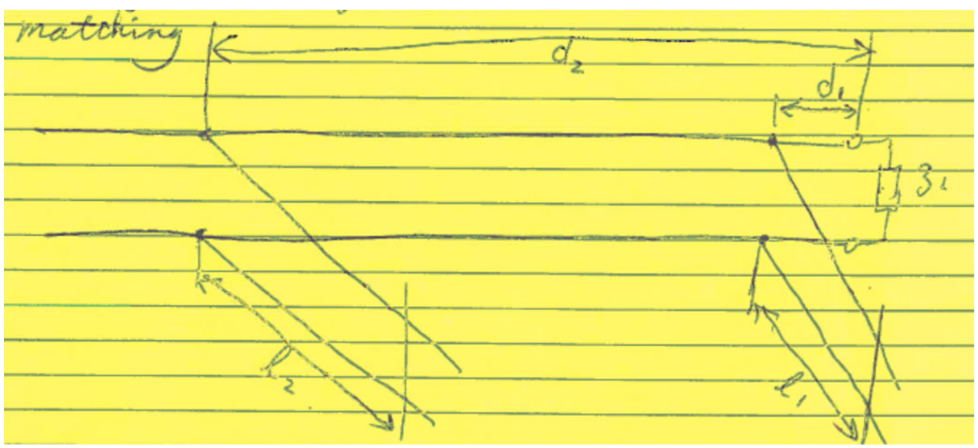
We use the "y-chart."

$g = 1$ circle of the y-chart

$g = 1$ circle of the z-chart

Locate z_L and then find y_L .

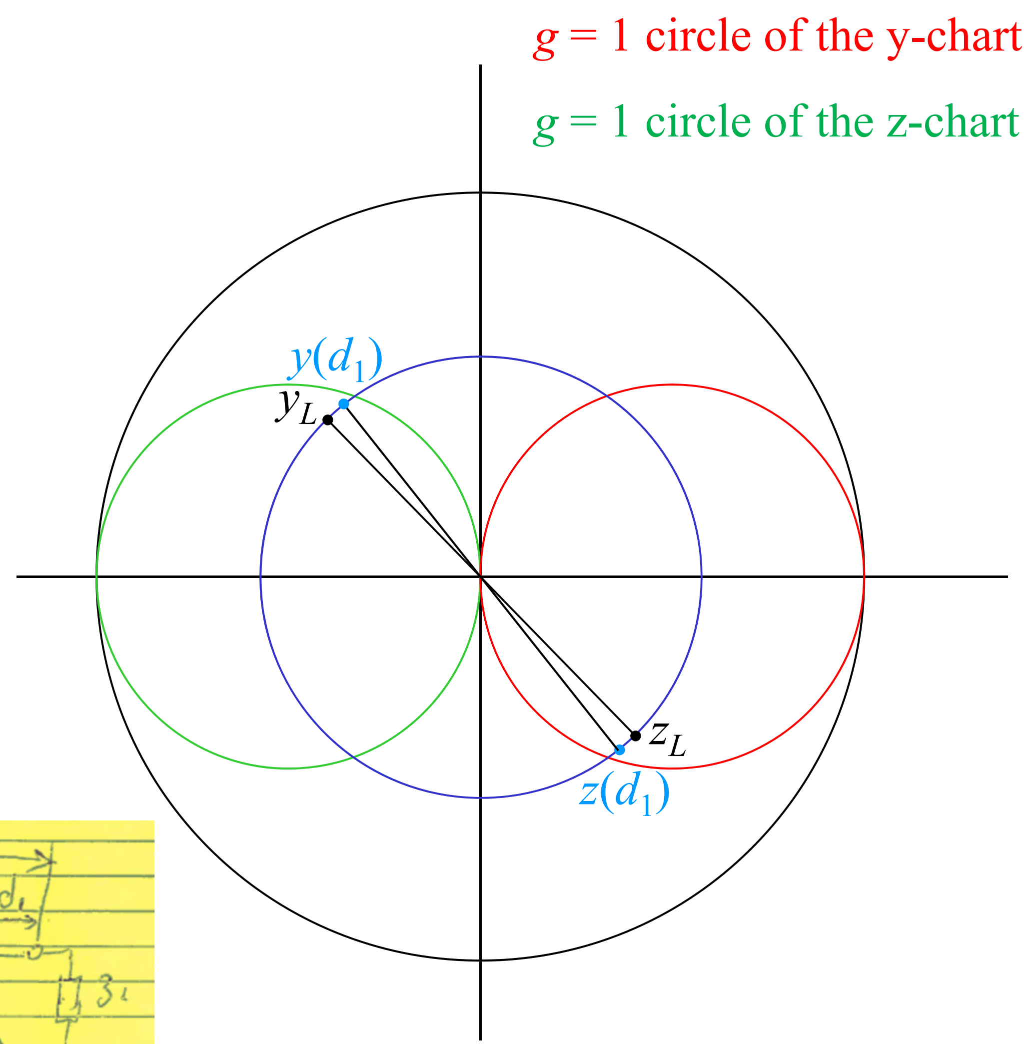


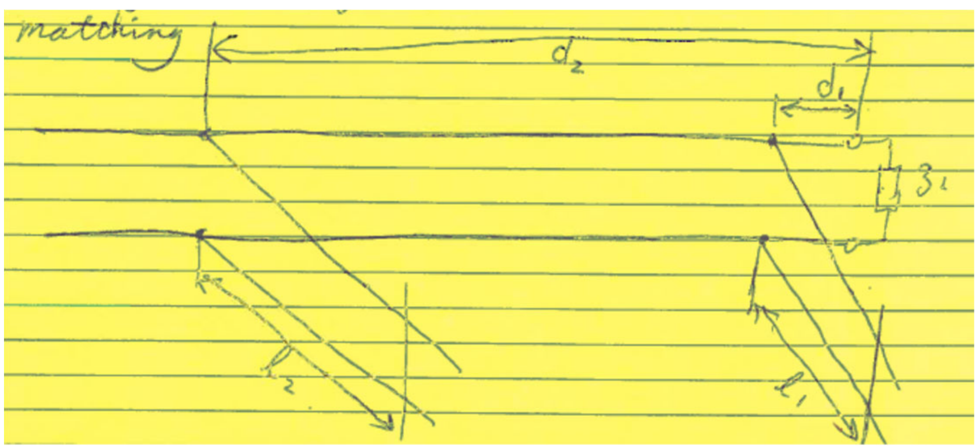


d_1 is fixed.

$$y_{\text{total}}(d_1) = y(d_1) + y_{\text{stub1}}$$
$$= g(d_1) + jb(d_1) + jb_{\text{stub1}}$$

Stub purely reactive.

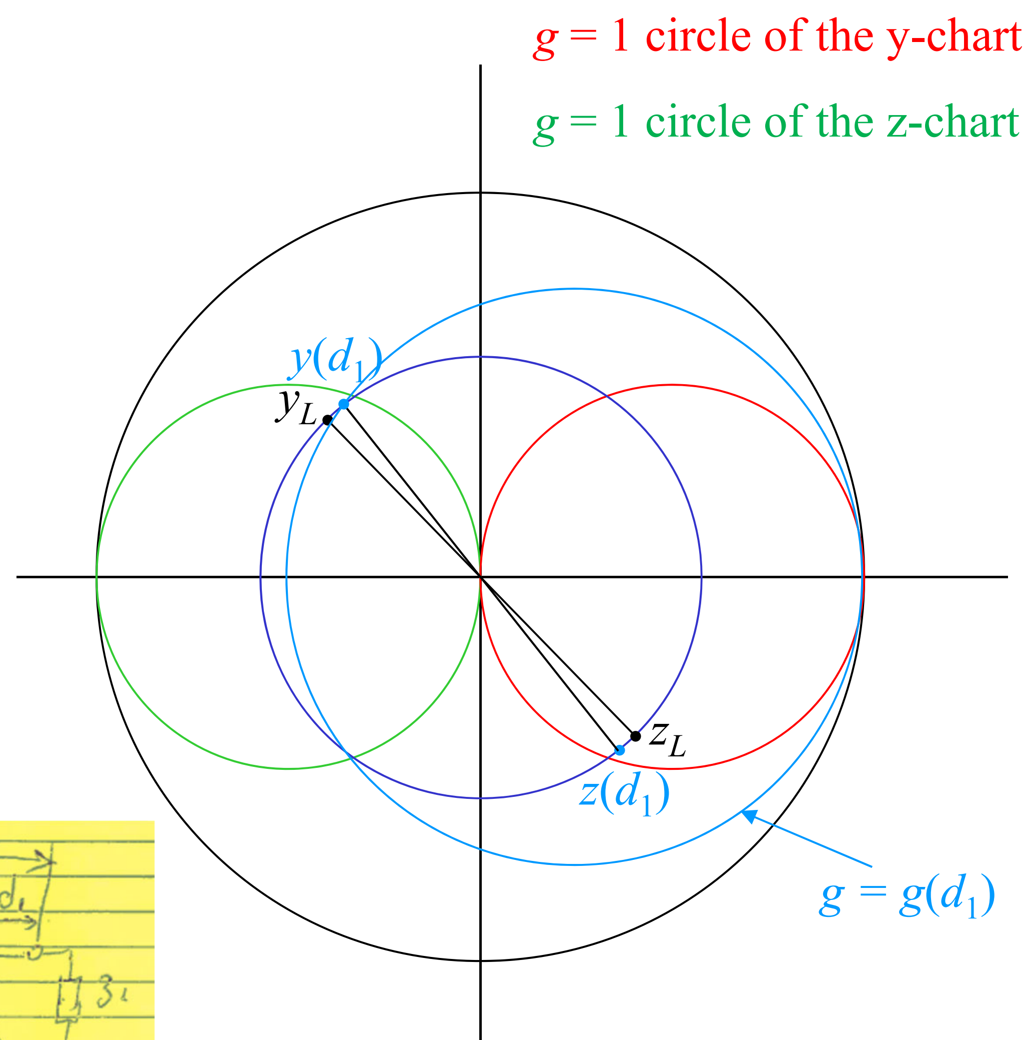


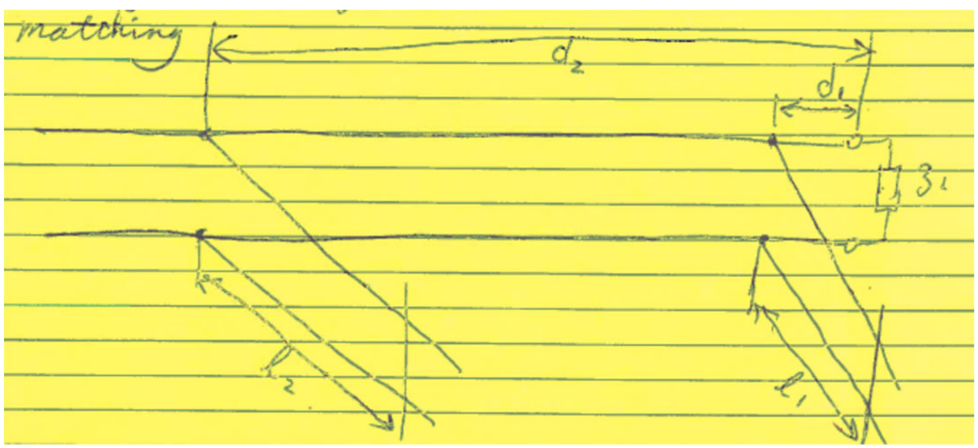


d_1 is fixed.

$$y_{\text{total}}(d_1) = y(d_1) + y_{\text{stub1}}$$
$$= g(d_1) + jb(d_1) + jb_{\text{stub1}}$$

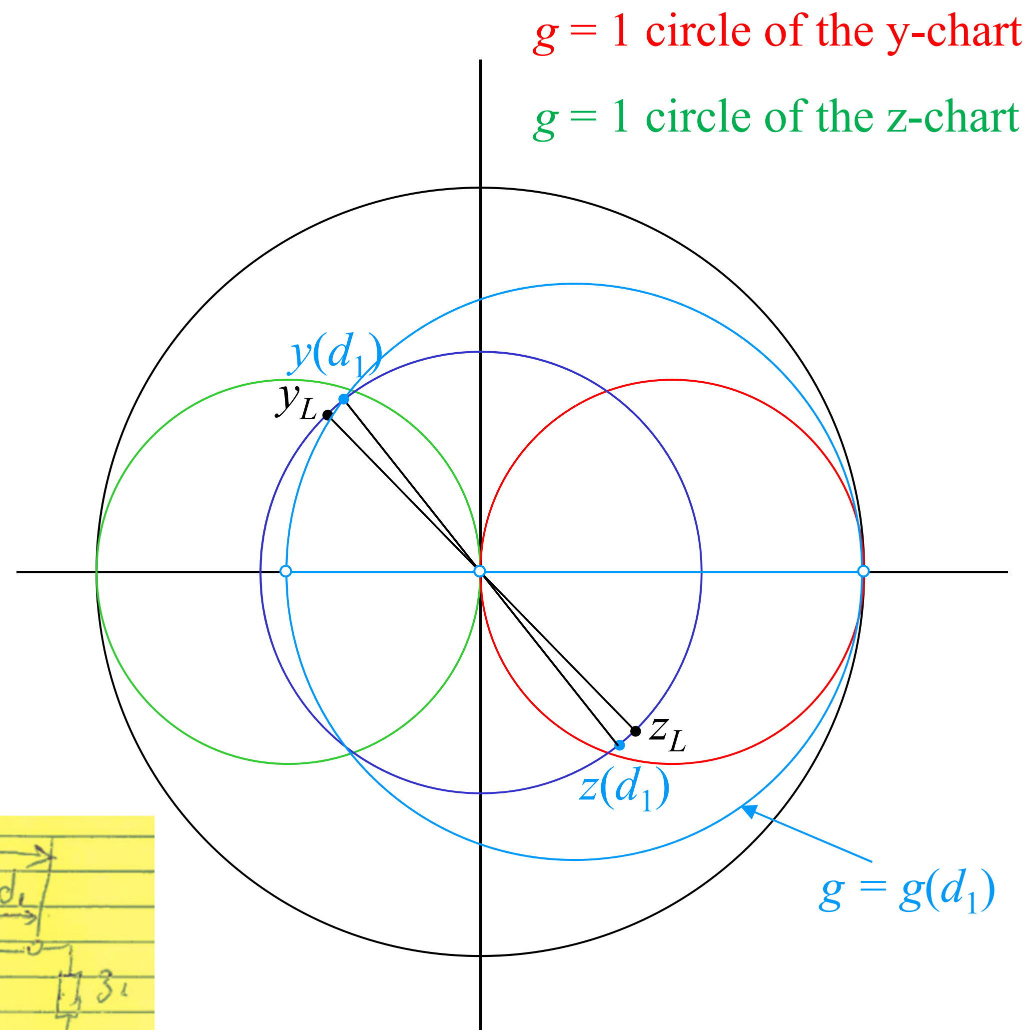
Stub purely reactive.
Therefore trajectory of $y_{\text{total}}(d_1)$ is the $g = g(d_1)$ circle when l_1 is adjusted.

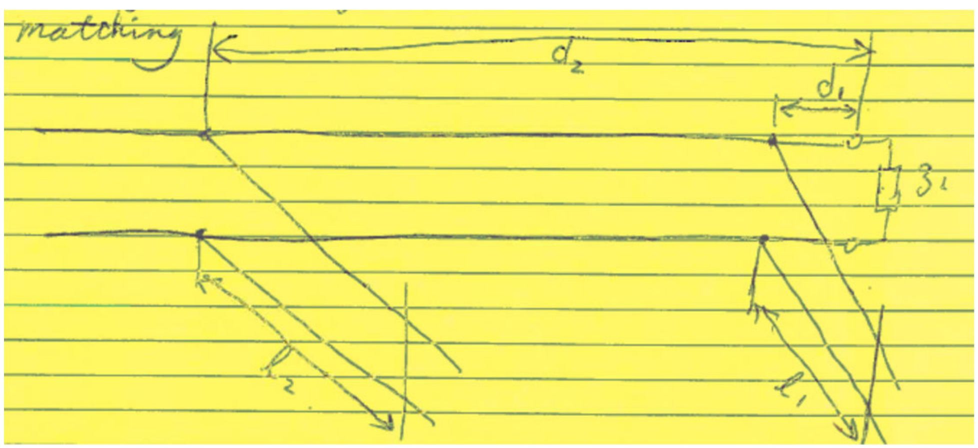




$$y_{\text{total}}(d_1) = y(d_1) + y_{\text{stub1}}$$
$$= g(d_1) + jb(d_1) + jb_{\text{stub1}}$$

Mark these points: ∘

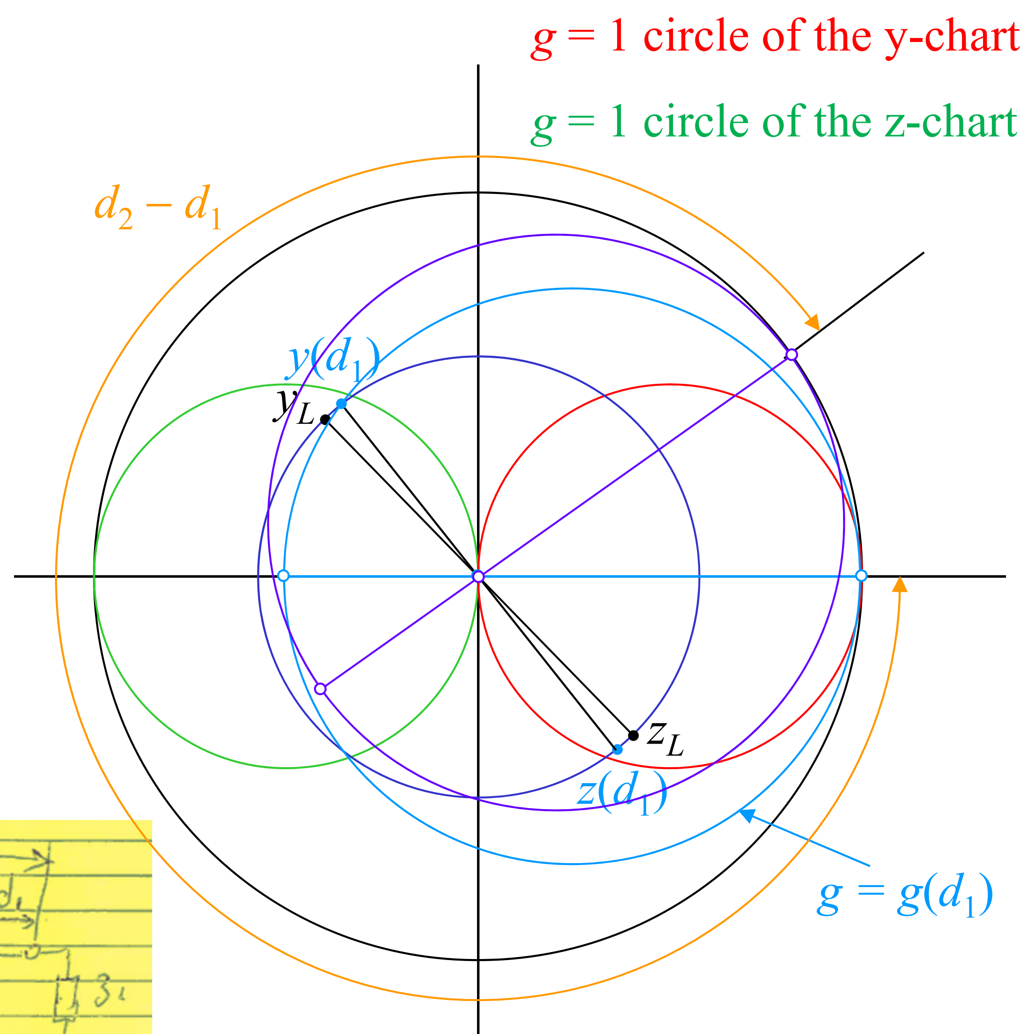


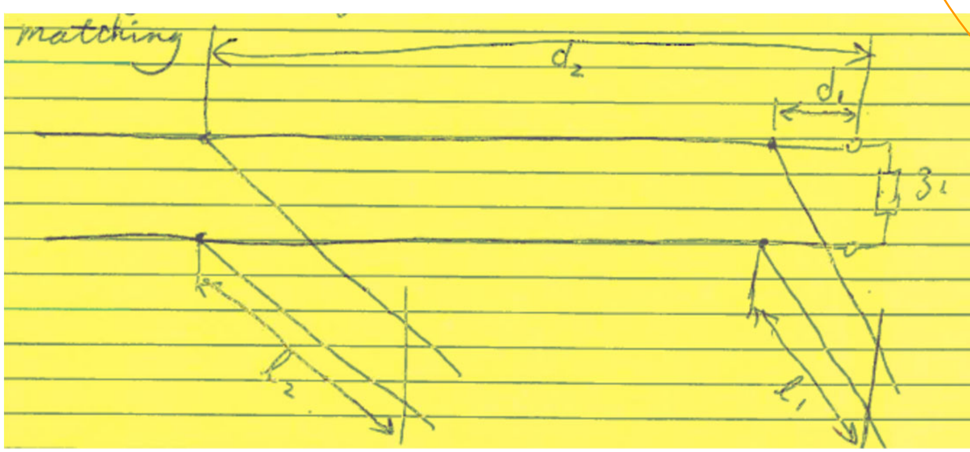


$$y_{\text{total}}(d_1) = y(d_1) + y_{\text{stub1}}$$
$$= g(d_1) + jb(d_1) + jb_{\text{stub1}}$$

Mark these points: ∘

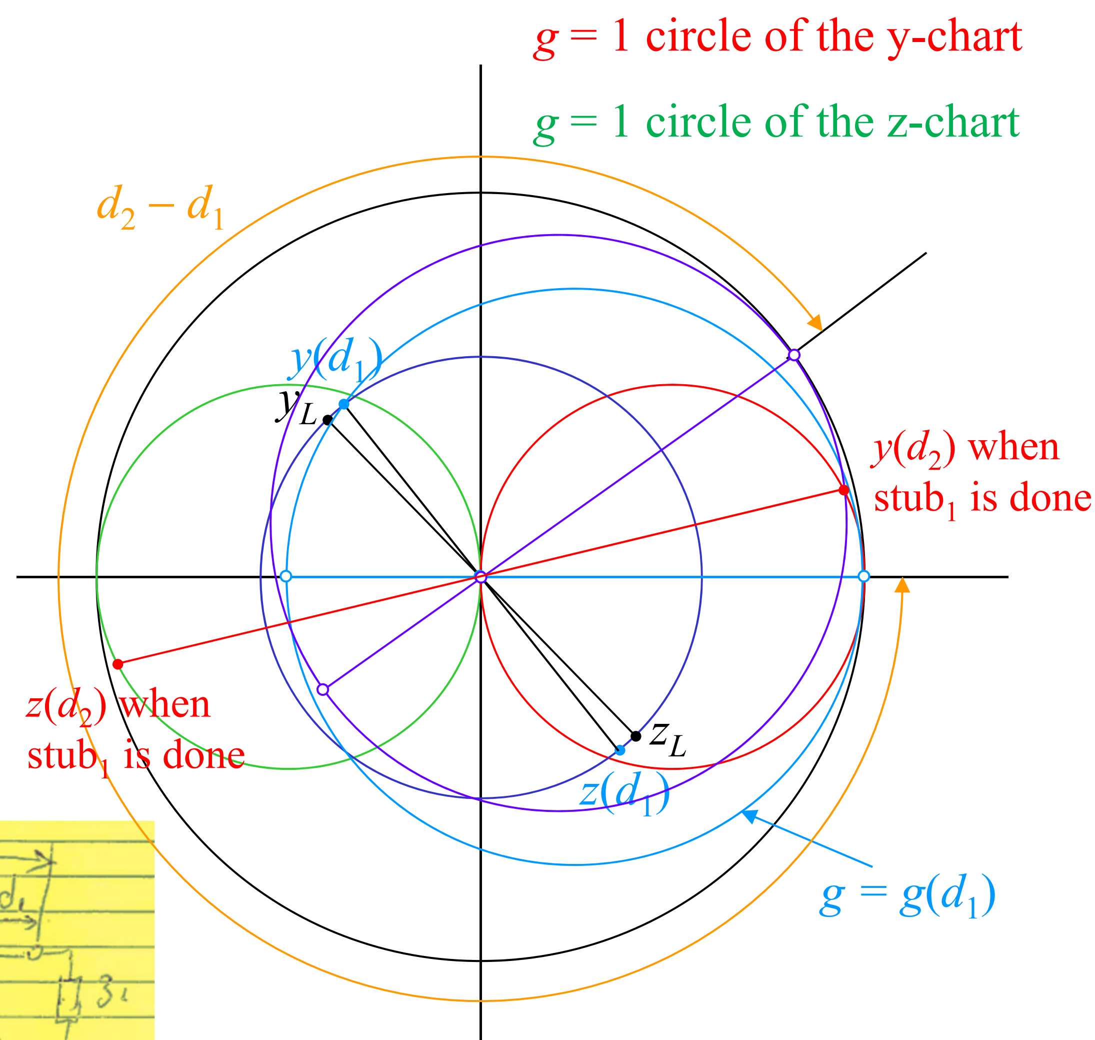
Moving from d_1 to d_2 is rotating the $g = g(d_1)$ circle into the violet circle. (Follow the marked points.)

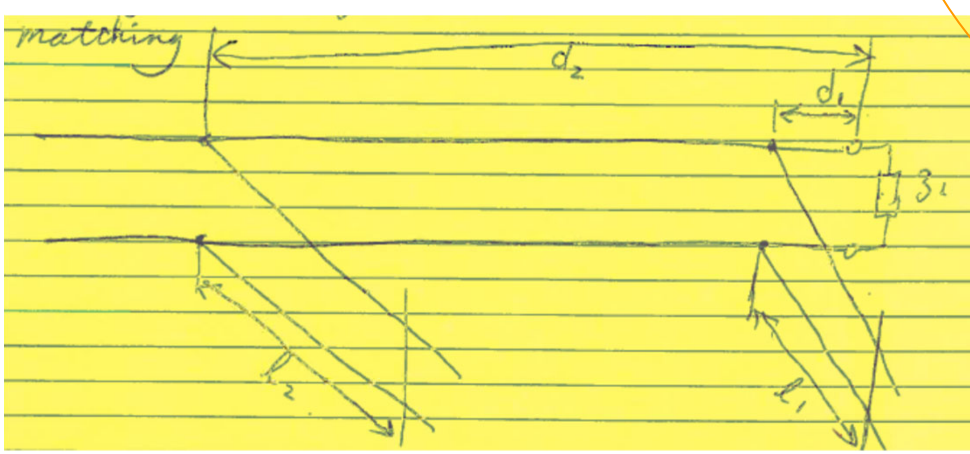




$$y_{\text{total}}(d_1) = y(d_1) + y_{\text{stub1}}$$
$$= g(d_1) + jb(d_1) + jb_{\text{stub1}}$$

The violet circle intersects the $g = 1$ circle of the y-chart.
The intersection is the desired $y(d_2)$.



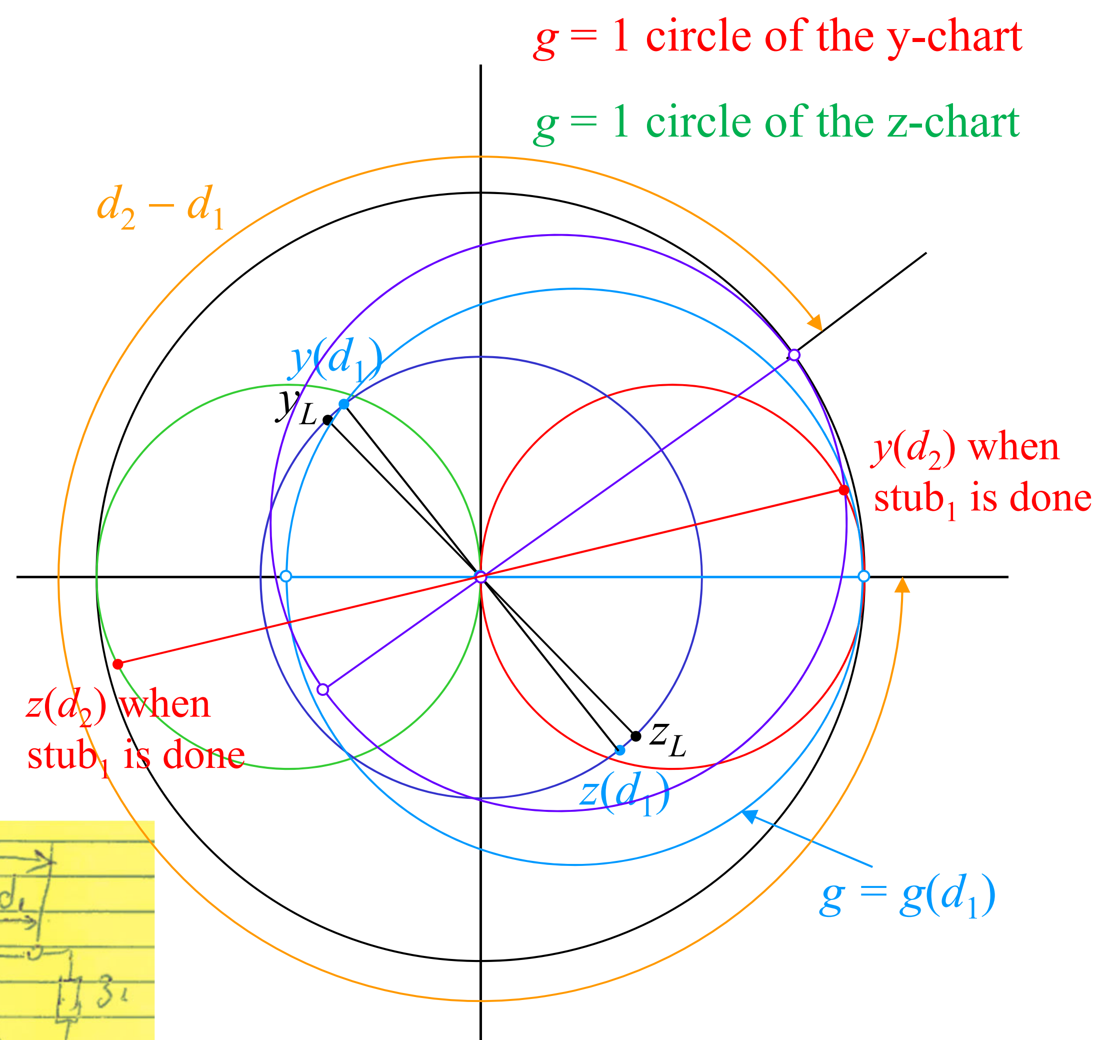


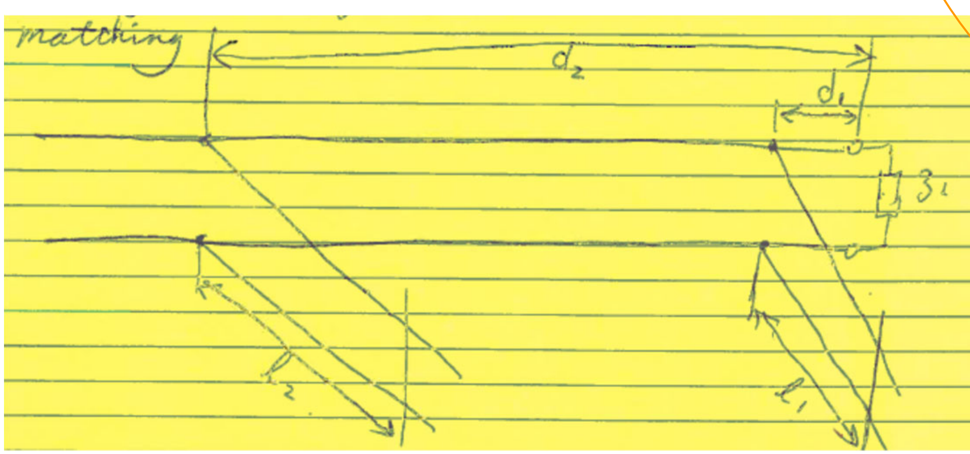
When stub_1 is done, $z(d_2)$ falls on the green circle.

In the lab, the network analyzer displays a z-chart. The TAs put this circle on the screen to help you.

$$y_{\text{total}}(d_1) = y(d_1) + y_{\text{stub1}}$$
$$= g(d_1) + jb(d_1) + jb_{\text{stub1}}$$

The violet circle intersects the $g = 1$ circle of the y-chart.
The intersection is the desired $y(d_2)$.

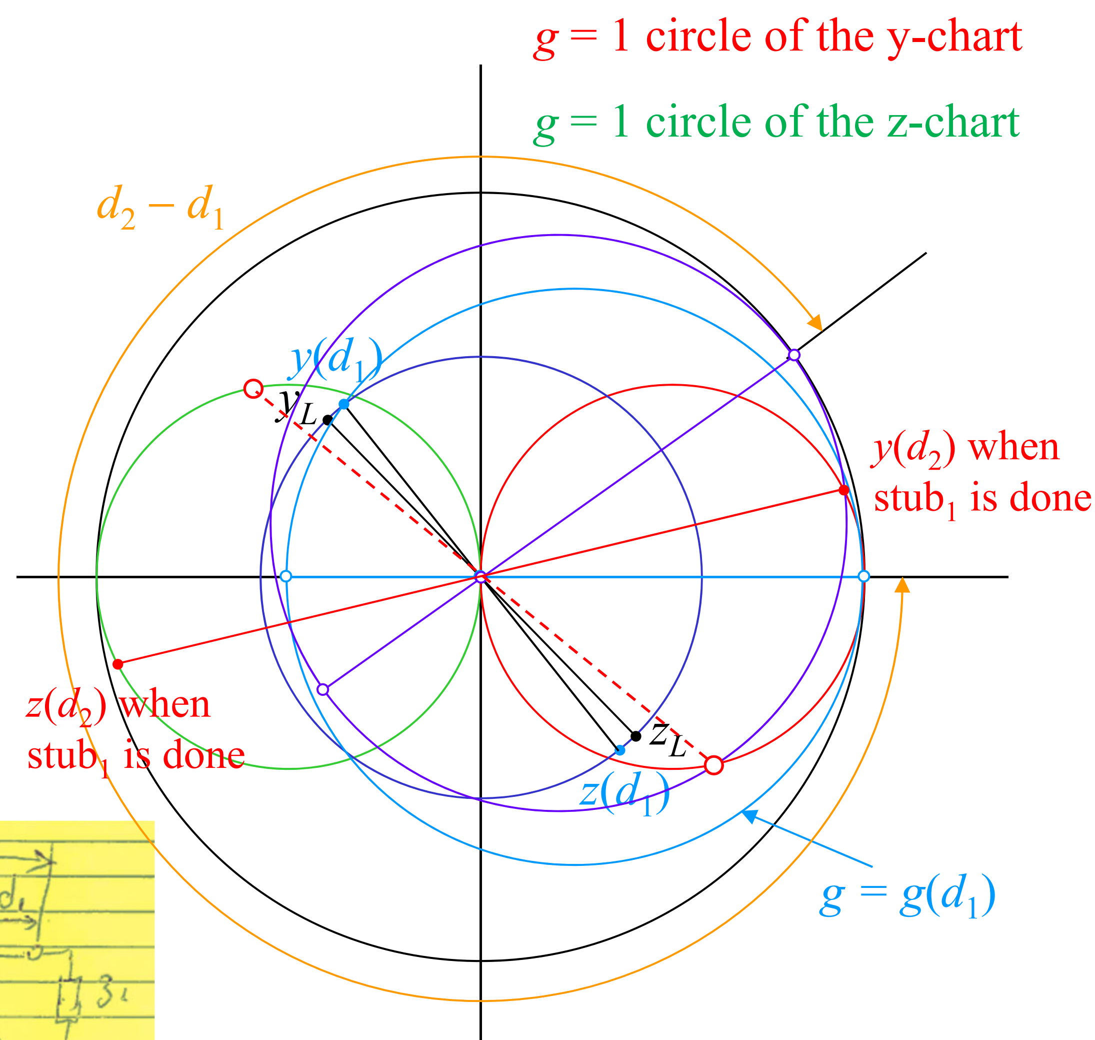


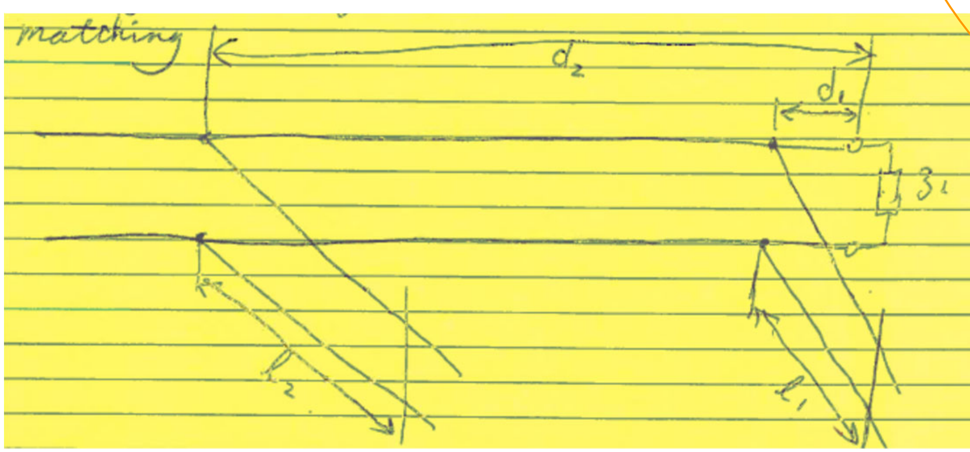


As in single-stub matching, there are two solutions. Can you spot the other solution?

$$y_{\text{total}}(d_1) = y(d_1) + y_{\text{stub1}}$$
$$= g(d_1) + jb(d_1) + jb_{\text{stub1}}$$

The violet circle intersects the $g = 1$ circle of the y-chart.
The intersection is the desired $y(d_2)$.





As in single-stub matching, there are two solutions. Can you spot the other solution?