

In order to work out the relative needle valve aperture to venturi aperture, you need to establish the size of needle jet, and size of needle and size of needle within the jet during the appropriate phase of the slide operation. The ¼ to ¾ operation attributed to the needle jet is based on area of venturi open rather than vertical movement of the needle and the relationship between the two require calculations that are out of my comfort zone. I found a calculator to do this online @ handymath.com (you can easily work area of segment as this is simply a quarter of the total, turning this into a segment height is where you need the calculator.

So the first job is to manually measure the needle in full open and closed positions against the top of the emulsion tube, as this is possible to mark through the front of the carburettor.  
Next you must measure the distance between the top of the emulsion tube and the top of the needle jet.  
apply this correction factor and draw sketch of needle to help.

Next work out area of venturi, and the ¼, 1/2 and ¾ areas from this.

Using calculator (handymath.com) work out segment heights for these.  
Given that these segments essentially are vertical movements from the (now defined) point on the needle which intersects with the top of the needle jet when the slide is fully down, these can be marked on the needle and the needle measured to establish the diameters at those points.

Scott carb				
Needle jet (size				
s diameter	0.106			
main jet used	170			
Main jet diameter	0.044			
needle no	6			
needle notch				
(from bottom as				
1)	3			
distance from				
bottom of needle				
to max open				
position (relative				
to top of needle				
jet)	0.507			
venturi diameter				
of carburettor	1			
area of venturi	0.8866	¼ of this is 0.222		0.317
¼ venturi area	0.22165	¼ of this is 0.443		0.531
½ venturi area	0.4433	¼ of this is 0.665		0.746
¾ venturi area	0.66495			
¼ lift height	0.317			
½ lift height	0.531			
¾ lift height	0.746			
¼ lift needle dia	0.099			
½ lift needle dia	0.0945			
¾ lift needle dia	0.0875			
flow area at				
needle jet at ¼				
lift	0.0011271925			
flow area at				
needle jet at ½				
lift	0.0018111666			
flow area at				
needle jet at ¾				
lift	0.0028118936			
fuel/air ratio at ¼				
fuel/air ratio at ½				
fuel/air ratio at ¾				

Table 3 : needle /needle jet ratios at varying lifts

	needle dia	needle area	needle jet dia		available area
¼ throttle (1.209 from end)		0.099	0.007696855	0.106	0.008825878
½ throttle (1.0007 from end)		0.0945	0.0070147114	0.106	0.008825878
¾ throttle (0.805 from end)		0.0875	0.006013844	0.106	0.008825878
			main jet area		0.001520728
			if needle jet area exceeds main jet area at ¼ then substitute main jet size for final calculation		

Air to fuel ratio					
so	venturi area open	Needle area open (Auto input from table 3)	percentage ratio (fuel to air)( calculated)	difference between phases	
¼	0.22165	0.0011271925	0.51%		
½	0.4433	0.0018111666	0.41%		0.10%
¾	0.66495	0.001520728	0.23%		0.18%