Driver/Operator 1B Cheat Sheet

Friction Loss (FL) = $C(Q^2)L$
PDP = NP + [FL + AL ± EP]

NP = Nozzle Pressure
100 psi - Combination
80 psi - Smooth Bore (master)
50 psi - Smooth Bore (handheld)

AL = Appliance Loss
10 psi - Wye/Siamese
15 psi - Deck Gun
25 psi - Portable Monitor
25 psi - Stand Pipe
75 psi - Aerial Ladder (Do not add elevation)

EP = Elevation Pressure
+5 psi - every floor (excluding 1st)
- 5 psi - Below 1st floor (basements, etc.)
+5 psi - every 10' of elevation
-5 psi - every 10' drop of elevation

L = Length of line (÷ by 100)

C = Coefficient of hose

1" - 150	2½" - 2
1½" - 24	3" - .8
1¾ " - 10	5" - .08

Q = Quantity (÷ by 100) *a.k.a. GPM*
Fog Nozzle - 250gpm - 100psi
1" Smooth tip - 100gpm - 50psi

Rules of Thumb
- Supplying other engines:….Start at 50 psi
- Sprinkler systems:……pump at 150 psi
- **150' of 1½" or 1¾"** hose, pump at 135 psi
- **200' of 1½" or 1¾"** hose, pump at 150 psi
- **2½" line** - drop '0', minus 10 = FL per 100'
- Assume 1" nozzle @200GPM if not specified

Calculation Considerations
Wye - Add GPMs from both nozzles
** For two equal lines, calculate for only one.*
Siamese - Divide nozzle GPM by 2

- Never exceed PDP of 250 psi
- Intake (residual pressure) should never drop below 20 psi.

Field Hydraulics

2½" Handline (smooth bore)

TIP	GPM	FL / 100'	NP
⅞"	150	5 PSI	50 PSI
	200	8 PSI	50 PSI
1⅛"	250	13 PSI	50 PSI
1¼"	300	21 PSI	50 PSI

2½" Master Streams (smooth bore)

TIP	GPM	FL Single / 100'	FL Dual / 100'	NP
1¼"	400	32 PSI	8 PSI	80 PSI
1⅜"	500	50 PSI	13 PSI	80 PSI
1½"	600	72 PSI	18 PSI	80 PSI
1⅝"	700	98 PSI	25 PSI	80 PSI
1¾"	800	128 PSI	32 PSI	80 PSI
1⅞"	900	162 PSI	41 PSI	80 PSI
2"	1000	200 PSI	50 PSI	80 PSI

Use **Volume** mode when:
- 2 or more 2½" or larger hose lines are used
- Pumping at 50% or more of pump capacity

Frequently Squared #'s
$1.25^2 = 1.56$
$1.5^2 = 2.25$
$1.75^2 = 3.06$
$2.5^2 = 6.25$

GPM from Hydrants

Red:	0 - 499
Orange:	500 - 999
Green:	1000 - 1499
Blue:	1500 +

Square roots for Nozzle Pressure

50 PSI	7.07
80 PSI	8.94
100 PSI	10

Radius ⏲ Diameter ⏲ Circumference ○ Area ● π = 3.14

Area		$= \pi r^2$
Circumference		$= 2\pi r$
Cylindrical Volume		$= d^2 6h$
Cubic Volume		= w•l•h
Gallons per cubic foot		= 7.48
Gallons Per Minute	for Nozzle Pressure	= 29.7 (d2•√NP)
Gallons Per Minute	for Hydrant Pressure	= 29.7 [C(d2•√FP)]

If the GPM for a handline is unknown, assume the following:
- 1½" hoseline – 100 gpm
- 1¾ "hoseline – 150 gpm
- 2½" hoseline – 250 gpm

Typical GMP for lines:
Small fire stream……40 GPM or less
1¾' hand line ……100 gpm to 210 gpm
2½" hand line…… up to 325 gpm
Master streams…… 350 gpm or greater

Drafting
1. Ensure drains/valves are airtight
2. Throttle RPM's to 1000-1200
3. Close tank to pump
4. Switch to volume mode (if applicable)
6. Pull prime 15-45 seconds
   - ➢ Adequate intake pressure?
7. Flow line to maintain lift
8. Set relief valve for desired PDP

Suction Percentage Drop = [(Static – Residual) • 100] / Static
0-10% drop allows 3 times amount of water being delivered
11-15% drop allows 2 times amount of water being delivered
16-25% drop allows 3 times amount of water being delivered

FL chart	1½" Hose					1¾" Hose					2½" Hose					5" Hose				
GPM→	20	30	60	95	125	30	60	95	125	150	150	200	250	325	500					
↓LGTH																				
100'	1	2	9	22	37	2	6	14	24	62	5	8	13	21	50					
200'	2	4	17	43	76	3	11	28	48		9	16	25	42	100					
300'	3	6	26	65	112	4	17	42	73		14	24	38	63	150					
400'	4	9	35	86							18	32	50	84	200					
500'	5	11									23	40	63	106	250					
600'	6	13																		
700'	7	15																		
800'	8																			
900'	9																			
1000'	10																			

Notes: