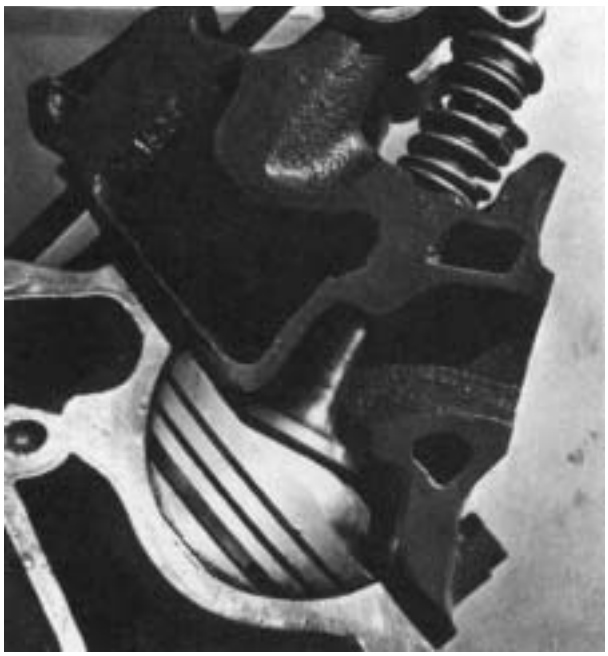
Do you know your V.O.T.C.?



What is V.O.T.C.?

V.O.T.C. is ISKY'S revolutionary new concept in aiding in the selection and installation of a racing camshaft. V.O.T.C. (Short for VALVE OPENING AT TOP DEAD CENTER) is "the amount the valves are actually off their seats at TDC" during overlap. How does this help you? Well, very simply it will tell you whether or not the racing camshaft you're thinking of installing in your engine will be tolerated. In other words will it install with sufficient V/P(Valve to Piston) clearance?

Why worry about V.0.T.C.?

Very simply V.O.T.C. has a direct bearing on your V/P clearance because as V.O.T.C. increases V/P clearance decreases. Unfortunately the most unasked question by racers installing a particular racing camshaft is "Will my valves clear my pistons?" This most important aspect is very often overlooked and many engines are damaged by insufficient V/P (Valve to Piston) clearance. If the camshaft is a mild hydraulic grind to be installed in a low compression stock engine, there is usually NO PROBLEM. However, with the multitude of engine models, from year to year, having variables such as cylinder head combustion chamber volume, compression ratio, stock camshaft, etc., it is becoming impossible to give a definite yes or no answer as to V.P.C. (Valve/Piston Clearance).

Even when using special racing pistons, insufficient V.P.C. can result when long overlap cams are employed.

Racers are very often disheartened when finally assembling a short block to discover the engine is suffering from inadequate V.P.C. and must now be dissassembled in order to flycut the pistons for additional relief. But there's even a more painful feeling; that's when the mechanic fails to even bother to check V.P.C. and on the first fire up a $1000 engine goes up in smoke, (Bent Valves,Broken Piston and maybe even the block itself destroyed). ISKY TO THE RESCUE! Simply read the catalog and note the V.O.T.C. for any cam. So, V.P.C. should be understood by the racer before he buys the camshaft!

EXAMPLE: Engines in the Car

The simple removal of one intake and one exhaust valve spring on your engine will enable you to determine your V/P clearance with a modified camshaft. Begin by cranking the engine over toT.D.C. compression on #1 cyl. With ball-stud rocker arm engines remove the intake and exhaust rocker arms from #1 cyl. With shaft mounted rocker engines, it is necessary to remove the entire rocker shaft from the #1 cylinder side. A Valve Spring Removal Kit is next used to remove the intake and exhaust valve springs. The kit includes an air fitting which threads into the spark plug hole and accepts shop air pressure to hold the valves up on their seats, and two "Light Tension Springs" that simulate the original springs and facilitate checking.
Remove the #1 cyl. spark plug and replace it with the appropriate air fitting. Connect shop air pressure to the fitting and using the Valve Spring RemovalTool, remove the #1 cyl. intake and exhaust valve springs. Install ISKY'S "Light Tension" checking springs and replace the keepers and retainers. Release the air pressure and employ a dial indicator on the retainer or a graduate scale alongside, and now measure and record the distance of free valve travel from the seated position to the piston crown. You may then subtract the ISKY V.O.T.C.Value from this figure and determine what your actual V/P clearance will be when the Isky cam is installed. Follow the same procedure to determine your exhaust V/P clearance. Having accomplished this reconnect the shop air pressure to the cylinder, replace the regular intake and exhaust valve springs and the rockerarms to their original position.

EXAMPLE: Sufficient V/P Clearance

The valve traveled distance from seated position to open, on a certain Chevy small block V-8 engine is .250" Int. and .270" Ex.The V.O.T.C. for the desired ISKY 310 Hyd. cam is.132", hence 250" travel minus .132" V.O.T.C. = .118" Int. V/P clearance and.270" Travel minus .132" V.O.T.C. = .138" Ex. V/P clearance.This is greater than the tollerable minimum clearance of .100", so the 310° HYD. camshaft will install in this engine nicely.

EXAMPLE: Insufficient Clearance

Valve traveled distance seat to piston is .200" Int. and .210" Ex.Intake valve travel .200" minus .132" V.O.T.C. = .068" V/P clearance. Ex. Valve Travel .210" minus .132" V.O.T.C. = .078" V/P clearance. Since .068" and .078" are both under the tollerance .100" V/P minimum clearance, this cam will not install safely!

EXAMPLE: Engine on Engine Stand

When building up an engine on the bench from scratch, you'll be ordering special racing piston no doubt. By all means do furnish the Piston Co. with the V.O.T.C. values pertinent to your camshaft plus your valve diameters. This way your piston reliefs (eyebrows) should be correct. But you can't be too careful! So let's install #1 piston (without rings) in the bore for the actual check of V/P clearance. (See page 177 "How to check for V/P clearance").

The table on the following page contains the pertinent V.0.T.C. values for all popular V.8 engines in use today. Space prohibits listing less popular V-8 and 6 cyl engines. However, should you desire V.O.T.C. information for any engine not listed feel free to write the ISKY factory for this information. We know the Racer and Top Tuners will accept ISKY'S new term V.O.T.C. because it's needed and long over due. We suspect our contemporaries will fight the term and attempt to conjure up a new term to seal the credit for themselves. We at ISKENDERIAN refer to that as the "Penalty of Leadership."

LISTED BELOW ARE EXAMPLES OF THE VALVE OPEN VALUES AT T.D.C. OVERLAP (V.O.T.C.) ON SOME OF OUR MORE POPULAR CAM PROFILES FOR THESE ENGINES

Engine	Grind	Tappet Lift at TDC Overlap Intake / Exhaust	VOTC Intake / Exhaust
CHEVY SMALL BLOCK V-8 265-350	256-HYD	.040 / .016	.060 / .024
	262-HL-HYD	.042	.063
	270-HYD-HL	.049 / .051	.074 / .076
	270-MEGA-HYD	.056 / .059	.084 / .089
	280-MEGA-HYD	.072 / .074	.109 / .112
	292-MEGA-HYD	.091 / .094	.137 / .141
	304-MEGA-HYD	.110 / .112	.165 / .168
	Z-20	.066	.099
	Z-25	.094	.141
	Z-35	.106	.159
	Z-40	.118 / .121	.177 / .181
	Z-50	.103 / .104	.155 / .156
	Z-65	.126	.189
	Z-70	.114	.172
	Z-75	.133	.200
	Z-85	.144	.216
	505-T	.104	.156
	RR-520	.080	.120
	RR-570-T	.098	.147
	RR-505-T	.093	.139
	RR-575	.091	.137
	RR-641-E	.162 / .171	.243 / .257
	RR-602	.126	.189
	RR-630	.135	.202
	RR-660	.152	.228
	RR-662	.160	.240
CHEVY BIG BLOCK V8 396-454	262-HL-HYD	.042	.073
	270-MEGA-HYD	.059”	.103
	280-MEGA-HYD	.074”	.129
	292-MEGA-HYD	.094”	.164
	256-HYD	.040 / .016	.070 / .028
	Z-55	.103 / .104	.180 / .182
	Z-33	.101	.177
	Z-77	.118 / .121	.207 / .212
	Z-90	.111 / .125	.194 / .219
	Z-95	.133	.233
	Z-89	.114	.200
	Z-88	.126	.220
	RR-640	.114	.200
	RR-650	.126	.220
	RR-727	.163	.285
	RR-654	.152	.266
	RR-747-C	.162 / .168	.283 / .294
CHRYSLER “B” ENGINE 383-440	256-HYD	.040 / .016	.060 / .024
	262-HL-HYD	.042	.063
	270-HYD-HL	.049 / .051	.074 / .076
	280-HYD-HL	.060	.090
	270-MEGA-HYD	.056 / .059	.084 / .089
	280-MEGA-HYD	.072 / .074	.109 / .112
	RPM-300	.066	.099
	B-777	.085	.127
	292-MEGA-HYD	.091 / .094	.137 / .141
	304-MEGA-HYD	.110 / .112	.165 / .168
	Z-35	.106	.159
	505-T	.104	.156
	Z-70	.114	.172
	Z-75	.133	.200
	590	.167	.251
	616	.171 / .167	.257 / .251
	RR-627	.174 / .167	.261 / .251
	RR-505-T	.093	.139
	RR-735	.168 / .158	.252 /.237
	RR-660	.152	.228

*** ALL TAPPET LIFT AND VALVE OPEN VALUES ARE BASED ON ZERO VALVE LASH.**

Engine	Grind	Tappet Lift at TDC Overlap Intake / Exhaust	VOTC Intake / Exhaust
CHRYSLER “A” ENGINE 273-360	256-HYD	.040 / .016	.060 / .024
	262-HL-HYD	.042	.063
	270-HYD-HL	.049 / .051	.074 / .076
	280-HYD-HL	.060	.090
	300-HYD-HL	.076	.114
	B-777	.085	.127
	292-MEGA-HYD	.091 / .094	.137 / .141
	304-MEGA-HYD	.110 / .112	.165 / .168
	1012-C	.155	.232
	505-A	.104	.156
	Z-35	.106	.159
	555	.132	.198
CHRYSLER 426 ST. HEMI	288-HYD	.085	.127
	SH-444	.103	.155
	SH-520	.132	.198
	590	.167	.251
	616	.171 / .167	.257 /.251
	RR-700	.174 / .174	.273 / .264
	RR-780/294	.199 / .199	.312 / .302
	RR-781-A	.164 / .178	.267 / .270
	RR-770/288	.186 / .186	.292 / .282
FORD 221-302 & 351 WINDSOR	270-HL-HYD	.049 / .051	.074 / .076
	280-HYD	.060	.096
	300-HYD	.073	.117
	256-HYD	.040 / .016	.064 / .026
	262-B-HYD	.040	.060
	270-MEGA-HYD	.056 / .059	.090 / .095
	280-MEGA-HYD	.072 / .074	.116 / .120
	292-MEGA-HYD	.091 / .094	.146 / .150
	FL-368	.095	.152
	FL-468	.118 / .121	.189 / .194
	FL-568	.114	.182
	FL-358	.094	.150
	FL-378	.101	.161
	RR-670-A	.150 / .157	.240 / .251
FORD BOSS 302-351 & 351 CLEVELAND	FL-370	.095	.166
	FL-470	.118 / .121	.206 / .211
	FL-570	.114	.200
	RR-747-C	.170 / .176	.298 / .308
	RR-747-D	.179 / .186	.314 / .326
FORD 332-428 V-8	262-HYD	.040	.070
	282-HYD	.060	.105
	270-MEGA-HYD	.056 / .059	.098 / .102
	280-MEGA-HYD	.072 / .074	.126 / .129
	EE-391	.101	.177
	EE-390	.095	.166
	EE-393	.118 / .121	.206 / .211
	EE-396	.114	.200
	EE-399	.130	.228
PONTIAC 389-421 V-8	280-HYD-HL	.060	.090
	270-MEGA-HYD	.056 / .059	.084 / .089
	280-MEGA-HYD	.072 / .074	.109 / .112
	292-MEGA-HYD	.091 / .094	.137 / .141
	304-MEGA-HYD	.110 / .112	.165 / .168
	RPM-300	.066	.099
	256-HYD	.040 / .016	.060 / .024
	262-HL-HYD	.042	.063
	270-HL-HYD	.049 / .051	.074 / .076
	CC-400	.094	.141
	CC-500	.106	.159
	Z-70	.114	.172
	Z-75	.133	.200
	RR-630	.135	.202
	RR-675	.138 / .135	.207 / .202