Distributor Vacuum Advance Control units
Specs and facts for GM Distributors

by Lars Grimsrud
Colorado Corvette Crazies (CCC)
The Ultimate Corvette Tuning & Beer Drinking Fraternity
Lafayette, CO

Rev. B 8-19-02

I've been seeing a lot of discussion and questions regarding distributor vacuum advance control units; what do they do, which ones are best, what was used on what, etc., etc. To clarify some of this, I thought I'd summarize a few facts and definitions, and provide a complete part number and specification listing for all vacuum advance control units used by Chevrolet on the points-style distributors. I'm also providing a listing of the specs for all other GM (non-Chevrolet) control units, but without the specific application listed for each (it would take me a bit too much time to research each part number by application across each of the GM Motor Divisions – it took me long enough to compile just the Chevy stuff…!). This latest revision to this paper also includes the HEI listings (the HEI distributors use a longer control unit, so the non-HEI and HEI vacuum advance control units CANNOT be interchanged).

As always, I'm going to include the disclaimer that many of these are my own comments and opinions based on my personal tuning experience. Others may have differing opinions & tuning techniques from those presented here. I have made every attempt to present factual, technically accurate data wherever possible. If you find factual errors in this information, please let me know so I can correct it.

Background
The vacuum advance control unit on the distributor is intended to advance the ignition timing above and beyond the limits of the mechanical advance (mechanical advance consists of the initial timing plus the centrifugal advance that the distributor adds as rpm comes up) under light to medium throttle settings. When the load on the engine is light or moderate, the timing can be advanced to improve fuel economy and throttle response. Once the engine load increases, this "over-advance" condition must be eliminated to produce peak power and to eliminate the possibility of detonation ("engine knock"). A control unit that responds to engine vacuum performs this job remarkably well.

Most GM V8 engines (not including "fast-burn" style heads), and specifically Chevys, will produce peak torque and power at wide open throttle with a total timing advance of 36 degrees (some will take 38). Also, a GM V8 engine, under light load and steady-state cruise, will accept a maximum timing advance of about 52 degrees. Some will take up to 54 degrees advance under these conditions. Once you advance the timing beyond this, the engine/car will start to "chug" or "jerk" at cruise due to the over-advanced timing condition. Anything less than 52 degrees produces less than optimum fuel economy at cruise speed.

The additional timing produced by the vacuum advance control unit must be tailored and matched to the engine and the distributor's mechanical advance curve. The following considerations must be made when selecting a vacuum advance spec:

How much engine vacuum is produced at cruise? If max vacuum at cruise, on a car with a radical cam, is only 15 inches Hg, a vacuum advance control unit that needs 18 inches to peg out would be a poor selection.

How much centrifugal advance ("total timing") is in effect at cruise rpm? If the distributor has very stiff centrifugal advance springs in it that allow maximum timing to only come in near red-line rpm, the vacuum advance control unit can be allowed to pull in more advance without the risk of exceeding the 52-degree maximum limit. If the engine has an advance curve that allows a full 36-degree mechanical advance at cruise rpm, the vacuum advance unit can only be allowed to pull in 16 more degrees of advance.

Are you using "ported" or "manifold" vacuum to the distributor? "Ported" vacuum allows little or no vacuum to the distributor at idle. "Manifold" vacuum allows actual manifold vacuum to the distributor at all times.

Does your engine require additional timing advance at idle in order to idle properly? Radical cams will often require over 16 degrees of timing advance at idle in order to produce acceptable idle characteristics. If all of this initial advance is created by advancing the mechanical timing, the total mechanical advance may exceed the 36-degree limit by a significant margin. An appropriately selected vacuum advance unit, plugged into manifold vacuum, can provide the needed extra timing at idle to allow a fair idle, while maintaining maximum mechanical timing at 36. **A tuning note on this**: If you choose to run straight manifold vacuum to your vacuum advance in order to gain the additional timing advance at idle, you ***must*** select a vacuum advance control unit that pulls in ***all*** of the advance at a vacuum level 2" below (numerically less than) the manifold vacuum present at idle. If the vacuum advance control unit is not ***fully*** pulled in at idle, it will be somewhere in its mid-range, and it will fluctuate and vary the timing while the engine is idling. This will cause erratic timing with associated unstable idle rpm. **A second tuning note on this**: Advancing the timing at idle can assist in lowering engine temperatures. If you have an overheating problem at idle, and you have verified proper operation of your cooling system components, you can try running manifold vacuum to an appropriately selected vacuum advance unit as noted above. This will lower engine temps, but it will also increase hydrocarbon emissions on emission-controlled vehicles.

Thus, we see that there are many variables in the selection of an appropriate control unit. Yet, we should keep in mind that the control unit is somewhat of a "finesse" or "final tuning" aid to obtain a final, refined state of tune; we use it to just "tweak" the car a little bit to provide that last little bit of optimization for drivability and economy. The vacuum advance unit is not used for primary tuning, nor does it have an effect on power or performance at wide open throttle.

With these general (and a little bit vague, I know…) concepts in mind, let's review a few concepts and terms. Then it's on to the master listing of specs and parts…..:

Part Number
There are many different sources for these control units. Borg Warner, Echlin, Wells, and others all sell them in their own boxes and with their own part numbers. Actually, there are very few manufacturers of the actual units: Dana Engine Controls in Connecticut manufactures the units for all three of the brands just mentioned, so it doesn't make much difference who you buy from: They're made by the same manufacturer. The part numbers I have listed here are the NAPA/Echlin part numbers, simply because they are available in any part of the country.

ID#
Every vacuum advance control unit built by Dana, and sold under virtually any brand name (including GM), has a stamped ID number right on top of the mounting plate extension. This ID, cross referenced below, will give you all specifications for the unit. So now, when you're shopping in a junkyard, you'll be able to quickly identify the "good" vs. the "bad" control units.

Starts @ "Hg
Vacuum is measured in "inches of Mercury." Mercury has the chemical symbol "Hg." Thus, manifold vacuum is measured and referred to as "Hg. The "Start" spec for the control unit is a range of the minimum vacuum required to get the control unit to just barely start moving. When selecting this specification, consideration should be made to the amount of vacuum that a given engine produces, and what the load is on the engine at this specification. For example, an engine with a very radical cam may be under very light load at 7 inches Hg, and can tolerate a little vacuum advance at this load level. Your mom's Caprice, on the other hand, has such a mild cam that you don't want the vacuum to start coming in until 9 – 10 inches Hg. For most street driven vehicle performance applications, starting the vacuum advance at about 8" Hg produces good results.

Max Advance
Since the vacuum advance control unit is a part of the distributor, the number of degrees of vacuum advance is specified in DISTRIBUTOR degrees – NOT crankshaft degrees. When talking about these control units, it is important that you know whether the person you're talking to is referring to the distributor degrees, or if he's talking crankshaft degrees. All of the listings shown in the following chart, and in any shop manual & technical spec sheet, will refer to distributor degrees of vacuum advance. You must DOUBLE this number to obtain crankshaft degrees

(which is what you "see" with your timing light). Thus, a vacuum advance control unit with 8 degrees of maximum advance produces 16 degrees of ignition advance in relationship to the crankshaft. When selecting a unit for max advance spec, the total centrifugal timing at cruise must be considered. Thus, a car set up to produce 36 degrees of total mechanical advance at 2500 rpm needs a vacuum advance control unit producing 16 degrees of crankshaft advance. This would be an 8-degree vacuum advance control unit.

Max Advance @ "Hg
This is the range of manifold vacuum at which the maximum vacuum advance is pegged out. In selecting this specification, you must consider the vacuum produced at cruise speed and light throttle application. If your engine never produces 20" Hg, you better not select a control unit requiring 21" Hg to work.

The following listing (Non-HEI) is as follows: The first two part number listings are the two numbers that are most commonly used in a Chevrolet performance application. The "B1" can is the most versatile and user-friendly unit for a good performance street engine. As you can see, it was selected by GM for use in most high performance engines due to its ideal specs. The "B28" can was used on fuel injected engines and a few select engines that produced very poor vacuum at idle. The advance comes in very quick on this unit – too quick for many performance engines. Do not use this very quick unit unless you have a cam/engine combination that really needs an advance like this. It can be used as a tuning aid for problem engines that do not respond well to other timing combinations, and can be successfully used in applications where direct manifold vacuum is applied to the can (see paragraph and discussion on this above)

After this, the listing is by Echlin part number. The Chevrolet applications are listed first by application, followed by a complete listing of all of the units used on any GM product (all GM units are interchangeable, so you can use a Cadillac or GMC Truck unit on your Vette, if that's what you want to do).

Non-HEI Distributors:

P/N	ID#	Application	Starts @ "Hg	Max Adv (Distr. Degrees @ "Hg.)
VC680	B1	1959 – 63 All Chevrolet 1964 Corvette exc. FI 1964 Impala, Chevy II 1965 396 High Perf. 1965-67 283, 409 1966-68 327 exc. Powerglide 1967-68 All 396 1969 Corvette 427 High Perf. 1969 396 Exc. High Perf. 1969 Corvette 350 TI 1969-70 302 Camaro 1970 400 4-bbl 1970 396 High Perf. 1970 Corvette 350 High Perf. 1973-74 454 Exc. HEI	8-11	8 @ 16-18
VC1810	B28	1965 409 High Perf. 1965 327 High Perf. 1966 327 High Perf. 1964-67 Corvette High Perf. FI	3-5	8 @ 5.75-8
VC1605	B9	1965 impala 396 Exc. High Perf. 1965 327 All Exc. FI 1969 327 Camaro, Chevelle, Impala	7-9	10.3 @ 16-18

		1969-70 Corvette 350 Exc. High Perf. 1969-70 350 4-bbl Premium Fuel 1970 350 Camaro, Chevelle, Impala High Perf. 1971-72 350 2-bbl AT 1971-72 307 All		
VC1675	B13	1968 327 Camaro Powerglide 1968 327 Impala AT 1968 307 AT 1968 302, 307, 327, 350 Camaro, Chevy II 1970 350 Camaro, Chevelle Exc. High Perf.	9-11	8 @ 16-18
VC1760	B19	1969 350 Camaro, Chevelle, Impala 4-bbl 1969-70 350 2-bbl	5.5-8	12 @ 14-18
VC1765	B20	1965 396 Impala High Perf 1966-67 Corvette Exc. High Perf. 1966-67 Impala 427 Exc. High Perf. 1966-68 327 Powerglide Exc. High Perf. 1969 307 All 1969-70 396, 427 Camaro, Chevelle High Perf. 1970 400 2-bbl 1970 307 MT 1973 Camaro 350 High Perf.	5-7	8 @ 11-13
VC1801	B21	1971 350 2-bbl 1971-72 400, 402 1971-72 307 AT	7-9	10 @ 16-18
VC1802	B22	1971-72 350 4-bbl	7-9	8 @ 14-16

Other Part Numbers & Specs:

VC700	B3	8-10	11.5 @ 19-21
VC1415	M1	6-8	10 @ 13-15
VC1420	M2	5-7	11 @ 16-17
VC1650	B12	8-10	10 @ 15-17
VC1725	B18	8-10	12 @ 13-16
VC1740	A5	6-8	12 @ 15-17.5
VC1755	A7	8-10	12.5 @ 18-20.5
VC1804	B24	6.5-8.5	10 @ 12-14
VC1805	M13	6-8	12 @ 14.5-15.5
VC1807	B25	5-7	8 @ 13-15
VC1808	B26	5-7	8 @ 11-13
VC1809	B27	5-7	9 @ 10-12
VC1812	B30	5-7	12 @ 11.75-14

The following listing (HEI) is as follows: The first four part number listings are the 4 numbers that are most commonly used in a Chevrolet performance application. The “AR12” can is the most versatile and user-friendly unit for a good performance street engine. The AR 15 and AR23 are almost identical, with only slight variations in their “start-stop” specs. The “AR31” can is the HEI equivalent to the “B28” Hi-Perf can used on the early engines: The advance comes in very quick on this unit – too quick for many performance engines. Do not use this very quick unit unless you have a cam/engine combination that really needs an advance like this. It can be used as a tuning aid

for problem engines that do not respond well to other timing combinations, and can be successfully used in applications where direct manifold vacuum is applied to the can (see paragraph and discussion on this above)

After this, the listing is by Echlin part number. All GM HEI vacuum advance units are interchangeable, so you can use a Cadillac or GMC Truck unit on your Vette, if that's what you want to do.

HEI Distributors:

P/N	ID#	Application	Starts @ "Hg	Max Adv (Distr. Degrees @ "Hg.)
VC1838	AR12	1975 350 Buick	7-9	7 @ 10-12
VC1843	AR15	1977 305 All Exc. Hi Alt, Exc, Calif. 1974 400 All w/2-bbl 1977 305 El Camino 1976 262 Monza Exc. Calif 1976 350 Vette Hi Perf, Incl. Calif 1975 350 Z-28 1977 305 Buick Skylark	3-5	7.5 @ 9-11
VC1853	AR23	1976 350 All Calif. 1976 350 Vette Calif., Exc. Hi Perf 1976 400 All, Exc. Calif 1975 350 4-bbl 1974 350 All w/1112528 Distr. 1978 350/400 Heavy Duty Truck, Exc. Calif, Exc. Hi Alt.	5-7	7.5 @ 11-12.5
VC1862	AR31		2-4	8 @ 6-8
---	---	---	---	---
VC1703	N/A	1978-79 Vette Special Hi Perf 1979 305 El Camino Calif. 1978-79 350 Blazer & Suburban 1979 Buick 305/350	N/A	N/A
VC1825	AR1	1976 454 Caprice, Impala 1975 454 Caprice, Chevelle, Monte, Suburban	3-5	9 @ 6-8
VC1826	AR2		5-7	12 @ 10-13
VC1827	AR3		5-7	9 @ 9-11
VC1828	AR4	1975-76 350 Buick & Olds 1976 350 Pontiac	6-9	10 @ 12-14
VC1831	AR7		6-8	12 @ 14-16
VC1832	AR8	1975-76 455 Buick Electra	4-6	12 @ 12-14
VC1833	AS1	1975-76 500 Cadillac Exc. Calif.	4-6	14 @ 15-16
VC1834	AR9		4-6	13 @ 13-16
VC1835	AS2	1975-76 350 Olds	5.5-7.5	12 @ 15-17

VC1836	AR10	1977 305 All Hi Alt, Exc. Calif. 1977 350 All exc. Calif. 1977 350 Vette Exc. Calif, Exc. Hi Perf 1976 305 All Exc. Calif 1976 350 All Exc. Vette, Exc. Calif 1976 350 Vette Exc. Calif., Exc. Hi Perf 1975 262, 350 All w/2-bbl carb 1975 350 All 4-bbl w/ 1112880 & 1112888 Distr. 1977 305 Chev Truck Light Duty 1975-76 350 El Camino 2-bbl	3-5	9 @ 11-13
VC1837	AR11	1976 305 Blazer, Exc. Calif 1976 350/400/455 Pontiac 4-bbl	6-8	12.5 @ 10.5-13.5
VC1839	AR13		4-6	12 @ 11-13
VC1840	AR14	1975-76 350/400/455 Pontiac Firebird	6-8	10 @ 9-12
VC1841	AS3	1975-76 500 Cadillac Calif.	5-7	10 @ 13-14
VC1842	AS4	1976 350 Olds Cutlass	5-7	12 @ 13-15
VC1844	AR16		3-5	12 @ 13.5-15.5
VC1845	AS5	1978-79 425 Cadillac w/F.I. 1977 425 Cadillac	4-6	14 @ 14-16
VC1846	AR17	1977 301 Buick Skylark 1977 301 Pontiac	3-6	13 @ 10-13
VC1847	AS6	1978 403 Motor Home 1977-79 350/403 Buick LeSabre Hi Alt, Riviera, Olds 1977-79 350/403 Pontiac Hi Alt	4-6	12 @ 12-14
VC1848	AR18		4-6	12 @ 9-12
VC1849	AR19		4-6	12 @ 7-10
VC1850	AR20	1977 350/400 Pontiac	4-6	10 @ 8-11
VC1851	AR21	1977-79 350 Buick LeSabre, Century 1978-79 350 Pontiac	5-7	12 @ 11-13
VC1852	AR22	77-78 305/350/400 Chev Truck, Heavy Duty 1975-76 350/400 Chev Truck Heavy Duty	7-9	5 @ 12-14
VC1854	AR24		3-5	13 @ 10-13
VC1855	AS7	1977-79 260 Olds Cutlass	3-5	15 @ 10-12
VC1856	AR25		3-6	15 @ 10-14
VC1857	AR26		3-6	12 @ 13-16
VC1858	AR27	1978-79 305 All 1978 350 Camaro	3-6	9 @ 11-13

		1978 305 Chev Truck, M/T, Light Duty 1978 350 Chev Truck Hi Alt 1978 305/350 Buick & Olds 1978-79 305 Pontiac		
VC1859	AR28	1979 350 Vette Exc Hi Perf 1978-79 305 w/1103282 Distr., Incl. El Camino A/T 1979 350 Camaro, Impala, Nova, Malibu, Monte 1979 350 Suburban 1979 350 Buick Century 1978 305/350 Buick & Olds 1978-79 305 Pontiac Hi Alt.	3-6	10 @ 9-12
VC1860	AR29		3-6	12 @ 10-13
VC1861	AR30	1978-79 301Buick 1979 301 Olds 1978-79 301 Pontiac	3-5	13 @ 11-13
VC1863	AR32		2-4	10 @ 11-13
VC1864	AR33	1978 305 Chev Truck, A/T, Light Duty	4.5-6.5	13 @ 11-13
VC1865	AR34	1973-74 350 Vette Special Hi Perf	3-5	15 @ 8.5-11.5
VC1866	AS8	1978-79 425 Cadillac w/carb	3-5	14 @ 13-15
VC1867	AS9		2-4	10 @ 8-10
VC1868	AR35	1979 305 Chev Truck & El Camino 1979 305 Buick & Olds 1979 305 Pontiac A/T	2-4	10 @ 6-9
VC1869	AS10		2-4	12 @ 8-11