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# EIGHT-LUG WHEELS: A RESTORATION CHALLENGE

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By Roger W. Riehl  
Unadilla, New York

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## "BRAKE-THROUGH" TECHNOLOGY:

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In 1960, the Pontiac Motor Division of General Motors Corp. introduced a revolutionary wheel and brake system for its full-size automobiles: Eight-Lug Wheels. This innovation was the brake system ultimate for its time. Made with a cast iron liner and an aluminum drum, this wheel combined the durability of iron with the heat dissipation qualities of aluminum. The result was a drum brake with stopping power superior to unfinned and finned HD cast iron drums.

The brake shoes and mechanisms were identical to the standard setup, so they are easily interchanged with standard brake drum and rim sets. The cast aluminum drums had fins on the outside for heat radiation and held eight lugs near the perimeter which mated with eight tangs of the special rim. Decorative nuts covered the bolt ends and the centers were covered by small caps. The rims had higher than usual safety beads for their time, making them superior in side slide stability. From 1960 to 1968, Pontiac offered these wheels on full size cars. They were particularly popular on '62-'68 Grand Prix models.

Although pictured in some rare promotional literature, Pontiac never actually sold GTO's sporting 8-Lugs.

There were several cosmetic and mechanical changes between 1960 and 1968. For example, only rims made in 1960 have folded edges on the lug holding tangs, and they will not fit on later drums ('63-'68) because the aluminum fins are too close to the lugs. Rims made after 1960 fit all drums. Except for a few gold-colored wheels, the finish on '60-'63 drums was natural aluminum and the rims were silver grey. The '64-'68 drums and rims were black with aluminum colored fin edges on the drums. The '65-'68 front drums have longer splash guards and deeper iron liners than previous drums. They

are held out further on the spindle for the 1/4" wider brake shoes (2 3/4" vs. 2 1/2").

These drums can be used on earlier cars provided the splash guard is trimmed back. However, since they are four/five pounds heavier, they should be used in pairs for even braking results. On '67-'68 rims, the band of metal holding the lug tangs was notched. The 1960 X-400 rims had eight separate lug brackets.

Wheel nuts used from '60-'62 were round-top acorn style, and from '63-'68 were longer and had tapered sides. They screwed onto replaceable 1/2-20 lugs which were pressed in from the inside. Lugs on the driver-side drums had left-hand threads from '60-'63. The '60-'62 hubcaps are a flat hat style; the '63-'64 hubcaps are conical sections and match the taper of the fins on the drum (the '63 is polished bright and the '64 is brush finished); and the '65-'68 hubcaps are curved semi-conical sections. All hubcaps are made from stainless steel and will fit all drums. In addition, there were two styles of trim rings: narrow ('60-'62) and wide ('63-'68).

Over the years, Pontiac experts debated and still disagree as to what effect installing 8-Lugs has on vehicle weight. Based on my own tests of all the variations noted above, I can say conclusively that both sides are partially correct. Installing 8-Lugs on '60 to '62 models results in a vehicle weight reduction of 10 pounds. This drops to two pounds in the '63 to '64 models. Then, in '65 and '66, the wider front drums make these cars six pounds heavier than non-8-Lug vehicles. And finally, in '67 and '68, lighter rims restore the balance to zero. This led me to an interesting discovery: if you use the '67-'68 rims on a 1960 vehicle and remove the trim rings and adapter plate, you can reduce vehicle running weight by 22 pounds! (Since the 8-Lug spare is 3 pounds lighter than the standard, removing it for drag racing shrinks the weight advantage to 19 pounds.)

The tricky part of making these wheels was manufacturing the brake drums. Pontiac would first cast the iron liner and then cast the aluminum drum over it. The iron liner was cast with reverse-tapered serrations that kept it from separating and moving out of the drum during use. The '65-'68 front drum (casting #58154) has a single ridge retainer and a thicker, wider liner. The final combined casting was then machined and balanced.

Balancing involved screwing up to four steel weights onto the drum to compensate for off-center positioning of the iron liners. The rear drums were made with five mounting holes which matched up with the rear axle flange, using standard nuts to retain it. The front drums had integrally cast rotors of aluminum which held the inner and outer front wheel bearings.

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## ALL THAT GLITTERS...

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Although I and many others agree that these 8-Lug wheels are the best drum brake system furnished on production automobiles, they are not without their special problems and precautions. Since 1969, with the advent of front disc brakes, 8-Lugs have been out of production. For the first decade or so afterwards, it was relatively easy for mechanics and restorers to get new replacement stock or substitute less worn drums for worn out ones. For the last 15 years, though, the supply of good drums has been shrinking and new ones are practically nonexistent.

The rims are still in good supply, although many are broken by poor tightening of the nuts. To prevent this, nuts should be rechecked for tightness several times during the first 200 miles. If two adjacent nuts are loose the tangs on either side of them can break off from vibration. (The 1960 rims are more resistant to this problem.)

Occasionally, wheel balance is an issue. The balance weights can fall off when the screws that hold them rust with age, causing vibration and bearing wear. If that happens, the front bearings must be changed with care because they are in aluminum seats which are easily damaged. The '60-'61 front drums are bored for ball bearings, however in '61, special cup pieces permitted the use of roller cones which are identical to later bearings. ('58-'61 brake drums can use these cups to convert from ball to roller bearings.)

Of all the problems encountered with 8-Lug wheels, there is one which dwarfs all others. This is the problem of corrosion forming between the iron liner and the aluminum drum. During the process of heat cycling with normal use, the iron liner begins to separate from the aluminum at the edges of the drum, because of the difference in expansion rates between iron and aluminum. There is a greater problem at the edges than near the finned end

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where heat is removed more efficiently. As moisture seeps in between the aluminum and the iron liner, corrosion occurs rapidly due to the proximity of the dissimilar metals. Furthermore, the rate of corrosion is intensified electrically by the thermocouple formed by the iron/aluminum interface being heated during braking.

Corrosion caused two problems for the original equipment. The first problem was that expanding corrosion under the iron caused the iron to bulge up and crack. The second problem was the thermal insulating effect of the corrosion layer itself, which caused the brakes to fade easier as time went on. To fix this, Pontiac started coating the outer surface of the iron liner with an insulating material in 1964. While alleviating the problem of corrosion, heat transfer was not as good. Even with this innovation, air eventually invaded the space between the aluminum and the iron, with the result that fading increased with time. Wider front brake shoes from '65 to '68 did not help because cars were then heavier.

### HOW DO I RESTORE THEE?

Faced with the growing shortage of good 8-Lug drums, restorers were left with two options:

1) Abandoning 8-Lugs altogether; or 2) relining worn out or corroded drums.

For many, option 1 was unacceptable. But option 2 would prove to be elusive.

Prior attempts to reline these wheels have produced somewhat disappointing results. Here's a summary of what's involved in relining an 8-Lug. First of all, the old iron liner must be scraped out and the drum turned using heavy machinery to remove all corrosion and damage from the surface. Then a new iron insert must be cast and machined so that it is slightly larger than the drum it is being matched to. It is then inserted by expanding the aluminum with heat to get an interference fit. (Iron must be used for the insert because it is the only material that can handle the wear and heat of heavy braking and give the correct coefficient of friction with the brake shoe lining.) But if no provision is made to prevent the entrance of moisture, the clock starts ticking on the corrosion process, all over again.

If the restorer got past all that, a

new problem appeared: under heat cycling the inserts move out of the drums. After all, the new inserts lack the reverse-tapered serrations of the originals, so there is nothing holding them in other than the grip of the drum. Under load and heat, the drum begins to take a conical shape, pushing the insert out. It does so because it expands more at the edges than at the finned side which is more efficiently cooled. (Spinning of the iron liner in the aluminum does not seem to be a problem as an unsecured liner can move out .25 inches while rotating less than 2 degrees.)

### REVERSAL OF FORTUNES

If all that seems insurmountable, I have good news. My company, CCC, has come up with a solution to each of these problems. For starters, we use a proprietary method of retaining the insert. There are no visible devices but we guarantee the insert will not, under any circumstance, leave the drum or rotate in it. Even chewed-out corroded basket cases can be restored like new.

Sandwiched between the iron and aluminum is a special coating that excludes moisture and air and conducts heat better than the coating Pontiac used. (It also has a higher temperature rating than the epoxy used to hold brake shoe linings.) This coating, which is critical to our success, has a thick grease-like consistency that allows it to distribute evenly as the heated drum shrinks over the new iron insert. If, in service, the drum is overheated, it will not inhale air because the coating expands to fill voids and is too viscous to move through a crack under vacuum. The coating also fills the voids and surface pores of the iron insert which further enhances heat transfer and electrically insulates the two metals.

The drums are perfectly balanced as part of the remanufacturing process. That's because we center-bore the drum and use a perfectly concentric insert which is finish-bored before insertion. Consequently, no balance weights are needed nor can the wheel lose its balance over time.

In short, an 8-Lug wheel relined this way is better than new. Knowing what you now know, you could attempt it yourself with a reasonable shot at success. Or, if you prefer, CCC would be happy to do it for you, just as we have for many Pontiac enthusiasts, just like you. Some of the other things we specialize in are beadblast, bearing changes, realignment of bearing bores, sleeving of bearing bores, and installation of new lugs. We are also studying repair techniques for broken rim tangs and will hopefully have something good to report to you soon. And, if there is sufficient interest, we are looking at reproducing nuts and caps, and casting completely new drums.

Before closing, I would like to thank Mr. Merle Green of Warrior Revival Co. for his help in compiling some of the information used in this report. Of course, an article like this can't answer all your questions. So if there is anything else about 8-Lugs you need to know, please write or call me at CCC. I'll make sure you get an answer.

### About the Author

Roger W. Riehl is a scientist, engineer and inventor. He joined POCI in 1982 and has restored several 1960's vintage Pontiacs. He currently owns three 1960 Bonnevilles which he maintains, himself. He regularly drives his black four door. Mr. Riehl can be reached at CCC, RD 3 Box 250-A, Unadilla, New York, 13849, or by calling 607-265-3432. For a reprint of this article plus other 8-Lug charts, pictures, etc., send SASE plus \$3 to CCC at the address above.



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WEIGHT CHART ITEM	STANDARD WHEELS (wt. in lbs.)				8-LUG WHEELS					
	QUAN.	60-62	63-64	65-68	QUAN.	60-62	63-64	65-66	67-68	
Adapter Plate	0	0	0	0	1	3.25	3.25	3.25	3.25	
Hub (iron)	2	7.00	7.00	7.00	0	0	0	0	0	
Front Drum	2	17.31	16.50	*21.50FC	2	21.50	22.75	26.50	26.50	
Rear Drum	2	17.31	16.50	16.50	2	17.50	18.13	18.13	18.13	
Trim Ring	0	0	0	0	5/4	(5) .56	(4)1.00	(4)1.00	(4)1.00	
Cover/Cap	4	1.4	1.4	1.4	4	.38	.38	.38	.38	
Wheel Rim	5	18.44	18.44	18.44	5	16.60	16.50	16.50	15.50	
Nuts(STD)	20	.062	.062	.062	10	.062	.062	.062	.062	
Nuts,Capped	0	0	0	0	32	.081	.094	.094	.094	
TOTALS (lbs.)		182.29	179.04	*189.04FC		171.28	176.65	184.16	179.16	
(* FC=W/Full Cast Front Drums)						Weight Loss-	11.01	2.39	*4.88	* 9.88

### 8-LUG WHEEL PARTS LIST

WHEEL RIM Group # 5.803 (8-LUG,14x6" Steel)	Years Used	GM PART#
W/Reinforced Lug Tangs, Silver Gray Face (Fits 60-62 only)	60-61E	535288
W/Flat Lug Tangs, Silver Gray Face	61-63	540997
W/Flat Lug Tangs, Black	64-66	9776156
W/Flat Lug Tangs, Black, Notched Band	67-68	9787151
FRONT DRUM Group # 6.306,(8-LUG Finned Al.)	Casting #s	
Short Fin RHT, Ball Brng.,Alum.Clr.(60-45228=ALCOA)	KH-E 45228/46002	60-61 535279
Short Fin LHT, Ball Brng.,Alum.Clr.(60-45228=ALCOA)	KH-E 45228/46002	60-61 535280
Short Fin RHT, Roller Brng.,Aluminum Color	KH 49013	62 541544
Short Fin LHT, Roller Brng.,Aluminum Color	KH 49013	62 541545
Long Fin RHT, Roller Brng.,Aluminum Color	KH 49313	63 9770799
Long Fin LHT, Roller Brng.,Aluminum Color	KH 49313	63 9770800
Long Fin RHT, Roller Brng.,Black	KH 49313	64 9776153
Long Fin RHT, Roller Brng.,Black, Wide Shoes	KH 58154	65-68 9778481
REAR DRUM Group # 5.809,(8-LUG Finned Al.)		
Short Fin RHT, Aluminum Color (60-45234=ALCOA)	KH-D 45234/46008	60-62 535282
Short Fin LHT, Aluminum Color (60-45234=ALCOA)	KH-D 45234/46008	60-62 535283
Long Fin RHT, Aluminum Color	KH 49317	63 9770793
Long Fin LHT, Aluminum Color	KH 49317	63 9770794
Long Fin RHT, Black	KH 49317	64-68 9776152
HUB CAP Group # 5.858A (Stainless + Chrome Flash)		
Flat Hat Style, Polished Sides, Grained Center	60-62	535286
Conical Style, Polished Cone Surface	63	548980
Conical Style, Grained Cone Surface	64	9775310
Semi-Conical, (Fried Egg), Polished	65-68	9780985
TRIM RING Group # 5.858B--(Stainless + Chrome Flash)		
Narrow Type,Polished Finish	60-62	535376
Wide Type,Bright Polished edges,Deep dish (3" total depth)	63-66	548981
Wide Type,Bright Polished edges,Deep Dish (3" total depth)	67-68	9785696
LUG NUT & WHEEL STUD (lug) Group # 5.183 & 5.812		
Acorn Style,Oval Top, Chrome Plated, 1/2"-20 RHT	60-62E	535275
Acorn Style,Oval Top, Chrome Plated, 1/2"-20 LHT	60-62E	535276
Capped Nut,Crown Top, Chrome Plated, 1/2"-20 RHT	62L-68	544459
Capped Nut,Crown Top, Chrome Plated, 1/2"-20 LHT	62L-63	544460
Press Fit,1/2"-20 RHT,Offset Head,5/16" shoulder,1-1/8"long,.600 Knurl D	60-68	536657
Press Fit,1/2"-20 LHT,Offset Head,5/16" shoulder,1-1/8"long,.600 Knurl D	60-68	536658
BEARINGS & SEALS Group #s 6.311 & 6.313		
Ball Type, Front Inner,(B-70),(2.6487 OD),(1.25 ID)(Seal #533249)	58-61E	909070
Ball Type, Front Outer,(B-67),(2.0787 OD),(.75 ID)	58-61E	909067
Cup Adapter,Front Inner(IM-67019) (2.6487 OD),(Heavy Duty)(Seal#533249)	58-61	Hyatt#153213Y
Cup Adapter,Front Outer(IM-11919),(2,0787 OD),(Heavy Duty)	58-61	Hyatt#113158Y
Roller Type,Front Inner,(2.329 OD),(1.25 ID), (A-6)(Seal #539161 62-70)	62-84	7450630
Roller Type,Front Outer,(1.781 OD),(,75 ID), (A-2)	62-84	7450627

## PAINTING SPECIFICATIONS FOR 8-LUG ALUMINUM BRAKE DRUMS

### SURFACE PREPARATION

1. Inspect fin edges for deep scratches and burrs. File as required.
2. Sandblast with medium sand using high pressure gun.
3. Solvent flush to remove all traces of compressor oil.  
Use SNAP brand Carb & Choke Cleaner (pure acetone) (not Gumout)  
(A Sodium Hydroxide [lye] etch will not bother iron or lugs)

### CLEAR COAT PROCESS 60-63: For Drums Only (Holds up 5 years in weather)

4. Wet with Phosphoric Acid/Fluoride conditioner for 2-3 Min.  
Do not allow to dry. Cover lugs. Keep off Liner.  
(Cleans, Brightens, Etches)(PPG, DX 533, ALUMIPREP)
5. Flush with clear water.
6. Wet with Clear Alodine solution for 2-5 Minutes.  
Do not allow to dry.(PPG, DX 501)  
(Passivates surface, Prevents filiform corrosion.)
7. Flush with clear water. Allow to dry.
8. Spray on a fine coat of Chrome/Alum to brighten.  
(Dutch Boy # 4101 spray can.)(Limits Graying/Wet look)
9. Apply fine coats of Urethane Clear Coat until slightly gray.  
(Dust with #4101 to pull brightness back before clear dries)  
(Dupont # 7500s Chromaclear + 7585s Activator Mix 4:1)

Notes: Wet look will fade with time and exposure to weather.  
We recommend doing 4 at once for best match.

### OTHER ALUMINUM COLOR PROCESSES 60-63 (For rims and drums)

4. Apply one coat of Gray Epoxy primer.(PPG. DP-50/DP-401)(Mix 1:1)
5. Cover with Thin coat of Lt.Metalic Silver Gray.(77 chevy code 13)  
(Ditzler[PPG] #2953 Laquer w/Flatner),(looks like Argent Silver)

NOTE: Original rims came in 2 silver colors. These were a white silver or an Aztec greenish-grey silver. Both have been found on 60-63 Rims.  
Early rims were black except for outer face. Drums were clear Anodized?

### BLACK PAINTING PROCESS 64-68 (For rims and drums)

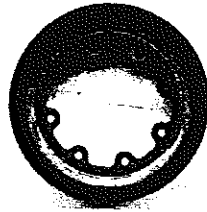
4. Spray on 1 or 2 wet coats of Black Epoxy Primer.  
(PPG, DP-90/DP-401)(Mix 1:1)
5. Paint one drum & before paint dries: Stretch clean cloth over finger tip. Wipe off excess from each fin edge moving cloth each time. Dampen with solvent. Wipe to finish. Don't press hard.  
Use SNAP Brand Carb/Choke Cleaner.(Pure Acetone) (Not Gumout)

### IMPORTANT INSTALLATION TIPS IGNORE THIS AT YOUR OWN RISK!

1. WHEELS MUST TURN FREELY. Adjust shoes accordingly.  
(Rubbing can warp liners with heat. Light brushing is OK.)
2. REAR DRUMS are pulled off center when tightening lugs.  
(5 ways to mount / Mark drum & Axle for future Reference)
3. BEWARE A BENT RIM. Even one tang bent .060" can pull drum out of round and make pedal throb & Car vibrate.
4. HARD BRAKE SHOE MATERIALS will chew up drums and may cause vibration. Use only soft asbestos/organic types.  
Ours are soft asbestos/organic & inspected by us.
5. DO NOT REPLACE BEARING RACES, We inspect good or replace.
6. WEAK, RUSTED SPRINGS, can cause chatter/sticking on release.

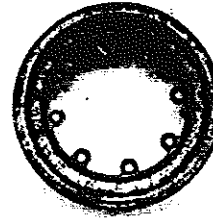
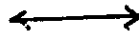
WHEELS  
(RIMS)

Curled  
Edges



1960-61 PN 535288

Silver  
Color

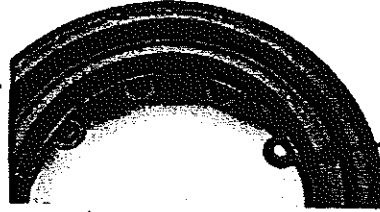


1961-63 PN 540997

Black  
Color



1964-66 PN 9776156

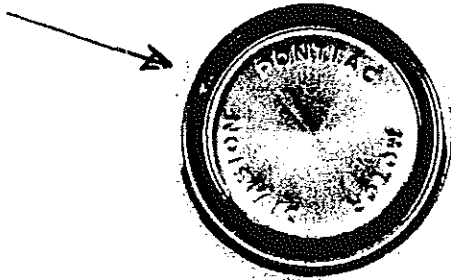


1967-68 PN 9787151

Notched  
Ring

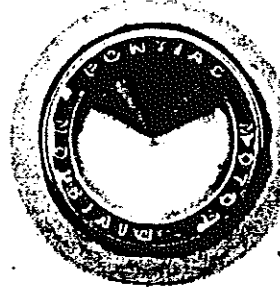
CENTER CAPS

Inquire  
For Price



1960-62 PN 535286

Polished  
Finish

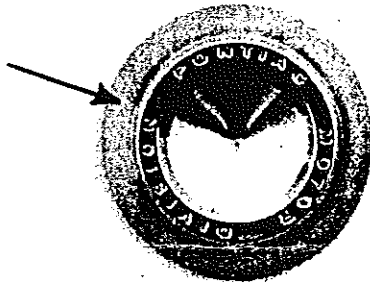


1963 PN 548980

Driver, Better, Show

\$25, 35, 45 ea.

Brushed  
Finish



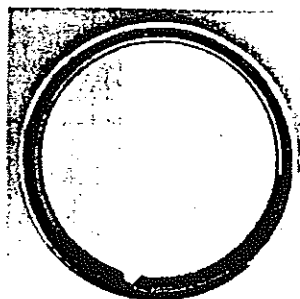
1964 PN 9775310



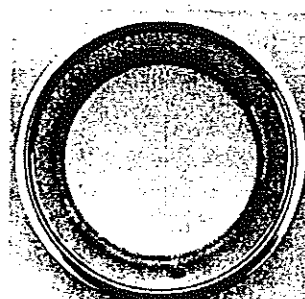
1965-68 PN 9780985

TRIM RINGS

REFURBISHED ORIGINALS AVAILABLE (Repros are not exact)



1960-62 PN 535376



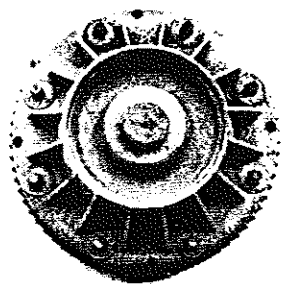
1963-68 PN 548981 & 9785696

RTC Division CCC  
RD #3 Box 250-A  
Unadilla, NY 13849  
Tel 607-265-3432

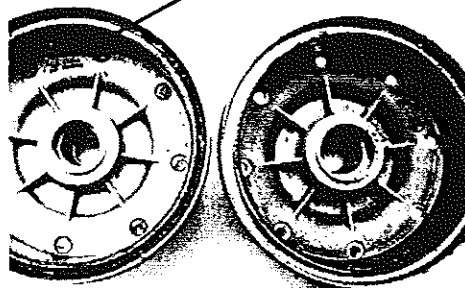
### ALUMINUM DRUM ASSEMBLIES

TRADE IN YOUR SURPLUS OR INCORRECT 8-LUG COMPONENTS ON YOUR ORDER OR SEND LATER FOR CASH REFUND.

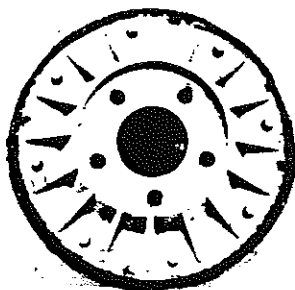
Casting #



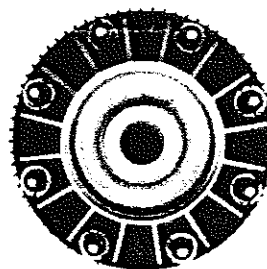
1960-62  
(Short Fins)  
(Alum. Color)



LATE 1961-62  
COMPARISON OF BALL  
& ROLLER BEARINGS



1963  
(Long Fins, Alum.Color)



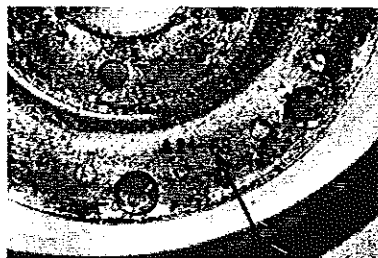
1964-68  
( Long Fins, Black Color)

65-68  
(wider)

60-64



1964-68  
COMPARISON OF  
FRONT DRUM WIDTH



1960-68  
DETAIL OF  
DATE STAMP

### LUG NUTS

STAINLESS STEEL SETS (32)---\$140.00  
CHROME PLATED STEEL (32)--\$ 75.00 - (only \$60.00 w/drum orders)  
(63 & earlier sets have 16 LHT & 16 RHT)  
(No extra S&H for nuts with drum orders)



60-62

ACORN STYLE  
PN 535275 & 535276



63-68

HEX CROWN STYLE  
PN 544459 & 544460