



# MOTOWN 220/23° CYLINDER HEADS

## Iron & Aluminum SBC Specifications and Instructions

Technical instructions for assembled & bare head part numbers:

### IRON 220

014150	<b>220cc Bare, angle plug, 64cc chamber</b>
014150-2	Mechanical flat tappet, hydraulic roller, angle plug, 64cc chamber 1.437 dual spring
014150-3	Mechanical roller, angle plug, 64cc chamber 1.550 dual spring
014250	<b>220cc Bare, straight plug, 64cc chamber</b>
014250-2	Mechanical flat tappet, hydraulic roller, straight plug, 64cc chamber 1.437 dual spring
014250-3	Mechanical roller, straight plug, 64cc chamber 1.550 dual spring

### ALUMINUM 23°

024015	<b>215cc Bare, straight plug, 64cc chamber</b>
024015-1	Hydraulic cam, straight plug, 64cc chamber 1.250 single spring
024015-2	Mechanical flat tappet, hydraulic roller, straight plug, 64cc chamber 1.437 dual spring
024015-3	Mechanical roller, straight plug, 64cc chamber 1.550 dual spring
024020	<b>235cc Bare, angle plug, 64cc chamber</b>
024020 - 2	Mechanical flat tappet, hydraulic roller, angle plug, 64cc chamber 1.437 dual spring
024020 - 3	Mechanical roller, angle plug, 64cc chamber 1.550 dual spring

### Specifications:

<b>Valves: 215 / 220cc</b>	2.08 Intake	-1 and -2 Aluminum Head replacement valve part # 830627
		-2 Iron Head replacement valve part # 830625
		-3 Iron and Aluminum Head replacement valve part # 830627
	1.60 Exhaust	-1 Aluminum Head replacement valve part # 830636
		-2 Iron Head replacement valve part # 830615
		-2 Aluminum Head replacement valve part # 830616
		-3 Iron and Aluminum Head replacement valve part # 830636

<b>Valves: 235cc</b>	2.08 Intake	-2 and -3 Head replacement valve part #830627
	1.60 Exhaust	-2 Head replacement valve part # 830616
		-3 Head replacement valve part # 830636

**Valve Locks:** -1 & -2 Heads have 7 degree locks. Replacement part # 830305  
-3 Heads have 10 degree locks. Replacement part # 830310

### Valve Springs & Retainers:

-1 Heads use a 1.250 diameter spring. Seat pressure 100 lbs. @ 1.810 Replacement part # 830105. Retainer part # 83210  
-2 Heads use a 1.437 diameter spring. Seat pressure 125 lbs. @ 1.810 Replacement part # 830110. Retainer part # 83225.  
-3 Heads use a 1.550 diameter spring. Seat pressure 200 lbs. @ 1.900 Replacement part # 830115. Retainer part # 830235.

**Pushrod Guide Plates:** Motown 220 Iron replacement guideplate part # 830450. Motown 23° 215cc replacement guideplate part # 830454. Motown 23° 235cc replacement guideplate part # 830456 .Note: Hardened pushrods MUST be used with guideplates. Plates MUST be adjusted to obtain proper rocker/ valve tip alignment.

**Oil Seals:** -1& -2 Iron and Aluminum use umbrella type replacement part # 830405. -3 Iron and Aluminum use PC type replacement part # 830410.

**Pushrods:** To obtain proper rocker geometry, pushrod length will need to be determined by using an adjustable checking pushrod.

**Rocker Arms:** Motown Iron heads utilize a standard offset rocker designed for the Small Block Chevy. Motown 23° Aluminum heads use a standard exhaust rocker and an intake rocker with a .150 offset. This head uses a special stud girdle. Part # 832005.

**Special Note:** When using rocker arms greater than 1.5 ratio, it may be necessary to elongate the pushrod guide holes in the cylinder head. On aluminum heads with the offset rocker arms, it may be necessary to relieve the corner of the intake rocker for clearance.

**Rocker Arm Studs:** -2 Iron heads use a 3/8 rocker arm stud. Replacement part # 830475 / -3 Iron and All Aluminum heads use a 7/16 rocker arm stud. Replacement part # 830480

**Combustion Chamber Volume:** Iron and Aluminum 64cc.

**Intake Runners:** Iron-220cc, Aluminum 215 or 235cc

**Head Bolts:** ARP bolts 134-3601

**Head Studs:** ARP studs 134-4001

**Head Gaskets:** Fel Pro 1003. If steam holes are needed for 400 engines, use a 1014 gasket. Note: Motown iron and aluminum heads are not drilled for steam holes. If steam holes are desired, it is necessary to drill six 1/8 steam holes. To drill, invert the cylinder head with the deck side up. Using a head gasket as a template, center punch the head where the steam holes will be drilled. The three steam holes closest to the intake side must be drilled at a 30 degree angle toward the exhaust side of the head. The remaining three steam holes that are closest to the exhaust side will be drilled straight down.

**Intake Gaskets:** Mr. Gasket 5821 or equivalent

**Header Gaskets:** Fel Pro or equivalent

**Spark Plugs:** Iron heads use a .460 reach, 5/8 hex plug such as an Accel 276 or equivalent. Iron heads with angle plugs, may use Accel 276S to gain additional header to plug clearance. Aluminum cylinder heads MUST use .750 reach plug such as an Accel 416 or equivalent.

**Emissions:** These heads are intended for pre-emission vehicles and off road use.

## **Before Final Assembly**

1. Please inspect castings for defects or damage prior to modification, assembly or installation. Cylinder heads that have been modified, installed or used ARE NOT RETURNABLE. Then install the cylinder head with no head gasket and snug the bolts.
2. Due to different ratio rockers and different deck height blocks, now is the time to check for pushrod to cylinder head interference. If the pushrod has interference with the cylinder head, remove the cylinder head, grind the casting the needed amount, clean the head after grinding, reinstall the cylinder head using the mock up procedure and recheck the clearance. Repeat the procedure as necessary until the desired clearance is achieved.
3. The Motown 220 & Motown 23° 215cc use a 2.08 diameter intake valve. Because of the larger diameter intake valve it is VERY IMPORTANT to check piston to valve and valve to valve pocket clearance.
4. Once everything has been checked and all the desired clearances and specifications achieved, final assembly may begin.
5. If a new flat tappet camshaft is being installed with a -2 cylinder head, it is HIGHLY RECOMMENDED to remove the inner valve spring during the camshaft break in procedure. After the cam is broken in, reinstall the inner valve spring.

## **ATTENTION:**

ALL EXHAUST, VALVE COVER, INTAKE AND ROCKER STUDS AND/OR BOLTS MUST HAVE SEALER APPLIED TO THEM AS SOME OF THEM GO INTO WATER.

### **Head Bolt Torque Specs:**

Torque all head bolts to 75 ft. lbs. (iron heads) 70 ft. lbs. (aluminum heads and studs) Before torquing, coat the head bolts and rocker studs with a thread sealing paste available from ARP. NOTE: See the factory service manual for proper head bolt tightening sequence.

**Rocker Arm Studs:** 55 ft. lbs.

### **Machine Shop Specs:**

NOTE: Specs are for reference only. ALWAYS measure before machining.

**Maximum Valve Diameter:** 2.080 Intake & 1.600 exhaust (Iron & 215CC Aluminum) 2.080 & 1.600 Exhaust (235CC Aluminum)

**Maximum Spring Seat Depth:** Spring seat is cut to accept a 1.550 spring. IT IS NOT RECOMMENDED TO CUT THE SPRING SEAT DEEPER OR TO ENLARGE THE SEA FOR A SPRING DIAMETER OVER 1.550.

**Maximum Spring Diameter:** 1.550

**Maximum Flat Mill:** .080

**Maximum Angle Mill:** .175

**Approximate Milling Guidelines:** .007 per 1cc

## **Brackets and Accessories:**

1. The Motown 220/Motown 23° have accessory bolt holes drilled in the factory locations.
2. The Motown 220/Motown 23° are drilled to accept either perimeter bolt valve cover or center bolt valve cover. However, because of the larger diameter of the valve springs used on these heads; there may be interference with the bolt supports when using centerbolt valve covers. It is HIGHLY RECOMMENDED to use the perimeter bolt style valve cover to eliminate clearance issues.
3. When using Motown/Motown23° heads with an angle plug location, use an exhaust header designed for angle plugs.

## **WARRANTY TERMS:**

World Products Inc. (World) manufactures parts to meet QS 9000 specifications. In addition, all parts go through several inspection procedures before shipping. However, YOU ARE THE FINAL INSPECTOR. Please note: Inspect all parts before doing any machine work or assembly. Remember the saying "measure twice and cut once." If any defects are found or suspected, call World before proceeding. World will replace or repair at its option any defective part which has not been modified or misused within one year of INVOICE purchase date. Any modification or marine use of parts will void all warranties.

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## **WARRANTY CLAIMS:**

Contact Customer Service to obtain a Return Material Authorization number directly from World Products for any warranty return. DO NOT CONTACT YOUR DEALER. DO NOT RETURN PARTS WITHOUT AUTHORIZATION. Returned product must be shipped prepaid. Collect shipments will be refused. Returned parts must have RMA number on the outside of the package, a copy of original bill of sale inside and a written explanation of the suspected defect. If the item is found defective, World Products will repair or replace it at its discretion and return it freight prepaid. No additional labor claims will be paid. There will be no exceptions to this rule.

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SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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