



# Instruction Sheet

Manufacturer of the Highest Quality Engine Blocks, Heads & Manifolds.

CASTING ID# **WOR-077A/B**

## 23° SMALL BLOCK CHEVY ALUMINUM HEADS

### Technical Instructions for assembled & bare head part numbers:

#### **024015    WOR-077B Bare head, 23° valve angle, 215cc Intake runner, 64cc chamber, straight plug**

- 024015 - 1    Assembled head, for Hydraulic flat tappet camshaft
- 024015 - 2    Assembled head, for Mechanical flat tappet or hydraulic roller camshaft
- 024015 - 3    Assembled head, for Solid roller camshaft

#### **024020    WOR-077A Bare head, 23° valve angle, 235cc Intake runner, 64cc chamber, angle plug**

- 024020 - 1    Assembled head, for Hydraulic flat tappet camshaft
- 024020 - 2    Assembled head, for Mechanical flat tappet or hydraulic roller camshaft
- 024020 - 3    Assembled head, for Solid roller camshaft

#### **024020C    WOR-077A Bare head, 23° valve angle, 255cc Intake runner, 64cc chamber, angle plug**

- 024020C - 1    Assembled head, for Hydraulic flat tappet camshaft
- 024020C - 2    Assembled head, for Mechanical flat tappet or hydraulic roller camshaft
- 024020C - 3    Assembled head, for Solid roller camshaft

### Specifications:

**Port Dimensions:** 024015    215cc intake: 2.275" x 1.185", Exhaust: 1.420" x 1.440"  
024020    235cc intake: 2.280" x 1.240", Exhaust: 1.360" x 1.640"  
024020C    255cc intake: 2.370" x 1.290", Exhaust: 1.720" x 1.500"

**Port Locations:** Intake: Stock, Exhaust: Stock

**Combustion Chamber Volume:** 64cc

**Valve Guides:** Manganese Bronze

**Valve Guide Spacing:** Ctr-Ctr 1.900" (Intake stock location / Exhaust is moved .040")

**Valve Seats:** Intake = integral cast iron seat, Exhaust = Durabond Powdered metal seat .006" press fit

**Valve Seat Dimension:** Intake 2.160"x 1.800"x .375" Exhaust 1.650"x 1.300"x .375"

**Valve Seat Angles:** Intake = 38°-(45°(.040"))-60°-75° Exhaust = 38°(45°(.060))-500radius-75°

**Intake Valves:** 2.080" 11/32" x Std Replacement part # 702825RM (For -1,-2,-3 Head assemblies)

**Exh. Valves:** 1.600" 11/32" x Std Replacement part # 702710RM (For -1,-2,-3 Head assemblies)

**Valve Locks:** 7 degree stamped steel locks. Replacement part # 702155-16 (for -1 &-2 head assemblies)

10 degree machined steel locks. Replacement part # 702156-16 (for -3 head assemblies)

**Valve Seals:** Umbrella valve seal. Replacement part # 702177-16 (for -1 &-2 head assemblies)

Metal clad Viton valve seal. Replacement part # 702179-16 (for -3 head assemblies)

**Valve Springs:** 1.250" O.D. single valve spring. Seat pressure 100 lbs. @ 1.810 Replacement part # 702202-16 (for -1 head assemblies)

1.437" O.D. dual valve spring. Seat pressure 125 lbs. @ 1.810 Replacement part # 702204-16 (for -2 head assemblies)

1.550" O.D. dual valve spring. Seat pressure 200 lbs. @ 1.900 Replacement part # 702206-16 (for -3 head assemblies)

**Spring Retainers:** 1.250" O.D. single valve spring Replacement part # 702102-8

1.437" O.D. single valve spring Replacement part # 702104-8

1.550" O.D. single valve spring Replacement part # 702106-8

**Pushrod Guide Plates:** Requires BMP flat style hardened steel guide plate. Replacement part # 702351-8.

**NOTE:** Hardened pushrods MUST be used with guideplates. The plates MUST be adjusted to obtain proper rocker/ valve tip alignment.

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

**Rocker Arms:** Motown 215 heads require a .150" offset intake rocker arm

Motown 235 heads require a .150" offset intake rocker arm

**NOTE:** When using rocker arms greater than a 1.5 ratio, it may be necessary to elongate the pushrod guide holes in the cylinder head.

**Rocker Arm Studs:** 3/8 rocker arm stud. Screw in style Replacement part # 702300-8 (for -1&-2 head assemblies)

7/16 rocker arm stud. Screw in style Replacement part # 702304-8 (for -3 head assemblies)

**Rocker Stud Girdle:** Must use BMP 7/16" part# 702452

**Head Bolts:** standard SBC head bolt hardware (ARP bolts 134-3601)

**Head Studs:** standard SBC head Stud hardware (ARP studs 134-4001)

**Head Gaskets:** Fel Pro 1003. If steam holes are needed for 400 engines, use a 1014 gasket. NOTE: Sportsman II 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 of the 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 of the head will be drilled straight down.

**Intake Manifold:** any conventional SBC intake manifolds. Due to tall port design and some manifold designs, check to make sure intake manifold covers the ports

**Intake Gaskets:** Felpro 1205, 1206 or equivalent.

NOTE: Earlier heads were made with early and late model intake bolt pattern. If using early model pattern then you must make sure the two late model bolts are covered by the gasket and manifold or simply seal with silicone or a set screw and loctite

**Header Gaskets:** Fel Pro 1404 or equivalent

**Pistons:** Most 23° aftermarket pistons

**Spark Plugs:** .14mm 750" reach, recommended starting point Accel #416.

**Head Bolt Torque Specs:** Torque all head bolts to 75 ft. lbs w/ oil. Before torquing, coat the head bolts and rocker studs with a thread sealing paste.

Note: Refer to the factory service manual for proper head bolt tightening sequence

**Rocker Arm Studs:** 75 ft. lbs. w/oil

NOTE: Specs are for reference only. Always measure before machining. REMEMBER: MEASURE TWICE, CUT ONCE.

**Maximum Valve Diameter:** 2.100 Intake & 1.625 Exhaust.

**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 SEAT FOR A SPRING DIAMETER OVER 1.550.

**Maximum Spring Diameter:** 1.550

**Maximum Flat Mill:** .080

**Maximum Angle Mill:** .175

**Approximate Milling Guidelines:** .0065 per 1cc

### **Brackets and Accessories:**

1. The BMP SBC aluminum heads have accessory bolt holes drilled in the factory locations.
2. When using BMP SBC aluminum heads with the angle plug location, it is best to use an exhaust header designed for angle plugs.

### **Before Final Assembly:**

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. At this time install the cylinder head to the block with no head gasket and snug the bolts.

This assembly should be checked to assure that all components are compatible with your combination before assembling your engine. There is no warranty on valve springs of any type.

1. 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 head, grind the casting the needed amount. Clean the head after grinding then reinstall the head using the mock up procedure and recheck the clearance. Repeat the procedure as necessary until the desired clearance is achieved.
2. Once everything has been checked and all the desired clearances and specifications achieved, final assembly may begin.
3. 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.
4. If you bought bare castings then remember, you must wash the heads before assembly.

### **WARRANTY TERMS:**

*No warranties of any nature (expressed, implied, fitness of usage or merchantability) are given on these products. Seller undertakes no responsibility for any product sold. Additional disclaimers are within and are binding upon this contract. Due to the intended usage of products offered, all products are sold on an "as-is" basis, and no warranties of any kind, whether written or oral are made by Bill Mitchell Products, its agents or employees. All implied warranties, including the implied warranties of merchantability and fitness are expressly excluded, and the buyer bears the entire risk as to quality performance and use of these products. Bill Mitchell Products will assume no responsibility of personal injury, labor or other injury arising out of the usage of high performance racing parts or products. Any defective part will be handled between the original manufacturer and the buyer. Bill Mitchell Products reserves the right to change specifications, prices and discontinue parts without notice. Installation of Bill Mitchell Products heads may adversely affect the vehicle manufacturer's warranties, and may violate State and Federal laws when vehicles so equipped are operated other than strictly off-highway. Bill Mitchell Products reserves the right to discontinue any product at its sole discretion and without any liability with respect to similar products already in the field. Some parts are not legal for sale or use on pollution controlled motor vehicles.*

***While our products are used in many applications using super-chargers, Turbos or Nitrous successfully, please be aware that there is a greater potential for engine damage due to the possibility of tuning errors.***

PLEASE DO NOT CALL THE DEALER FROM WHICH YOU PURCHASED YOUR PARTS. If you have any questions, please contact BMP customer service at 386-279-7131 (Fax 386-873-6431).

**SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE**

**BILL MITCHELL PRODUCTS**

**PO BOX 229344 DeLand, FL 32722**

**(386) 279-7131 | Fax (386) 873-6431 | [www.theengineshop.com](http://www.theengineshop.com) | Rev 01/21/17**