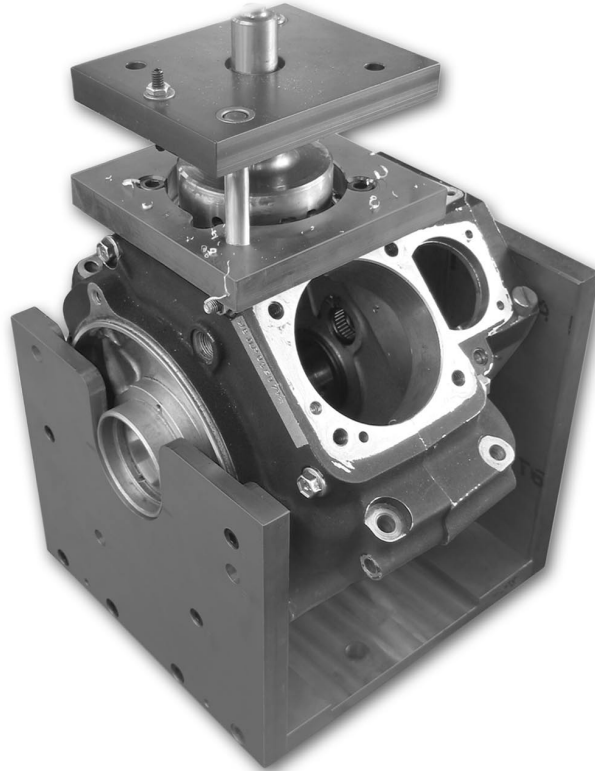




INSTRUCTION SHEET FOR TOOL #1409



EVO (EVOLUTION) CASE BORING TOOL

The JIMS® EVO Case Boring Tool takes all the guess work out of boring EVO engine cases to accept up to 3-13/16" bore cylinders. This tool is designed to be used in a heavy-duty 15" drill press, or milling machine.

Note: Please read all instructions completely and thoroughly before performing any work.

IF YOU DO NOT KNOW WHAT YOU ARE DOING, DO NOT DO IT!

No information in this instruction sheet pertaining to motorcycle repair is represented as foolproof or even altogether safe. Some people can ruin a mechanic's vise with a tack hammer. Even something safe, done incorrectly or incompletely can and will backfire.

You and only you are responsible for the safety of your repair work and for your understanding and application with the use of repair equipment, components, methods and concepts.

Each and every step that this tool is designed to do must be carefully and systematically performed safely by you. All information listed in this instruction sheet has been tested, re-tested and used daily in JIMS® Research and Development Department.

JIMS® IS NOT RESPONSIBLE FOR THE QUALITY AND SAFETY OF YOUR WORK.

Follow instructions in H.D.® Service Manual for removal of engine for your year and model. With the engine removed from the frame and safely mounted in one of JIMS® No. 1006T motor stands, follow the engine disassembly instructions in the service manual, including removal of the cylinder studs. Mask off all bearings and oil holes to prevent chips from contaminating those areas. Bolt cases together with H.D.® hardware using sequence and torque specs stated in H.D.® service manual, except top center case bolt between cylinders. Install this bolt last and torque to 50-90 in-lbs. maximum (Read Step 1).

Tools required for boring:

1/8", 3/16", 1/4", & 5/16" Allen wrenches, 7/16" Wrench, Calipers, Torque wrench, 1/2" socket, Cutting Fluid, Drill press or Milling machine.



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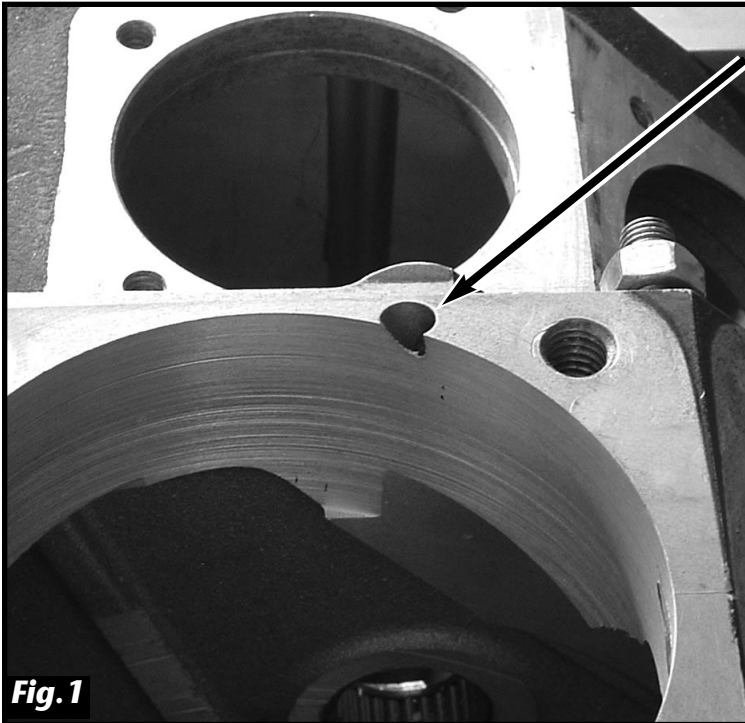


Fig. 1

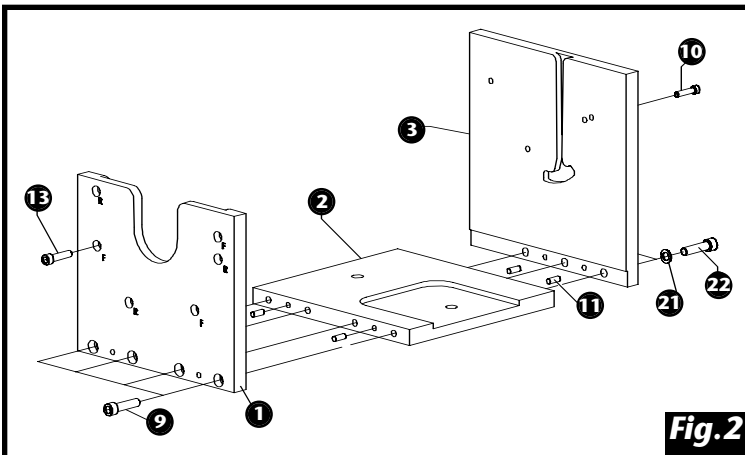


Fig. 2

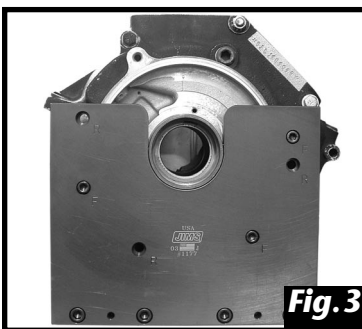


Fig. 3

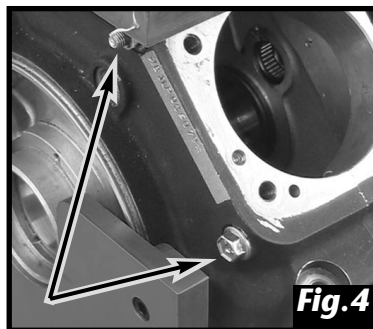


Fig. 4

INSTRUCTIONS

1. Prior to boring your cases, you will need to determine the Rockwell hardness your case hardware is. If your hardware is under 30 RC, you may bore your cases with your case bolts installed. If your hardware is harder than 30 RC, you will need to clearance the top center and top rear case bolts, (See Fig. 4). Damage may occur to the tool cutters if the above instructions are not followed. JIMS® is not liable for damaged tool cutters.

When you bore your cases for larger bore sizes, you may break out the tappet machining oil hole, (See Fig 1). You may need to re-plug and seal as required if disturbed.

2. Assemble Engine Cradle (No.1, No.2, No.3) as shown in Fig.2. Make sure all mating surfaces are clean.
3. Place the Engine Case in the Cradle and rotate the case so either the Front or Rear cylinder deck is horizontal and facing up. Fig.3
4. Install (2) lubed 1/4-20 SHCS (No.10) into the appropriate holes, depending on the spigot bore you are modifying, in the alignment plate (No.3) as shown in Fig.2. Do not tighten. Install (3) lubed 5/16-18 SHCS (No.13) into the mounting plate (No.1) holes marked with letter of the spigot bore you are modifying. Using a 1/4" allen wrench snug all three 5/16-18 bolts, then torque to 13-15 ft. lbs. Once you have tightened the 5/16-18 bolts, torque the 1/4-20 bolts to 90-120 ft lbs. using a 3/16" allen wrench.
5. Installing cutters:

NOTE: Boring head set-up shown is for reference only. Your set-up will vary depending on cylinder bore diameter and cylinder manufacturer. Instruction sheet is written for boring 3-5/8" bore cylinders. Again, if your cylinders are made from a different manufacturer or you are machining for other than a 3-5/8" bore, you will need to calculate your cutter dimensions (see set-up sheet, page 5).

NOTE: JIMS® recommends removing no more than .125" (on the diameter) of material at a time. Case machining may require more than one pass and set-up of cutters to obtain the desired bore.

Once you have determined the cutter dimensions, install the cutters in the boring head as shown in FIG. 5, FIG. 6 & FIG. 7. Using a 1/8" Allen wrench, adjust the adjustment screws (No. 1689) to set the cutters dimensions from your calculations (FIG. 7). Use a caliper for accurate measurements. Ensure that the cutters are held snug against the adjusting screws as the lock down screws are

CAUTION: WEAR SAFETY GLASSES. EXCESSIVE FORCE MAY DAMAGE PARTS!



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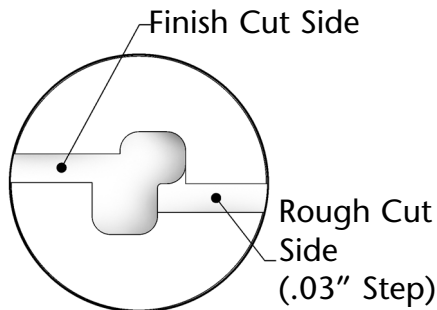


Fig.6

tightened. Torque the lock down screws (in order shown, FIG. 7) to 90 in./lbs. to secure the cutters in place.

WARNING: If cutters are set beyond $\varnothing 4.09$, the cutters may come in contact with the I.D. of the locating plate (1409-2), voiding the warranty of the 1409-2 Evo Case Boring Tool.

6. Setting Spigot depth:

Measure the length of your cylinders' spigot and add .03"-.06". This will be the depth you need to bore your cases to. (Example: If your spigot is 1.600", add .03"-.06" and your bore depth will be 1.630" + .03"/-.00". Using a 1/8" allen wrench and a 7/16" wrench, set the boring depth to the dimension as calculated above, as shown in Fig. 8. Be sure to measure from the finish tool cutter to the bottom of the locating plate (No. 5).

7. Place a 1-1/2" - 2" wood block between the boring assembly plates. Mount the boring assembly onto the engine case with (2) lubed 3/8-16 SHCS (No. 9). **Make sure the boring assembly is sitting flush on the engine case.** Using a 5/16" allen wrench, torque the mounting bolts to 18-20 ft. lbs.

8. Place the case boring fixture onto a drill press or milling machine table. Center the shaft of boring head (No. 4) in chuck or collet.

NOTE: If using a chuck, be sure that the chuck jaws locate on the flats of the boring head shaft.

Tighten the chuck or collet (depending on the machine being used) and remove the wood block used to separate the boring assembly. Clamp the base (No. 2) to the drill press table using the provided holes if possible. If you are unable to use the provided holes, be sure to clamp the fixture using C-Clamps or comparable clamps. Before running the machine, lube the two guide dowels with a light oil and run the quill up and down to make sure the boring assembly is not binding

CAUTION: DO NOT STRIKE CUTTERS AGAINST CRANKCASE When checking to make sure the tool action is correct, be aware not to strike the cutters against the crankcase while the machine is not running. Damage may result to the tool and crankcase.

NOTE: If the cradle assembly is not sitting flat to the machine table, adjust the table (or head) flat before clamping down the assembly.

9. Set the machines speed to approximately 600-800 RPM's. Before running the machine, make sure that the quill is at the top of it's travel. Start the machine to make sure that the head and/or table are not vibrating. If no vibrations occur, the RPM's may be increased. If vibrations occur, the RPM's will need to be reduced. JIMS® has found that 600-800 RPM's is

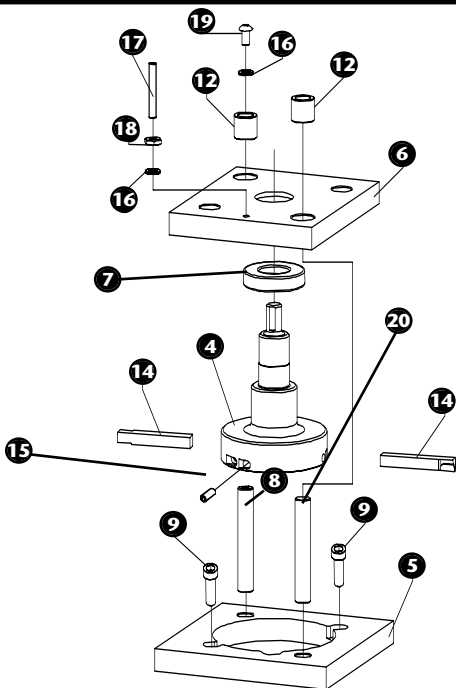
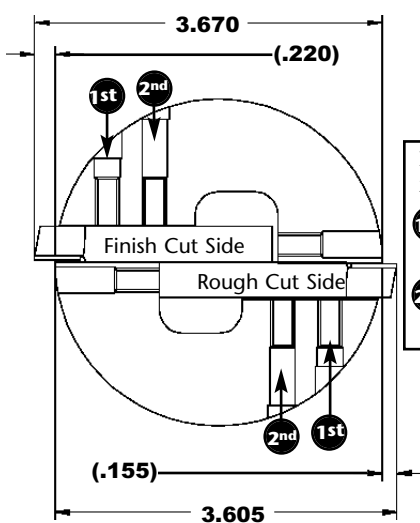


Fig.5

DIMENSIONS FOR 3-5/8" BORE



LOCK DOWN SCREWS
2 PLC No.1689

1st Tighten these screws first.

2nd Tighten these screws second.

Fig.7

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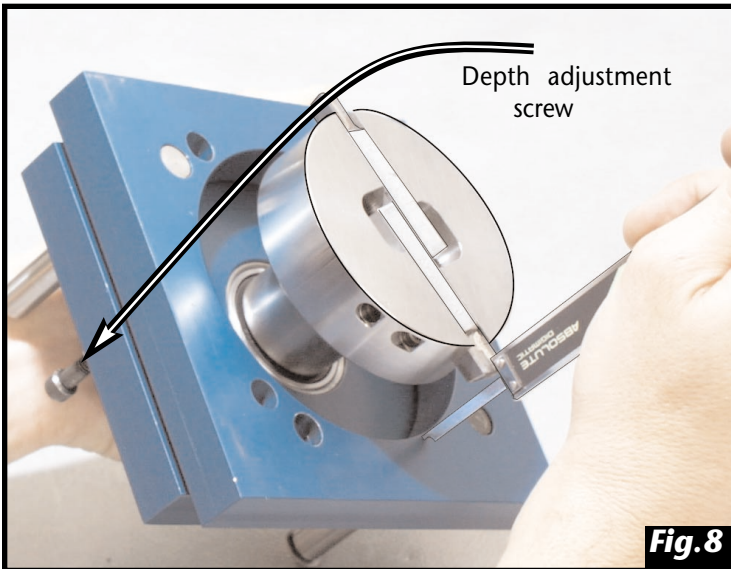


Fig.8

the best when using a drill press, although results can vary from your set-up and machine. Not all drill presses and milling machines are made the same.

CAUTION: It is recommended that you use a well maintained and dependable machine for this type of work. If you use a drill press or milling machine that is not up to normal standards, you risk the chance of damage to your work and injury to yourself. This is why we recommend you use a safe and well maintained drill press or milling machine. Make sure your machine is in good working order before starting any project.

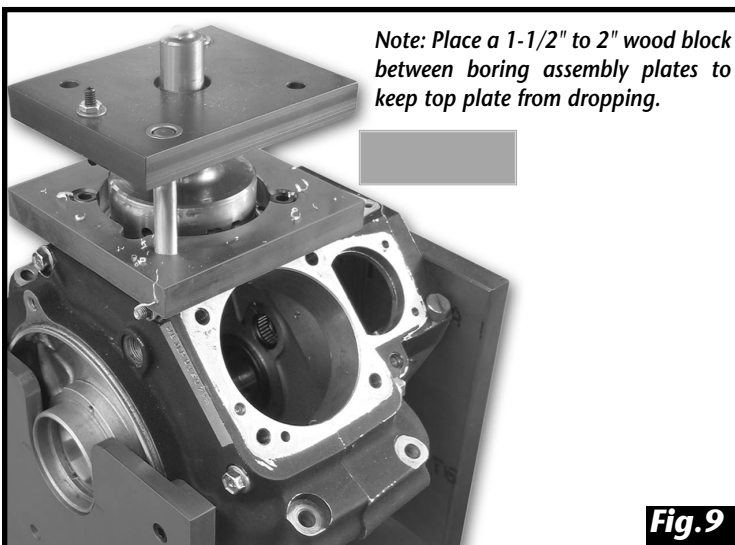
ALWAYS WEAR SAFETY GLASSES OR OTHER FACE AND EYE PROTECTION SUCH AS FULL FACE SHIELD.

JIMS® is not responsible for damage, injury or your work!

10. Make sure your eye and/or face protection is on. Double check to make sure you followed the procedures correctly and your work is properly clamped to the table. Start boring with slow, even pressure while applying cutting fluid (slower feed rate will yield a cleaner finish) until the boring assembly stop bottoms out. Shut down the machine and wait until it comes to a complete stop. Slowly retract the boring assembly until the cutters clear the case. Hold the quill up and replace the wood block. Remove the boring assembly from the case.

CAUTION: DO NOT PUSH IN OR LIFT OUT CUTTER TOO FAST OR ABRUPTLY WHILE BORING, DOING SO COULD RESULT IN DAMAGE TO YOUR WORK OR INJURY TO YOURSELF!

CAUTION: BEFORE RE-ASSEMBLY OF YOUR ENGINE MAKE SURE THE INSIDE OF THE CASE, SPIGOT BORE AND ALL INTERIOR AND EXTERIOR POCKETS AND HOLES ARE FREE OF ANY CONTAMINANTS AND DE-BURRED. STOP, DOUBLE CHECK AND THEN TRIPLE CHECK. YOU DO NOT WANT ANY CONTAMINANTS LEFT INSIDE. DOING SO CAN AND WILL CAUSE PPRE-MATURE WEAR AND DAMAGE.



Note: Place a 1-1/2" to 2" wood block between boring assembly plates to keep top plate from dropping.

Fig.9

NOTE: When re-assembling cases, tighten case bolts to factory specs except top center case bolt between cylinders. Install this bolt last after you have cylinders and heads installed and torqued to H.D.® specs. Apply Hylomar, or equivalent, sealer to shoulder of top center case bolt and torque to 50-90 in-lbs. maximum.

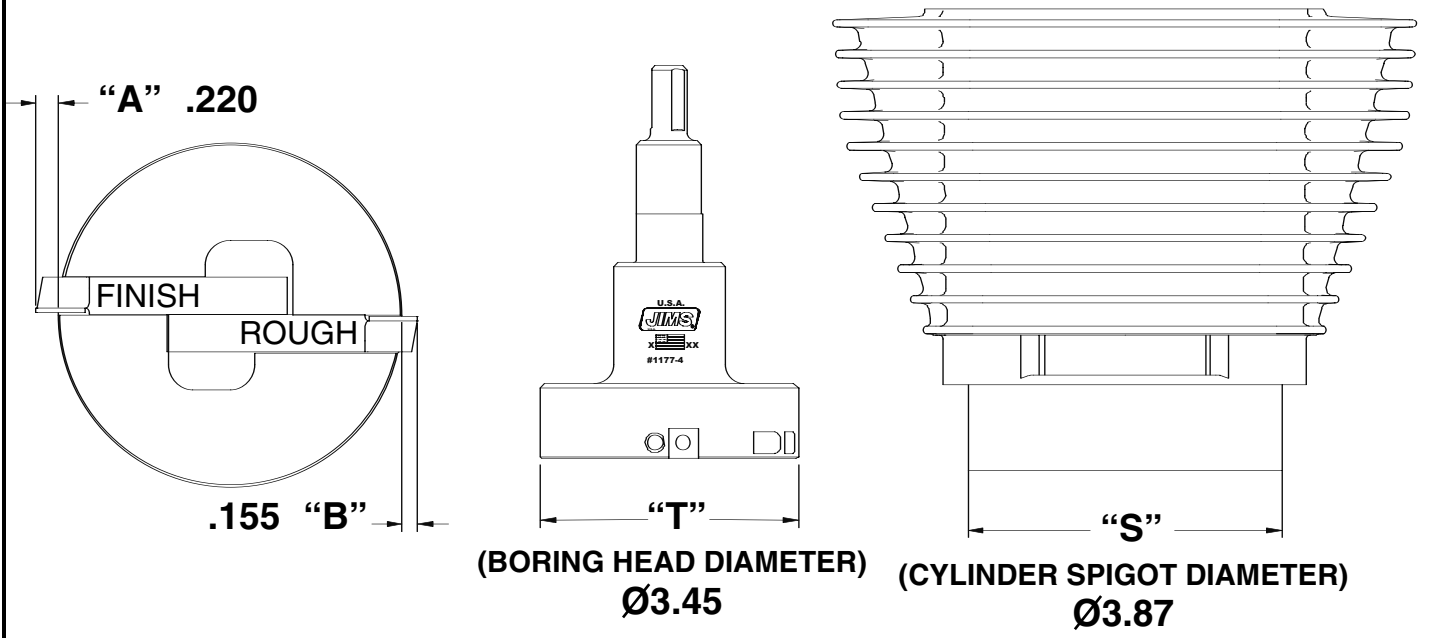
**JIMS® IS NOT RESPONSIBLE FOR YOUR WORK!
SO PLEASE USE YOUR BEST JUDGEMENT AND ALWAYS
DOUBLE AND EVEN TRIPLE CHECK YOUR WORK.
DOING SO WILL HELP ENSURE A POSITIVE EXPERIENCE AND OUTCOME.**

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**SET-UP SHEET
FOR 3-5/8" BORE**



- Step 1:** Measure your cylinder spigot diameter. (S) and add .02".
- Step 2:** Measure the boring head diameter (T) as shown above. Subtract boring head diameter from answer obtained in step 1, this is your overall clearance (D).
- Step 3:** Divide your overall clearance by 2. This is your "A" dimension.
- Step 4:** Subtract .065" from your "A" dimension. This is you "B" dimension.

- D = OVERALL CLEARANCE**
- S = CYLINDER SPIGOT DIAMETER**
- T = BORING HEAD DIAMETER**
- C = CASE BORING DIAMETER**

FORMULA
Step 1: $S + .02" = C$
Step 2: $C - T = D$
Step 3: $D / 2 = "A"$
Step 4: $"A" - .065" = "B"$

EXAMPLE
$3.87" + .02" = 3.89"$
$3.89" - 3.45" = .44"$
$.44" / 2 = .22"$
$.22" - .065" = .155"$

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PARTS LIST			
NO.	QTY	TITLE OR DESCRIPTION	PART NUMBER
1	1	MOUNTING PLATE	1177-1
2	1	BASE PLATE	1177-2
3	1	ALIGNMENT PLATE, CASE BORING TOOL, EVO	1409-1
4	1	BORING HEAD, BORING ASSEMBLY	1177-4
5	1	LOCATING PLATE, CASE BORING, EVO	1409-2 [*]
6	1	SUPPORT PLATE, BORING ASSEMBLY	1177-6
7	1	SHIELDED BEARING, 7/8" x 2" x 9/16" (1640-2RS)	8149
8	1	PULL OUT DOWEL, 1/2" x 3-1/2"	1685
9	6	3/8-16 x 1" SHCS	1686
10	2	1/4-20 x 1" SHCS	2133
11	4	DOWEL PIN, 1/4" x 3/4"	8093
12	2	BUSHING, .502" I.D. x .75" O.D. x .75" LONG	1681
13	3	5/16-18 x 1" SHCS	2405
14	2	TOOL BIT, AL, CEMENTED CARBIDE, 3/8"	1688 ^{**}
15	6	1/4-28 x 1/2" SET SCREW	1689
16	2	WASHER, 1/4", SAE	1683
17	1	1/4-20 x 1-3/4" SET SCREW	1679
18	1	1/4-20 JAM NUT	1682
19	1	1/4-20 x 1/2", BHCS	8090
20	1	DOWEL PIN, 1/2" x 3-1/2"	1680
21	3	3/8" AN WASHER	1265
22	3	3/8-16 x 1-1/4" SHCS	1036
23	1	INSTRUCTION SHEET	1409-IS

**1409-2 is not covered under warranty if locating plate displays cutter marks from improper adjustment.*

*** 1688 Non-serviceable wear item, no warranty.*

WARRANTY

All JIMS® parts are guaranteed to the original purchaser to be free of manufacturing defects in material and workmanship for a period of six (6) months from the date of purchase. Merchandise that fails to conform to these conditions will be repaired or replaced at JIMS® option the parts are returned within the six (6) months warranty period or within ten (10) Days thereafter.

In the event warranty service is required, the original purchaser must call or write JIMS® immediately with the problem. Some problems can be rectified by a telephone call and need no further course of action. A part suspected of being defected must not be replaced by a dealer without prior authorization by JIMS®. If it is deemed necessary for JIMS® to make an evaluation to determine whether the part is defective, it must be packaged properly to prevent further damage and be returned prepaid to JIMS® with a copy of the original invoice of purchase and a detailed letter outlining the nature of the problem, how the part was used and the circumstances at the time of failure. If after an evaluation has been made by JIMS® and the part was found to be defective, repair, replacement or credit will be granted.

ADDITIONAL WARRANTY PROVISIONS

1. JIMS® shall have no obligation in the event a JIMS® part is modified by person or organization.
2. JIMS® shall have no obligation if a JIMS® part becomes defective in whole or in part as a result of improper installation, improper maintenance, improper use, abnormal operation, or any other misuse or mistreatment of the part.
3. JIMS® shall not be liable for any consequential or incidental damages resulting in the failure of a JIMS® part, the breach of any warranties, the failure to deliver, delay in delivery, delivery in nonconforming condition, or for any other breach of contract or duty between JIMS® and a customer.
4. JIMS® parts are designed exclusively for use in Harley-Davidson® motorcycles. JIMS® shall have no warranty or liability obligation if JIMS® part is used in any other application.
5. Any parts or tool replaced by JIMS® becomes the property of JIMS® and will not be returned under any circumstance.