SERVICE RELEASE

N3/73 (Superseding N3/56)

850 MODEL COMMANDO

"STAGE ONE" HIGH PERFORMANCE MODIFICATIONS

Conversion from Standard Road Specification to High Performance Sports Condition.

The following components will require replacement or modification.

1. Camshaft replacement to 'SS' Sports specification.
2. Piston modification to Sports condition.
3. Cylinder head Conversion to Full Flow High Compression condition
4. New Amal Velocity Stacks for Carburettors.
5. Push rod modification.

The Service Release details the alterations that are necessary to convert existing components to High Performance Sports condition.

Sectioned drawings are provided to guide the enthusiast in achieving the optimum port shapes, together with the drawings illustrating the necessary alterations to Push rods and Piston Crown configurations to accommodate the increased compression ratio and valve opening.

For owners and riders wishing to fit Transistorised Electronic Ignition equipment, detailed fitting and set up instructions are provided in the Norton Villiers publication part number 065151 "Boyer Electronic Ignition" obtainable through Norton Spares outlets, or from the local Norton Distributor.

Warning

Although every attempt has been made to convey factory experience and recommendations in this publication Norton Triumph International Ltd. (or its representatives) do not guarantee that this conversion will result in the desired improvement in performance. In addition, owing to the greater stresses placed on the engine, and transmission parts, the manufacturers Guarantee (of replacement engine and transmission parts and associated labour) can no longer be applicable.

NORTON TRIUMPH INTERNATIONAL LTD., MACKADOWN LANE, KITTS GREEN, BIRMINGHAM 33 ENGLAND

Technical Data

Engine Number	Stamped on crankcase
Gearbox Number	Stamped on gearcase
Frame Number	Stamped on left side head lug
Cylinder bore (finished size)	2.8750″/2.8758″ (73.025mm/73.045mm)
Stroke	3.503″ (89mm)
Capacity	45.5 cu. in. (745cc)
Compression ratio	8.9 to 1
Ignition timing	28° B.T.D.C. (full advance)
Spark plug	N6Y
Spark plug gap	.023″-.028″
Contact breaker gap	.014″/.016″
Tappet clearance (cold) inlet	.006″
Tappet clearance (cold) exhaust	.008″
Valve spring free length (inner)	1.531″
Valve spring free length (outer)	1.700″
Piston ring gap (compression ring)	.013″
Push rod length assembled (inlet)	8.130″/8.166″
Push rod length assembled (exh'st)	7.285″/7.321″
Valve length (head to stem) Inlet	4.069″
Valve stem diameter (inlet)	.3095″/.3105″
Valve length (head to stem) exhaust	4.020″
Valve stem diameter (exhaust)	.3095″/.3105″
Rocker shaft diameter	.4985″/.4998″
Wrist pin diameter	.6868″/.6866″
Crankshaft journal diameter (drive side)	1.1815″/1.1812″
Crankshaft journal diameter (timing side)	1.1807″/1.1812″
Crankshaft journal diameter (con rod)	1.7505″/1.7500″
Camshaft bearing diameter (drive side)	.874″/.8735″
Camshaft bearing diameter (timing side)	.8735″/.8730″
Camshaft bush (bore size)	.875″/.8745″
Main roller bearing (drive side) single dot	30mm × 72mm × 19mm
Main ball single dot bearing (timing tide)	30mm × 72mm × 19mm
Intermediate shaft diameter	.5615″/.5610″
Intermediate gear (bush diameter)	.5627″/.5620″

GEARBOX

Mainshaft diameter (clutch end)	.8105″/.8095″
Mainshaft diameter (kickstart end)	.6248″/.6244″
Mainshaft ball bearing	$\frac{5}{8}$″ × $1\frac{9}{16}$″ × $\frac{7}{16}$″
Layshaft bearing	17mm × 40mm × 12mm
Layshaft diameter (clutch end)	.6692″/.6687″
Layshaft diameter (kickstart end)	.6855″/.6845″
Sleeve gear bush (OD)	.906″/.9053″
Sleeve gear bush (reamed *in situ*)	.81325″/.81200″
Layshaft bush (bore diameter)	.6875/.6865″
Clutch bearing	35mm × 62mm × 14mm

SPROCKETS

Engine	26 teeth
Clutch	57 teeth
Final drive (gearbox)	21 teeth or 19 teeth
Rear wheel	42 teeth

CHAIN SIZES

Front chain endless (triplex)	$\frac{3}{8}$″ × .225″ (92 pitches)
Rear chain (21 teeth sprocket)	$\frac{5}{8}$″ × .380″ (99 pitches)
Camshaft chain	$\frac{3}{8}$″ × .225″ (38 pitches)
Ignition chain	$\frac{3}{8}$″ × .155″ (42 rollers)
Rear chain (19 teeth sprocket)	$\frac{5}{8}$″ × .380″ (98 pitches)

CARBURETTER SETTINGS

Choke diameter	1.180″
Main jet size	220
Pilot jet size	25
Needle jet size	.106″
Throttle slide	3
Needle location	central notch

WHEEL BEARINGS

Left side front bearing	17mm × 40mm × 12mm
Right side front bearing	17mm × 40mm × 16mm
Left side rear bearing	17mm × 40mm × 16mm
Right side rear bearing	17mm × 40mm × 12mm

TORQUE WRENCH SETTINGS

Cylinder head bolts and nuts $\frac{3}{8}$″	360 inch lbs.
Cylinder head bolts $\frac{5}{16}$″ (2)	240 inch lbs.
All cylinder base nuts	240 inch lbs.
Con rod	300 inch lbs.
Rocker shaft cover plate bolt	100 inch lbs.
Gearbox inner cover nuts	140 inch lbs.
Cam chain tensioner nuts	180 inch lbs.
Oil pump stud nuts	180 inch lbs.
Banjo bolts	180 inch lbs.
Engine mounting bolts	300 inch lbs.
Alternator studs	120 inch lbs.

GEAR RATIOS

(21 teeth gearbox sprocket)	4.38	5.35	7.45	11.2
(19 teeth gearbox sprocket)	4.84	5.9	8.25	12.4
INTERNAL RATIOS	1:1	1.22:1	1.7:1	2.56:1

CAPACITIES

Gas tank	3.25 Imperial gallons (3.9 U.S. gallons) (14.7 litres)
Oil tank	5 Imperial pints (6 U.S. pints) (2.8 litres)
Gearbox	1 Imperial pint (1.2 U.S. pints) (.57 litre)
Primary chaincase	200 c.c (7 fluid ozs.)
Front forks	150 c.c (each leg)

1973 850 MODEL HIGH PERFORMANCE CONVERSION

Conversion to High Performance condition involves the following operations, achieved either by replacement, or conversion of the existing components as detailed below.

Camshaft	–	Replacement of the existing camshaft with 063536 'SS' camshaft.
Piston (850cc)	–	Conversion to High Performance/High compression condition.
Velocity Stacks (for carburettor)	–	Replacement of existing air filter equipment with the alternative Amal components.
Push Rods	–	Modifications to accomodate the alterations to the cylinder head configurations.

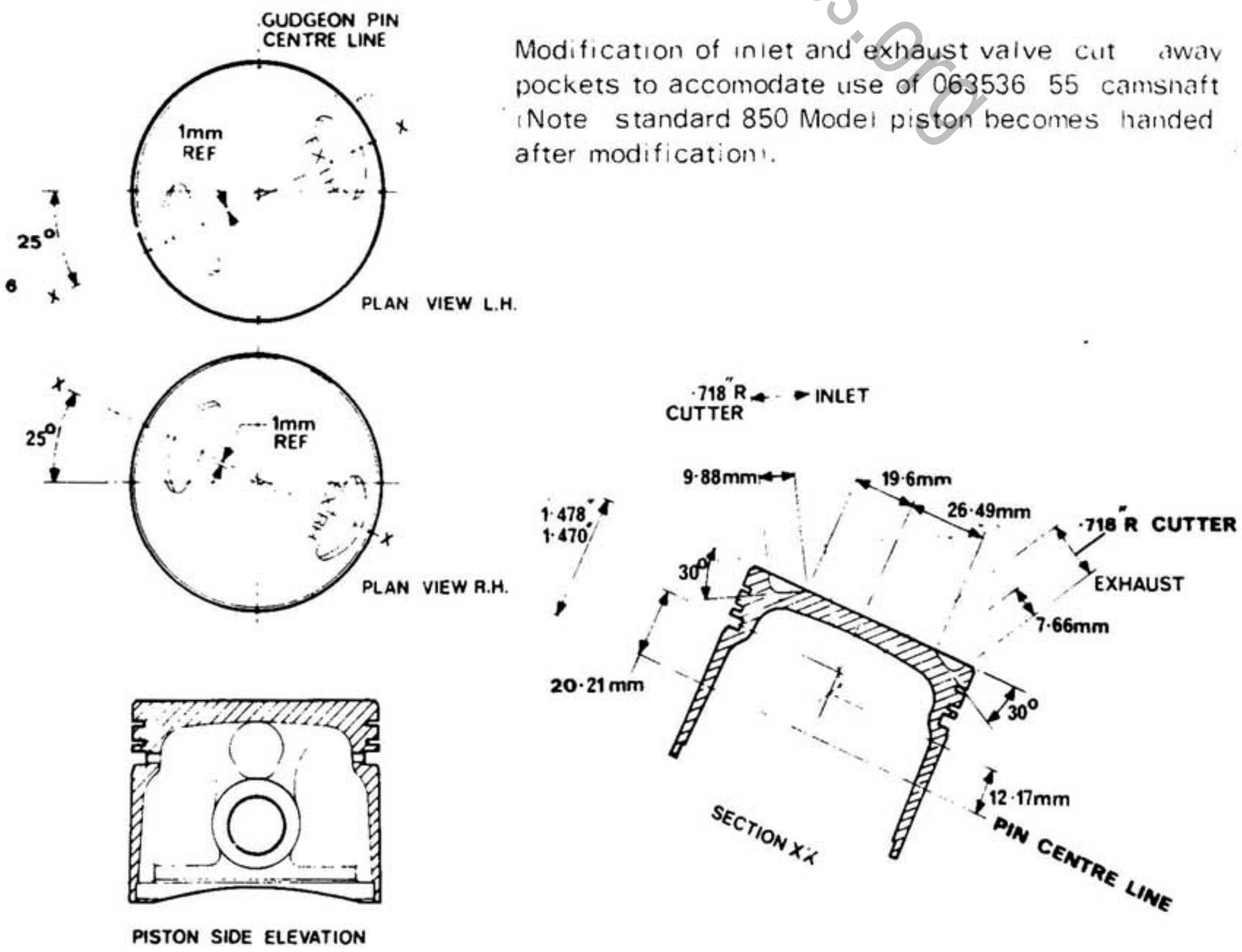
For those wishing to convert the original pistons and cylinder head to the modified condition the following instructions are provided and should be carefully observed. Modifications are also necessssary to push rod lengths to compensate for the alteration to rocker geometry resulting from cylinder head gasket face removal.

Modification required to Existing Components

1. PISTON

Conversion of the standard 850 piston 063838 to sports condition involves deepening the valve 'Cut-away' pockets in accordance with the dimensions given in Fig. 1.

The cut-aways require re-machining to the amended conditions as shown to allow for the additional 'valve drop' created by the use of the new Camshaft 063536. The head diameter of both the inlet and and exhaust valves should be measured – ensure head diameters do not exceed 1·490in. (37·85mm) - inlet, and 1·302in. (33·07mm) exhaust. This will avoid any possibility of subsequent 'hook up' when using 063536 Camshaft in the higher engine R.P.M. range.



Modification of inlet and exhaust valve cut away pockets to accomodate use of 063536 55 camshaft (Note standard 850 Model piston becomes handed after modification).

FIG. 1. PISTON CROWN MODIFICATION

Following modifications to both the pistons and the cylinder head, it is advisable to check the actual available 'valve drop' by placing modelling clay (Plasticine) into the valve clearance 'cut–aways' and rotating the crankshaft at least two complete revolutions. Measure the thickness of the modelling clay. A minimum clearance of 0·030in/0·040in (0·75mm/1·00mm) must be allowed when the inlet valve is closest to the piston at 3°/5° A.T.D.C.

2. CYLINDER HEAD

Modifications required to convert the standard 850 cylinder head 063830 to High Performance condition.

The diagram (Fig. 2) details the modifications that increase the compression ration to 10:1, and to convert both inlet and exhaust ports to the shape to provide optimum power with flexibility.

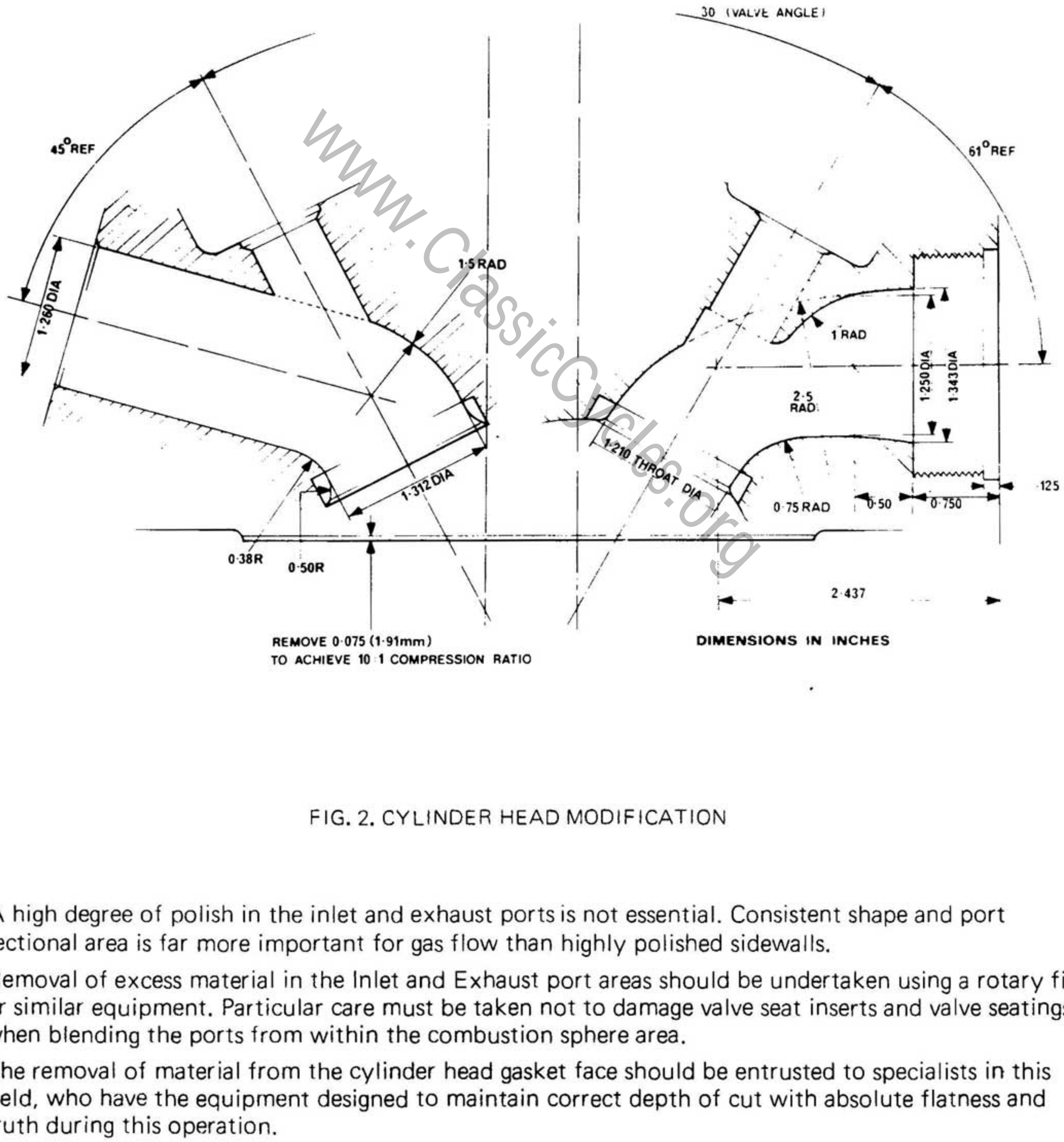


FIG. 2. CYLINDER HEAD MODIFICATION

A high degree of polish in the inlet and exhaust ports is not essential. Consistent shape and port sectional area is far more important for gas flow than highly polished sidewalls.

Removal of excess material in the Inlet and Exhaust port areas should be undertaken using a rotary file, or similar equipment. Particular care must be taken not to damage valve seat inserts and valve seatings when blending the ports from within the combustion sphere area.

The removal of material from the cylinder head gasket face should be entrusted to specialists in this field, who have the equipment designed to maintain correct depth of cut with absolute flatness and truth during this operation.

If in any doubt whatsoever, the total operation should be undertaken only by specialist machinists engaged in this type of work.

3. PUSH RODS

In order to maintain correct rocker geometry following removal of material from the cylinder head gasket face both end caps are removed from each of the four push rods, and 0.037in (0·95mm) of metal removed from each end of the push rod prior to replacement of the end caps. Do not remove all the metal from one end only of the push rod as this may result in the end caps not re-seating properly, and partially resting onto the taper run—out of the push—rod itself (see Fig. 3).

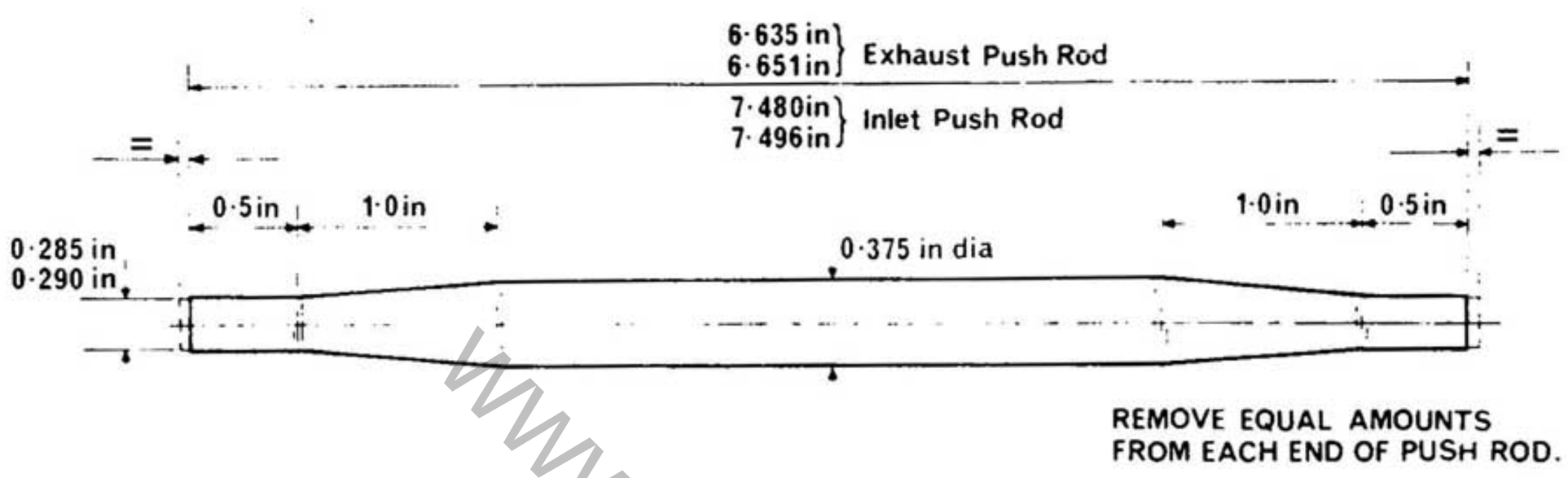


FIG. 3. PUSH ROD MODIFICATION

4. IGNITION TIMING

Contact Breaker	30° B.T.C. Max. Advance @ 3000 r.p.m.
Electronic Ignition	31° B.T.C. Max. Advance @ 5000 r.p.m.
Inlet	0·008in. (0·2mm)
Valve Clearance	'SS' Camshaft Part No. 063536
Exhaust	0·010in. (0·25mm)

5. CARBURETTORS

Standard 32mm carburettors as supplied with the machine give optimum performance utilising Amal Bell Mouth Velocity Stack.

Further detailed information is provided to assist in any subsequent incorporation of Electronic Ignition equipment. Norton Villiers Publication part number 065151 "Boyer Electronic Ignition" is available through normal Norton Service Channels.

Note

The fitting of oversized high tensile centreless ground bolts into sized and reamed crankcase boss and rear engine mounting bolt holes is advised to ensure maintenance of maximum rigidity of assembly.

On completion, it emphasized that the engine should be run only on a minimum of 100 Octane grade fuel. Also due to the increased efficiency and immediate response of the modified engine unit, great care must be taken not to over-rev the engine in the intermediate gears.

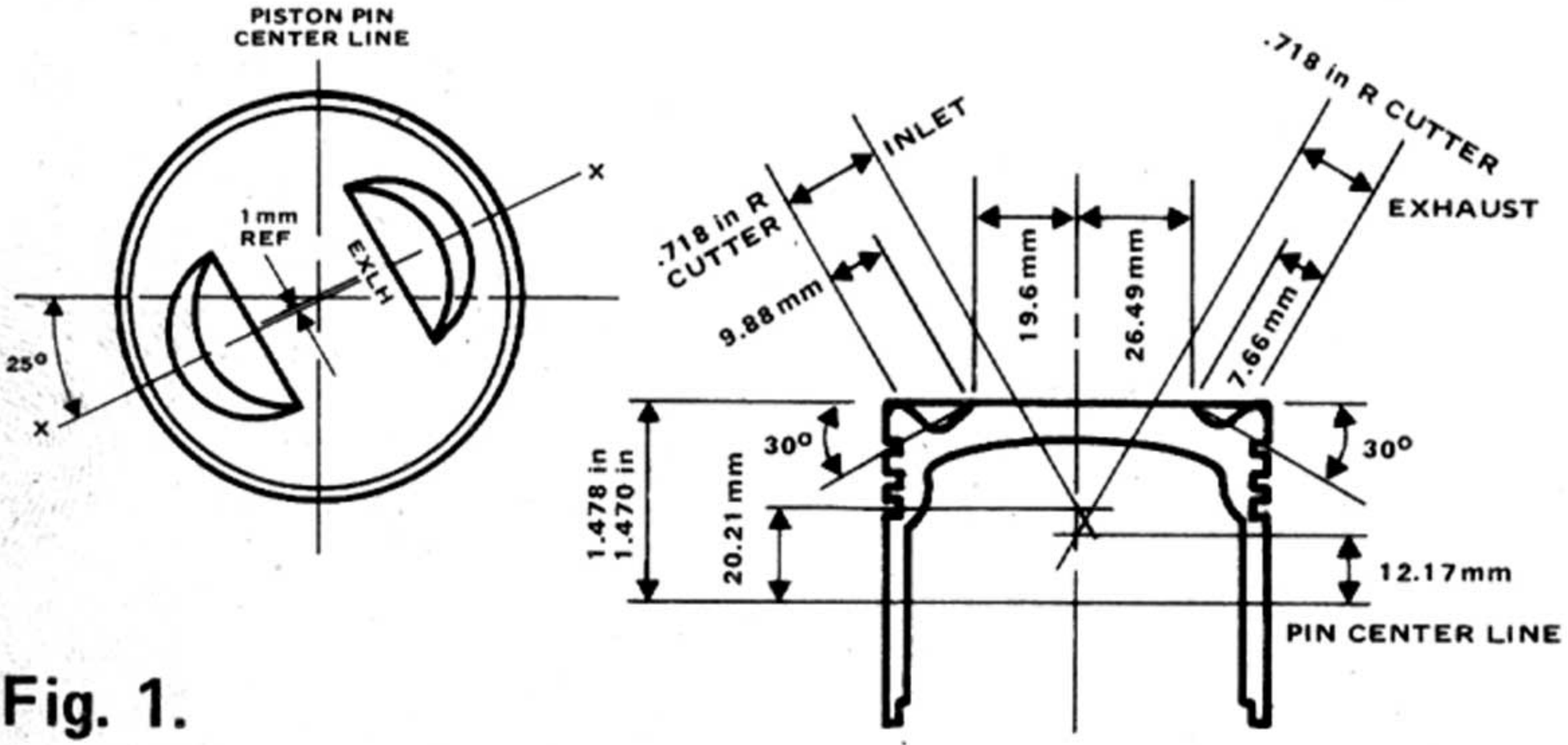


Fig. 1.

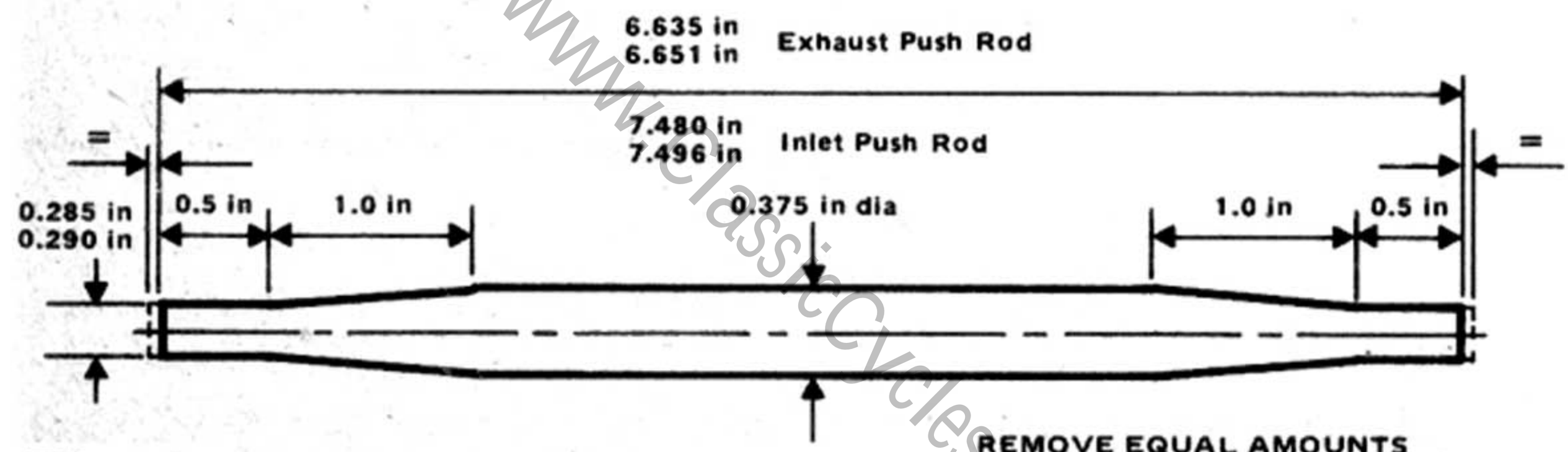


Fig. 3.

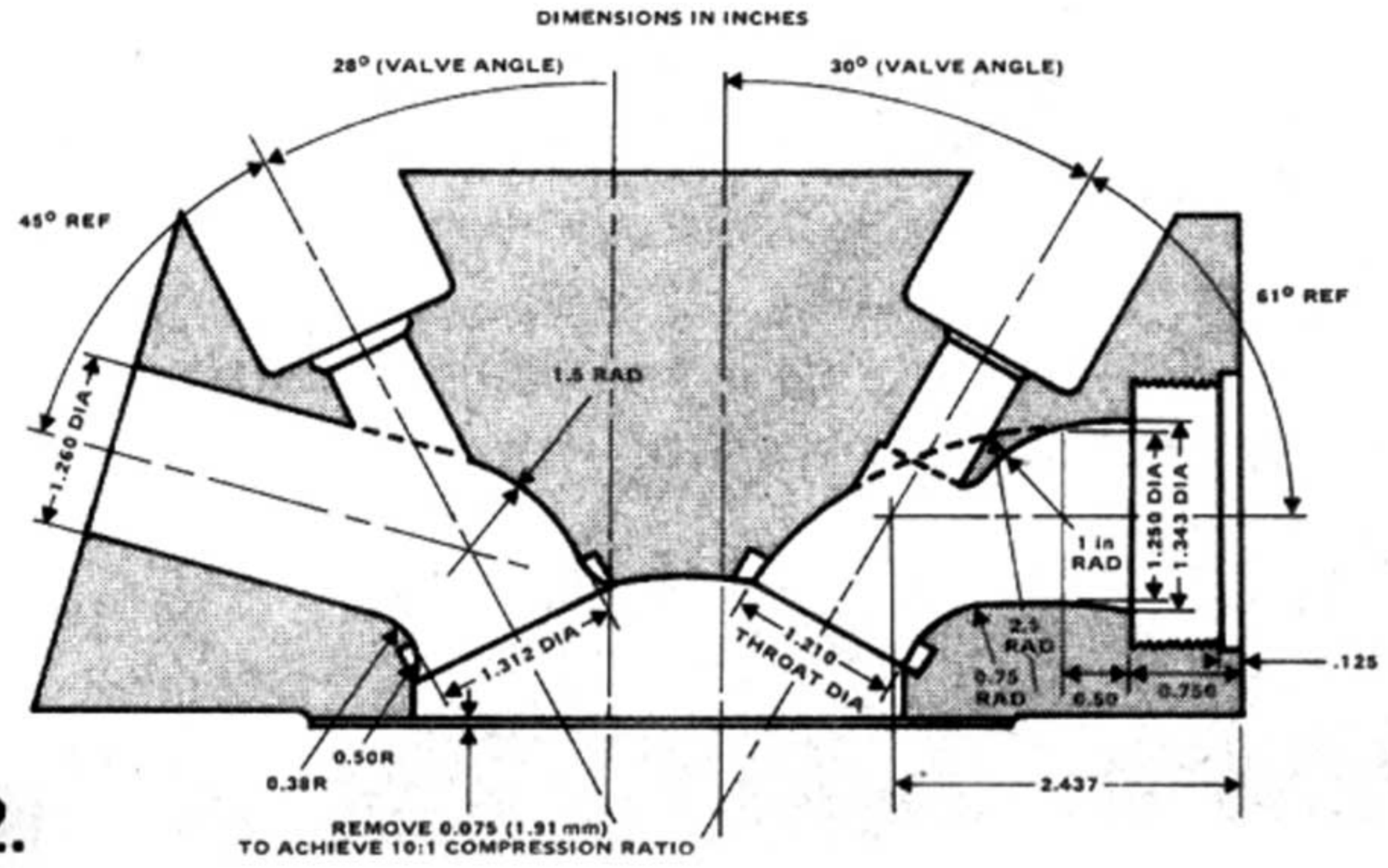


Fig. 2.