

THE M.G. (Series MGA) TWO-SEATER



'MGA'

1500 AND 1600

SPECIAL TUNING

Additional copies of this booklet are obtainable only from an M.G. Distributor and Part No. AKD819D should be quoted when ordering

Issued by

M.G. CAR COMPANY LIMITED

Proprietors: Morris Motors Limited

ABINGDON-ON-THAMES

Phone: Abingdon 251

Grams: Emgee, Abingdon

Sole Exporters:

NUFFIELD EXPORTS LIMITED

Proprietors: Morris Motors Limited

COWLEY - OXFORD - ENGLAND

Phone: Oxford, England, 77733

Telex: 83133 Morex, Oxford, England

Cables: Morex, Oxford, England



FOREWORD

This is another of the M.G. Tuning Booklets which have been issued in recent years. It deals specifically with the Series MGA.

The 'MGA' as delivered from the Factory in its standard form is tuned to give maximum performance with 90-octane gasoline consistent with complete reliability and reasonable freedom from pinking. There is, however, a more or less continuous demand from enthusiasts all over the world for information on methods of improving the performance for competitive purposes, and it is to meet this demand that this booklet has been prepared.

It must be clearly understood, however, that, whereas it is a simple matter to increase the power output of the engine, this increase in power must inevitably carry with it a tendency to reduce reliability. It is for this reason that the terms of the Warranty on a new M.G. expressly exclude any super-tuning of the kind described in this booklet, but this does not mean that tuning in this way will necessarily make the car hopelessly unreliable. In fact, it may be assumed that it will be at least as reliable as other cars of similar performance.

This booklet is laid out to give details for progressively increasing the power. With the above ideas firmly in mind, the owner should select the simplest tuning method which will give him the performance he requires, remembering all the time that here, as elsewhere, **Power Costs Money.**

Tuning hints are included for the racing enthusiasts who want to go to the limit and who have facilities to modify or make up special parts for their cars. We hope this section will be of use to them.

Owners are reminded that in certain countries noise restriction regulations are in force. The Company cannot therefore accept responsibility for any increase in the existing noise level of the car which may result after special tuning operations have been carried out.



GENERAL DATA

Engine		
Type		
'MGA 1500'	..	BP15GB or 15GB/U/H
'MGA 1600'	..	16GA
Number of cylinders		4
Bore		
'MGA 1500'	..	2.875 in. (73.025 mm.)
'MGA 1600'	..	2.968 in. (75.39 mm.)
Stroke	..	3.5 in. (89 mm.)
Capacity		
'MGA 1500'	..	90.88 cu. in. (1489 c.c.)
'MGA 1600'	..	96.906 cu. in. (1588 c.c.)
Firing order	..	1, 3, 4, 2
Compression ratio	..	8.3 : 1
Capacity of combustion chamber (valves fitted)	..	38.2 to 39.2 c.c. (2.3 to 2.4 cu. in.)
Valve operation	..	Overhead by push-rod
Safe maximum r.p.m.		5,800
Valve crash r.p.m.	..	6,000
B.H.P.		
'MGA 1500'	..	72 at 5,750 r.p.m.
'MGA 1600'	..	83 at 6,000 r.p.m.
B.M.E.P.		
'MGA 1500'	..	133 at 3,850 r.p.m.
'MGA 1600'	..	135 at 4,000 r.p.m.
Torque (lb. ft.)		
'MGA 1500'	..	80.2 at 3,850 r.p.m.
'MGA 1600'	..	87 at 4,000 r.p.m.
Octane rating	..	Minimum requirements for knock-free operation 87-90 octane
Cooling system	..	Thermo-siphon, pump- and fan-assisted
Oversize bore		
First	..	.010 in. (.254 mm.)
Maximum	..	.040 in. (1.016 mm.)
Crankshaft		
Main journal diameter	..	2 in. (50.8 mm.)
Minimum regrind diameter	..	1.96 in. (49.78 mm.)
Crankpin journal diameter	..	1.8759 to 1.8764 in. (47.65 to 47.66 mm.)
Crankpin minimum regrind diameter	..	1.8359 in. (46.64 mm.)



Main bearings

Number and type ..	3 shell type
Material	
'MGA 1500' ..	Steel-backed white metal
'MGA 1600' ..	Steel-backed lead-bronze, lead-indium or lead-tin overlay
Length ..	1.375 in. (34.925 mm.)
End-clearance ..	.002 to .003 in. (.051 to .076 mm.)
End-thrust ..	Taken by thrust washers at centre main bearing
Running clearance	
'MGA 1500' ..	.0005 to .002 in. (.0127 to .0508 mm.)
'MGA 1600' ..	.002 to .0037 in. (.0508 to .0939 mm.)

Connecting rods

Length between centres ..	6.5 in. (165.1 mm.)
---------------------------	---------------------

Big-end bearings

Material ..	Steel shell and lead-indium or lead-tin overlay.
Bearing side-clearance ..	.008 to .012 in. (.203 to .305 mm.)
Bearing diametrical clearance ..	.0015 to .0032 in. (.038 to .088 mm.)

Pistons

Type ..	Aluminium alloy
Clearances	
Bottom of skirt ..	.0017 to .0023 in. (.043 to .051 mm.)
Top of skirt ..	.0035 to .0042 in. (.090 to .106 mm.)
Oversizes ..	+ .010 in., + .020 in., + .030 in., + .040 in. (+ .254 mm., + .508 mm., + .762 mm., + 1.016 mm.)

Piston rings

Compression: Plain	Top ring (chrome-plated)
Tapered	Second and third rings
Width ..	.0615 to .0625 in. (1.56 to 1.58 mm.)
Thickness	
'MGA 1500' ..	.119 to .126 in. (3.02 to 3.20 mm.)
'MGA 1600' ..	.141 to .148 in. (3.58 to 3.75 mm.)
Fitted gap	
'MGA 1500' ..	.008 to .013 in. (.20 to .33 mm.)
'MGA 1600' ..	.009 to .014 in. (.228 to .355 mm.)
Clearance in groove ..	.0015 to .0035 in. (.038 to .089 mm.)



Piston rings—continued

Oil control ring ..	Slotted scraper
Width ..	.1552 to .1562 in. (3.94 to 3.99 mm.)
Thickness ..	.119 to .126 in. (3.02 to 3.20 mm.)
Fitted gap ..	.008 to .013 in. (.20 to .33 mm.)
Clearance in groove ..	.0016 to .0036 in. (.040 to .091 mm.)

Gudgeon pin

Type ..	Clamped
Fit ..	.0001 to .00035 in. (.0025 to .009 mm.) Hand-push fit at 68° F.
Diameter ..	.6869 to .6871 in. (17.447 to 17.4523 mm.)

Cylinder head

Cylinder head depth	$3\frac{11}{64} + \frac{1}{64}$ —0 in.
Thickness of cylinder head gasket	
'MGA 1500' ..	.035 in. (compressed) (Part No. 1H696 up to Engine No. 15687)
'MGA 1600' ..	.029 in. (compressed) (Part No. 1H1017 from Engine No. 15688)
'MGA 1600' ..	.029 in. (compressed) (Part No. 12H18)
Capacity of cylinder head gasket ..	3.73 c.c.
Capacity of combustion space ..	38.2/39.2 c.c. (valves fitted)
Capacity of piston head below block face ..	3.5 c.c.
Capacity of piston concavity ..	4.85 c.c.
Capacity of plug centre hole ..	.2 c.c.
Inlet and exhaust manifold gasket ..	Part No. 1G2417
Valve seat angle in cylinder head ..	45°

Valves and valve gear

Seat angle		
Inlet ..	45° up to Engine No. 4044	} Seat angle in cylinder head 45°
Exhaust ..	45 $\frac{1}{2}$ ° from Engine No. 4045	
Inlet ..	45° up to Engine No. 4044	
Exhaust ..	45 $\frac{1}{2}$ ° from Engine No. 4045	



Valves and valve gear—continued

Head diameter

Inlet 1.5 in. (38.1 mm.)
 Exhaust 1.281 in. (32.54 mm.)

Stem diameter

Inlet34175 to .34225 in. (8.6514 to 8.69189 mm.)	} Part No. IH653 up to Engine No. 23447
Exhaust3422 to .3427 in. (8.69188 to 8.70458 mm.)		} Part No. IH1059 from Engine No. 23448

Exhaust34175 to .34225 in.
(8.6514 to 8.69189 mm.)

Valve lift357 in. (9.06 mm.) *INT-.425 Ex-.401*
 Exhaust 1.165 to 1.175 in. (29.6 to 29.8 mm.) *420 325*

Throat diameter

Inlet 1.25 in. (31.75 mm.)

Valve stem to guide clearance

Inlet00155 to .00255 in. (.0375 to .0635 mm.)
 Exhaust00105 to .00205 in. (.025 to .051 mm.) (up
 to Engine No. 4044)
 .00200 to .00300 in. (.051 to .076 mm.)
 (from Engine No. 4045)

Valve rocker clearance

Running		<i>XSSZ</i>	<i>E02A</i>
'MGA 1500'	.017 in. (.432 mm.)—hot	<i>INT-.014</i>	<i>.015</i>
'MGA 1600'	.015 in. (.38 mm.)—hot	<i>EXH-.015</i>	<i>.018</i>

Timing

Inlet and exhaust .021 in. (.53 mm.)

Timing markings .. Dimples on timing wheels

Chain pitch and number of pitches

.. $\frac{3}{8}$ in. (9.52 mm.), 52 pitches

Inlet valve

Opens ..	16° B.T.D.C. - 25	<i>XSSZ</i>	<i>E02A</i>
Closes ..	56° A.B.D.C. - 65	<i>18</i>	<i>58</i>

Exhaust valve

Opens ..	51° B.B.D.C. - 65	<i>54</i>
Closes ..	21° A.T.D.C. - 25	<i>14</i>

Valve guides

Length

Inlet 1.875 in. (47.63 mm.) (Part No. IG2882)
 Exhaust 2.281 in. (57.94 mm.) (Part No. IG2322
 up to Engine No. 4044)
 2.203 in. (56.96 mm.) (Part No. IIG193
 from Engine No. 4045)



Valve guides—continued

Diameter

Inlet

Outside .. ..	.5635 to .5640 in. (14.3129 to 14.3256 mm.)	} Part No. IG2882 up to Engine No. 23447
Inside .. ..	.3438 to .3443 in. (8.7354 to 8.7452 mm.)		} Part No. IIG313 from Engine No. 23448
Outside .. ..	.5635 to .5640 in. (14.3129 to 14.3256 mm.)	} Part No. IG2322 up to Engine No. 4044
Inside .. ..	.34425 to .34475 in. (8.74269 to 8.75665 mm.)		} Part No. IIG193 from Engine No. 4045

Exhaust

Outside .. ..	.5635 to .5640 in. (14.3129 to 14.3256 mm.)	} Part No. IG2322 up to Engine No. 4044
Inside .. ..	.3433 to .3438 in. (8.71982 to 8.7354 mm.)		} Part No. IIG193 from Engine No. 4045
Outside .. ..	.5635 to .5640 in. (14.3129 to 14.3256 mm.)	} Part No. IIG193 from Engine No. 4045
Inside .. ..	.34425 to .34475 in. (8.74269 to 8.75665 mm.)		} Part No. IIG193 from Engine No. 4045

Fitted height above

head625 in. (15.87 mm.)

Valve springs

Free length

Inner $1\frac{3}{32}$ in. (50 mm.)
 Outer $2\frac{3}{64}$ in. (51.99 mm.)

Fitted length

Inner $1\frac{7}{16}$ in. (36.51 mm.)
 Outer $1\frac{9}{16}$ in. (39.69 mm.)

Number of working coils

Inner $6\frac{1}{2}$
 Outer $4\frac{1}{2}$

Pressure

Valve open .. Inner 50 lb. (22.7 kg.)
 Outer 105 lb. (47.6 kg.)
 Valve closed .. Inner 30 lb. (13.6 kg.)
 Outer 60½ lb. (27 kg.)

Tappets

Type Flat base. Barrel type

Diameter

Body $\frac{13}{16}$ in. (20.64 mm.)
 Working face .. $\frac{9}{16}$ in. (14.29 mm.)

Length

.. .. 2.293 to 2.303 in. (58.25 to 58.5 mm.)



Rockers

Outside diameter before fitting ..	.751 in. (19.07 mm.)
Inside diameter (reamed in position) ..	.616 to .620 in. (15.65 to 15.74 mm.)
Bore of rocker arms ..	.7485 to .7489 in. (19.01 to 19.02 mm.)
Rocker ratio ..	1.426 : 1

Camshaft

Journal diameters	
Front ..	1.78875 to 1.78925 in. (45.43 to 45.44 mm.)
Centre ..	1.72875 to 1.72925 in. (43.91 to 43.92 mm.)
Rear ..	1.62275 to 1.62325 in. (41.22 to 41.23 mm.)
End-float ..	.003 to .007 in. (.076 to .178 mm.)
Bearings—number and type .. 3. Thinwall steel-backed white metal	
Outside diameter (before fitting)	
Front ..	1.920 in. (48.76 mm.)
Centre ..	1.860 in. (47.24 mm.)
Rear ..	1.754 in. (44.55 mm.)
Inside diameter (reamed in position)	
Front ..	1.790 in. (45.47 mm.)
Centre ..	1.730 in. (43.94 mm.)
Rear ..	1.624 in. (41.25 mm.)
Clearance ..	.001 to .002 in. (.0254 to .0508 mm.)

Engine lubrication system

Oil pump	
Type ..	Eccentric rotor
Relief pressure valve operates ..	75 to 80 lb./sq. in. (5.3 to 5.6 kg./cm. ²)
Relief valve spring	
Free length ..	3 in. (76.2 mm.)
Fitted length ..	2 $\frac{5}{8}$ in. (54.77 mm.) at 16 lb. (7.26 kg.) load
Identification colour .. Red spot	
Oil filter	
Type ..	Tecalemit
Capacity ..	$\frac{1}{2}$ pint (.6 U.S. pint, .28 litre)
Oil pressure	
Normal running	
Minimum ..	30 lb./sq. in. (2.1 kg./cm. ²)
Maximum ..	80 lb./sq. in. (5.6 kg./cm. ²)



Torque wrench settings

Cylinder head nuts ..	50 lb. ft. (6.91 kg. m.)
Main bearing nuts ..	70 lb. ft. (9.7 kg. m.)
Connecting rod set screws ..	35 lb. ft. (4.83 kg. m.)
Clutch assembly to flywheel ..	50 lb. ft. (6.91 kg. m.)

Fuel system

Carburetter	
Make and type ..	S.U. twin H4 semi-downdraught
Diameter ..	1 $\frac{1}{2}$ in. (38.1 mm.)
Needle	
'MGA 1500' ..	GS (Richer CC, Weaker No. 4)
'MGA 1600' ..	No. 6
Jet ..	.090 in. (2.29 mm.)
Carburetter piston	Part No. AUC8019
Piston spring ..	Red (Part No. AUC4387)

Air cleaner

Make and type ..	Vokes, oil-wetted
------------------	-------------------

Fuel pump

Make and type ..	S.U. electric, high-pressure
Delivery test ..	10 gal. per hr. (12 U.S. gal., 45.4 litres per hr.)
Suction lift ..	33 in. (83.8 cm.)
Output lift ..	48 in. (121.9 cm.)

Cooling system

Type ..	Pressurized radiator, thermo-siphon, pump and fan-assisted
Filler cap spring pressure	
'MGA 1500' ..	4 lb. (1.814 kg.)
'MGA 1600' ..	4 lb. (1.814 kg.), 7 lb. (3.175 kg.) from Car No. 71832

Thermostat setting

'MGA 1500' ..	70 to 72° C. (158 to 162° F.)
'MGA 1600' ..	68° C. (154° F.)

Quantity of anti-freeze

15° frost ..	1 pint (1.2 U.S. pints, .57 litre)
25° frost ..	1 $\frac{1}{2}$ pints (1.8 U.S. pints, .85 litre)
35° frost ..	2 pints (2.4 U.S. pints, 1.1 litres)

Ignition system

Sparking plugs	
Size ..	14 mm.
Plug gap ..	.019 to .021 in. (.48 to .53 mm.)
Coil ..	Lucas HAI2
Distributor ..	Lucas, Type DM2. Later models DM2P4



Ignition system—continued

Distributor contact points gap	..	.014 to .016 in. (.35 to .40 mm.)
Suppressors—type	..	Lucas No. 78106A fitted on each H.T. cable
Static timing		
'MGA 1500'	..	7° B.T.D.C.
'MGA 1600'	..	6° B.T.D.C.

Clutch

Make and type	..	Borg & Beck A6G single dry plate
Diameter	..	8 in. (20.3 cm.)
Facing material	..	Wound yarn—Borglite
Damper springs	..	6
Colour		
'MGA 1500'	..	White with light-green stripes
'MGA 1600'	..	Maroon and light green
Release lever ratio	..	9 : 1

Details of clutch pressure springs

'MGA 1500'	..	6 springs × 165/175 lb. (75/79.4 kg.), black/yellow, Part No. 3H2914 to Engine No. 16225. From Engine No. 16226, 180/190 lb. (81.6/86 kg.), cream and green, Part No. 1H1024
'MGA 1600'	..	6 springs, light grey

Gearbox

Number of forward speeds	..	4
Synchromesh	..	Second, third, and fourth gears
Ratios		
Top	..	1.0 : 1
Third	..	1.374 : 1
Second	..	2.214 : 1
First	..	3.64 : 1
Reverse	..	4.76 : 1
Overall ratios		
Top	..	4.3 : 1
Third	..	5.908 : 1
Second	..	9.520 : 1
First	..	15.652 : 1
Reverse	..	20.468 : 1

<i>M.p.h. per 1,000 r.p.m.</i>	
17.00	
12.372	
7.678	
4.670	

Speedometer gears ratio

5/12

Optional axle ratios

Overall ratios

<i>M.p.h. per 1,000 r.p.m.</i>	
16.1	
11.7	



Gearbox—continued

		Overall ratios	<i>M.p.h. per 1,000 r.p.m.</i>
Second	..	10.07 : 1	7.26
First	..	16.55 : 1	4.42
Reverse	..	21.61 : 1	3.38
Alternative axle ratios			
Top	..	4.1 : 1	17.8
Third	..	5.63 : 1	13.0
Second	..	9.06 : 1	8.05
First	..	14.9 : 1	4.9
Reverse	..	19.5 : 1	3.74
Top	..	3.9 : 1	18.7
Third	..	5.36 : 1	13.7
Second	..	8.63 : 1	8.46
First	..	14.2 : 1	5.15
Reverse	..	18.6 : 1	3.94

Steering

Type	..	Rack and pinion
Steering-wheel turns—lock to lock	..	2 $\frac{3}{8}$
Steering-wheel diameter	..	16 $\frac{1}{2}$ in. (41.9 cm.)
Camber angle	..	1° positive to $\frac{1}{2}$ ° negative on full bump
Castor angle	..	4°
King pin inclination	..	9 to 10 $\frac{1}{2}$ ° on full bump
Toe-in	..	Wheels parallel
Track		
Front	..	Disc wheels 47 $\frac{1}{2}$ in. (1.203 m.) Wire wheels 47 $\frac{7}{8}$ in. (1.216 m.)
Rear	..	Disc wheels 48 $\frac{3}{4}$ in. (1.238 m.) Wire wheels 48 $\frac{3}{4}$ in. (1.238 m.)

Front suspension

Type	..	Independent coil
Spring details	..	Up to Car No. 15151 From Car No. 15152
Coil diameter (mean)	..	3.238 in. (82.24 mm.) 3.28 in. (82.25 mm.)
Diameter of wire	..	.498 in. (12.66 mm.) .54 in. (13.72 mm.)
Free height	..	9.28 ± $\frac{1}{16}$ in. (23.49 cm. ± 1.6 mm.) 8.88 ± $\frac{1}{16}$ in. (22.55 cm. ± 1.6 mm.)
Number of free coils	..	7.5 7.2
Static laden length	..	6.60 ± $\frac{1}{32}$ in. (16.76 cm. ± .8 mm.)
Nominal load	..	1,095 lb. (497 kg.)
Maximum deflection	..	4 in. (10.16 cm.)
Dampers	..	Piston type



Rear suspension

Type	Semi-elliptic
Spring details	
Number of leaves	6
Width of leaves ..	1 $\frac{3}{4}$ in. (44.45 mm.)
Gauge	$\frac{7}{8}$ in. (5.56 mm.)
Working load ..	450 lb. (203.7 kg.)
Free camber ..	3.60 in. (91.44 mm.)
Dampers	Piston type

Propeller shaft

Type	
'MGA 1500' ..	Tubular, reverse spline
'MGA 1600' ..	Tubular, flanged type
Propeller shaft length	
'MGA 1500' ..	31 $\frac{3}{8}$ in. (79.69 cm.)
'MGA 1600' ..	30 $\frac{1}{2}$ in. (77.47 cm.)
Overall length	
'MGA 1500' ..	38 $\frac{1}{2}$ in. (97.44 cm.)
'MGA 1600' ..	32 $\frac{1}{16}$ in. (82.98 cm.)
Diameter	2 in. (50.8 mm.)
Make and type of joints	Hardy Spicer, needle-roller

Rear axle

Make and type ..	B.M.C. 'B' type, three-quarter-floating
Ratio	
Standard	10/43
Optional	9/41
Adjustment	Shims

Electrical equipment

System	12-volt, positive earth
Charging system ..	Compensated voltage control
Battery	Two 6-volt Lucas SG9E
Starter motor ..	Lucas 4-brush M35G
Dynamo	Lucas C39PV2

Brakes ('MGA 1500')

Type	Lockheed hydraulic (front and rear)
Size	10 in. by 1 $\frac{3}{8}$ in. (25.4 cm. by 44.45 mm.)
Front	Two leading shoes
Rear	Single leading shoe
Drum size	10 in. (25.4 cm.) (front and rear)
Lining dimensions ..	9.6 in. by 1 $\frac{3}{8}$ in. (24.38 cm. by 44.45 mm.)
Lining area	
Front	67.2 sq. in. (433.55 cm. ²)
Rear	67.2 sq. in. (433.55 cm. ²)
Material	Ferodo DM12



Brakes ('MGA 1600')

Type	Lockheed hydraulic (disc front, drum rear)
Lining material (rear)	Don 24
Lining dimensions ..	9.63 in. by 1.7 in. (24.46 cm. by 43.2 mm.)
Total lining area ..	65.48 sq. in. (422.36 cm. ²)
Disc diameter	11 in. (27.94 cm.)
Disc pad material ..	Don 55

Wheels

Type	
Ventilated disc ..	4J x 15
Wire (optional) ..	4J x 15 and 48-spoke

Tyres

Size	5.60—15
Tyre pressures	
Normal	
Front	17 lb./sq. in. (1.2 kg./cm. ²)
Rear	20 lb./sq. in. (1.4 kg./cm. ²)
Fast motoring	
Front	21 lb./sq. in. (1.48 kg./cm. ²)
Rear	24 lb./sq. in. (1.69 kg./cm. ²)
Competition work and sustained high-speed motoring	
Front	23 lb./sq. in. (1.62 kg./cm. ²)
Rear	26 lb./sq. in. (1.83 kg./cm. ²)

Capacities

	Imp.	U.S.	Litres
Engine sump (incl. filter) ..	8 pts.	9.6 pts.	4.56
Gearbox	4 pts.	5 pts.	2.27
Rear axle	2 $\frac{3}{4}$ pts.	3.25 pts.	1.56
Cooling system	10 pts.	12 pts.	5.67
Steering rack	$\frac{1}{2}$ pt.	.6 pt.	.28
Fuel tank	10 gal.	12 gal.	45.4
Brake system	1 pt.	1.2 pts.	.568

General Dimensions

Wheelbase	94 in. (2.388 m.)
Overall length	156 in. (3.962 m.)
Overall width	58 in. (1.473 m.)
Overall height	50 in. (1.270 m.)
Ground clearance ..	6 in. (15.24 cm.)
Weight: fully equipped with tools, spare wheel, oil, water, and 2 gal. (2.5 U.S., 9.1 litres) of fuel	1,988 lb. (901.81 kg.)
Turning circles	28 ft. (8.534 m.)



Stage MGA.I 'MGA 1500' and 'MGA 1600'

Tuning by port polishing

An increase of some 3 b.h.p. can be had by general attention to the cylinder head and port polishing as detailed below.

Lightly grind and polish the exhaust and inlet ports throughout. They should not be ground out so heavily that the shape or valve choke diameters are impaired.

Match up, by grinding, all the exhaust and inlet manifold ports with the cylinder head ports.

Grind out and polish the inlet manifold, also matching the carburetter bore. Make the bore of the manifold a gradual taper from the carburetter end to the cylinder head port, grinding away any ridges left by machining during manufacture.

Do not grind out the combustion spaces as these are already quite clean and partly machined, but remove any frazes and lightly polish all over. Any enlargement around the combustion walls may cause the cylinder head gasket to overlap and destroy the efficiency of the seal. Also the compression ratio will be lowered and the tuning will be ineffective.

On 'MGA 1500' engines prior to 17151 it is necessary to grind out and enlarge the inlet port at the neck (see Fig. 1). Make up a sheet-metal template to the dimensions given in Fig. 1 and fasten it to a long bolt so that it may be used as a gauge when grinding out the inlet ports.

On 'MGA 1500' engines prior to 4046 bore out the exhaust port valve throat to the dimensions given in Fig. 2, at the same time reducing the length of the exhaust valve guide and boss by $\frac{3}{32}$ in. at the port end (see Fig. 2).

All 'MGA 1500' engines after 4045 and all 'MGA 1600' engines have the increased diameter exhaust throat and the shortened guide. All 'MGA 1500' engines from 17151 and all 'MGA 1600' engines have the enlarged inlet port neck.

The illustration in Fig. 3 on page 19 shows the peak of the combustion chamber ground away to a $\frac{3}{16}$ in. radius. This need only be done if the cast point is rather thin and sharp; if the casting is stubby and round-ended it may be left alone.

The 'MGA 1500' engine will then give approximately 75 b.h.p. at 5,750 r.p.m. and the 'MGA 1600' engine 82 b.h.p.

It is sometimes found beneficial, but not essential, to fit the richer carburetter needles 'CC' to the 'MGA 1500' carburetters.

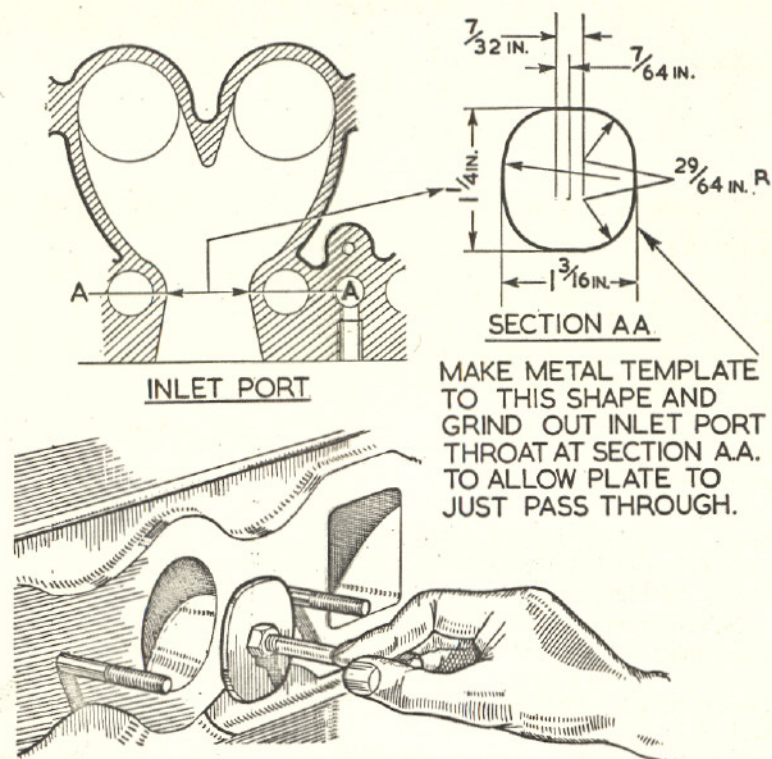


Fig. 1

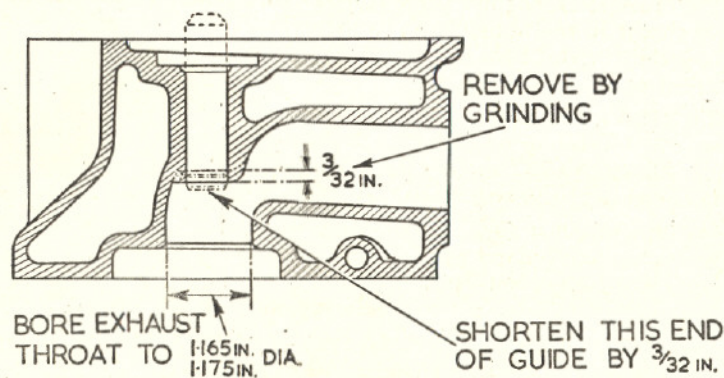


Fig. 2



Stage MGA.2 'MGA 1500' and 'MGA 1600'

Tuning for middle-range acceleration

If most importance is placed on initial and middle-range acceleration an improvement of 2 to 3 b.h.p. may be gained in the lower ranges by fitting camshaft Part No. 1H603.

This has a timing: Inlet opens 5° B.T.D.C., inlet closes 45° A.B.D.C., Exhaust opens 40° B.B.D.C., exhaust closes 10° A.T.D.C.

The valve lift is .322 in. (8.1778 mm.).

The standard distributor may be used, but a distributor with the correct advance curve for use with this camshaft is Part No. 1H1228 (Riley One-Point-Five).

The static ignition setting should be 4° B.T.D.C.

The tappet setting should be .015 in. (.381 mm.).

Top end performance will only be slightly impaired between 5,000 and 6,000 r.p.m.

If desired, the head may be tuned by port polishing as laid down in Stage MGA.1.

Stage MGA.2A 'MGA 1500' and 'MGA 1600'

Tuning for middle range with higher compression ratio

If increased middle-range performance is required carry out fitting of the camshaft, etc., as Stage MGA.2 and fit flat-top pistons 9.0 : 1 ratio (Part No. 1H1178) to the 'MGA 1500' engine and pistons 9.25 : 1 ratio (Part No. 12H173) to the 'MGA 1600' engine. Connecting rods, Part Nos. AEH644 (Nos. 1 and 3) and AEH642 (Nos. 2 and 4), must be used with pistons (Part No. 12H173).

Static ignition setting should range between 4° and 2° B.T.D.C. for the 'MGA 1500' engine and between 3° and 1° B.T.D.C. for the 'MGA 1600' engine.



Stage MGA.3 'MGA 1500' and 'MGA 1600'

Tuning for high-compression ratios 9.0 : 1 and 9.25 : 1

Carry out the procedure for tuning by port polishing as Stage MGA.1.

The compression ratio is raised to 9.0 : 1 on the 'MGA 1500' or 9.25 : 1 on the 'MGA 1600' engine by fitting the appropriate pistons and the connecting rods as at Stage MGA.2A.

Use Champion N5 plugs or Champion N3 plugs for hard driving.

The static ignition setting should be approximately 4° B.T.D.C. Carburetter needles 'CC' are to be used with the 'MGA 1500' carburetters and needle No. 6 with the 'MGA 1600' carburetters.

The 'MGA 1500' engine will then give 78-80 b.h.p. and the 'MGA 1600' 85-86 b.h.p. at 6,000 r.p.m.

Stage MGA.3A 'MGA 1600' only

Tuning with high-compression ratio 9.25 : 1 and larger carburetters

Tune the engine as the procedure for Stage MGA.3.

Fit 1 $\frac{3}{8}$ in. (44.45 mm.) dia. S.U. carburetters (Part No. AUC780); these are fitted with .100 jets and KW needles. Alternative needles—richer RF, weaker KW1.

A new inlet manifold (Part No. AEH200) will be required. This manifold has a $\frac{5}{8}$ in. (15.87 mm.) dia. by-pass hole in the balance pipe.

Polish this manifold as explained in Stage MGA.1.

To prevent vibration of the carburetters it is advisable to use a synthetic rubber gasket (Part No. AH5791) between the carburetters and the manifold and a $\frac{1}{8}$ in. (3.18 mm.) thick double-coil spring washer under the carburetter fixing nuts, so that the carburetters may be left not quite tightened solid. Wire the nuts in pairs to prevent them becoming slack.

No air cleaners are arranged for these carburetters, but the standard ones would be suitable if bored out to 1 $\frac{1}{8}$ in. (46.04 mm.) dia. and fixing nuts and vent holes altered to match the 1 $\frac{3}{8}$ in. (44.45 mm.) carburetter flange. These carburetters will not give a large improvement, but the engine should give about 88 b.h.p. at 6,000 r.p.m.



Stage MGA.4 'MGA 1500' only

Tuning for high-compression ratio 10:1 : 1

Carry out the procedure for port polishing as Stage MGA.1.

The compression ratio is raised to 10:1 : 1 by fitting special raised-top pistons to Part No. IH1180 (complete with rings and gudgeon pins).

The raised portion on the piston head is shaped to match the combustion space, and the piston will only fit one way round—that is, with the sloping face of the raised head towards the sparking plug side.

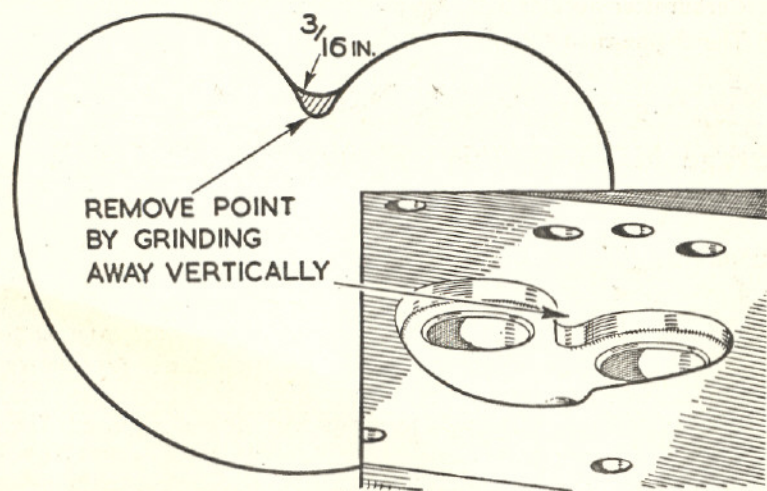


Fig. 3

Also grind away the point on each combustion space as in Fig. 3, otherwise this will foul the raised portion of the piston head. Check the clearance at this point by putting a small blob of plasticine locally on the piston head, when at the top of the stroke, and drop the cylinder head over the studs. Examine the impression and ensure a lateral clearance of $\frac{1}{16}$ in. from the raised head of the piston. These pistons are for special competition purposes; they have increased clearances over the standard pistons and may give some increase of oil consumption.



The special pistons have fully floating gudgeon pins of diameter increased to $\frac{7}{8}$ in. (22.22 mm.), and will require new connecting rods:

2 off Part No. AEH644 (Nos. 1 and 3) } Use in balanced sets.
2 off Part No. AEH642 (Nos. 2 and 4)

With the above high-compression ratio it is essential that the cylinder head gasket be clamped efficiently. Check the cylinder head face, and if not dead flat have the face lightly and accurately surface-ground or fine-machined.

Use super premium 100-octane gasoline.

N5 Champion plugs for normal driving, but N3 required for hard driving.

Static ignition setting 2° B.T.D.C.

Carburetter needles 'CC'.

The engine then gives 86 b.h.p. at 6,000 r.p.m.

Stage MGA.4A 'MGA 1500' only

Tuning with high-compression ratio 10:1 : 1 and larger carburetters

Tune the engine as the procedure for Stage MGA.4.

Fit $1\frac{3}{4}$ in. (44.45 mm.) dia. S.U. carburetters (Part No. AUC780); these are fitted with .100 jets and KW needles. Alternative needles—richer RF, weaker KW1.

A new inlet manifold (Part No. AEH200) will be required. This manifold has a $\frac{5}{8}$ in. (15.87 mm.) dia. by-pass hole in the balance pipe.

Polish this manifold as explained in Stage MGA.1.

To prevent vibration of the carburetters it is advisable to use a synthetic rubber gasket (Part No. AHH5791) between the carburetters and the manifold and a $\frac{3}{8}$ in. (3.18 mm.) thick double-coil spring washer under the carburetter fixing nuts, so that the carburetters may be left not quite tightened solid. Wire the nuts in pairs to prevent them becoming slack.

No air cleaners are arranged for these carburetters, but the standard ones would be suitable if bored out to $1\frac{1}{4}$ in. (46.04 mm.) dia. and fixing nuts and vent holes altered to match the $1\frac{3}{4}$ in. (44.45 mm.) carburetter flange. These carburetters will not give a large improvement, but the engine should give about 88 b.h.p. at 6,000 r.p.m.



Other Special Items

Valves 'MGA 1500' only

If an exhaust valve is desired with a longer service life or more resistance to burning, valves (Part No. IH1025) which have a Bright Ray hard face are available.

These valves may also be used in 'MGA 1600' engines up to Engine No. 20846. After this engine number an improved quality exhaust valve in 21-4/N.S. material was fitted.

Brakes 'MGA 1500' only

After many consecutive applications of the brakes during competition driving some brake fade may be experienced with the standard linings.

Competition linings or lined shoes are available (see list).

With fair competition driving these linings will be free from fade, but will give a harder pedal effort on application.

Brake-drum life will be decreased.

Balancing of road wheel and tyre assemblies

To obtain the smoothest steering, free from all steering-wheel kick, and to eliminate any tendency to front wheel patter, especially at speeds around 70 m.p.h. (113 km.p.h.) and over, it will be found beneficial to have the front road wheel and tyre assemblies statically and dynamically balanced. This usually results in balance weights being fitted on both sides of the rims, but this dynamic balancing is well worth while. Balance may require re-checking every few thousand miles if the car suffers brake locking, etc., as this may again put the tyres out of balance enough for the effect to be felt.

It is advisable to keep front tyres in good condition and free from uneven tread wear. This can sometimes be done by changing tyres from front to rear before uneven wear develops.

Pick the best tyres for use at the front (or those that have even tread wear and run true) before they are dynamically balanced.

Balancing a tyre which has flats or uneven wear is not usually very successful. In some cases the tread can be buffed true, but this is not an economic way of using rubber.

Clutch 'MGA 1500' only

Up to Engine No. 16225 the clutches were fitted with pressure springs (Part No. 3H2914), black and yellow markings, 165/175 lb. (75/79.4 kg.) load. Some delay in clutch take-up may be experienced when making very fast up gear changes. If a quicker take-up is desired



clutch pressure springs (Part No. IH1024), cream and green marking, 180/190 lb. (81.6/86 kg.) load, can be fitted.

All engines after 16225 are fitted with the 180/190 lb. (81.6/86 kg.) springs, and these clutches are capable of handling most competition work.

Clutch 'MGA 1500' and 'MGA 1600'

If a high-duty clutch is required, then a competition clutch assembly (Part No. AHH5457) is available. This may be expected to give a somewhat sharp take-up but will stand any amount of hard work.

Sparkling plugs and suitable alternatives

<i>Champion</i>	=	<i>Lodge</i>	=	<i>K.L.G.</i>
N5	=	HLN	=	FE70
N3	=	3 HLN	=	FE100

Note.—The previous designations of Champion plugs were NA8 for N5 and NA10 for N3.

Some arduous conditions may call for sparking plugs in the racing range, such as Champion N58R (was NA12) (Part No. 97H2275), Lodge RL47, or K.L.G. FE220.

It is advisable to refer to the plug representatives for advice on the full range available.

Valve springs

The valve bounce r.p.m. on the standard engine is 6,000 r.p.m., and the valve springs, operating mechanism, and drive are safely stressed to maintain this.

If for very special competition purposes it is desired to raise the valve bounce period, the appropriate springs may be selected from the following table:

	Part No. outer springs	lb.	Part No. inner springs	lb.	Total lb. full lift	Valve bounce r.p.m.
Standard	IH722	105	IH723	50	155	6,000
	6K873	115	IH723	50	165	6,200
	IH1111	117	IH723	50	167	6,230
	6K873	115	IH1112	57	172	6,320
	IH1111	117	IH1112	57	174	6,360
	1G2887	131	IH723	50	181	6,480
	1G2887	131	IH1112	57	188	6,600

It is advised that these springs be used only for very special events, as if used under everyday conditions the cams and followers will have a shorter service life.

The springs will not necessarily give an increase in brake-horsepower, but will extend the same horse-power up to valve bounce.



This is sometimes useful in enabling a lower gear to be retained, still maintaining the same maximum speed, with increased power for acceleration.

Close-ratio gearbox

Close-ratio gears are available giving gearbox ratios of—third 1.268 : 1, second 1.62 : 1, first 2.45 : 1.

The following parts are required:

IH3297	First motion shaft	.. ..	1 off
IH3298	Laygear	.. ..	1 off
IH3299	Second speed mainshaft gear		1 off
IH3300	Third speed mainshaft gear		1 off

Rear axle ratios

With the combination of the 4.55, 4.3, 4.1, and 3.9 : 1 axle ratios available and the standard and close-ratio gears it is possible to obtain a combination of conditions suitable for most competition purposes.

Oil cooler

An aluminium-alloy oil cooler is available. This is supplied complete with high-duty flexible hoses and can easily be mounted on the floor behind the radiator grille as depicted in Fig. 8.

Water thermostat

For sustained maximum power and speed, such as in road-racing conditions, it is advantageous to remove the thermostat. This will ensure the maximum water flow under these conditions.

Fuel pump

Check the fuel flow of your petrol pump by removing the two float-chamber tops complete with the fuel lines. Unclip the main fuel line and reassemble it alongside the car so that the two float-chamber tops (complete with needles and levers) can be held over a 2 gal. (2.4 U.S. gal., 9.1 litres) or larger can.

Switch on the pump and check the time for 1 gal. (9.6 U.S. pints, 4.5 litres) to flow.

The standard engine uses a maximum of approx. 5.7 gal. (6.8 U.S. gal., 26.5 litres) an hour, and the engine tuned to Stage 4A uses approx. 7 gal. (8.4 U.S. gal., 32 litres) an hour.

A good pump may flow at 9 gal. (10.8 U.S. gal., 41 litres) an hour, but a pump needing attention may only flow at 6 gal. (7.2 U.S. gal., 27.3 litres) an hour.

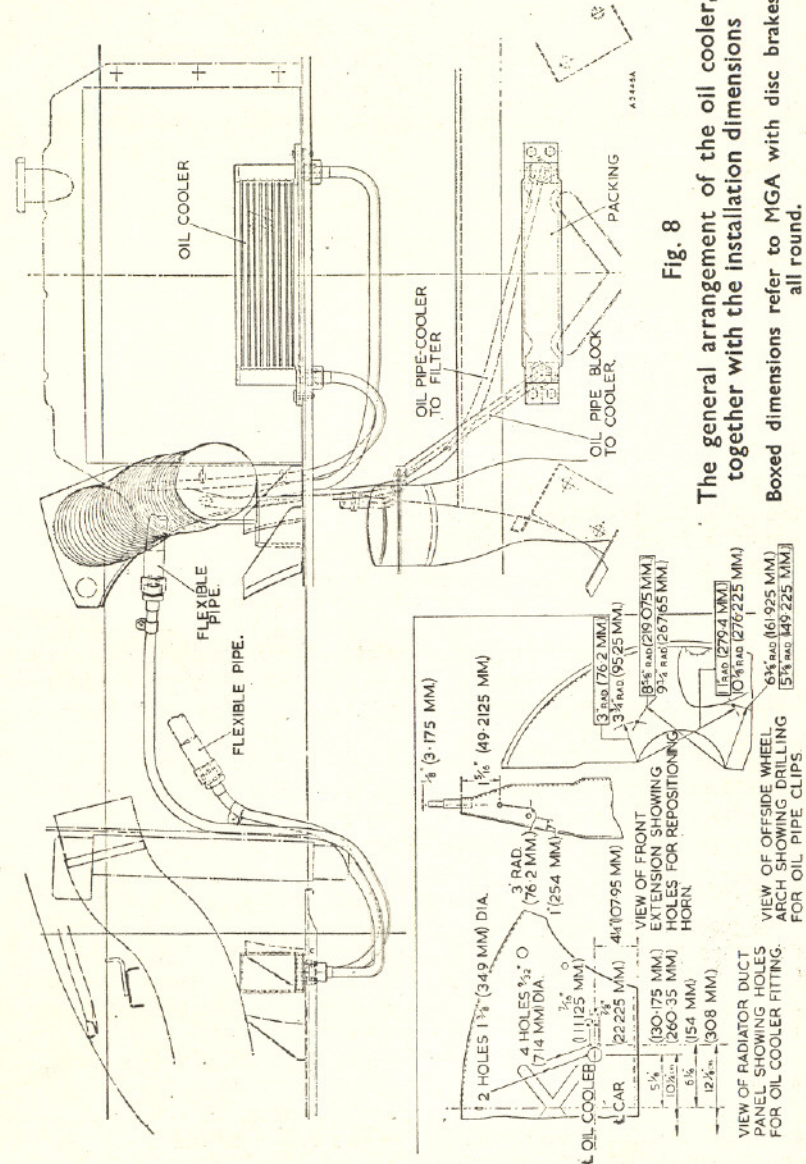


Fig. 8
The general arrangement of the oil cooler, together with the installation dimensions. Boxed dimensions refer to MGA with disc brakes all round.



If a pump is required which will give a flow with a wide safety margin S.U. fuel pump (Part No. AUA73) is available.

The mounting bracket will need slight alteration to mount this pump and the fuel lines reset to suit.



Racing and Competition Equipment

	Part No.	
	'MGA 1500'	'MGA 1600'
Filler Cap Le Mans type		AHH5498
Fuel tank—15 gal.		AHH5863
Fuel gauge—15 gal.		17H299
Tank unit—15 gal.		BHA4094
Tank strap assembly (qty. 2) 15 gall. only		AHH5998
Fuel tank—17 gal.		AHH5990
Fuel gauge—17 gal.		BHA5159
Tank unit—17 gal.		BHA4161
Tank strap assembly (qty. 2) (17 gall. only)		AHH5992
Bracket—front tank mounting		AHH5501
Distance tube—rear hanger (qty. 2) .. .		AHH5504
Rear hanger—tank strap		AHH5502
Windshield—full-width (aluminium and perspex).. .. .	AFH2591	AFH2591
Steering-wheel (wood rim, light alloy, Italian)	AHH5800	AHH5800
Exhaust valve (high-duty)	IH1025	IH1025
Piston assembly—flat head—9.0 : 1 ratio	IH1178	
Piston assembly—raised head—10.1 : 1, including:	IH1180	
Piston rings	IH1181	
Gudgeon pin	IH1110	
Circlip—gudgeon pin	CCN214	
Connecting rods (for use with pistons having fully floating gudgeon pins):		
Nos. 2 and 4	AEH642	AEH642
Nos. 1 and 3	AEH644	AEH644
Piston assembly—flat head—9.25 : 1 ratio		I2H173
Carburetters— $1\frac{3}{4}$ in. (44.45 mm.) (1 pair)	AUC780	AUC780
Gasket—carburetter— $1\frac{3}{4}$ in. (44.45 mm.)	AHH5791	AHH5791
Inlet manifold for $1\frac{3}{4}$ in. (44.45 mm.) carburetters	AEH200	AEH200
Valve springs (outer)	IH1111	IH1111
Valve springs (inner)	IH1112	IH1112



METRIC AND DECIMAL EQUIVALENTS OF FRACTIONS (of one inch)

mm.			inches
0.3969		$\frac{1}{64}$	0.015625
0.79375		$\frac{1}{32}$	0.03125
1.1906		$\frac{3}{64}$	0.046875
1.5875	$\frac{1}{16}$	$\frac{5}{64}$	0.0625
1.9844		$\frac{7}{64}$	0.078125
2.38125		$\frac{3}{32}$	0.09375
2.7781		$\frac{7}{64}$	0.109375
3.1750	$\frac{1}{8}$	$\frac{9}{64}$	0.125
3.5719		$\frac{5}{32}$	0.140625
3.96875		$\frac{11}{64}$	0.15625
4.3656		$\frac{13}{64}$	0.171875
4.7625	$\frac{3}{16}$	$\frac{7}{32}$	0.1875
5.1594		$\frac{15}{64}$	0.203125
5.55625		$\frac{7}{32}$	0.21875
5.9531		$\frac{17}{64}$	0.234375
6.3500	$\frac{1}{4}$	$\frac{19}{64}$	0.25
6.7469		$\frac{17}{64}$	0.265625
7.14325		$\frac{9}{32}$	0.28125
7.5406		$\frac{19}{64}$	0.296875
7.9375	$\frac{5}{16}$	$\frac{21}{64}$	0.3125
8.3344		$\frac{21}{64}$	0.328125
8.73125		$\frac{11}{32}$	0.34375
9.1281		$\frac{23}{64}$	0.359375
9.5250	$\frac{3}{8}$	$\frac{23}{64}$	0.375
9.9219		$\frac{25}{64}$	0.390625
10.31875		$\frac{13}{32}$	0.40625
10.7156		$\frac{27}{64}$	0.421875
11.1125	$\frac{7}{16}$	$\frac{27}{64}$	0.4375
11.5094		$\frac{29}{64}$	0.453125
11.90625		$\frac{15}{32}$	0.46875
12.3031		$\frac{31}{64}$	0.484375
12.70	$\frac{1}{2}$		0.5



mm.			inches
13.0969		$\frac{33}{64}$	0.515625
13.49375		$\frac{17}{32}$	0.53125
13.8906		$\frac{35}{64}$	0.53125
14.2875	$\frac{9}{16}$		0.5625
14.6844		$\frac{37}{64}$	0.578125
15.08125		$\frac{19}{32}$	0.59375
15.4781		$\frac{39}{64}$	0.609375
15.8750	$\frac{5}{8}$		0.625
16.2719		$\frac{41}{64}$	0.640625
16.66875		$\frac{21}{32}$	0.65625
17.0656		$\frac{43}{64}$	0.671875
17.4625	$\frac{11}{16}$		0.6875
17.8594		$\frac{45}{64}$	0.703125
18.25625		$\frac{23}{32}$	0.71875
18.6531		$\frac{47}{64}$	0.734375
19.050	$\frac{3}{4}$		0.75
19.4469		$\frac{49}{64}$	0.765625
19.84375		$\frac{25}{32}$	0.78125
20.2406		$\frac{51}{64}$	0.796875
20.6375	$\frac{13}{16}$		0.8125
21.0344		$\frac{53}{64}$	0.828125
21.43125		$\frac{27}{32}$	0.84375
21.8281		$\frac{55}{64}$	0.859375
22.2250	$\frac{7}{8}$		0.875
22.6219		$\frac{57}{64}$	0.890625
23.01875		$\frac{29}{32}$	0.90625
23.4156		$\frac{59}{64}$	0.921875
23.8125	$\frac{15}{16}$		0.9375
24.2094		$\frac{61}{64}$	0.953125
24.60625		$\frac{31}{32}$	0.96875
25.0031		$\frac{63}{64}$	0.984375
25.4	$\frac{1}{2}$		1.0