GROUP 2
ENGINE

SECTIONS IN GROUP 2

SECTION 2-A
ENGINE SPECIFICATIONS

CONTENTS OF SECTION 2-A

SERVICE BULLETIN REFERENCE

Bulletin No.	Page No.	SUBJECT

2-1 ENGINE TIGHTENING SPECIFICATIONS

Use a reliable torque wrench to tighten the parts listed, to insure proper tightness without straining or distorting parts. These specifications are for *clean and lightly lubricated threads only;* dry or dirty threads produce increased friction which prevents accurate measurement of tightness.

Part	Location	Thread Size	Torque Ft.Lbs.
Plug	Spark	14 MM	22-28
Plug	Crankcase Drain	18 MM	30-35
Bolt	Lower Crankcase	5/16-18	6-15
Bolt	Flywheel Housing to Upper Crankcase	7/16-14	55-60
Bolt	Timing Gear Cover	3/8-16	15-20
Bolt	Valve Push Rod Cover	5/16-18	4-5
Nut	Valve Rocker Arm Cover	5/16-24	4-5
Bolt	Water Pump to Crankcase	3/8-16	25-30
Nuts	Manifold Stud	3/8-24	25-30
Bolts	Cylinder Head	7/16-14	65-70
Nut	Connecting Rod Bolt—Series 40-50	3/8-24	40-45
Nut	Connecting Rod Bolt—Series 70	7/16-24	60-65
Bolt	Piston Pin Clamp	5/16-24	25-30
Bolt	Crankshaft Bearing Cap	1/2-13	90-100
Bolt	Balancer Retaining	3/4-16	100-110
Nut	Flywheel to Crankshaft—Series 40-50	3/8-24	35-40
Bolt	Flywheel to Crankshaft—Series 70	3/8-24	45-50
Bolt	Rocker Arm Shaft Bracket	3/8-16	30-35
Nut	Rocker Arm Shaft Bracket Stud	3/8-24	30-35
Nut	Generator to Bracket Bolt	3/8-24	25-30
Bolt	Generator Mounting Bracket to Crankcase	3/8-16	30-35
Nut	Front Engine Mounting Bracket to Frame Bolt	3/8-24	30-35
Nut	Front Engine Mounting Stud	3/8-24	30-35
Bolt	Transmission Mounting Pad to Rear Bearing Retainer	3/8-24	30-35
Nut	Transmission Mounting Pad to Transmission Support Bolt	3/8-24	30-35
Nut	Transmission Support to Frame Cross Member Bolt	3/8-24	30-35
Nut	Thrust Pad to Transmission Support and Thrust Plate	3/8-24	30-35

2-2 ENGINE GENERAL SPECIFICATIONS

a. General Information

Items	Series 40-50	Series 70
Type	←Valve in Head→	
Cylinders and Arrangement	←8 in Line→	
Bore and Stroke	3 13/32" x 4 1/8"	3 7/16" x 4 5/16"
Piston Displacement	248.1 Cu. In.	320.2 Cu. In.
Compression Ratio—		
Series 40	6.3 to 1	
Series 50-70 Syncro-Mesh	6.6 to 1	6.6 to 1
Series 50-70 Dynaflow	6.9 to 1	6.9 to 1
Compression Pressure at Cranking Speed (lbs./sq. in.)		
Series 40	112	
Series 50-70 Syncro-Mesh	114	114
Series 50-70 Dynaflow	118	118
Firing Order	←1-6-2-5-8-3-7-4→	
Taxable Horsepower	30.63	37.81
Max. Brake H.P., Bare Engine, @ 3600 RPM		
Series 40	110	
Series 50-70 Syncro-Mesh	115	144
Series 50-70 Dynaflow	120	150
Engine Weight, Less Clutch and Transmission (lbs.)	709	840
Type of Engine Mountings	←Controlled Frequency→	
Number of Mountings and Material	←3 Synthetic Rubber→	

b. Cylinder Crankcase and Cylinder Head

Cylinder Crankcase Type	←Block Case Integral with Crankcase→
Cylinder Head Type and Material	←One Piece, Cast Iron→
Combustion Chamber	←Cast in Head→
Head Bolts, Number and Diameter	←22, 7/16"→

c. Crankshaft Bearings, Flywheel Balancer

Crankshaft Weight	85.5 lbs.	114 lbs.
Number of Crankshaft Bearings	5	5
Bearing which takes Thrust	←Center→	
Crankshaft Bearing Type	←Replaceable-Precision→	
Crankshaft Bearing Material	←Steel Backed Durex-100A→	
Provision for Bearing Adjustment	None	None
Bearing Cap Bolts, No. and Diam.		
Rear Bearing	Two, 1/2"	Four, 1/2"
Other Bearings	Two, 1/2"	Two, 1/2"
Flywheel Material		
Syncro-Mesh	Cast Iron	Cast Iron
Dynaflow	Pressed Steel	Pressed Steel
Weight of C. I. Flywheel and Ring	36.55 lbs.	44.75 lbs.
Number of Teeth on Ring	146	156
Crankshaft Balancer Type	←Laminated Steel Flywheel Supported on Steel Leaf Springs→	
Balancer Location	←Front End of Crankshaft→	

d. Connecting Rods, Pistons and Rings

Connecting Rod Bearing Type—		
1948 and First 1949	←Centrifugally Cast in Rod→	
1949 Except First Jobs	←Replaceable-Precision→	
Provision for Bearing Adjustment		
1948 and First 1949	←Solid Shims→	
1949 Except First Jobs	None	None
No. and Diam. of Cap Bolts	Two, 3/8"	Two, 7/16"
How are Rods and Pistons Removed	←From Top of Cylinder→	
Weight of Connecting Rod Assembly (lbs.)		
With Cast Bearings	1.779	2.224
With Replaceable Bearings	1.804	2.224
Piston Type	←Full Skirt→	
Piston Weight, Less Pin and Rings	13.776 oz.	17.94 oz.
Piston Features	←Turbulator Top—Cam Ground Transverse Slot→	
Piston Material and Surface Treatment	←Aluminum Alloy—Anodized→	
Compression Rings per Piston	2	2
Type	←Inside Bevel→	
Oil Rings per Piston	2	2
Type, Upper	←Channeled—Oil Return Slot→	
Type, Lower	←Flex-Fit→	
Location of All Piston Rings	←Above Piston Pin→	

e. Camshaft and Valve Mechanism

	Series 40-50	Series 70
Camshaft Drive	Link Belt Chain	
Number of Camshaft Bearings	5	5
Camshaft Bearing Material	Steel Backed Babbitt	
Camshaft Thrust Control	Plate at Front End	
Camshaft Sprocket—		
Material and Width	Cast Iron, 1 1/32"	
No. of Teeth	38	38
Crankshaft Sprocket—		
Material and Width	Steel, 1 1/32"	
No. of Teeth	19	19
Timing Chain Width	1"	1"
Valve Lifter Type—		
1948 All Series, Except Late Ser. 70 Dynaflow	Plain Sleeve	
1949 with Syncro-Mesh	Plain Sleeve	
Late 1948 Ser. 70 and 1949 Ser. 50-70 Dynaflow		Hydraulic
Valve Type—Inlet	Streamlined	
Exhaust	Mushroom	
Valve Seat Angle—Inlet and Exhaust	45 Degrees	
Valve Spring Type	Dual Helical	
Valve Guide Type and Material	Removable, Cast Iron	

f. Engine Oiling System

	Series 40-50	Series 70
Oiling System Type	Forced Feed	
Oil Supplied to Bearing Surfaces—		
Crankshaft Bearings	Pressure	
Connecting Rod Bearings	Pressure	
Pistons and Pins	Spray	
Camshaft Bearings	Pressure	
Timing Chain and Sprockets	Metered Jet and Spray	
Rocker Arms and Valves	Low Pressure	
Valve Tappets	Gravity Flow from Rocker Arms	
Location of Oil Filler	In Valve Rocker Arm Cover	
Location of Oil Drain	Plug in R. Side of Lower Crankcase	
Oil Reservoir Capacity—Quarts—		
Dry Engine	6 1/2 (*8)	8 (*9 1/2)
Refill	5 1/2 (*7)	7 (*8 1/2)
	(*With Dry Oil Filter)	
Oil Level Gauge—Type and Location	Rod in R. Side of Crankcase	
Oil Pressure Gauge—Make	AC	AC
Normal Oil Pressure	35 lbs. @ 35 MPH	
Oil Pump Type	Helical Gear	
Oil Pump Location	Suspended in Lower Crankcase	
Oil Screen Location	On Float Attached to Pump	
Oil Pressure Regulator Type	Non-Adjustable Spring and Valve	

g. Engine Cooling System

	Series 40-50	Series 70
Cooling System Type	Pressure	
Water Temperature Control	Thermostat and Fixed By-Pass	
Cooling System Capacity—Qts.—		
Less Heater	13 (**14)	16 3/4
With Heater	14 1/4 (**15 1/4)	18
	(**Series 50 with Dynaflow Drive)	
Location of Drains	Cocks in Radiator and in R.H. Side of Crankcase	
Water Pump Type	Centrifugal	
Water Pump Location	Front End of Crankcase	
Water Pump and Fan Drive—With Generator	Single Vee Belt	
Water Pump to Crankshaft Speed Ratio	.92 to 1	.96 to 1
Water Pump Bearing Type	Sealed Double-Row Ball	
Water Pump Seal Type	Spring Loaded, Packless	
Fan Diameter	18"	17 1/2"
Number of Blades	4	5
Radiator Make	Harrison	
Core Material	Copper	
Core Frontal Area (sq. in.), Syncro-Mesh	419.43	421.12
Dynaflow Drive	417.07	409.3
Core Thickness, Syncro-Mesh	2"	2 31/32"
Dynaflow Drive	2 15/32"	3 3/8"
Radiator Pressure Control	Valve in Filler Cap	
Radiator Pressure (lbs.)—		
Syncro-Mesh	7	7
Dynaflow Drive	7	13
Radiator Thermostat—Make	Harrison	
Thermostat Location	In Housing Above Water Pump	
Thermostat Calibration	See Par. 2-3, f	

2-3 ENGINE DIMENSIONS, FITS AND ADJUSTMENTS

NOTE: *Dimensions and limits for fit of parts apply to new parts only. Where limits are given, "T" means tight and "L" means loose.*

a. Crankshaft and Connecting Rod Bearings

Items	Series 40-50	Series 70
Crankshaft Bearing Nominal Diam. x Length—		
Front	2 5/16" x 1 17/64"	2 9/16" x 1 9/32"
Front Center	2 3/8" x 15/16"	2 5/8" x 31/32"
Center	2 7/16" x 1 5/8"	2 11/16" x 1 15/32"
Rear Center	2 1/2" x 15/16"	2 3/4" x 31/32"
Rear	2 9/16" x 1 25/32"	2 13/16" x 2 15/32"
Crankshaft Journal Diameters—		
Front	2.3105"—2.3115"	2.5605"—2.5615"
Front Center	2.3735"—2.3745"	2.6235"—2.6245"
Center	2.4355"—2.4365"	2.6855"—2.6865"
Rear Center	2.4985"—2.4995"	2.7485"—2.7495"
Rear	2.5605"—2.5615"	2.8105"—2.8115"
Crankshaft Journal to Bearing Clearance	.0005" to .002"	
Crankshaft End Play, at Center Bearing	.004" to .008"	
Fit of Main Drive Gear Pilot Bearing in Crankshaft	.0004" T to .0012" L	
Crankpin Journal Diam.—1948	1.997"—1.999"	2.248"—2.249"
Crankpin Journal Diam.—1949	1.998"—1.999"	2.248"—2.249"
Crankpin Journal to Bearing Clearance	.0005" to .002"	
End Clearance of Connecting Rod on Crankpin	.005" to .010"	
Connecting Rod Length, Center to Center	7 5/8"	8 1/4"

b. Cylinders, Pistons, Pins and Rings

Cylinder Bores, Standard Size	3.091"—3.094"	3.436"—3.439"
Piston Length, Overall	4 21/64"	4 9/16"
Piston Diameter at 90° to Piston Pin—		
Standard	3.0910"—3.0922"	3.4358"—3.4370"
.005" Oversize	3.0966"—3.0972"	3.4414"—3.4420"
.010" Oversize	3.1016"—3.1022"	3.4464"—3.4470"
.020" Oversize	3.1116"—3.1122"	3.4564"—3.4570"
.030" Oversize	3.1216"—3.1222"	3.4664"—3.4670"
Piston Clearance in Cylinder Bore at Top of Skirt	.0018"—.0024"	.002"—.0026"
Piston Fit at 70° F, Using Feeler Gauges, Allowing Piston to Drop on its Own Weight	.0015" Go—.002" No Go	
Piston Pin Length	2 11/16"	3 1/16"
Piston Pin Diameter	.8124"—.8129"	.8744"—.8749"
Piston Pin Fit in Piston at 70° F	Finger Push Fit (.0003"—.0004")	
Width of Compression Rings	3/32"	3/32"
Width of Channeled Oil Rings	3/16"	3/16"
Width of Flex-Fit Oil Rings	.1855"—.1865"	
Width of Gap, Ring in Bore—		
Compression Ring	.010" to .020"	
Upper Oil Ring	.010" to .020"	
Flex-Fit Oil Ring	No Checking or Fitting Required	
Side Clearance of Rings in Piston Groove—		
Compression Ring	.0015"—.0035"	
Upper Oil Ring	.0015"—.003"	
Flex-Fit Ring	.0015"—.0035"	

c. Camshaft and Valve Mechanism

Camshaft End Play	.04" to .008"	
Camshaft Bearings—Diam. x Length—		
No. 1	2 5/32" x 1 1/8"	2 5/32" x 1 1/8"
No. 2	2 1/8" x 3/4"	2 1/8" x 15/16"
No. 3	2 5/32" x 1 1/8"	2 5/32" x 1 1/8"
No. 4	2 1/16" x 3/4"	2 1/16" x 15/16"
No. 5	1 3/4" x 31/32"	1 3/4" x 31/32"
Camshaft Clearance in Bearings	.0005"—.0035"	
Valve Lifter Diameter	.9975"—.9985"	
Valve Lifter Clearance in Crankcase	.0005"—.0025"	
Rocker Arm Shaft O.D.	13/16"	13/16"
Rocker Arm Clearance on Shaft	.002"—.004"	
Valve Head Diameter—Inlet	1 17/32"	1 25/32"
Exhaust	1 11/32"	1 7/16"
Valve Seat Angle—Inlet and Exhaust	45 Degrees	
Valve Lift—Inlet	.348"	.347"
Exhaust	.342"	.348"

Items	Series 40-50	Series 70
Valve Stem Diameter—Inlet	.3715″—.3725″	
Exhaust	.3711″—.3719″	
Valve Stem Clearance in Guide—		
Inlet	.0015″—.0035″	
Exhaust	.0021″—.0039″	
Valve Guide Extension from Top of Cyl. Head	$1\frac{5}{32}$″	$1\frac{5}{32}$″
Inner Valve Spring, used with *Adjustable Valve Lash*		
Valve Open (lbs. @ length)	48-54 @ $1\frac{5}{16}$″	
Valve Closed (lbs. @ length)	17.5-22.5 @ $1\frac{31}{32}$″	
Outer Valve Spring, used with *Adjustable Valve Lash*—		
Valve Open (lbs. @ length)	74-80 @ $1\frac{19}{32}$″	
Valve Closed (lbs. @ length)	29.5-34.5 @ $1\frac{15}{16}$″	
Inner Valve Spring, used with *Hydraulic Lifters*—		
Valve Open (lbs. @ length)	49-55 @ $1\frac{5}{16}$″	
Valve Closed (lbs. @ length)	22-26 @ $1\frac{31}{32}$″	
Outer Valve Spring, used with *Hydraulic Lifters*—		
Valve Open (lbs. @ length)	116-124 @ $1\frac{19}{32}$″	
Valve Closed (lbs. @ length)	49-55 @ $1\frac{15}{16}$″	

d. Valve Lash

NOTE: *Does not apply to engines equipped with hydraulic valve lifters.*

Valve Lash at Road Operating Temp.—		
Inlet and Exhaust	.015″	.015″
Valve Lash Using Shop Procedure	.017″ Go—.018″ No Go	

e. Engine Oiling System

Pump Shaft to Bearing Clearance	.001″ to .0025″
Pump Idler Gear Bearing Clearance	.001″—.0025″
Pump Driving Gear Backlash	.003″—.005″
Pump Drive and Idler Gears Backlash	.003″—.006″
Pump Drive and Idler Gears End Clearance	.0005″—.004″
Oil Pressure Valve Clearance in Body	.003″—.006″

f. Engine Cooling System

Fan Belt Adjustment	$\frac{1}{2}$″, See fig. 2-41	
Fit of Bearing in Water Pump Body	.0006″ L to .0009″ T	
Pump Bearing Shaft Diameter	$\frac{5}{8}$″	$\frac{5}{8}$″
Fan Hub Fit on Bearing Shaft	.001″ T to .0025″ T	
Fan Hub Position on Shaft	$\frac{13}{64}$″ from End	
Radiator Hose Inside Diam. and Type	$1\frac{9}{16}$″ Elbow	
By-Pass Hose Inside Diam.	$1\frac{13}{16}$″	
Standard (151°) Radiator Thermostat Calibration, @ Atm. Press.—		
Start to Leave Seat	148° F to 155° F	
Fully Open	Not over 175° F	
High Temp. (182°) Radiator Thermostat Calibration, @ Atm. Press.		
Start to Leave Seat	178° F to 185° F	
Fully Open	Not over 211° F	

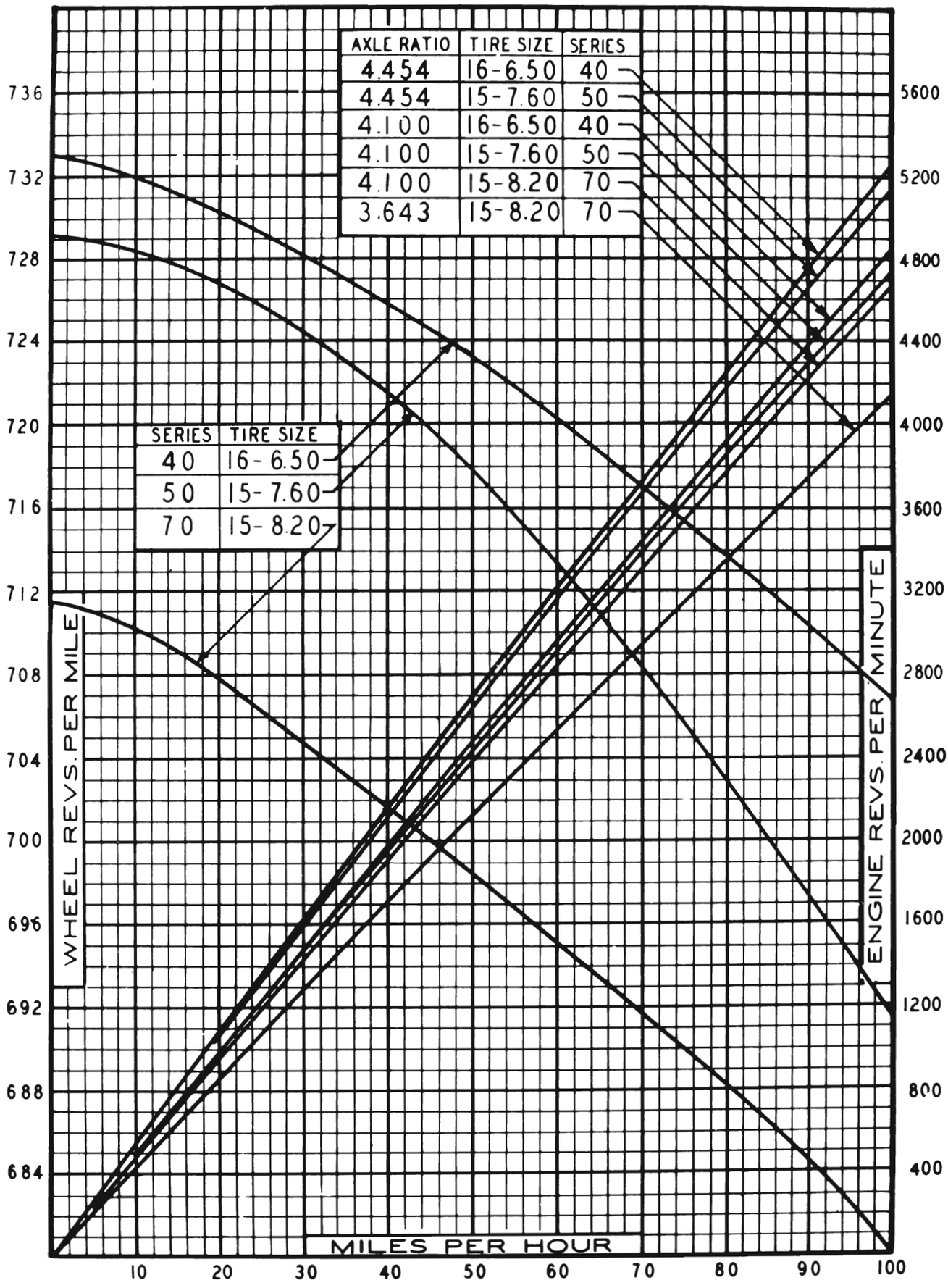

Figure 2-1—Chart Showing Relation Between Engine Revolutions and Car Speeds—1948 Models

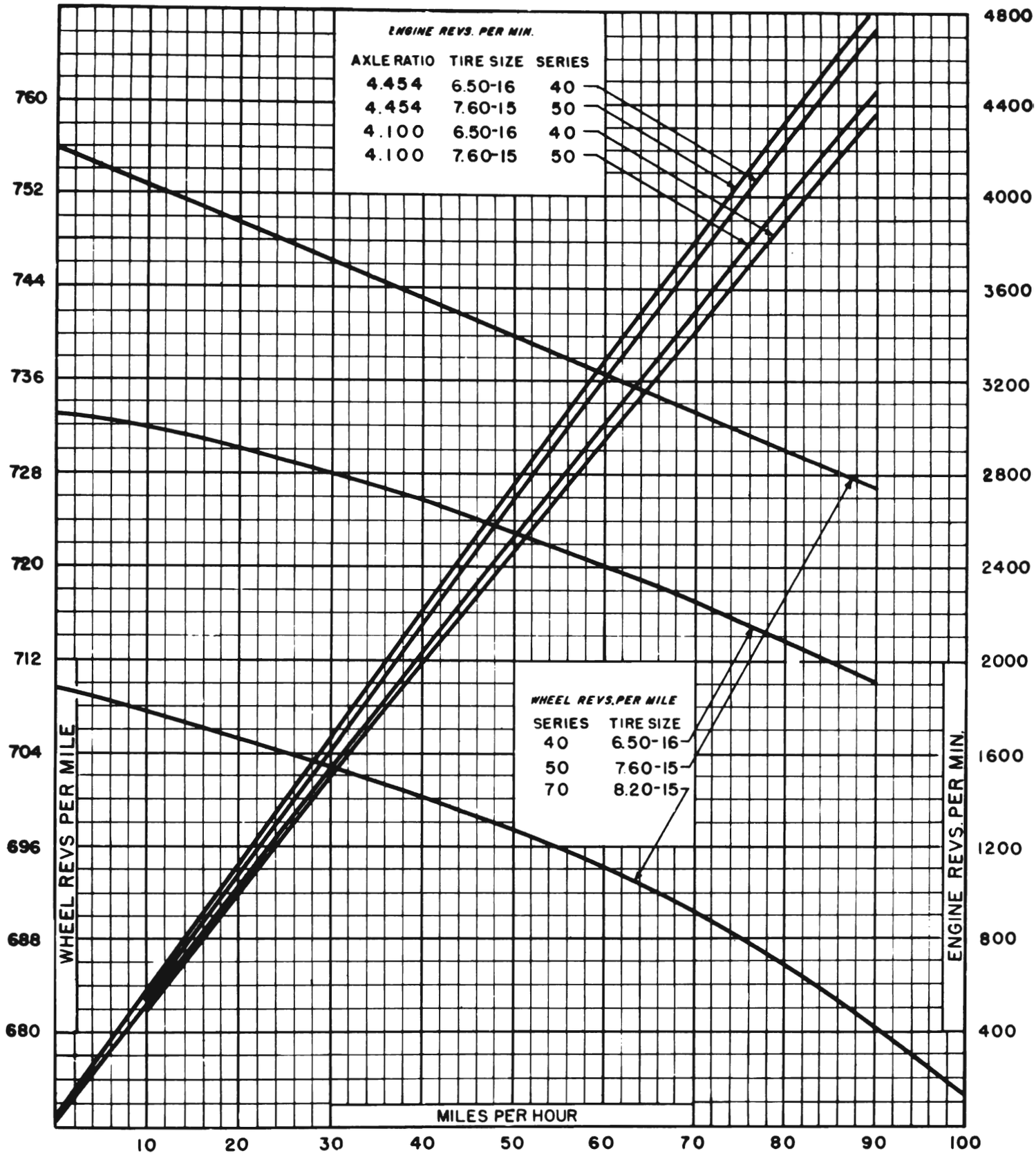

Figure 2-2—Chart Showing Relation Between Engine Revolutions and Car Speeds—1949 Series 50-70