

1938 Hudson
Model 89 '112'
Tune-up Specifications

ENGINE HOOD: - Hood hinged at front. Secured by handle on each side panel. To raise, turn one handle (handles inter-connected), grasp hood along edge and lift forward until self-locking hinge support locks hood in raised position. Hinge support released by raising hood slightly and pushing lower half to rear.

Hood Side Panels - When removing panels, free hood handle from tie rod at either end. Clamp bolt provided on tie rod.

MODEL IDENTIFICATION

SERIAL NUMBER: - First number 89-28566. Stamped on plate on right front door hinge pillar post.

ENGINE NUMBER: - First number 89-28566. Stamped on top of cylinder block between #1 and #2 exhaust manifold flanges.

TUNE-UP

COMPRESSION: - Ratio-6.50-1 Std. No Optional ratios.

Pressure - Approx. 100-105 lbs. at 170 R.P.M.

VACUUM READING: - Gauge should show steady reading of 18-21" with engine idling at 7 M.P.H.

FIRING ORDER: 1-5-3-6-2-4. See diagram.

SPARK PLUGS: Champion Type J-8A. 14 mm. Metric. Gaps - .032".

IGNITION: See Coil, Condenser, and Distributor.

Breaker Gap - .020" Cam Angle 35° (closed).

Automatic Advance - 14° max. at 1580 RPM (distributor).

IGNITION TIMING: See Ignition Timing.

Std. Setting - ¼" (flywheel travel) BTDC. with flywheel mark "UDC.1-6" ¼", before indicator on left front face of rear motor support (housing).

CARBURETION: See Carburetor & Carb. Equipment.

Idle Setting - Idle screw ¾-1½ turns open. Idle speed 7 MPH.

Float Level - 3/8" from gasket seat on cover to nearest point on float (top at free end).

Accelerating Pump - Lower hole (medium) Normal. Inner hole (Summer), Outer upper hole (Winter) for temperature extremes.

Fuel Pump Pressure: 3 lbs. maximum.

MANIFOLD HEAT CONTROL: - Manual adjustment type located at center of exhaust manifold behind carburetor. Setting should be changed for seasonal requirements.

Setting - To adjust, loosen nuts on strut bar on face of

valve cover, turn cover so that pointer is in line with 'W' mark on manifold (Winter temperatures), straight up (Normal summer temperatures), toward front in line with 'S' mark (Extremely hot temperatures). Tighten strut nuts securely to prevent exhaust gas leaks.

VALVES: See Valve Timing.

Tappet Clearance: - .006" Intake, .008" Exhaust, (hot).

NOTE - For access to valve compartment, remove fender dust shield as follows: Remove shield bolts along frame side member and at radiator shell (in engine compartment), remove right front wheel, take out shield cap screws under fender and fender brace bolt. Lower shield out by grasping lower edge.

STARTING: See Battery, Starter, Generator, and Regulator (when used).

IGNITION

Ignition Switch: - Mitchellock Model 24-B, Type 7642. Ignition Lock-Briggs & Stratton, Mitchell No. 6095.

COIL: Auto-Lite Model IG-4650. Service Coil (less switch & cable)

CONDENSER: Auto-Lite Part No. IGB-1025J.

Capacity - .20-.25 microfarad.

DISTRIBUTOR: Auto-Lite Model IGW-4104-A. Single breaker, 6 lobe cam, full automatic advance type.

NOTE-Resistor unit (mounted on distributor terminal connected in primary circuit) must be removed when radio generator with regulator installed or replace with IGW-4103A (no resistor).

Breaker Gap - Set at .020"

Cam Angle or Dwell - 35° (closed), 25° (open).

Breaker Arm Spring Tension - 16-20 ounces.

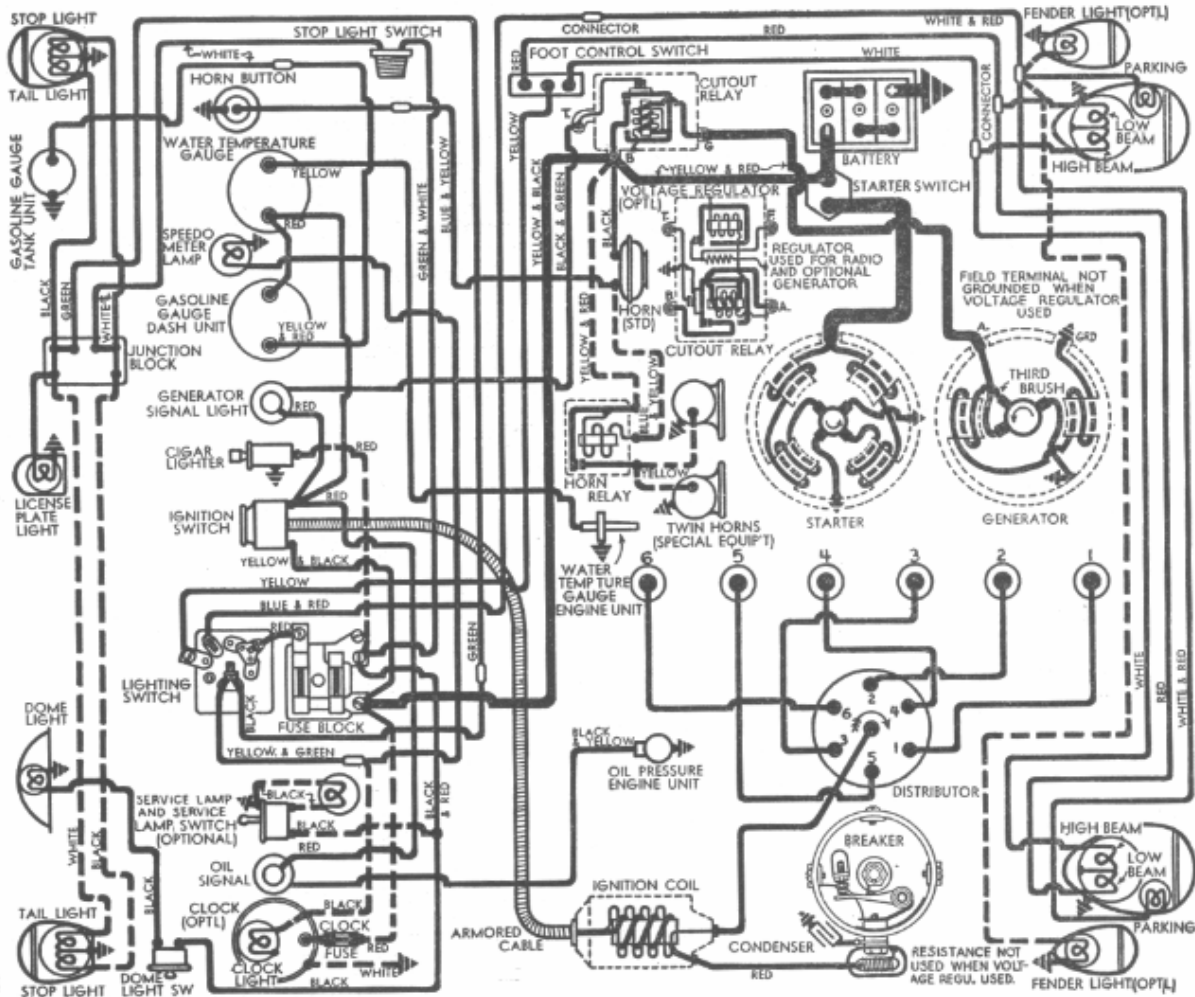
Rotation - Clockwise viewed from top.

Automatic Advance

Distributor		Engine	
Degrees	R.P.M.	Degrees	R.P.M.
Start	300	0	600
3	400	6	800
4	500	8	1000
9	1040	18	2080
14	1580	28	3160

Fuel Compensator - Provides manual adjustment at distributor for octane rating of fuel used. See Fuel Compensator Setting (following).

Distributor Removal: - Mounted on right side of engine. To remove, take out hold-down screw in advance arm.



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BATTERY

BATTERY: - National, Type HT-17 (original equipment), L-17-IF (replacement).

Starting Capacity - 120 amperes for 20 minutes.

Zero Capacity - 300 amperes for 3.5 minutes.

Grounded Terminal - Positive (+) terminal.

Battery grounded to left front fender support pointer bracket. Engine grounded to frame by ground strap at bell housing.

Dimensions - Length 10 9/16". Width 7 1/4". Height 7-15/16".

Location - In left front fender under hood.

STARTER

Auto-Lite Model MAJ-4057. Armature MAJ-2062.

Drive - Inboard Barrel type Bendix No. A-1673.

Starter (Cont'd)

Rotation - Counter-clockwise at commutator end.

Brush Spring Tension - 42-53 ounces.

Cranking Engine - 150 R.P.M., 125 amps. at 5.4 volts

Performance Data

Torque	R.P.M.	Volts	Amperes
0 ft. lbs	4100	6.5	67
3 " "	2500	5.5	100
6 " "	1450	5.0	200
4.6 " "	960	4.5	300
7.3 " "	575	4.0	400
10.3 " "	225	3.5	500
12. " "	Lock	3	550
17 " "	Lock	4	750

Removal: - Starter flange mounted on left rear corner of engine. To remove, take out flange mounting bolts.

Starter: (Cont'd)

Starting Switch: - SW-4010. Mounted on side of steering gear housing. Controlled by shaft extending to toe-board.

GENERATOR

Auto-Lite Model GBM-4609A. Armature No. GBM-2065. Third brush control type. Ventilated by fan on drive pulley.

Charge Rate Adjustment - Remove commutator cover band, shift third brush by hand counter-clockwise to increase. or clockwise to decrease charging rate (brush held in position by friction).

Maximum Charging Rate - 20 amperes (cold), 18 amperes (hot), 8.5 volts, 30-35 MPH. Use test ammeter connected in charging line at battery terminal of cutout relay to check generator output.

Performance Data

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	760	0	6.4	800
4	6.8	920	4	6.9	960
8	7.25	1050	8	7.35	1150
12	7.65	1240	12	7.8	1360
16	8.1	1450	16	8.3	1750
20	8.5	2150	18	8.5	2450

Rotation - Counter-clockwise at commutator end.

Brush Spring Tension--50-60 ozs. (new brushes).

Field Current-3.80-4.20 amperes at 6.0 volts.

Motoring Current-5.7-6.3 amperes at 6.0 volts.

Removal:-Generator pivot mounted at left front of engine with fan belt drive. To remove, take out clamp and pivot bolts.

Belt Adjustment:-Loosen clamp and pivot bolts, swing generator out until slack in belt midway between generator and fan pulleys is 3/8" (measured with straight edge across pulleys).

GENERATOR Cars With Radio

Auto-Lite Model GDF-4802A. (Cars with Radio). Armature No. GDF-2006. Third brush control type with external voltage regulator. Ventilated by fan on drive pulley.

Maximum Charging Rate - 32.0 amperes (cold), 29.5 amperes (hot), at 8.0 volts, 35 MPH. Actual charging rate controlled by Voltage Regulator and dependent on battery condition.

Charging Rate Adjustment - Maximum output controlled by third brush. Do not adjust third brush for output greater than shown in table below (with field

terminal grounded to render regulator inoperative). See \ Regulator Section below.

NOTE - Standard third brush setting 2-1/8 commutator bars from nearest main brush.

Performance Data

Cold			Hot		
Amperes	Volts	R.P.M.	Amperes	Volts	R.P.M.
0	6.4	920	0	6.4	1000
4	6.6	1030	4	6.6	1140
8	6.8	1140	8	6.85	1280
12	7.0	1300	12	7.1	1440
16	7.25	1460	16	7.3	1640
20	7.45	1650	20	7.55	1840
24	7.65	1880	24	7.75	2220
28	7.9	2220	28.2	8.0	3200
32	8.0	3100			

Rotation - Counter-clockwise at commutator end.

Brush Spring Tension - 53 ozs. max. (new brushes).

Field Current - 1.90-2.10 amperes at 6.0 volts.

Motoring Current - 5.3-5.9 amperes at 6.0 volts.

Removal & Belt Adjustment: - As given for std. generator.

CUTOUT RELAY

Auto-Lite Model CBA-4003. (Used with Std. GBM4609A Generator). Mounted on engine side of dash. Relay has extra set of contacts for Teleflash Generator Charging Indicator.

Cuts In - 6.75-7.5 volts. Approx. 10 M.P.H.

Cuts Out - 1.5-4.5 amperes discharge current (after charging at 16 amperes).

Contact Gap - .015-.0451, with upper ground contacts closed (upper contacts must open when main contacts close).

Air Gap - .010-.030" with contacts closed.

REGULATOR

Cars With Radio

Auto-Lite Model VRD-4008A (Used with Gen. GDF4802A). Voltage type. Consists of Cutout Relay & vibrating Voltage Regulator in case on dash. Cutout Relay has extra set of contacts for Teleflash Generator Charging Indicator.

NOTE - See distributor note for change to be made when this unit installed in field.

Cutout Relay

Cuts In - 6.4-7.0 volts Cold. Approx. 10 MPH.

Cuts Out - .5-3.0 ampere discharge (Before Serial No. 2T-000001), 1.5-4.5 amperes (After 2T-000001).

Contact Gap - .015" minimum (with ground contacts closed-ground contacts must be open with main contacts closed).

Air Gap - .03411 min., .038" max. with contacts open. Measure at hinge end of core.

Regulator (Cont'd)

Voltage Regulator

Setting - 7.35-7.65 volts at 70° F. (after 15 minutes operation charging at 10 amperes).

To Check (without breaking seal) - Connect ammeter in charging line at 'BAT' terminal on regulator, connect voltmeter between 'BAT' terminal and ground. Operate generator at speed equivalent to 30 MPH., charging fully charged battery until voltage is constant. Voltmeter reading should be within 7.1-7.8 volts (high limit cold, low limit hot). If outside these limits regulator is defective.

To Adjust (with cover removed) - Change regulator armature spring tension slightly by bending lower spring hanger. Check setting as above.

Contact Gap - .010" min., .0201, max. with armature against stop pin.

Air Gap - .0595-.0625,f with contacts just opening.

LIGHTING

LIGHTING: - **Headlamps** - Hall, pre-focused type with interchangeable lenses. Upper and lower beams (lower beams deflected slightly to right) controlled by foot selector switch with lighting switch in driving (right hand) position.

Headlamp Adjustment - Aim headlamps; straight ahead with top of beam 38-13/16" above floor level on screen placed at 25' (car unloaded and upper beams lighted). Headlamps aimed by loosening mounting stud on inside of radiator shell (reached by raising hood and working through opening in top radiator tank shield) and shifting lamp by hand.

Switches Lighting - R.B.M. Model 1725 ' Foot Selector-R.B.M. Model 1076.

Bulb Specifications

Position	Candlepower	Mazda No.
Headlamps	32-32	2331
Headlamps (export)	21-50	2520D
Parking, Instrument	1½	55
Dash Signals	1	51
Stop and Tail	21-3	1158
License, Fender	3	63
Dome	15	87

MISCELLANEOUS ELECTRICAL

SIGNAL LIGHTS: - Teleflash Generator Charging Indicator and Oil Pressure Indicator mounted on instrument panel.

FUSES: - Lighting - 20 ampere capacity mounted on fuse block on lower flange of instrument panel.

Accessory - 20 ampere capacity on same fuse block - has two terminals for accessory connections.

Mics. Electrical (Cont'd)

HORN: - Single horn standard. Sparton twin horns with R.B.M. horn relay optional
R.B.M. Model 780 horn relay optional (dash mounted).

ENGINE

ENGINE SPECIFICATIONS:- 6 cylinder, 'L' head type. Bore-3". Stroke-4-1/8".

Displacement - 175 cubic inches. Rated Horsepower-21.6 (A.M.A.)

Developed Horsepower - 83 HP at 4000 R.P.M.

Compression Ratio - 6.50-1 cast-iron head.

Compression Pressure - Approx. 100-105 lbs. at 170 R.P.M. Check with plugs removed and wide open throttle.

Vacuum Reading - 18-21" steady at 7 M.P.H.

PISTONS: - Own Lo-Ex aluminum alloy, 'T' slot, cam ground type. Use finished replacement pistons.

Weight - 10.5 ozs. (stripped). Length-3-3/16".

Removal - Pistons and rods removed from above.

Clearance - Top .011", Skirt .002"

Fitting New Pistons: - Insert .0015" feeler ½" wide in extreme right of cylinder, insert piston with slot to left and pin bosses parallel to crankshaft. Tension to withdraw feeler must be within 3-4 lbs.

Installing Pistons: - Slot away from camshaft side.

PISTON RINGS: - Pinned type, 2 compression, 1 oil ring above pin, one oil ring below pin. 5/16,1 oil drain holes, 12 drain holes (2 to pin bosses) in upper oil ring groove, 4 holes and 2 slots drilled in lower groove. Rings positioned by pin in grooves.

Ring	Width	End Gap	Side Clearance
Compression	3/32	.005-.010"	.001"
Oil (both)	3/16"	.005"	.001"

PISTON PIN: - Diameter - ¾". Length - 2-7/16"

Pin floats in piston and rod, held by locking rings. Pin hole in rod bronze bushed. Pins furnished standard and .002", .005" and .010" oversize.

Pin Fit in Piston - .0003" clearance (hand push fit) with piston heated to 200°F.

Pin Fit in Rod Bushing - .0003" clearance.

CONNECTING ROD: - Weight 30½ oz. Length 8-5/8".

Crankpin Journal Diameter - 1-15/16".

Lower Bearing - Spun-babbitt. Rods exchanged. Finished bearings furnished standard and undersize (special order).

Clearance - .001". Sideplay - .006-.010".

Bearing Adjustment: - None (no shims). Replace rods. After tightening bolt nuts, install new palnut (smooth face to nut), turn palnut on bolt with fingers until tight, then lock in place by turning with wrench an

Connecting Rod (Cont'd)

additional 1/4-1/3 turn.

Installing Rods: - Offset. Install rods with widest half of bearing toward rear (#1, 2, 4), toward front (#3, 5, 6).

Oil scoop on all rods toward camshaft.

CRANKSHAFT: - 3 bearing, integral counterweights.

Journal Diameters - #1, 2-11/32"; #2, 2-3/8"; #3, 2-13/32".

Bearing Type - Bronze-backed, babbitt-lined. Furnished standard and unfinished (1/32" extra stock).

Clearance - .001".

Bearing Adjustment: - Shims.

End Thrust: - Taken by center bearing. Replace bearing to adjust. Endplay - .006-.012".

CAMSHAFT: - Three bearing. Gear driven.

Journal Diameters - #1, 2"; #2, 1-31/32"; #3, 1 1/2".

Bearing Clearance - .0025".

End Thrust: - Taken by thrust washer assembled between front face of crankcase and rear side of camshaft front flange, and by spring loaded button in camshaft hub and thrust plate on gear cover. See that spring and button in place under cover.

Timing Gears: - Crankshaft gear cast iron. Camshaft gear GE. or Continental Diamond Fibre Bakelite.

Note: 1941 Type Timing Gear Set can be installed on these models (tooth angle redesigned to provide quieter operation).

Camshaft Setting: - Gears marked. Mesh marked tooth of crankshaft gear between two marked teeth on camshaft gear.

VALVES: -

	Head Dia.	StemDia.	Length
All valves	1-3/8"	11/32"	5-1/32"

	Seat Angle	Lift	Stem Clearance
Intake	45°	11/32"	.0015-.003"
Exhaust	45°	11/32"	.003-.005"

Valve Guides: 2-9/16" long. Top 1-1/16" below top of block. Finish ream to size after installation.

Valve Springs: - Springs are cadmium plated, Dampeners originally used on bottom of all springs, but recommended that they be omitted whenever valves are serviced. Spring check (out of engine) - 34 lbs. min. at 2".

	Spring Pressure	Spring Length
Valve Closed	44 lbs	2"
Valve Open	102 lbs	1-21/32"

Valve Lifters: - Roller shoe type, fitted in removable guides.

VALVE TIMING

Tappet Clearance - .006" Intake, .008" Exhaust, engine hot.

Valve Timing: - See Camshaft Setting above.

Intake Valves - Open 10° 40' BTDC. Close 60° ALDC.

Exhaust Valves - Open 50° BLDC. Close 18° 44' ATDC. These figures correct with .010" tappet clearance.

To Check Timing - Set tappet clearance #1 intake valve at .010". This valve should open with piston 10° 40', or .0441", before top dead center when a point on the flywheel approximately 3.97 teeth before dead center mark 'U.D.C.1 -6/' lines up with pointer in inspection hole in front face of left rear motor support. Reset tappet clearance at .006" with engine warm.

LUBRICATION

LUBRICATION: - Duo-flow (pressure and positive splash) system. Force feed by oil pump to connecting rod oil troughs and timing gears, splash to all other bearing points.

Oil Pump: - Oscillating plunger type, gear driven by camshaft. Mounted on right center of crankcase.

Normal Oil Pressure - 3 lbs. (no gauge).

Oil Pressure Regulator: - Located at right side of crankcase at rear. Opens at 3 lbs. Not adjustable.

Oil Pressure Indicator: - Teleflash Oil Pressure indicator. Operated by oil pressure regulator.

Crankcase Capacity: - 5 1/2 qts. (dry), 4 1/2 qts. refill).

COOLING

COOLING SYSTEM: - Water Pump, Centrifugal, belt driven, packless type.

Removal - With water drained and fan belt removed, disconnect hoses at pump, remove mounting bolts, lift fan and pump assembly off.

Thermostat: - Mounted in cylinder head water outlet.

Setting - Start to open 150-155° F. Fully open 185° F.

Water Capacity: - 12 quarts.

CLUTCH

CLUTCH: - Own make. Single plate, cork insert type operating in oil.

Clutch (Cont'd)

Driven Member - Thickness .203". Inside Diameter 5.375". Outside Diam. 8.625". Facing 90 cork inserts.

Adjustment: - Pedal free movement must be 1½". To adjust, remove clevis pin at lower end of connecting link on throw-out shaft lever, loosen locknut, turn clevis for proper clearance.

Removal: - Remove transmission (see Transmission Removal following), take out 16 clutch cover cap screws and remove clutch assembly from below.

TRANSMISSION

TRANSMISSION: - Own make. Constant-mesh, helical gears (Second & High), sliding spur gears (Low & Reverse).

Removal: - Disconnect speedometer cable and drive shaft at front universal. Support engine at rear and take out rear mounting bolts. Remove bell housing to engine mounting bolts, pull transmission straight back and remove.

UNIVERSALS

UNIVERSAL JOINTS: - Spicer. 1271 (front), 1278 (rear). Needle bearing type.

REAR AXLE

REAR. AXLE: - Own make. Semi-floating, spiral bevel gear type.

Ratio - 4 1/9 Standard, 4 5/9 optional.

Backlash - .0005-.003". Screw adjustment.

Removal: - Remove rear wheel and hub assembly (use screw type puller only), take out four nuts on bearing cap bolts, push bolts out through backing plate (allows cap removal without disturbing hand brake operating link), remove shims, pull wheel bearing and axle shaft, disconnect drive shaft at rear universal joint, remove 8 nuts from axle housing-to-carrier stud bolts, withdraw differential carrier assembly without disturbing axle housing.

Rear Axle (Cont'd)

Wheel Bearing Adjustment: - Controlled by shims under bearing cap. Measure endplay by dial indicator clamped to backing plate with plunger against end of axle shaft. To adjust, remove bearing caps (as directed above), add or remove shims equally at both wheels.
Endplay - .004-.010".

SHOCK ABSORBERS

SHOCK ABSORBERS: - Monroe-156778 (front), 156578 or 156779 (rear). Hydraulic, direct acting type.

FRONT SUSPENSION

Front Suspension: - Conventional 'I' beam front axle with Elliott ends and semi-elliptic springs.

Kingpin Inclination - 7° crosswise.

Caster - 2-2½° and equal within ½° for both wheels. Adjusted in usual manner by wedge shims between spring seat on axle and spring.

Camber - 1-1½°. No adjustment. Make minor corrections by bending axle cold.

Toe In - 0-1/8". Measured 10" up from ground. Adjust by loosening clamp bolts and turning tie rod.

Steering Geometry - Inner wheel 20°. Outer wheel 17¾°

STEERING GEAR

Steering Gear: Gemmer Model 305. Worm-and-Roller type with "Push-pull" adjustments.

BRAKES

BRAKES: - Service-Bendix Hydraulic, Duo-Servo, double anchor type. Mechanical follow-up (pedal linked to hand brake cables) provided. Hand lever applies rear service brakes.

Drum - Alloy - steel. Diameter - 9-1/16".

Lining - Moulded (primary), woven (secondary). Width 1¾". Thickness 3/16". Length per wheel 19".

Clearance - .010" at heel and toe of each shoe.

Hand Brake: - See Service Brakes above.