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Handbook

1922

The

ABC

12-H.P. Light Car

HANDBOOK

A.B.C. Motors (1920) Limited
Walton-on-Thames
Surrey——England

Sales Manager.

Telephone - -	Esher 306 and 307
Telegrams -	Revs, Walton-on-Thames

Price 2/6 nett.

£2.50

T.N. 32

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write
AA
car broke down
towed wheathered & left
and carried on by car
to Sutton by AA Garage
Bill follows.

Write Garage
Bill for towing
& car home

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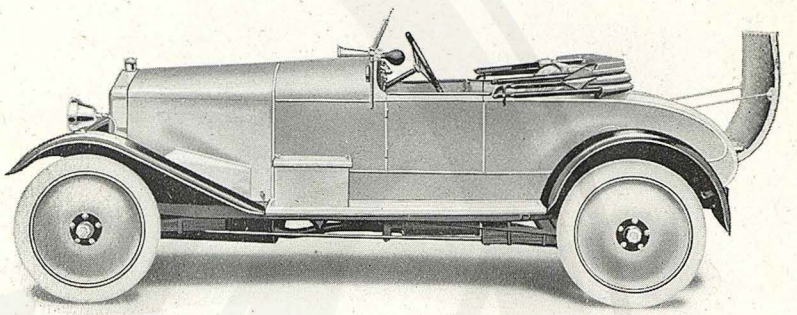
PREFACE

THIS handbook has been prepared with the object of giving owners of A.B.C. Light Cars as much useful information as possible upon the care and management of their cars, without going into unnecessary detail.

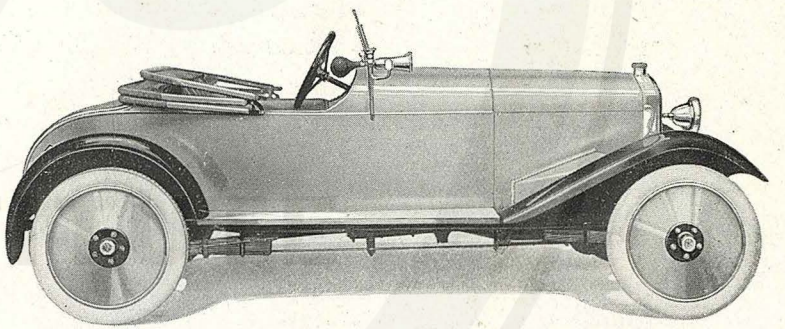
¶ It is not intended to encourage dismantling, but rather, as the result of perusal and study, to enable the owner or driver to obtain the maximum of satisfaction and enjoyment.

¶ Simplicity, accessibility, and ease of operation, make it possible for those without previous mechanical experience to secure entirely satisfactory results with but ordinary attention; it cannot however, be too strongly impressed upon clients that although their cars have no feelings, they have very distinct means of giving warning if something is not as it should be, and an attentive, careful driver can nearly always discover difficulties arising before they become serious.

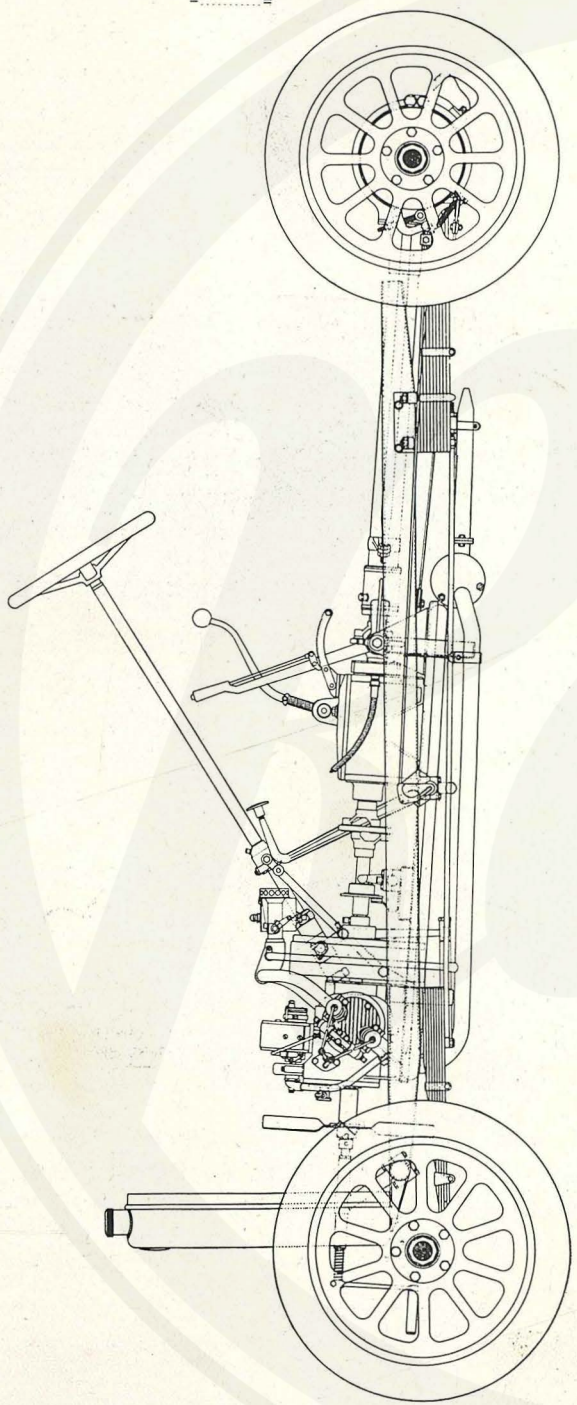
¶ We endeavour, as far as possible, to deal generally with difficulties which may arise, but shall always be pleased to amplify instructions upon any point not sufficiently clear.



A.B.C. 12-H.P. STANDARD MODEL.



A.B.C. 12-H.P. SPORTING MODEL.



A.B.C. 12-H.P. LIGHT CAR CHASSIS.

CARE AND MAINTENANCE

THE following instructions will, if carefully followed out, be all that is necessary for the maintenance of our cars in satisfactory running order and condition.

¶ In the event of general garage overhaul at any time, special attention should be drawn to these remarks.

THE ENGINE is a 12-h.p. twin-cylinder, horizontally opposed, air-cooled unit.

For taxation purposes its rated h.p. is 10.37.
The bore and stroke are equal, 3.6-in. or 91.5 m/m.
The cubic capacity is 1198 cubic centimetres.
(See diagram page 16.)

Timing.—For the purpose of re-timing the engine it is only necessary to turn the flywheel (the rim of which is clearly marked) to top dead centre No. 1 cylinder, at which time the magneto contact-breaker points should just commence to break with the contact-breaker retarded through two-thirds of its travel. With the magneto fully advanced the setting should correspond with the flywheel marking, viz., 35 degrees advance.

The standard valve setting is as follows :—
Inlet opens—Top dead centre.
Inlet closes—50 degrees late.
Exhaust opens—60 degrees early.
Exhaust closes—10 degrees late.
Ignition—35 degrees fully advanced.

It should be especially noted that marking upon the periphery of the flywheel is applicable only to an engine that is hot.

For purposes of re-setting the valves it is also useful to note that the two teeth directly above the keyway of the crankshaft pinion should correspond with the mark O punched upon the face of the cam-shaft timing wheel.

Care and Maintenance.

Lubrication is effected by a special type of mechanically operated Roto Plunger oil pump, fitted on the cover of the crankcase and driven directly off the camshaft. On the top of this pump a sector is marked to act in conjunction with a pointer, for the purpose of increasing or reducing delivery of the supply; the position of this pointer can be varied by slacking the nut securing the pointer to the pump, care being taken to re-tighten this after the adjustment has been made. This applies only to the **non-adjustable type of sight feed.**

Interconnected between pump and engine a sight feed is fitted upon the instrument board.

The correct amount of lubrication is readily found by experience but, to begin with, it is better to give too much than too little, gradually lessening this as experience teaches. About 60-80 drops through the sight feed per minute is suitable for normal running and traffic, but prolonged runs at speeds over 30 miles per hour necessitate twice as much lubrication and very hard driving requires a continuous stream.

If trouble is experienced at the sight feed it is probable that the small disc valve at its base is being held up by dirt, in which case this valve and also its seating should be thoroughly cleaned. This can easily be accomplished by unscrewing the union nut nearest the underside of the support bracket. The last two paragraphs refer only to those cars fitted with the **adjustable type of sight feed.**

The oil tap, fitted beneath the oil tank, is that nearest the driver, need never be closed, and is open when the handle points downwards, as also is the petrol tap.

Vacuum A. should always be used in winter; Vacuum B.B. in summer.

Generally.—The induction pipe flanges and joints, both at the carburettor and cylinder heads should occasionally be inspected for leaks, if any irregularity in slow running is experienced, and difficult starting may be entirely due to their blowing.

The overhead rockers should be lubricated externally every two hundred miles with ordinary engine oil. The cups to these rockers should best be filled with graphite grease.

Care and Maintenance.

It is important that a few spots of oil be regularly applied to the cups at each end of the long tappet rods, otherwise a squeak may develop as the valve lifts, due to dryness of the ball end.

The overhead rockers should be adjusted whenever they commence to become noisy and it is necessary for these to be adjusted in both directions. The side play in the rockers should first be taken up by slacking off the small screws fitted through the split clamp nuts on the ends of the pins which carry the rockers. These clamp nuts should then be screwed towards the rockers until the rocker is just free with only slight side play, if no clearance is allowed friction against this nut may affect operation of the rocker especially when the engine is hot; after this the clamp nuts should be locked in position by the small screws already referred to. The push rods should then be adjusted up till there is just no clearance between the valve stem and the rocker **care being exercised to see that the valve is fully closed and the cam lifting the valve on the opposite cylinder before adjusting.** This adjustment should be made when the engine is quite cold as it contracts when cooling off and will leave the valves lifted.

If the crankcase leaks oil, the crankcase release valve should be removed and inspected. The small flat valve should have a slight clearance so as to lift off its seat freely and this can be heard slightly when the engine is turned slowly by hand. If the nut which bolts the crankcase release elbow to the magneto wheel cover is pinched up too tightly it will compress the fibre washer and possibly pinch the valve hard upon its seating, rendering it inoperative. A thicker fibre washer will remedy this.

Leakage of oil between the magneto spindle and the magneto wheel cover is prevented by a washer and if any leakage occurs it is only necessary to slacken off the magneto bolts and push the magneto towards the flywheel whilst tightening up the bolts. This will compress the washer and cure any slight whistle or squeak occasionally occurring through air being sucked past the washer. Great care is necessary to ensure that the magneto is set square with its drive when re-tightening the two nuts securing it to the crankcase.

Care and Maintenance.

As already mentioned it is very essential to keep the cylinder head joint gas-tight where it bolts on to the cylinder. Any leaks will heat up the cylinder and head and cause starting to become very difficult. A copper asbestos washer is provided for this joint and there should be no trouble experienced if this is carefully fitted and the six holding down bolts are pulled down equally after dismantling and a final tightening up given when the engine is hot. These bolts should be re-tightened after the first 200 miles together with the bolts holding the induction pipe. No boiled oil, gold size or other jointing substance is necessary.

The induction pipe is heated by an exhaust jacket at the point where the carburettor is bolted. If excessive oiling has been done for some thousands of miles this jacket or the connecting pipes may become clogged and in order to render the heating satisfactory and the running of the engine better in cold weather it will be necessary to remove the induction pipe and thoroughly clean out the jacket and pipes with paraffin and lead shot.

The gaps to both sparking plugs should be as nearly equal as possible.

Cleanliness.—This cannot be too strongly insisted upon, especially in the case of carburettor, petrol filter, magneto and sparking plugs, all of which are specially liable on all cars to be impaired in efficiency if dirt is allowed to accumulate.

SPECIAL NOTE.—IMPORTANT.

¶ It should always be borne in mind, *more especially so for purposes of quotation when ordering replacements,* that the pistons and cylinders of our engines are available in four separate grades, A, B, C, and D, representing the differences of finished diameter at top of cylinder bore. On no account can any but the respective piston be fitted to any cylinder and vice versa.

¶ The adoption of such principle is intended to counteract the possibility of undesirable variation in clearances between piston and cylinder wall. Upon reference the necessary markings will be found punched upon the squared flange at cylinder foot and upon the crown of the piston. Additionally also, the numeral 1 or 2 in conjunction with the grade letter upon the cylinder flange *should always be quoted* to decide whether a near side No. 1 or off side (driver's side) No. 2 cylinder is required.

Care and Maintenance.

THE CLUTCH consists of a single steel plate gripped between two plates carrying Ferodo rings. It is of ample surface and is capable of standing an unusual amount of slipping, this however, is bad practice and should not be unduly indulged in; it is far better and more economical to change into a lower gear.

When the clutch is disengaged, by pushing down the pedal, both plates are positively separated to ensure freedom for engaging the gears and a clutch stop is provided for bringing the single steel plate to rest in a short space of time. Some little attention should be given to this clutch stop as it makes all the difference in changing gear and if the driver finds the gears difficult to engage it is almost certain to be caused by the clutch stop being adjusted so as to come into action too soon which necessitates an inconveniently quick change, or, coming into action too slowly requires too long a pause and therefore brings the plate to a standstill instead of allowing it to slow down just the right amount.

A driver with long legs will require the clutch stop adjusted further away as his tendency is to push the clutch pedal further than does one with shorter legs.

The clutch stop consists of a red fibre pad attached to a small flat spring bolted to the sub-frame plate immediately under the clutch operating toggle. Its operation can be watched by lifting the floorboards and with the engine running the driver should push out the clutch to the same extent as he would normally do when driving. If the universal joint connecting the clutch to the gearbox stops instantly, it is a sign that for that driver the clutch stop is adjusted too closely to the flange on the clutch shaft against which it presses, and the two nuts holding the stop should be slackened and the stop moved slightly further away so that only with the full travel of the foot does it come into operation. Do not forget to tighten up the nuts again.

The clutch surfaces should not be treated in any way as no substances are better than the original surfaces. If the clutch slips the operating mechanism should be inspected. Excepting the accidental presence of oil in the clutch which would soon wear off, only some mechanical trouble preventing the surfaces coming together will cause the clutch to slip.

To prevent any such trouble the grease cup at rear of the flywheel should be kept well filled. It is also very necessary to give the splined shaft, upon which the clutch is mounted, a few drops of engine oil occasionally. Dust may accumulate in these keyways and cause the clutch to work irregularly, or tend to stick, and remain out when the pedal is released so producing the aforementioned results.

A clutch shaft carrying a forked toggle is fixed in bearings on the sub-frame plate. This forked toggle presses up against a thrust bearing running in a steel housing upon the clutch shaft, and when the clutch pedal is at rest and the clutch fully engaged there should be a slight clearance (about one-tenth to one-twentieth of an inch) between the toggle arms and the thrust bearing. If there is no clearance here, it is evident that the clutch is being held out of engagement, and the connecting rod carried between the lower end of the clutch pedal and the arm on the clutch operating shaft should be **lengthened.** There is a further mechanism attached to this and carried to one of the frame cross-members for keeping the toggle arms from constantly rubbing against the clutch thrust bearing when the car is running. This consists of a long rod, two nuts and a spring. The nut on the back of the cross-member is to adjust the position of the clutch pedal and acts as a stop for it when it comes back (thereby preventing it hitting the floorboards). If this nut is adjusted up too far it can possibly hold the clutch out of engagement and should be inspected, when the clutch slips, in conjunction with the details already referred to.

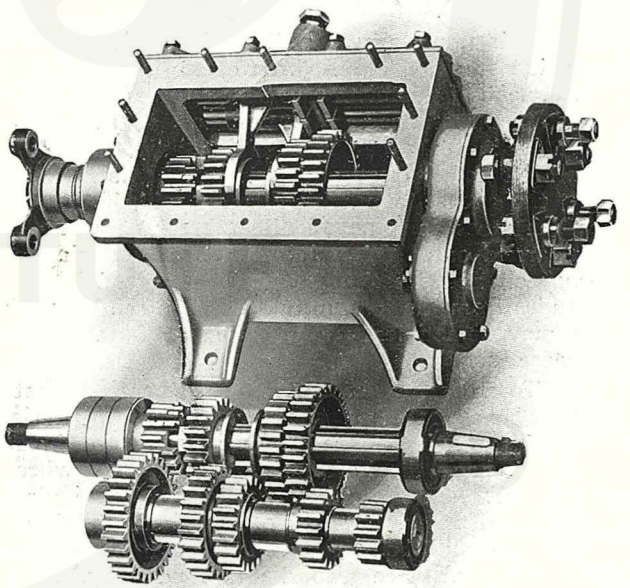
When this nut is adjusted so as to give the correct clearance between the forked toggle arms and the thrust bearing, the spring on the other side of the cross-member should be adjusted up so as to just take the weight off the driver's foot. It is important also that when resting his foot against the pedal it does not press the toggle against the thrust bearing and keep it running all the time the car is travelling.

THE GEAR BOX is fitted with gears of an exceptionally large size for the size of the car, and no adjustments are necessary except on the spring plungers which keep the selectors in the proper position, either in neutral or in gear as the case might be. These plungers are on the side of the gear-box nearest the driver and can be seen moving when the gear lever is shifted. They are chisel-shaped at the inner end and the gear selectors are

provided with notches into which these plungers fall when the gear is in the correct position, thereby holding the gear from jumping out. If the gear should jump out of any particular notch when the car is being driven hard (for instance on third gear up a steep hill) it is only necessary to first slack off the lock nut, afterwards tighten up the nut which surrounds this particular plunger, thereby increasing the tension on the spring, and conversely, if the gear lever is too tight to move out of the notch, the spring tension can be released by unscrewing the nut. For ease of gear changing it will generally be found possible to keep the lower of these plungers, which retains first and second speeds in gear, slacker than the top securing third and fourth speeds. The driver should be careful not to mistake any initial stiffness of a gear lever on a new car for too much pressure on the selector springs as this stiffness will wear off in a few hundred miles on the road, failing which the plunger adjustment should be tried.

At the gear-box, four speeds and a reverse are provided, showing the following ratios at the road wheels: 4.5-1, 6.525-1, 9.45-1, 13.77-1, and 18.36-1.

Vacuum C.C. gear oil should always be employed.



Care and Maintenance.

To correctly refill the gear-box the large plug in the lid should be removed and also the smaller or level plug fitted low down upon the gear-box near side. The box should then be filled at the large entry until flow is apparent through the smaller hole when the correct level is obtained, a little too much oil, however, is better than too little.

For separate information as to gear changing reference should be made to that section headed "Use on the Road." (See also diagram page 16.)

THE STEERING is by nut and thread which is lubricated by engine oil instead of the usual packing of thick grease. This renders it very light at all times and to fill this up with oil it is only necessary to remove the big nut from the lowest end of the steering column, fill this with engine oil and replace, care being taken to see that this nut is screwed up tightly. As the screw descends into the well of oil this oil rises up the centre of the hollow steering tube. Thick grease should not be used because a cushioning effect is produced when the big nut is tightened up and free travel of the thread is prevented.

The steering ball-joints should be frequently lubricated. Good class leather bags may be fitted with advantage and if well packed with grease will necessitate less frequent lubrication.

It is important to well lubricate the steering pivots on the front axle. A bronze bearing is fitted at the lower end of this pivot upon which the stub axle revolves. A ball thrust bearing is provided at the top to take the load of the car and this is adjustable by a right and left hand thread and lock nut. It is further secured by the grease cup which is an added protection and which must be **removed altogether** before any adjusting is carried out. When lubricating the steering pivot use gear oil and see that sufficient is forced in so that oil exudes from the bottom and through the lowest bearing. It may sometimes require three or four fillings of the grease cup.

To adjust up the vertical pivot bearing, first remove the whole of the greaser (by screwing in a right-hand direction as it is fitted with a left-hand thread) then slacken back the lock nut and, with the wheel jacked up, screw down the ball cup until all the play is just taken up but with the pivot still free. Tighten up the lock nut still holding the ball cup, and then replace the greaser. (See also diagram page 17.)

Care and Maintenance.

THE REAR AXLE.—No comment is required upon this except that it should not be filled with grease.

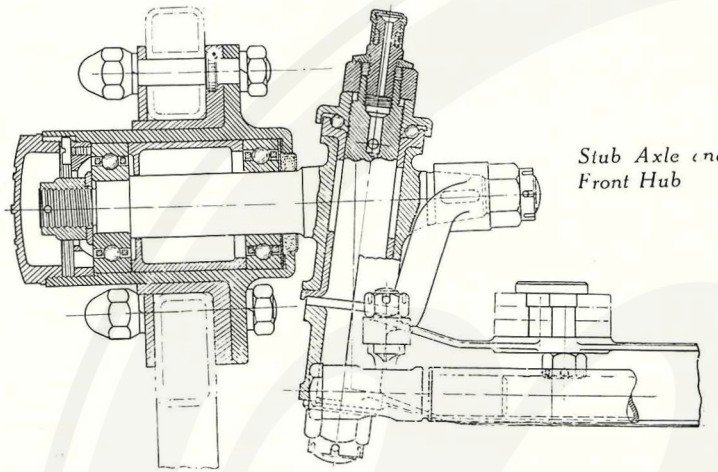
Grease is a poor lubricant having only a small percentage of oil mixed with it and when it becomes hard it is worse than useless. Thick gear oil (such as Vacuum C.C.) should be used and poured until this overflows at the oil entry. It is desirable to warm up the oil slightly before refilling. (See also diagram page 17.)

THE BRAKES on the A.B.C. car are one of the special features. They are of exceptional size and wearing surface and if they are not efficient it is simply due to maladjustment. The hand brake is an internal expanding one and, having a ratchet and pawl in the usual manner, is principally used to hold the car at rest on a slope, but the driver should get into the habit of using either brake so that in the case of emergency he does it automatically. The only adjustment for this brake (which should run over 10,000 miles without adjustment and under hard usage) is a slight shortening of the cable by undoing the clamps provided. This brake is compensated and therefore there is equal pull on both wheels.

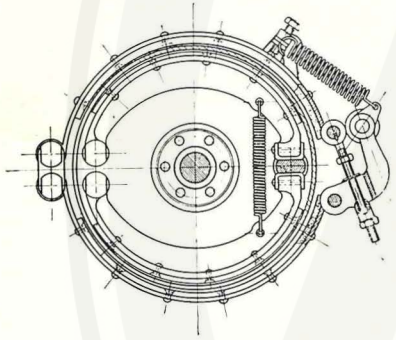
The foot brake is extremely sweet and powerful in action and is the one most frequently used. It is easier to inspect, being an external contracting brake, and easier to remove for relining. It should not require the brake linings renewed oftener than once in 10,000 miles and it well repays any slight attention that is necessary in order to keep it properly adjusted.

There is only one real adjustment provided or necessary for tightening the shoes (although it is possible to shorten the cable, but this should not be done if the reel on which this cable is carried will make this cable tight when both reels are pressed back and almost against the lower brake shoe). The adjustment consists of a bolt and nut which couples the two half shoes together. Even one-half turn of this nut makes a considerable amount of difference and care should be taken not to adjust these too much otherwise the brakes will bind. If the brake is working properly it should not require more than one-half turn of adjustment in every 1,000 miles.

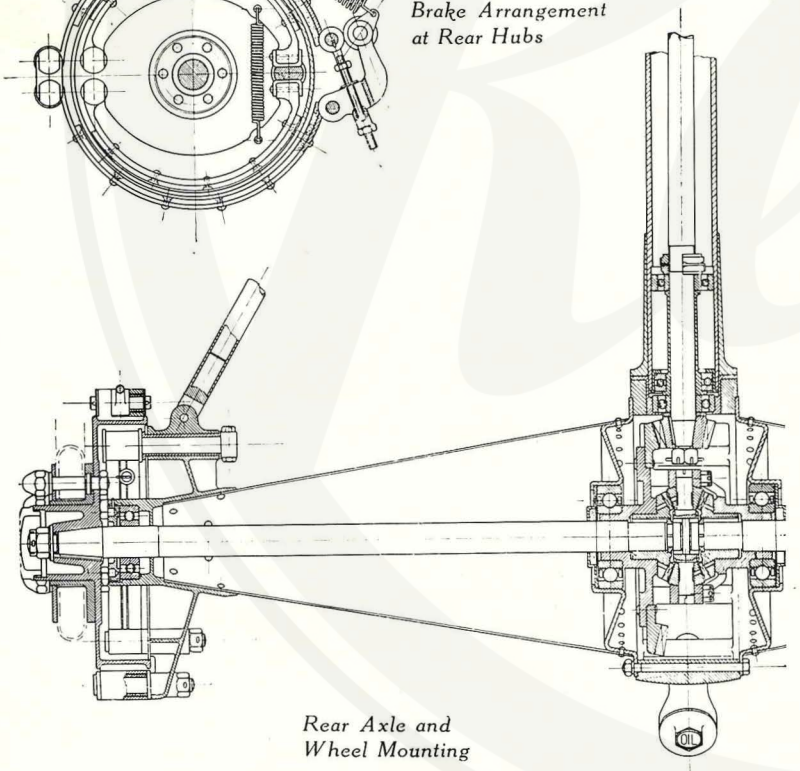
If the cable is shortened too much, the cranked lever which operates the two brakeshoes will be working at a bad angle and it is impossible to get the proper braking action.



Stub Axle and Front Hub

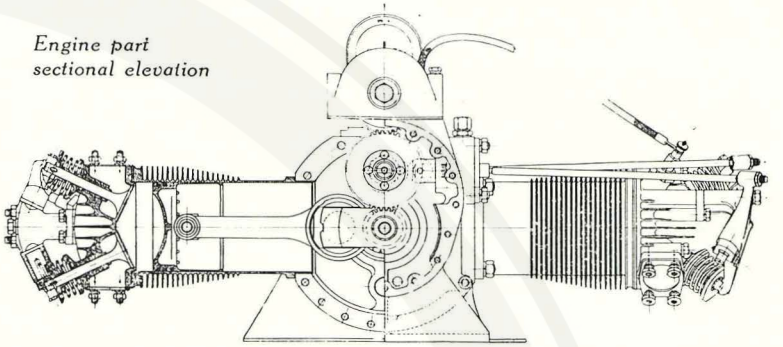


Brake Arrangement at Rear Hubs

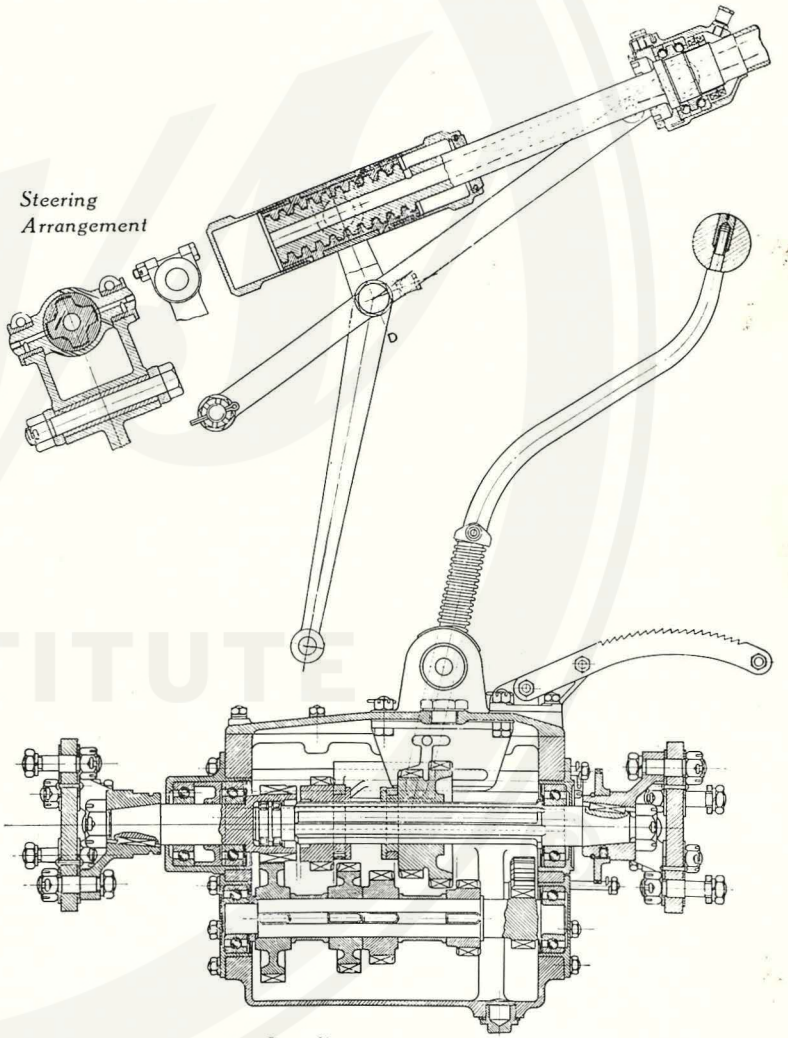


Rear Axle and Wheel Mounting

Engine part sectional elevation



Steering Arrangement



Gear Box sectional elevation

Care and Maintenance.

There is a spring fitted on the adjustment bolt to keep the two half shoes apart and this should be inspected to see that it is really lifting the upper shoe.

All the hinges on the brake shoes and their adjusting bolt pins are fitted with oil-less bushings which do not require attention or oiling but if the parts are caked with mud it does not hurt to add a few spots to free them. **Do not let any oil get on to the brake drums or brake bands.**

If the foot brake joints are free and the springs return them when the pedal is released they do not require any attention at this point.

Care should be taken to see that the foot brake does not rub, as it will make the car sluggish and lower the speed as much as six or seven miles per hour even without an appreciable heating up of the brake drums, therefore, if the drums are not hot do not be satisfied that the shoes are not rubbing. If everything is free it should be possible to easily push the car on a smooth Macadam road with one finger.

To lift the brake shoes off the brake drums a small screw and lock nut are provided underneath (at the point of attachment of the pull-off spring) and this should be adjusted up so that the lower shoe is just clear of the drum, the necessary clearance for the top shoe being obtained by means of the nut mentioned above.

The foot brake is not fully compensated and each brake must be tested separately. To do this both rear wheels should be jacked up and someone else asked to apply the foot brake a certain distance then test each brake for grip by pulling the wheel round, in the case of Sporting Models the adjustment can be more efficiently carried out with the wheel removed.

To inspect the internal brake it is necessary to remove the wheel hub. This is held upon a taper on the rear axle shaft and it should be removed as follows.

First remove the wheel and then the two external brake shoes should be uncoupled and hinged back out of the way. Then remove the hub cap and after that the split pin on the end of the shaft and the nut which holds the hub on. Then insert a wheel extractor (in the threads which accommodated the hub cap and with the brake off you can draw off the hub and brake drum complete). If it is very tight it will be preferable to slip back the road wheel in order to hold the hub whilst turning the extractor bar. (See also diagram page 17.)

Hoods and Fittings.—Avoid closing hood if at all wet. It should be kept up if possible until quite dry.

PREPARATIONS FOR RUNNING.

ALL A.B.C. LIGHT CARS are thoroughly tested and finally greased up before delivery. With the exception therefore of filling up with petrol and oil they are ready for immediate use. As being inclusive, however, of usual routine, the following general information may be useful as occasion demands.

BEFORE STARTING OUT.—Replenish both petrol and oil tanks, the petrol filler cap at radiator top is clearly marked so. The oil filler cap will be found upon the near side underneath the bonnet at the opposite end of the tank.

The total capacities are:—

Petrol tank, 6 gallons.
Oil tank, 1 gallon.

The petrol and oil cocks at the bottom of the tanks are "on" correctly when pointing downwards.

The petrol filter, which is fitted immediately under the petrol tap in the tank, should be frequently cleaned out.

If benzol can be obtained it is much better to run on a mixture of about one-third benzol and two-thirds petrol. The engine runs smoother and gives more power on hills.

Tyres.—The tyres should be pumped up hard. Never run on soft tyres. The air pressure should be:—

Tyre.	lbs. per sq. inch.
700 x 80 m/m. Front	55
700 x 80 m/m. Rear	65
710 x 90 m/m. Front	65
710 x 90 m/m. Rear	70

Preparations for Running.

TO START THE ENGINE.—

1. The magneto switch upon the instrument board should point upwards to start and downwards to stop the engine.
2. See that the gear lever is in neutral, in which position it can be pushed up and down without resistance.
3. By means of the lever at centre of the instrument board, the magneto should be slightly retarded when starting (about ¾ advance), the carburettor flooded when cold, and care should be taken to engage the starting handle so that the compression stroke of the engine is on the upstroke of the starting handle as this enables a smarter pull to be given and a better spark as well as preventing injury due to backfire. An additional safeguard is to keep the thumb and the fingers on the same side of the crank pin. The A.B.C. engine, being a 2-cylinder has one explosion stroke per complete revolution and all fear of backfire is removed by pulling up over the compression instead of pushing down.
4. The throttle should be set by the small adjuster on the right hand side of the instrument board so that it is only just open, as it is easier to start on the slow running jet than at any other position of the throttle. (If starting is difficult the throttle should be closed still further till it is almost fully closed).
5. The starting handle is clamped to the forward cross-member of the chassis and if this has been dismantled care should be exercised to see that the clamp bolts are quite tight and that the spindle which carries the starting pin slides easily in and out of the starting claw on the crankshaft. When the starting handle comes out of engagement it should be quite free of this starting claw. The starting claw should be occasionally lubricated.

TROUBLES.—If the engine cuts out on one cylinder the first thing to inspect is the spark plug of that particular cylinder. If this is clean and firing properly look at the tappet rod adjustment to see if one valve is lifted when it should be on its seat. If all these are in order the rocker on the magneto contact breaker may be sticking or may be only lifting on the one contact, the remedy being to adjust the platinum points so as to give a little more clearance. Another cause of firing

Preparations for Running.

on only one cylinder may (particularly at slow speeds) be due to one of the induction pipe washers leaking or having broken in which case it should be replaced.

If the engine is very difficult at starting and only starts when the carburettor is well-flooded after which it tends to stop unless the accelerator pedal is constantly tapped with the foot it is almost certain that the slow running jet is stopped up.

If the engine fires steadily on one cylinder and occasionally cuts out on the other at high speeds and the plugs have been inspected and tested by changing to new ones, inspect the slip ring and high tension brushes on the magneto to see if they are making contact and are clean.

If the magneto constantly retards itself and the lever on the instrument board moves over rough roads, tighten up the clamp bracket found attached to the dash-board under the scuttle.

If the compression is very bad on one cylinder and one of the push rods is not holding the valve off its seating remove the cylinder head and grind in the valves unless, on close inspection and listening, some other obvious cause of the trouble presents itself.

If you have had the engine dismantled make sure that the timing is correct to the marks on the flywheel. which, as already mentioned, are applicable only to an engine which is hot. If the engine runs regularly but has no power at all look to see if the magneto has been very much retarded, i.e., the points should break well before the piston has reached the top dead centre (as marked on the flywheel) with the ignition lever on the instrument board in the advance position.

Do not imagine without complete investigation that a certain thing is wrong and spend half an hour taking it down only to find it is something else. Five minutes spent in considering how and why it can cause the trouble will often save hours of labour. Half the ability to make an adjustment or repair is the ability to decide its necessity.

Do not assume that the engine has overheated. If everything is in order and the magneto timing correct and no valves badly blowing it is practically impossible to make it overheat at all.

When the car is running well do not imagine that it can go better, or allow anyone to interfere with it, or try and make it do so.

USE ON THE ROAD

FROM an owner driver's point of view the subject of gear changing is perhaps better considered a possible source of pleasurable interest rather than a convenience or a necessity.

¶ Proper accomplishment is attainable only by road experience, and the adoption of accepted principles is essential. The following remarks therefore have been prepared as being applicable to the A.B.C. and for the useful purpose especially, of those first interested in our cars.

GEAR CHANGING.—A special type of gate is employed. Some short explanation therefore is perhaps necessary, though practical difficulties are in no way suggested, in fact it can be said that our gear box is as nearly fool-proof as possible.

The gate itself of quite usual type is invisible, being fitted vertically upon the underside of the gear box lid, being therefore constantly lubricated. A key to its form, however (which should first be carefully studied), will be found cast upon the aluminium knob at the top of each gear operating lever.

To go through the Gears.—First place the gear lever in neutral, so that when the knob is depressed the lever will sink, being returned if released by the spring at its foot.

To Enter First Gear.—With the engine running slowly, declutch (this operation, of course, being necessary with every change, the left-hand, foot pedal, being pressed) now depress the gear lever fully, and move it slightly forward, gently but firmly, always feeling —unconsciously if possible—for the gears to engage. Release the hand brake and gently and gradually engage the clutch by removing the pressure of the foot.

Second.—A similar operation but with a reverse or backward movement of the lever is necessary to engage second speed. Care being taken whilst pulling back the lever to press it down whilst passing by the neutral position thereby preventing it rising and engaging top speed.

Third.—Now return the lever to neutral, at which position the spring will automatically lift the lever upwards (which vertical movement corresponds exactly to the lateral movement necessary to cross neutral with an ordinary H section gate), again press forward, quite firmly, to attain third speed.

Fourth.—Draw the lever right back passing neutral firmly into fourth or top speed.

Reverse is obtained by passing right through first and moving the lever still further down and further forward.

It is often helpful to remember that all movements in neutral take place in the vertical plane, all gear entry movements being effected longitudinally.

If the gears do not engage when the car is standing, it is because the teeth of the wheels on the two shafts are not in correct position for ready engagement. The lever should in this case be put in "neutral" and the clutch let in slightly. Then depress the clutch pedal and try again.

When desiring to reduce speed close the throttle (do not declutch and apply brakes suddenly except where it is required to stop), then if possible, it is as well to let the car slow down before declutching and apply brakes; in short, drive on the throttle and not on the clutch; do not declutch with the accelerator pressed except when double-clutching as described below.

Accelerate gradually, never race the engine unnecessarily and the life of its bearings will be considerably prolonged.

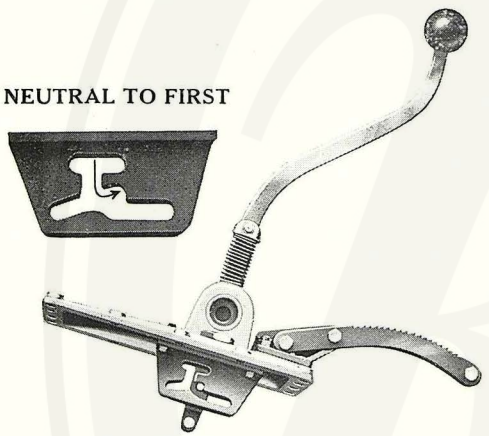
Especially bearing in mind previous remarks under the heading "Clutch," it should be remembered that a clutch stop is only used when changing the gears up from a lower gear to a higher one and for engaging first speed or reverse gear when the car is standing at rest.

Be Deliberate.—When changing into a higher gear it is well to pause a moment or two after disengaging the gears before moving into the next speed.

GEAR BOX CONTROL AND GATE OPERATION.

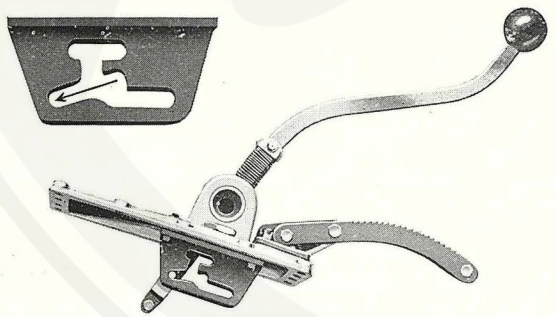
The gate separately illustrated at the top left hand corner of each diagram is merely an enlargement of the gate incorporated with the respective diagram, and by means of the arrow, more clearly portrays, the direction of travel of the selector necessary to correctly position the lever for the particular speed.

NEUTRAL TO FIRST



FIRST

FIRST TO SECOND

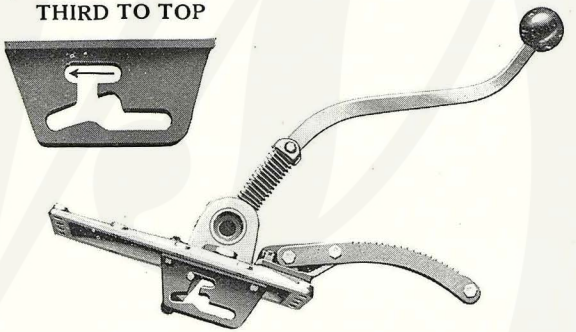


SECOND

SECOND TO THIRD

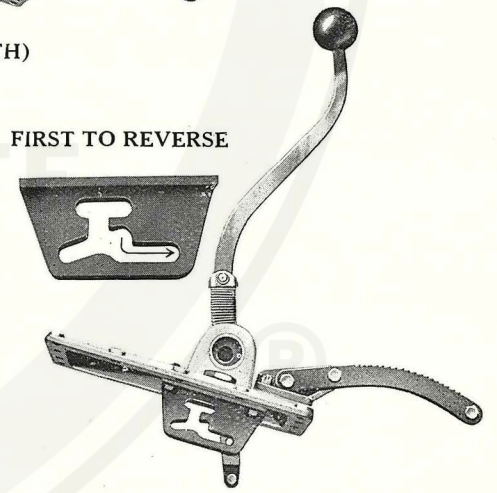
THIRD

THIRD TO TOP



TOP (FOURTH)

FIRST TO REVERSE



REVERSE

Use on the Road.

The fundamental requirements in every case are that the gears to be meshed shall be revolving at as nearly the same speed as possible, by waiting a moment time is given for this to take place.

In changing to a higher gear, **slow down** the engine while the gears are disengaged. When changing to a lower speed **accelerate** the engine while the gears are disengaged.

When changing down on a hill to a lower gear the clutch should never be pushed out far enough to reach the stop and it is advisable for the driver to learn the art of "double clutching" when changing down if he wishes to make a silent change.

DOUBLE CLUTCHING.—The procedure is as follows:—

1. Depress clutch pedal just enough to free clutch and move the change speed lever into neutral position.
2. Let clutch pedal in and simultaneously slightly accelerate engine.
3. Depress clutch pedal just enough to free clutch and move change speed lever into lower gear.
4. Release clutch pedal and accelerate engine as desired.

Be Considerate.—When it is necessary to change to a lower gear do not hang on top gear until the last possible moment, especially on a stiff hill, when the change from top to third should be made before the speed drops below 18/20 m.p.h. Four forward speeds have been placed at your disposal each ratio of which is assigned for certain loads and conditions. Do not overload the motor; the next lower gear, while a little slower, is in the end an insurance of longer life and more efficiency.

TO JACK THE CAR UP.—Pull on the hand brake to prevent the car moving, place the jack under the front axle in the ordinary way. At the back axle the jack is best operated upon the roller immediately beneath the rear springs.

TO REMOVE A WHEEL.—After jacking up the car for the wheel it is intended to remove, unscrew the five acorn nuts with the wheel brace supplied. Remove the spring washers and the large washer. The whole wheel can then be withdrawn. Before replacement a little engine oil upon the studs is desirable.

Use on the Road.

GENERALLY.—If the car is to be left standing for any while, always see that the switch is "off," the change speed lever in "neutral," and the hand brake "on" before getting out of the car. When stopping upon a hill always turn the front wheels into the curbstone.

Use your brakes gently and as little as possible. Do not use one brake only in hilly country. Use both when necessary and allow one to cool whilst using the other when only one is necessary.

Keep the ignition lever as far advanced as possible without causing the engine to "pink."

Watch the sight feed oil indicator upon the instrument board, and be satisfied, always, that the system is working as it should do.

Always show consideration for other users of the road who invariably appreciate and reciprocate accordingly.

LUBRICATION

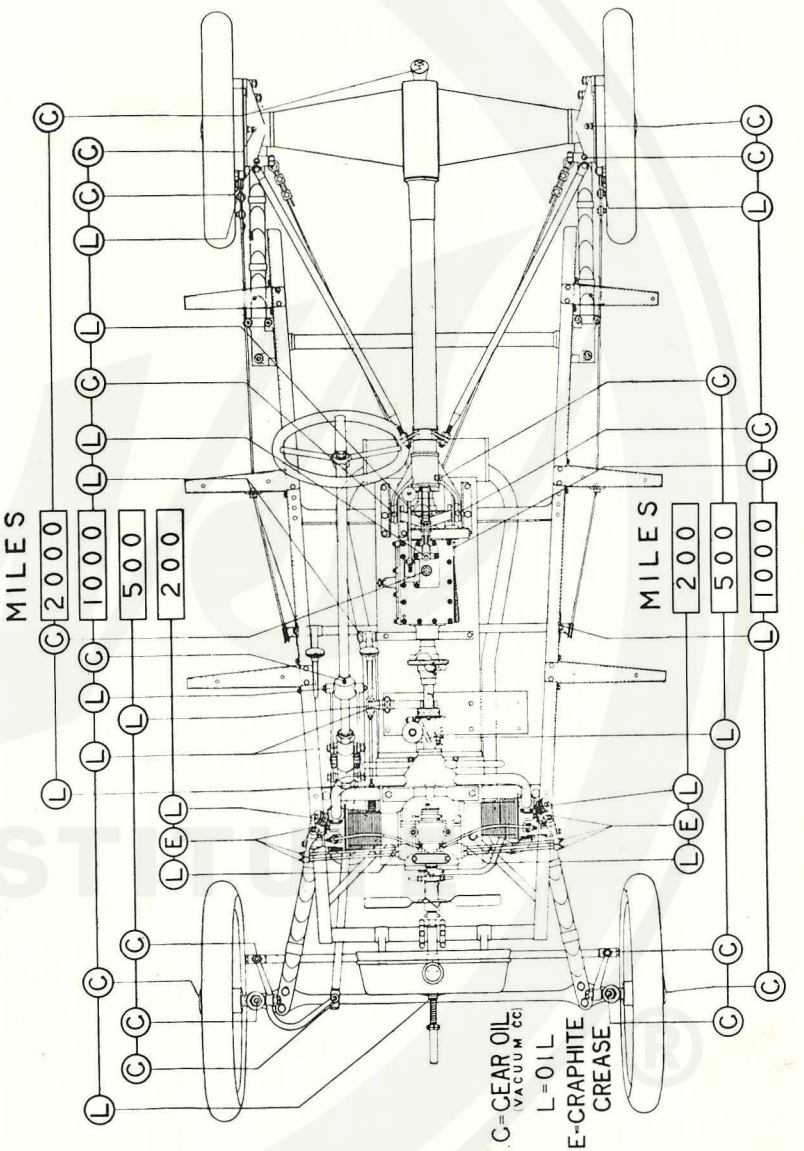
IT cannot be too strongly urged that adequate lubrication of the chassis moving parts is an absolute essential, and scarcely too much attention can be given to this vital matter. The lubrication diagram hereto should be studied very carefully and the instructions implicitly followed.

Particular attention should be given to the oiling of the front steering pivots (see also steering system previously), the oiler immediately behind the clutch, the front end of the cardan shaft casing, and the ball joints for the steering.

It should be noted that the oilers are not grease cups to be filled up and screwed down a little each day but are intended for oil. They should be filled up as specified and screwed right home so as not to shake loose. The only exception to this is the cup fitted to the overhead rocker bearing which can be given one turn each morning.

The hub caps should be removed and filled with grease every one thousand miles and in the event of general overhaul much improved effect will be apparent if the road springs are carefully greased between the leaves.

The matters of engine and also chassis lubrication have already been further fully dealt with under the heading "Care and Maintenance," sub sections "The Engine" (Page No. 8) and "The Gear Box" (Page No. 14) to which reference should be made.



OILING DIAGRAM 12-H.P. A.B.C. LIGHT CAR.

It is important that delivery of the oil supply to engine be so adjusted that the sight feed upon the dashboard shows 60-80 drops per minute for moderate touring, and almost a continuous stream for high speeds.

CARBURATION

THE well-known and dependable type of Zenith Carburettor is fitted to both Standard and Sporting Models. Further remarks are therefore unnecessary beyond that the carburettor is correctly set as it leaves the works and, except for periodical cleaning, should not be otherwise interfered with.

The Zenith carburettor is adjusted by determining the correct sizes of the choke tube, main jet and compensator.

The purpose of the **choke tube** is to obtain the correct velocity of air around the jets in order to get the best mixture at all speeds.

The **main jet** has most influence at high speeds.

The **compensator,** which corrects the irregularities of the main jet, has the greatest influence at low pulling speeds.

Besides these three parts, there is a special device to regulate the slow running.

We mention below a few of the things that are likely to happen and the best way to correct these faults by altering the different parts.

1. **Choke Tube Too Big.**—The choke tube is too large when the picking up is bad, or when it is impossible to obtain a sharp acceleration no matter what size of compensator is used.

2. **Choke Tube Too Small.**—With too small a choke tube the pick-up is excellent, but the speed attained on the level with the accelerator right down is insufficient. A larger choke tube is then fitted, and the jets altered proportionately, when the tests are continued until the symptoms of too large a choke tube are noticed.

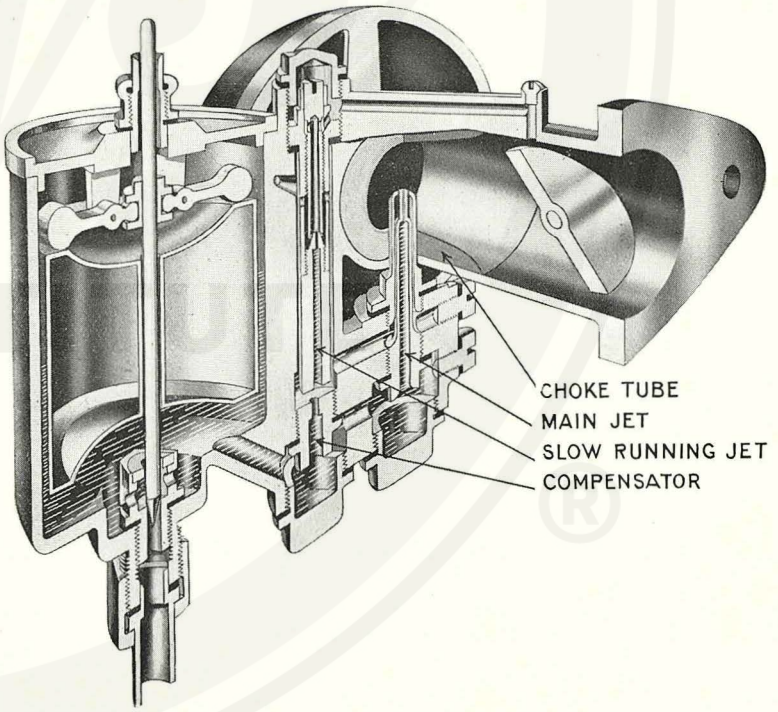
3. **Main Jet Too Large.**—To ascertain the correct size of main jet, the test is made on the level at high speed.
   A jet which is much too large causes choking, and the engine often runs jerkily and hunts. The petrol consumption is also excessive.

4. **Main Jet Too Small.**—The main jet is too small when the car gets away badly and popping-back occurs in the carburettor when accelerating. This popping-back occurs at irregular intervals, and the engine has no power and cannot drive the car at a high speed.
   The popping-back may also be caused by air leaking into the induction pipe through joints which are not air-tight, or by the valves not closing properly.

5. **Compensator Too Large.**—The compensator is too large when the engine at this speed runs with an irregular, jerky motion; the hunting which takes place at high speed in the case of too large a main jet is found at low speeds with too large a compensator.

6. **Compensator Too Small.**—The compensator is too small if the engine misses now and again, the transmission receives thumps, and the engine finally stops. In this case fit a larger compensator until the engine runs regularly.

NOTE.—Our standard setting with the old pattern carburettor is as follows: Main Jet 90, Compensator 85, Choke Tube 20. For further information the address of the Zenith Carburettor Company, Limited, is 40-42 Newman St., W.1.



New Type 1922 Triple Diffuser Carburettor.

A.B.C. Light Cars for 1922 are fitted with the new type triple diffuser Zenith Carburettor, the basic principle of which is exactly that of the old type previously fitted as standard with all our cars. The foregoing remarks therefore remain generally applicable to either type. With the new model, however, certain altered methods of adjustment are provided, more especially so the slow running adjustment, to which particular attention is drawn. The following remarks should be considered applicable to the new model only.

DISMOUNTING THE MAIN CHOKE TUBE.—It is not necessary when taking out the main choke tube to remove the throttle valve as in the case of the old pattern carburettor. The air cowl, however, must first be withdrawn and afterwards the diffuser tube. The use of a slightly bent screwdriver will facilitate removal of the two screws securing this. Finally, after loosening the outside locating screw two or three turns the main choke tube can be withdrawn.

Coincidence of the locating screw with the groove around the choke tube ensures correct repositioning.

HOW TO FIND THE CORRECT JET ADJUSTMENT.—Our standard setting when the car is delivered will be found suitable for all general purposes. If re-adjustment is necessary, it should be remembered that the main jet and compensator play the same part as with the old pattern carburettor. The method of adjustment and regulation therefore is the same.

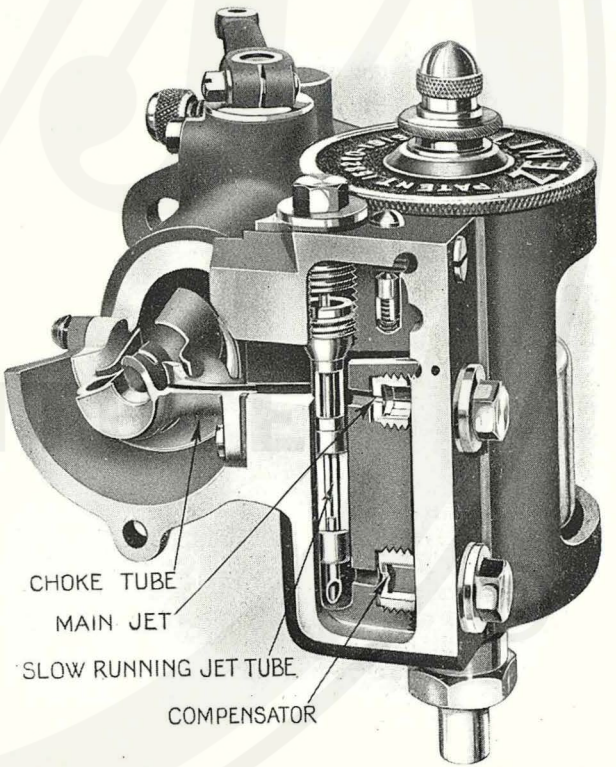
ADJUSTMENT OF THE SLOW RUNNING TUBE.—Advantage should be taken to perfect adjustment of the slow running tube when the engine is hot. After retarding the spark, so adjust the regulating screw until that period is obtained where slow running is most regular. Unscrewing the screw makes the mixture weaker, and screwing up richer. The slow running tube as fitted at time of delivery is generally most suitable to our engine. If however it is necessary to unscrew

the screw more than two turns, the orifice is too large, and a smaller tube should be fitted. In any event, it should never be necessary to unscrew this more than three turns, otherwise damage may result to the serrations which lock this. If the mixture cannot be regulated sufficiently rich enough by screwing up the adjustment as far as it will go, a larger slow running tube should be fitted.

THROTTLE ADJUSTMENT.—If the engine races, adjust the knurled throttle opening adjuster nut placed near the control lever, until the correct setting has been obtained. Down to open, and up to close, is the correct procedure.

In the unlikely event of its being necessary to remove the throttle actuating mechanism, care should be taken to replace this correctly, especially having regard to the incorporation of a throttle return spring.

It is suggested that reference be made to the respective instruction booklets issued by and always obtainable from the Zenith Carburettor Company, 40-42 Newman Street, London, W.1, who will also be pleased to answer any enquiries that may be necessary.



ELECTRICAL SYSTEM

IGNITION.—Ignition is by high tension magneto, which ordinarily requires little attention.

Should the ignition appear to be at fault, the platinum points at contact breaker should be examined and correctly adjusted to separate half a millimetre. The correct gap is readily found by using a feeler.

Attention should be given to the bell-crank lever, which works in a fibre bush. Under varying climatic conditions it may occasionally happen that this bell-crank lever becomes stuck up owing to the swelling of the fibre bush, but by very slightly increasing the bore of the fibre bush this defect can be easily remedied. The fibre bush should never be oiled but eased with emery cloth.

The sparking plugs may be short circuited by a piece of carbon between the electrodes and the body of the plug. Removing the carbon particles will remedy this at once.

Cleanliness is essential; always keep the sparking plugs free from carbon deposit by washing occasionally in petrol, at which time the points gap should be re-set not more than half a millimetre apart.

LIGHTING.

A six-volt dynamo generates the current for lighting the two head lights and the rear tail lamp. When the car is being driven at 20 m.p.h. on top gear, the ammeter upon instrument board should show a charge of not less than 6 amps.

If the dynamo does not charge satisfactorily inspect the belt which drives this to see if it is sufficiently tight. A suitable adjustment can readily be made by adjusting, up or down, the two nuts on the vertical bolt which controls the rocking of the dynamo, and care should be exercised to see that the belt is not tightened so as to put an excessive strain upon it. The correct tension is when there is just no slackness in the belt whatever. Do not forget to lock up both

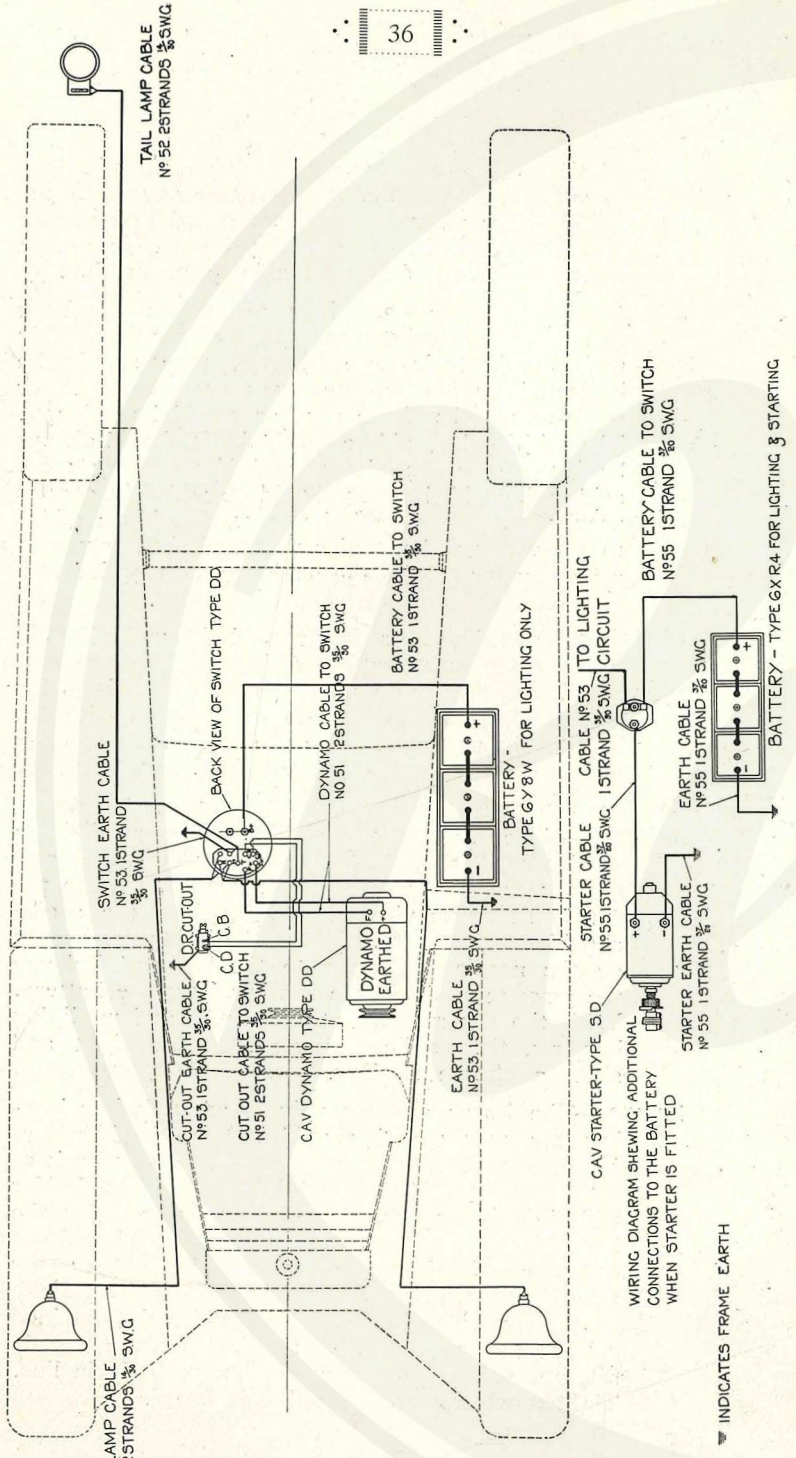
nuts tightly afterwards. If the dynamo still fails to charge remove the small fuse cover from the switch plate on the instrument board and inspect the fuse, replacing this with 10 amp. fuse wire if it has blown and is not making a connection.

Batteries.—These are carried in a box on the near side running board and unless the owner thoroughly understands their care himself, they should be inspected by a competent man once a month or say two months if the car has not had much use. The acid level should be checked. It should always be just above the plates, and if necessary more acid and distilled water should be added in correct proportions. The acid, however, should be added to the water and not vice versa. When returning a battery for repairs the acid may be emptied out. On no account fill the cells with water.

Charging.—The dynamo switch should always be kept in the "on" position whilst running. The ammeter remains always in circuit when the switch is in the charge position. Never run the dynamo with the battery disconnected. If there is any doubt as to the battery being charged, always give the battery the benefit of it and keep charging.

Ammeter.—The Ammeter registers upon a dial at the instrument board the charge or discharge rate of current flowing through the system. When the car is at rest and no lights burning, the needle should stand at zero. When the lights are turned on the needle will move to the left and indicate the amount of discharge flowing from the battery. With the car running at 20 m.p.h. and no lights burning, the needle will move to the right and show a charge reading.

Lamps.—The lamps are correctly focussed before leaving the works and should not need alteration. If necessary, however, the small screw at back of the lamp should be slacked off when the holder will slide in or out. The best way to focus the lamps is to select a straight piece of road and get someone holding a paper to stand about one or two hundred yards away, then focus each lamp separately until the best illumination is obtained on the paper. See that the lamps are correctly set, not pointing up or down, but properly in line. Tighten when correct position is found.



ELECTRICAL SYSTEM 12-H.P. A.B.C. LIGHT CAR.

Electrical System.

Bulbs.—24 C.P. bulbs should be fitted to the head lights.

8 C.P. bulbs should be fitted to the rear light.

Lubrication.—A drop or two of engine oil in each lubricator of the dynamo every thousand miles or so is sufficient. The best oil to use is ordinary engine oil, and when lubricating, it is as well to examine the commutator and brushes. Special attention is drawn to the wiring chart attached hereto.

STARTING (with Electric Self-Starter).—Special arrangements have been made for the inclusion of a dynamo electric self-starter if necessary, as an extra. This unit is for the purpose of turning the engine until it runs under its own power. To operate correctly, the magneto switch should be in the "on" position and the ignition lever slightly retarded. Firm but careful foot pressure should then be exerted at the starter button which is placed near the clutch pedal, until the engine takes up.

When the engine starts firing the increased speed of the flywheel causes the starter pinion to rotate faster than the threaded sleeve, and consequently it travels endwise out of mesh, and the centrifugal effect of the pinion weight holds it out of mesh until the motor comes to rest, thereby completing the sequence of operations.

If the engine will not start up after one or two attempts the trouble does not lie with the starter, and the carburettor, plugs, etc., must be examined to locate the cause.

Do not abuse the system by unnecessary, and too frequent, use of the starter motor.

Every operation of the starter motor represents a considerable drain on the battery, which will require several miles of travelling to replace.

As the starter motor is only used occasionally, and for very short periods, it needs practically no attention, but as a matter of precaution an occasional inspection

should be made of the commutator and brushes to see that the commutator is clean and in good condition, and the brushes free in the holders.

Oilers are provided for the ball bearings, which should be given a few drops of good oil about every 1,000 miles.

Summary.

1. Periodically examine the battery, and carefully follow the makers' instructions.
2. Inspect and adjust, if necessary, the level of the acid, once every month.
3. Keep the battery properly charged.
4. Do not use the starter motor more than is actually required.
5. Do not run the car or engine with battery disconnected unless the fuse is out, or dynamo belt off.
6. Do not keep the engine running by means of the Starter motor for more than a few seconds at a time, and if it fails to start rapidly see to the carburettor and ignition adjustments.
7. Lubricate the dynamo bearings every 1,000 miles.
8. Do not blame the system when something goes wrong, but locate the cause of the trouble and always put any defects right as soon as possible.

Any further information required should be obtained from the respective instruction booklets issued by the manufacturers of the particular set that is fitted.

In cold weather it is advisable to crank over the engine with switch off to take off the initial stiffness before using starter.

CONCLUSION

WE have endeavoured to deal as clearly and comprehensively as possible with matters of likely interest or of possible occurrence with our own or any make of car. With the knowledge of our product it is confidently expected that tiresome troubles are unlikely to arise, we realise, however, that there will be times when it is difficult to diagnose. We are always ready to give such cases our special attention.

We take this opportunity also of thanking owners of our cars for their valuable support the furtherance of which is our constant endeavour, and of assuring our clients that the matter of their good interest is at heart no less after, than before, the sale of a car.

A.B.C. MOTORS (1920) LIMITED,

(10/21).