

AMERICAN BOSCH PRODUCTS

Repair Instructions for American Bosch Adjustable Impulse Couplings

Type IC-200 Series

TRADE MARK  AMERICAN BOSCH

The American Bosch Adjustable Impulse coupling is used to facilitate the starting of heavy duty gas engines on trucks, tractors and motor boats, without the aid of an auxiliary ignition system.

This device is so designed that, when attached to the magneto, it gives the armature a short quick turn regardless of how slowly the engine is cranked. The coupling automatically disengages when the engine attains a speed of approximately 150 R.P.M. and then acts as a positive drive coupling only. The parts are so designed that they can be readily assembled for either clockwise or anticlockwise rotation. An adjustable feature is incorporated which permits the magneto to be accurately and positively timed to the engine.

Since the first of the IC-200 series Impulse Couplings was developed, various changes and improvements have been incorporated, and in order that each major change of design might be readily identified from the previous design a new edition number was assigned.

Five distinct editions of the IC-200 couplings have been developed, each embodying some improvement in design over the preceding edition. Full details and illustrations of each edition are given on pages 3152d and 3152e.

None of the principal operating parts of the couplings have been affected by the various changes, and the description of the working parts which follows applies to all editions.

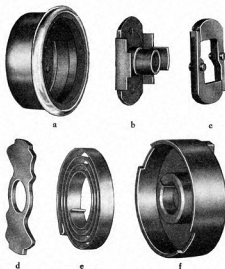
Description of Working Parts

The Impulse Member.

In the illustration (Fig. 1) the impulse member is shown disassembled.

The impulse member consists of a hardened steel housing (a) which in actual use is mounted to the magneto shaft endplate. This housing is known as the arrester plate.

The impulse coupling hub (b) is mounted directly on the tapered magneto drive shaft by means of one of two keyways—one for clockwise and the other for anti-clockwise rotation. These two keyways are iden-



The Impulse Member Disassembled

Fig. 1

tified by the marks "A" (for anticlockwise) and "C" (for clockwise) stamped near each keyway.

The two dove-tailed arrester weights (c) are placed over the coupling hub (b). The two turned up edges of the hub (b) serve as a guide for the arrester weights (c).

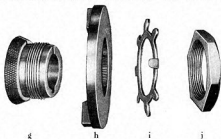
The cam (d) is located next to the arrester weights (c). When the cam (d) revolves a certain number of degrees, it engages with the pins of the arrester weights (c) and forces them apart.

The spiral spring (e) serves as a connecting link between the hub (b) and the housing (f).

The housing (f) is provided with a recess to accommodate the spiral spring (e). The inner end of the spiral spring (e) is anchored in a suitable slot in the hub of housing (f). The outer end of the spiral spring (e) is hooked over one of the turned up edges of the hub (b).

The Driving Member.

All parts of the driving member are shown in Fig. 2. The flexibility and adjustable features of these parts are instantly apparent. The flange (h) carries two



Driving Member Parts
Fig. 2

tongues for engaging the driving disc. A serrated surface is provided on the flange (h) which is placed in mesh with similar serrations in the hub (g). This makes a very accurate and positive timing adjustment possible. Since hub (g) is mounted directly on the accessory or driving shaft of the engine, it is available in sizes ranging from $\frac{1}{2}$ " to 1" bore, and with various keyways (see the tabulated list included in the parts list.) As already stated, the hub (g) also carries serrations which mesh with the serrations in flange (h).

The star washer (i) has eight lips, one of which is bent to lock in a hole provided in the flange (h). After the hex nut (j) has been tightened, two or more lips should be bent sharply against the flat sides of the nut, thus securely locking the entire assembly. The nut (j) draws the hub (g) against the flange (h) thereby making the timing adjustment absolutely positive.

NOTE: The parts illustrated in Fig. 2 and the description above applies to the Ed. 4 and Ed. 5 Driving Member. For details on other editions see pages 3152d and 3152e.

The Driving Disc.

All driving discs are made of a non-metallic material. These parts, in the past, have been made of various materials, the standard driving disc is now however made of phenol cotton fabric.

Operation

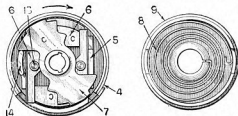
When the engine is cranked, the impulse coupling is in its normal position. (See Fig. 3.) The edge of one of the arrester weights (6) rests against the edge of the cutout section of the arrester plate (4), holding the coupling hub (5) stationary. As the engine is cranked over, the impulse housing (9) revolves and winds up the spring (8). At a fixed point the cam (7) lifts the arrester weight (6) clear of the edge of the arrester

plate housing (4) and the wound spring (8) is released, giving the magneto armature a short, quick turn.

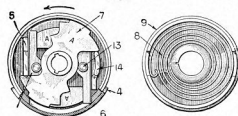
This causes the magneto to deliver an intense spark in the cylinder then under compression, and the engine starts, regardless of the cranking speed.

As soon as the engine attains a speed of approximately 150 r. p. m., centrifugal force throws the arrester weights (6) out of engagement with the arrester plate (4). As long as this or a higher speed is maintained, the entire mechanism will act as a strong and positive drive coupling.

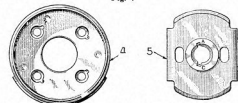
When the American Bosch Impulse Coupling is used to start an engine, it is absolutely impossible for the engine to backfire, because the adjustment is such that, when cranking, the spark is automatically retarded, and therefore occurs only after the piston has passed its top dead center position of the compression stroke.



How to Assemble for Clockwise Rotation
Fig. 3



How to Assemble for Anti-clockwise Rotation
Fig. 4



Arrester Plate in position
ready for fastening to
Magneto End-plate

Rear of Coupling Hub showing
the two keyways, one for clock-
wise (c) the other for anti-
clockwise (a) rotation setting

Fig. 5

Fig. 6

Installation

The American Bosch Impulse Coupling Type IC-200 can be made to work in either direction of rotation, and, therefore, before installing on a magneto, it is necessary to determine the rotation of the magneto. This is shown by an arrow located at the driving or shaft end of the magneto.

NOTE: Rotation is always determined from the magneto drive shaft end.

The coupling may be installed on Types AT, DU, U, and ZR American Bosch Magnetos in connection with corresponding shaft end plates. The face of these end plates have four counter-sunk spots which indicate the holes for drilling and tapping, so that the impulse arrester plate (4) may be mounted.

How to Install the American Bosch Impulse Coupling

First remove the magneto shaft end plate. Drill with No. 18 drill and tap the four holes, using a 7/32" x 24 thread tap (Whitworth Standard).

With the shaft endplate removed, fasten the impulse arrester plate (4) to the end plate as shown in the illustration Fig. 5, i. e., with the cut-away section of the coupling at the bottom or towards the base of the magneto, using the four screws furnished.

Make certain that these screws are set up as tightly as possible and staked in slots provided for the purpose. Fasten the shaft end plate with the impulse arrester plate (4) attached, to the magneto.

How to Assemble Impulse Member

Place spring (8) into impulse housing (9) in the proper position for the rotation of the magneto, as shown in the illustration (See Fig. 3 and Fig. 4 respectively). Engage the inner end of the spring (8) with the slot in the hub of the impulse housing (9). Take the coupling hub (5) in your hand, and hold it so that the turned over edges (14) are facing you. Place the two arrester weights (6) in engagement with each other and mount this assembly over the coupling hub (5) according to the rotation of the magneto, as shown in the illustration. If you assemble for clockwise rotation, the letter "C" stamped on the arrester plate must face you. Place cam (7) over the coupling hub (5) in proper position with correct rotation letter facing you. The impulse housing (9), with spring included, should now be placed in engagement with the assembly you have just completed, by engaging the bent up edge or tongue (14) of the coupling hub plate (5) with the free or outer end of the spiral spring (8).

Carefully twist with a three-quarter turn the two assemblies against each other; this winds up spring.

The proper location or position is arrived at when the cam (7) locks into position in the two notches provided on the edge of the impulse housing (9).

Set the complete impulse member on the driving shaft of the magneto, using standard woodruff key, and fasten it by means of the washer and nut. Two keyways are provided, one for clockwise (C), the other for anticlockwise (A) rotation (see Fig. 6). When assembling be sure that all parts are assembled correctly as to marking, as shown in the illustration. The impulse member shaft nut should be securely tightened and then locked with the set screw provided. Set the magneto on its bracket, but do not tighten the magneto fastening screws.

The adjustable member should then be placed on the drive shaft of the engine and the composition driving disc set between the impulse member and the adjustable driving member. Line up the magneto with the adjustable driving member and fasten the adjustable driving member to the drive shaft, using key and pin, then tighten the magneto fastening screws. Loosen the hex nut of the adjustable driving member and you are ready to proceed with the timing of the magneto.

Timing the Magneto

NOTE: Before proceeding with the timing of a magneto equipped with an Impulse Coupling read carefully the instructions given in Section 3150.

Bring No. 1 piston up to the top dead center position of the compression stroke. Revolve the magneto armature *backward* until the contact points would be just about to open if the armature were revolving in the *correct* direction. Then securely lock the adjustment of the adjustable driving member.

Determine the location of the distributor brush and connect the distributor plate terminal under which it rests with the spark plug of No. 1 cylinder. Connect the leads of the remaining distributor plate terminals, in their proper rotation to the spark plugs in accordance with the engine firing order.

When timing a magneto, the timing arm should be in full retard position.

Exact Magneto Timing: The above instructions are for general purposes only and apply principally to variable ignition. *For most efficient operation of the individual engine, always follow the ignition timing instructions issued by the manufacturer of your engine.*

When fixed spark ignition is used, the timing must be done with the piston in a position 15° to 40° before top dead center (*According to Maker's Specifications*) to procure maximum efficiency. Correct timing, as recommended by the engine manufacturer, is generally indicated on the flywheel. *Always follow Engine Maker's Instructions.*

Identification of Editions

IC-200 Series Impulse Couplings

A—THE COMPLETE COUPLINGS



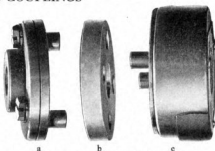
IC-200 Ed. 1 Complete



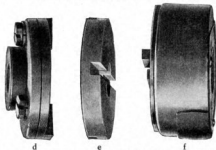
IC-200 Ed. 2 Complete



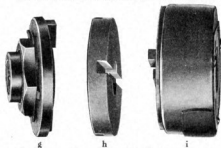
IC-200 Ed. 3 Complete



Main Assemblies of Type IC-200 Ed. 1 Coupling



Main Assemblies of Type IC-200 Ed. 2 Coupling



Main Assemblies of Type IC-200 Ed. 3 Coupling

The type IC-200 Ed. 1 (Fig. 1) coupling, now obsolete, used what is known as a pin drive. Pins projecting from the impulse member (c) and the adjustable driving member (a) engage with holes in a non-metallic driving disc (b).

The type IC-200 Ed. 2 (Fig. 2) coupling, also obsolete, differs from the IC-200 Ed. 1 in that it uses what is known as the "Oldham Drive." Tongues projecting

from the impulse member (f) and the adjustable driving member (d) engage with grooves in the non-metallic driving disc (e).

The IC-200 Ed. 3 (Fig. 3) like the IC-200 Ed. 2, uses the "Oldham drive." This coupling differs from both the Edition 1 and Edition 2 couplings in that its driving member (g) is held together by one large hexagonal nut whereas the other two editions use three cap screws.

Fig. 1

Fig. 2

Fig. 3

Care and Maintenance

The American Bosch Impulse Couplings are thoroughly tested and oiled before leaving the factory and require no attention. All parts are of steel and there is practically no wear under proper operation. In case it should be necessary to disassemble the coupling, *Do not pack it in grease when re-assembling. Use a good thin oil only, as grease will harden and interfere with the free action of the weights.*

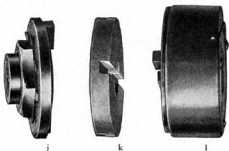
When Ordering

It is profitable to order a magneto with the impulse coupling attached. When ordering the coupling alone be sure to specify:

- 1—Type of Magneto.
- 2—Rotation of Magneto.
- 3—Diameter of driving shaft.
- 4—Make and model of engine on
which magneto is to be installed.



IC-200 Ed. 4 Complete

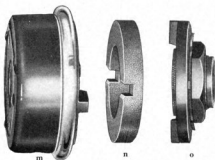


Main Assemblies of Type IC-200 Ed. 4 Coupling

Fig. 4



IC-200 Ed. 5 Complete



Main Assemblies of Type IC-200 Ed. 5 Coupling

Fig. 5

The IC-200 Ed. 4 Coupling, while similar to the IC-200 Ed. 3 in outside appearance, contains a number of internal changes. The serrated surfaces of the driving member hub and flange are beveled instead of flat as on the Ed. 3 coupling. A different type of nut is used for securing the impulse member to the magneto shaft and a set screw is provided to securely lock the nut on the shaft. With the use of this type nut the countersinking

in the impulse member housing was made shallower, thus strengthening the side wall of the center hub in the housing. A small groove on the outside surface of the IC-200 Ed. 4 impulse member housing permits the application of a felt dust ring to prevent the entrance of dust and dirt into the working mechanism. (The illustration on pages 3152 g, h, i and j show the exact difference between the various parts used in each edition of the IC-200 Series Couplings.)

The IC-200 Ed. 4 and Ed. 5 differ only in construction of the arrester plate. A felt dust ring is placed on the inside surface of the arrester plate to prevent dust and dirt from entering into the inside mechanism of the coupling. The raised rim on the Ed. 5 arrester plate allows the use of a larger felt ring, more securely retained, which obviously affords better protection.

Type IC-250 Series Ed. 4 and 5 Impulse Coupling

The major difference between the IC-200 Series and the IC-250 Series Couplings is that the IC-200 Series is fully automatic while the IC-250 Series Couplings incorporate a manual control of the engagement feature.

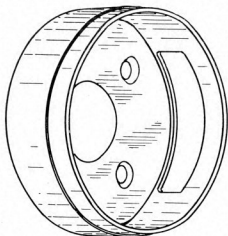
The manual engagement is incorporated in the arrester plate. It consists of a ring affixed to the outside of the coupling which controls the cam ring segment which engages the arrester weights. With the ring placed 90° to the arrester plate, the entire coupling is identical with that of the IC-200 Series. With the ring placed in contact with the arrester plate, the automatic engagement feature of the coupling is entirely eliminated.

This type of coupling is generally used on heavy duty, slow speed engines.

All working parts with the exception of the Arrester Plate are the same in the IC-250 Series as in the IC-200 Series.

B—THE IMPULSE MEMBER

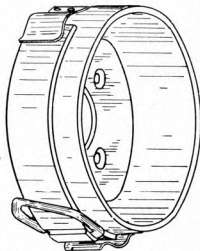
(Arrester Plates)



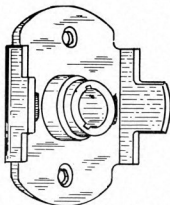
Impulse Arrester Plate 72084
used on all IC-200 Couplings
except Edition 5



64650
Impulse Arrester Plate
Fastening Screw
used on all type
couplings

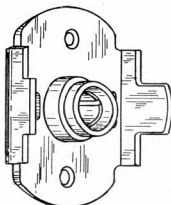


Impulse Arrester Plate 74464
used on Type IC-250 Coupling only

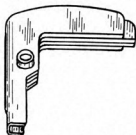


Impulse Coupling Hub 70777
used on Ed. 1, 2 and 3 Couplings

(Coupling Hubs)

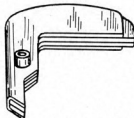


Impulse Coupling Hub 77242
used on Ed. 4 and Ed. 5 Couplings



Impulse Arrestor Weight 65972 (long)
used on all edition couplings

(Arrester Weights)



Impulse Arrestor Weight 71563 (short)
used on all editions as a "dummy" or
counterweight, when coupling is
used on magnetos, such as
ZR-4/2 360° IC

(Cams)



Impulse Member Cam
65966



Impulse Member Cam
70909



Impulse Member Cam
70921



Impulse Member Cam
77145

Since the cam is one of the important factors which determines the type of the Impulse Coupling, it is of utmost importance that you use particular care in selecting the correct cam for the type of coupling you are servicing.

The best method to follow is to lay the old cam on top of the corresponding illustration and then order the

cam by its part number. The number stamped on the edge of the cam formerly designated the number of degrees of spring wind-up, but the number now stamped on the cam indicates the number of degrees of automatic retard. (See "How to Identify American Bosch Impulse Couplings" on pages 3153, a, b, c and d of the Service Manual.

(Miscellaneous)



Impulse Member Spring 65967
used on all types and edition couplings



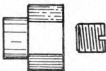
Plain Washer 71017
used under round nut for Edition 1,
2 and 3 Couplings



Plain Washer 77241
used under round nut for Editions 4
and 5 Couplings

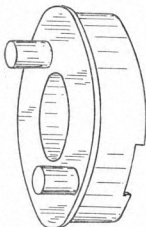


Impulse Member Shaft Round Nut
66851 (S.A.E. Thread $\frac{3}{8}$ -24) used on
Editions 1, 2 and 3 Couplings for Type
AT Magnetos, and 63820 (U. S. Std.
Thread $\frac{3}{8}$ - 16) for DU and ZR
Magnetos.

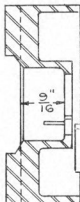


Impulse Member Shaft Round Nut
(78074), set screw (78076) used on
Editions 4 and 5 Couplings for AT and
round nut (78075), set screw (78077)
for Type DU, U and ZR Magnetos.

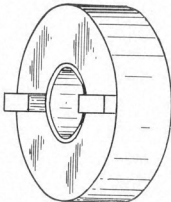
HOUSINGS



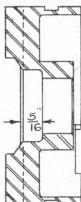
Impulse Housing 65971 with Pins
used on Ed. 1 Couplings



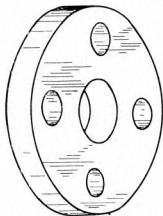
Impulse Housing 77013 with Tongues
used on Editions 2 and 3 Couplings



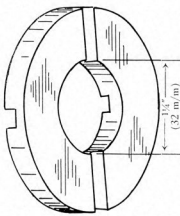
Impulse Housing 77243 with Tongues
used on Edition 4 Couplings



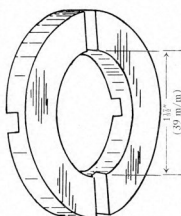
C—THE IMPULSE MEMBER DRIVING DISCS



Impulse Member Driving Disc 72008
used on Edition 1 Couplings only,
Pin Type

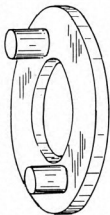


Impulse Member Driving Disc 63793
used on Edition 2 Couplings only,
Tongue Type

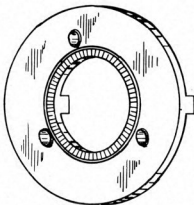


Impulse Member Driving Disc 75779
used on Edition 3, 4 and 5 Couplings,
Tongue Type

D—THE DRIVING MEMBER

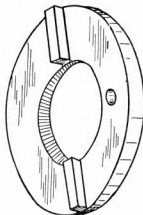


Driving Member Flange 70783
used on Edition 1 Couplings
only, Pin Type



Driving Member Flange 72364
used on Edition 2 Couplings
Tongue Type.

Edition 3 Flange, 75766 is
similar except that it has no
screw holes, the large lock nut
being used.



Driving Member Flange 77041
used on Edition 4 and 5
Couplings only, Tongue Type

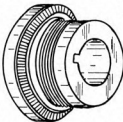
DRIVING HUBS



Keyed Hub

used on Editions 1 and 2 Couplings

Part numbers vary according to size of shaft and keyway. Find part number on page 810a of the Sales and Service Manual



Keyed Hub

used on Edition 3 Couplings only

Part numbers vary according to size of shaft and keyway. Find part number on page 810a of the Sales and Service Manual

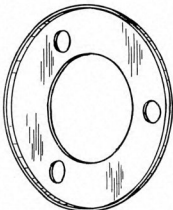


Keyed Hub

used on Edition 4 and 5 Couplings

Part numbers vary according to size of shaft and keyway. Find part number on page 811b of the Sales and Service Manual

CLAMPING MEMBERS



Clamping Plate 70782

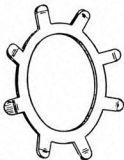
used on Editions 1 and 2 Couplings



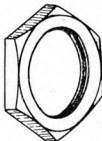
Lock Washer 71883
used with 70782
plate only



Clamping Screw 63807
used with 70782
plate only



Star Washer 75863
used on Editions 3, 4 and 5
Couplings



Lock Nut 75768
used on Editions 3, 4 and 5
Couplings

AMERICAN BOSCH PRODUCTS

HOW TO IDENTIFY

American Bosch Type IC-200 and IC-250 Ed. 4 and 5 Series Impulse Couplings



A number of our manufacturing customers are purchasing American Bosch magnetos equipped with impulse couplings and the last years have seen a considerable increase in magnetos sold with couplings.

In connection with some installations a special coupling must be furnished because the characteristic of the engine requires it.

Heretofore Service Stations have, in the majority of cases, confined their activities to the type IC-200 coupling. This has resulted in certain confusion because of lack of detailed information regarding special couplings used on particular engines. It has, therefore, frequently happened that special couplings have been serviced with standard IC-200 coupling parts with the result that the coupling lost its original identity. Naturally, when the job went back on the engine, difficulties were experienced such as rapid wear of contact points, hard starting, lack of power, overheating of engine, etc.

We have decided to label all couplings with the proper type number designation and couplings now

shipped from the factory carry such identification labels. This will materially help you in identifying the coupling and to ship the correct parts against orders received.

With the adoption of the designating label we have also inaugurated another feature which will materially clarify the situation. Up to the present time we have stamped the edge of the cam with the degree of "spring wind-up". Hereafter, however, we will mark the edge of the cam with the degrees of "automatic retard" so that the degree figure on the cam will be identical with the degrees printed on the coupling label.

Some explanation of the system which we have adopted in connection with labeling of impulse couplings is now given.

The labels fall into two major classifications:

"A"—Those covering the IC-200 series.

"B"—Those covering the IC-250 series.

In addition to the above marking, the label also indicates the degrees of "automatic retard."

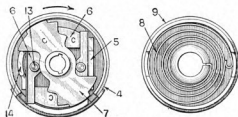
In order to make a quick reference possible and explain the entire set-up, we are listing below all essential information covering the "A" and "B" label classification, subdivided into their respective groups.

A—Type IC-200 Series Couplings Ed. 4 and 5

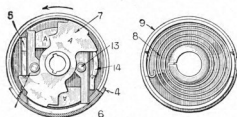
Group	Label	CAM MARKING		WEIGHTS	WEIGHT ARRANGEMENT	FINISH	SHAFT NUT
		Type	Wind-Up or Aut. Retard				
1	37°	200	64°	37°	2 long Use Fig. 1 for clw. Use Fig. 2 for anti.	Standard	Nut & screw
	37°	201	64°	37°	1 short 1 long Use Fig. 3 for clw. Use Fig. 4 for anti.	Standard	Nut & screw
	37°	202	64°	37°	1 short 1 long Use Fig. 5 for clw.	Standard	Nut & screw
	37°	209	64°	37°	1 short 1 long Use Fig. 6 for anti.	Standard	Nut & screw
	37°	211	64°	37°	2 long Use Fig. 1 for clw. Use Fig. 2 for anti.	Cadmium	Nut & screw
	37°	212	64°	37°	1 short 1 long Use Fig. 3 for clw. Use Fig. 4 for anti.	Cadmium	Nut & screw
2	43°	205	64°	37°	2 long Use Fig. 1 for clw. Use Fig. 2 for anti.	Standard	Nut without screw
	43°	207	70°	43°	1 short 1 long Use Fig. 4 for anti. Use Fig. 5 for clw.	Standard	Nut & screw
3	43°	207	70°	43°	2 long Use Fig. 1 for clw. Use Fig. 2 for anti.	Standard	Nut & screw
	43°	207	70°	43°	2 long Use Fig. 1 for clw. Use Fig. 2 for anti.	Standard	Nut & screw
3	23°	206	49°	23°	2 long Use Fig. 1 for clw. Use Fig. 2 for anti.	Standard	Nut & screw
4	30°	210	57°	30°	2 long Use Fig. 1 for clw. Use Fig. 2 for anti.	Standard	Nut & screw
5	27°	213	54°	27°	2 long Use Fig. 1 for clw.	Standard	Nut & screw
6	49°	216	76°	49°	2 long Use Fig. 1 for clw. Use Fig. 2 for anti.	Standard	Nut & screw

NOMENCLATURE

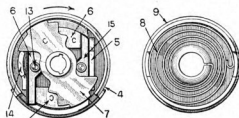
4. Arrester Plate.
5. Coupling Hub.
6. Long Arrester Weight.
7. Cam.
8. Spring.
9. Impulse Housing.
13. Arrester weight guide pin.
14. Coupling Hub Lag.
15. Short Arrester Weight.



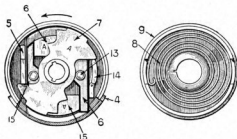
Assembly for Clockwise Rotation
Fig. 1



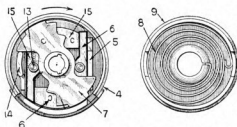
Assembly for Anti-clockwise Rotation
Fig. 2



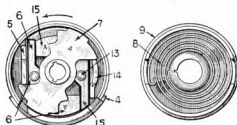
Assembly for Clockwise Rotation
Fig. 3



Assembly for Anti-clockwise Rotation
Fig. 4



Assembly for Clockwise Rotation
Fig. 5



Assembly for Anti-clockwise Rotation
Fig. 6

Referring to the information listed, you will note that the "A" or IC-200 Series falls into six (6) groups based on the automatic retard feature.

Arranging the couplings under automatic retard classifications, we find the following:

"A"—Type IC-200 Series

1st. All couplings bearing a 37 automatic retard indication on the label, i.e.:

IC-200
IC-201
IC-202
IC-209
IC-211
IC-212
IC-215

Note: Type IC-211 and IC-212 cams are actually 38° 30', but their manufacturing limits are such that these couplings can be safely handled under the 37° retard label.

- 2nd. 43° retard for IC-205 and IC-207.
3rd. 23° retard for IC-206.
4th. 30° retard for IC-210 - 214.
5th. 27° retard for IC-213.
6th. 49° retard for IC-216.

How to Use the "A" List

Let us suppose that you have in your hands a coupling requiring service. The label on the coupling reads: "Type IC-200 Series"

"37° automatic retard"

In referring to the "A" list you will note that group 1 covers all 37° automatic retard couplings or seven individual types and it is your job to determine the exact type of coupling so that you will be sure that only parts applicable to its original assembly are used in service to assure the original mechanical features of the coupling.

WARNING: Never take the Impulse Coupling to be serviced apart until you have definitely determined the particular type of coupling with which you are dealing. It is impossible to lay too much emphasis on this point because, with the coupling in a dismantled state, it is frequently impossible to arrive at its original type of assembly as will be shown later.

Obviously, the first thing to do is to determine the rotation of the coupling—whether it is assembled clockwise or anticlockwise. To do this on a coupling mounted on a magneto, is a simple matter because the magneto rotation is indicated by an arrow at the coupling or drive end.

When the coupling is not affixed to the magneto, take the coupling in the palm of your left hand so that the tongues of the coupling face you. With your right hand, twist the tongues and see in which direction the spring can be wound. If the tongues can be twisted to the right, and you feel the spring tension, you have a clockwise coupling; if to the left, you have an anti-clockwise coupling.

You should now take the impulse coupler apart very carefully. Make sure that you do this in exactly the same manner as it is described here.

With the coupling still in the palm of your left hand, take hold of the cam between the thumb and index finger of your right hand and lift the entire assembly away from its housing. Do this carefully—remember that the spring is "wound up" and under tension! Place the two halves of the coupler assembly on the bench in such a way that the spring and cam respectively face you. See the illustrations Figs. 1 and 2.

Before you lift out the cam, see whether its assembly checks with the coupling rotation which you have previously determined. If this rotation was clockwise, the marking on the face of the cam should be "C" and if anti-clockwise, this marking should be "A".

Note: While both faces of the cam are marked, one side "A" and the opposite side "C", only the marking now readable is the one which must correspond with the rotation desired for the complete coupling assembly. Again refer to Figs. 1 and 2.

Next lift the cam free from the hub assembly and note the degrees stamped on its upper edge. The degrees stamped there will be found to correspond with figures listed in the column headed "Cam Degrees", depending upon whether the particular cam is marked with the degrees "Spring Wind-up" (old style) or "Automatic Retard" (new style). This has been referred to previously. A reference to the column "Cam Degrees" reveals the fact that all 37° automatic retard couplings of the IC-200 series have identical cams, and they are either all marked 37° or 64° respectively, as listed in the two adjacent columns. A reference to the parts list, Sales and Service Manual page 811a, shows that the cam part number for the seven couplings listed in the first sub-division is 65966.

Note: Couplings Type IC-211 and 212 list cam No. 78928. You will note, however, that this cam is identical with cam No. 65966 except that it has been cadmium plated.

When a cadmium plated cam is found in an impulse coupling, you will, no doubt, also find that a number of other parts of the coupling are finished in the same manner.

Next carefully study the two weights which are now exposed to full view. If the coupling is one of clockwise rotation, the stamp on the face of the weights now visible, should be "C". If it is of anti-clockwise

rotation, the letter visible should read "A". Again, it should be noted that these weights are stamped on both faces and are, consequently, designed for both clockwise and anti-clockwise assembly.

Now determine whether you have two long weights or one long and one short weight.

Note: A short weight is one which has one leg cut off at a point where it will not engage the stop slot provided in the arrester plate. All short weights are designated by No. 15 in the illustrations Figs. 3 to 6 inclusive.

Suppose you have two long weights in your particular coupling. A reference to the chart will disclose the fact that coupling IC-200, IC-211 and IC-215 use two long weights. Your problem, therefore, has been reduced from seven couplings (when considering the cam alone) to that of three couplings when also taking the two long weights into consideration.

You must now determine, through a further process of elimination, the exact type of coupling which you have to service.

If your coupling is *cadmium plated*, it can only be Type IC-211 and your problem is therefore solved. If your coupling, however, is *not cadmium plated*, it is either of Type IC-200 or IC-215.

Since all internal parts which have anything to do with the identification of the coupling have, by this time, been examined, the only two parts left for examination are the impulse member shaft screw and round nut.

Refer to column headed "Shaft nut" and also see Sales and Service Manual page 811a, which definitely shows whether you have a Type IC-200 or IC-215 to service. Type IC-200 uses both a round nut and screw, while Type IC-215 uses a round nut only.

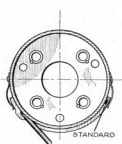
"B"—Type IC-250 Series

Under the "B" list all type IC-250 Series Couplings are listed and you will note that this "B" list consists of two groups as follows:

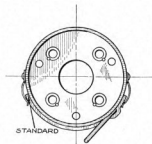
- 1st. The 43° retard for IC-250 and 252.
- 2nd. The 37° retard for IC-251 and IC-253.

B—Type IC-250 Series Ed. 4 and 5

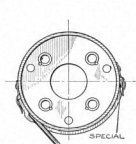
Group	Label	Type	CAM MARKING		WEIGHTS	WEIGHT ARRANGEMENT	FINISH	SHAFT NUT	ARRESTER PLATE
			Wind-Up or	Aut. Retard					
1	43°	250	70°	43°	2 long	Use Fig. 1 for clw. Use Fig. 2 for anti.	Standard	Nut & screw	See Fig. 7 or 8
	43°	252	70°	43°	2 long	Use Fig. 2 for anti.	Standard	Nut & screw	See Fig. 9 (Special)
2	37°	251	64°	37°	1 short 1 long	Use Fig. 6 for anti.	Standard	Nut & screw	See Fig. 8
	37°	253	64°	37°	1 short 1 long	Use Fig. 4 for anti. Use Fig. 5 for clw.	Standard	Nut & screw	See Fig. 7 or 8



Clockwise Housing
Fig. 7



Anti-clockwise Housing
Fig. 8



Special Housing
Fig. 9

How to Use the "B" List

Follow the same routine as described for the "A" list.

The major difference between the IC-200 Series and the IC-250 Series Couplings is that the IC-200 Series is fully automatic while the IC-250 Series Couplings incorporate a manual control of the engagement feature.

The manual engagement is incorporated in the arrester plate and is illustrated in Figures 7 to 9 inclusive. It consists of a ring affixed to the outside of the coupling which controls the cam ring segment which engages the arrester weights. With the ring placed 90° to the arrester plate, the entire coupling is identical with that of the IC-200 Series. With the ring placed in contact with the arrester plate, the automatic engagement feature of the coupling is entirely eliminated.

This type of coupling is generally used on heavy duty, slow speed engines.

Type IC-252 is a special coupling for anti-clockwise rotation, using a special arrester plate assembly shown in Fig. 9. Note the special long cam ring segment as compared to the standard cam ring used on types IC-250 - 251 and 253. The various parts of the IC-250 series couplings are listed on pages 812, a, b, of the American Bosch Sales and Service Manual.

C—COUPLING APPLICATIONS (Magnetos Types and Customers)

TYPE	MADE FOR	MAGNETO TYPE
IC-200 2 long weights	Standard	DU-2 4 ZR-4 DU-6 & ZR-6 AT-4 & 6
IC-201 1 short weight	Standard	DU-1 clw. or anti-c DU 4/2 360° anti-c
IC-202 1 short weight	Standard	ZR-4/2 360° clw. DU 4/2 360° clw.
IC-205 1 short weight	Buffalo-Spring- field Roller Co. Wolverine	DU 4/2 360° clw. DU 6/2 1C Ed. 31-V2
IC-206 2 long weights	Continental Motors Corp.	AT-4
IC-207 2 long weights	Advance Rumley Inter. Harvester	DU 4/2 180° Ed. 22, AT-4
IC-209 1 short weight	Standard	ZR 4/2 360° anti-c
IC-210 2 long weights	Massey Harris Co.	ZR-4
IC-211 2 long weights	Palmer Bros. Engines, Inc.	U-2, U-4, AT Same as IC-200 but Cadmium plated

TYPE	MADE FOR	MAGNETO TYPE
IC-212 1 short weight	Palmer Bros. Engines, Inc.	U-1 Same as IC- 201 but Cadmium plated ZR-4
IC-213 2 long weights	Ingersoll Rand Co.	GR-1 Ed. 3
IC-214 1 short weight	Standard	
IC-215 2 long weights	Leroi Co. Same as IC-200 except NT-78074 and SC-78076	ZR-4
IC-216 2 long weights	Hallett Mfg. Co.	ZRA 7 IC Ed. 1
IC-250 2 long weights	Same as IC-207 but has special arrester plate	DU 4/2 180° AT-4
IC-251 1 short weight	Ingersoll Rand Co. Same as IC-209 but has special arrester- plate assem.	ZR 4/2 360° anti-c
IC-252 2 long weights	Regal Gas Engine Co. Same as IC-250 but has special arrester plate assembly	DU 4/2 180° AT-4 anticlw.
IC-253 1 short weight	Bessemer Gas Engine Co.	ZR 4/2 360° clw. ZR 4/2 360° anti-clw.

All Impulse Couplings supplied for AT, DU and ZR Type Magnetos, are also supplied for the U Type American Bosch Magneto.



IC-200 Ed. 4 Complete



IC-200 Ed. 5 Complete