Selection and Operation of Motors

Types of Current

Before ordering a motor, and before connecting a motor to the line it is necessary to know the type of current in the shop. The more important types of current are as follows:

Direct Current. This is usually found in the downtown sections of the larger cities; it flows through the wires in one direction only. Three different voltages are in use: 32-volt D. C. for farm-lighting plants, 115 volts for lighting circuits in cities and 230 volts for power lines.

Alternating Current. This is the type of current in general use throughout the United States. While direct current flows in one direction only, alternating current (A. C.) rapidly changes its direction of flow. The rate at which these changes occur is expressed in CYCLES, and a 60-cycle alternating current reverses its directions 120 times per second. The voltages in common use are 110 for lighting circuits and 220 for power circuits.

Three-Phase Current. Alternating current coming from the generator station is generally transmitted over three wires, each carrying one "phase" of the current. This current is used in factory districts for operating large motors, etc., and practically all power circuits are three-wire, three-phase.

Single-Phase Current. In residential districts, the three-wire circuit is usually split into "single-phase" circuits, which are used for lighting and for small-power purposes. All A. C. lighting circuits are single-phase.

Types of Motors

It is impossible in the scope of an instruction booklet to describe all of the available types of motors, so our description is confined to the types usually specified for small-power uses.

Universal Motor.

This type of motor is generally used only where very little power is required, as for sewing machines, food mixers, etc. It can be operated on either A. C. or D. C. current, but ***it is completely unsuited for the operation of woodworking machinery,*** as it races when running idle, but slows down to a marked degree when under load. A constant-speed motor is required for such machinery, and one of the following types should always be used:

Direct-Current Motor.

The standard direct-current motor runs at a speed of 1750 R. P. M., and slows down but little under load. When ordering D. C. motors it is necessary only to specify that they are to be direct-current, and to state the voltage; as 32, 115 or 230 volts.

Split-Phase A. C. Motor.

This is the least expensive type of A. C. motor in first cost, and is quite satisfactory if used with due regard to its limitations. These motors draw a comparatively heavy starting current, and should not be used where they must start under load. They are excellent for various household-machines, such as washing machines, and ironers, or for such shop machines as grinders, buffers, scroll saws, etc., where there is little starting load. If used for lathes or other machines where there is apt to be a load on the machine to start with, care should be taken always to relieve the tailstock, or otherwise to make the starting load as small as possible.

Important:

These motors have an additional starting winding, which is in the circuit for a few seconds only, and which is automatically cut out by an internal switch whenever the motor gets up to about ¾ of its rated speed. This starting winding is of finer wire than the running winding, and if there is enough load on the machine to prevent the motor from attaining its running speed in the proper time, the starting winding will almost invariably be burned out. ***This is something that the motor manufacturer cannot possibly guard against, and is almost always due to faulty operation.*** It is especially dangerous to stall a split-phase motor for this reason, as the result of stalling generally is a burned-out starting winding.

Since split-phase motors take a comparatively heavy starting current, they will generally dim the lights on the same circuits for an instant when they are switched on. Many power companies will not permit the use of split-phase motors larger than ¼ or ⅓ H. P. on their lines for this reason.

If the dimming of the lights is objectionable, or if the motor must start under load, a repulsion-induction type of motor should be chosen.

Capacitor Start Motor.

If the starting winding of a split-phase motor is wound with heavier wire and connected in series with a condenser a motor results which takes a lower starting current, has an excellent starting torque and an exceptional pull-up torque. This motor has all the advantages of the regular split-phase motor with few of its disadvantages. ½ H. P. 3450 R. P. M. Motor No. 915 is of this type. It is easily converted into a reversible motor by means of a special reversing switch.

Repulsion-Induction Motor.

The repulsion-induction motor costs more than a split-phase motor, but is well worth the difference in cost for driving woodworking and other machinery, especially where machines must be started under load. It has a wound armature and a commutator, with the brushes carrying current during the starting period only. When the motor is up to speed the commutator is automatically shorted out of the circuit, and the motor then runs as an induction motor. The brushes on repulsion-induction motors of our make are of the continuous-riding type, which tend to polish off any marks caused by the current on the commutator during the starting period.

These motors start easily under load, require little starting current, may be used either on 110 or 220 volt lines and are capable of standing up under a considerable overload. A ½ H. P. repulsion-induction motor will often not require as much starting current as a split-phase ¼ or ⅓ H. P. motor, and may be operated from a lighting socket.

Repulsion-induction motors of larger H. P. than ½ are usually connected to a 220-volt power line.

Three-Phase Motor.

This type of motor is the most foolproof of all, and is the type that should be specified for factory, school and production work of all kinds. This motor has no armature windings, starting windings, commutator, short-circuiting device, brushes, or starting switch. It has excellent efficiency, good starting torque, good power factor and is very rugged.

Read Your Motor Name Plate

Before connecting your motor to the line read the name plate. Checking the name plate information will often prevent the connection of a motor to a wrong source of current supply, and prevent the ruin of the motor. If the motor is marked for direct current make sure you have a D. C. line, and if marked for alternating current, make sure that your line is of the correct voltage and frequency, because if your motor is connected to the wrong voltage or frequency not only will it be burned out, but all the fuses will be blown and perhaps more serious damage may result to the wiring.

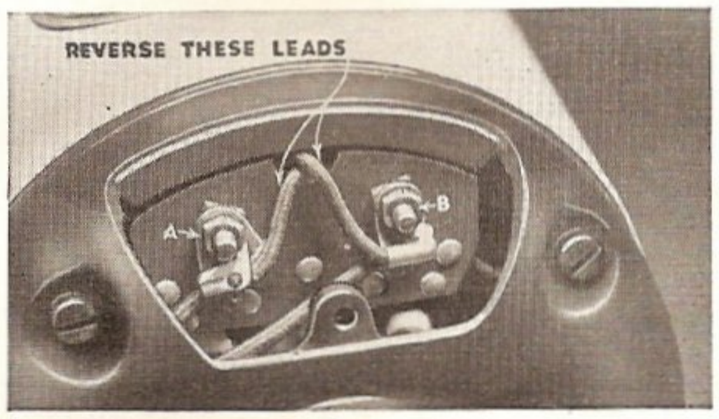


FIG. 3

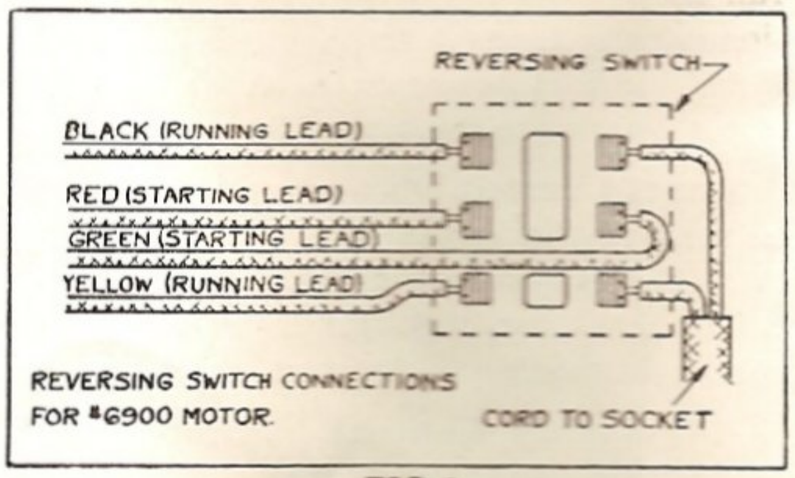


FIG. 9

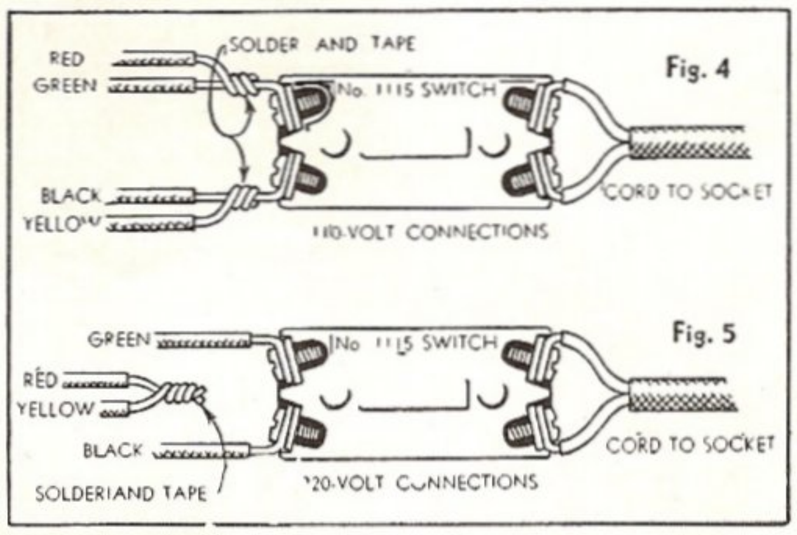


FIG. 8

Figure 7 shows how motors 8050 and 9000 are reversed. Screws marked "A" on each side of the bearing housing are loosened and the brush ring turned to right or left as required. Motor as shown is set for left hand rotation to reverse, the ring is shifted until the letter "R" is aligned with the index mark. Screws "A" are then retightened.

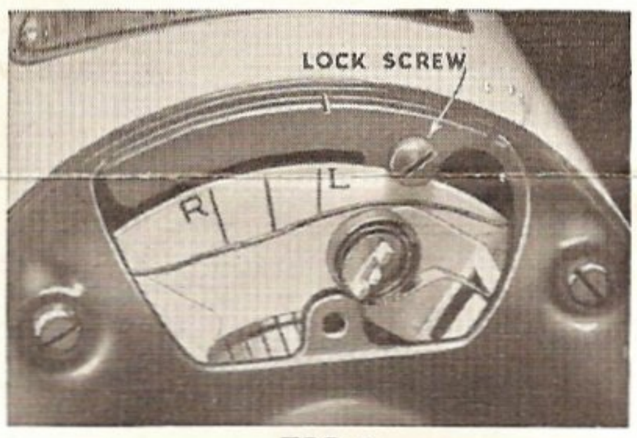


FIG. 6

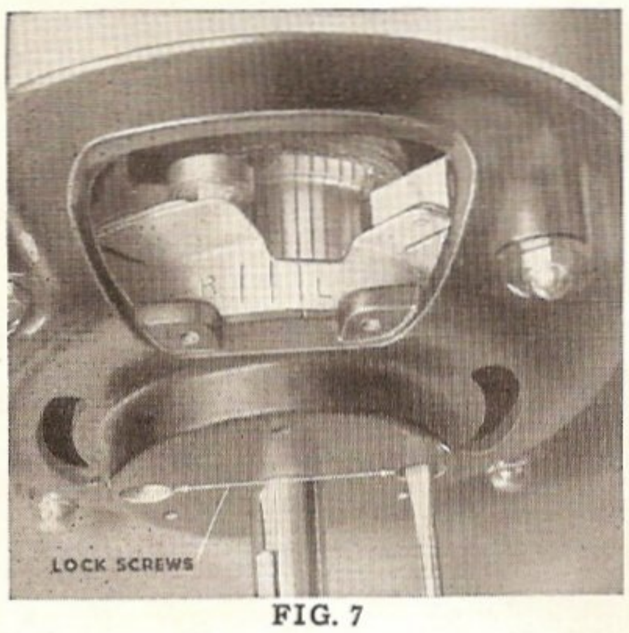


FIG. 7

Figure 6 shows how motors 6400 and 8300 are reversed. The screw which locks the brush ring "A" is located on the frame in the position shown. This is loosened and the brush ring is then rotated right or left as required. When properly set, tighten locking screw "A". Motor number 8300 is reversed in the same manner except that both inspection covers are removed and two locking screws are loosened instead of one.

Reversing Split Phase Motors

Change in direction of rotation on our 6000 and 6300 series motors is accomplished as follows: Remove cover plate on front bracket as shown in Figure 3. Inside are two terminals A and B, to which are connected four wires. Remove the terminal nuts, then reverse the position of the two wires as shown. Changing the wire from terminal A to B and from terminal B to A. Change these two wires only. (Voltage on these motors cannot be changed).

Reversing Capacitor Motors

Capacitor motors, series 6900, are reversed in a manner similar to split-phase motors, however, due to the fact that these motors are usually connected to a reversing switch, all the leads are brought out on the conduit box. The heavy black and yellow leads are for the running coils, and the lighter red and green leads are for the starting coils. Fig. No. 9 shows how the No. 1116 Reversing Switch is connected. While the leads on these motors are the same color as those used on No. 6400 motors do not attempt to change the voltage as shown in Fig. 4 and Fig. 5. (The voltage on these motors cannot be changed.)

Reversing Rep.-Induction Motors

The method of reversing Nos. 6400, 8200, 8250, 8300 is shown in Fig. 6. The same method is used on the large standard motors Nos. 8050, 9000, 9100 and 9200 series as shown in Fig. 7. All motors of this type are reversed by shifting the positions of the brushes. The brush holder ring has three marks on it, one marked R, the center one plain, and the other marked L. The lines marked R and L are to coincide with a mark on the motor bracket. To reverse motor loosen screws locking brush ring and shift brush ring from R to L or L to R to reverse rotation. Be sure that the lines R or L are perfectly in line with the one on the motor bracket in order to obtain full starting torque. Disregard the center line between R and L as this is put in only for convenience at the factory.

Reversing Direct Current Motors

The method of changing direction of rotation on Nos. 6700, 6800, 8600, 8650, 8700, 9600, 9700, 9800 series motors, is by reversing the leads to the brushes. These leads are made long enough so as to reach either brush terminal, and after making a change, be sure that the wires do not interfere with the commutator or brush rigging. Voltage on these motors cannot be changed.

Reversing Three Phase Motors

Three phase motors are reversed, by reversing any two leads at the switch, for example T1 and T3, leaving the power leads intact.

Repulsion Induction Motors

All of our repulsion induction motors are equipped with a built-in switch, cord and plug. However, since these motors may be connected either to 110 or 220 volt lines, it is sometimes necessary to change the connections inside the switch box. Fig. 4 and 5 show the method of making connections

for the different voltages. When changing connections be sure to solder the joints and tape carefully to avoid short circuits.

When remote control switch is connected to motor, the two wire cord is run from the switch box to the junction box on the motor and connections for the different voltages are made in the same way.

All motors of this type are connected at the factory for 110 volts.

Changing Voltage On Three Phase Motors

Some three phase motors are wound for single voltage only, in which case the motor must be operated only on current with the voltage specified. There are three leads at the junction box for connection to the line, and no provision for changing voltage, therefore, do not attempt to change this motor for voltage other than specified on nameplate.

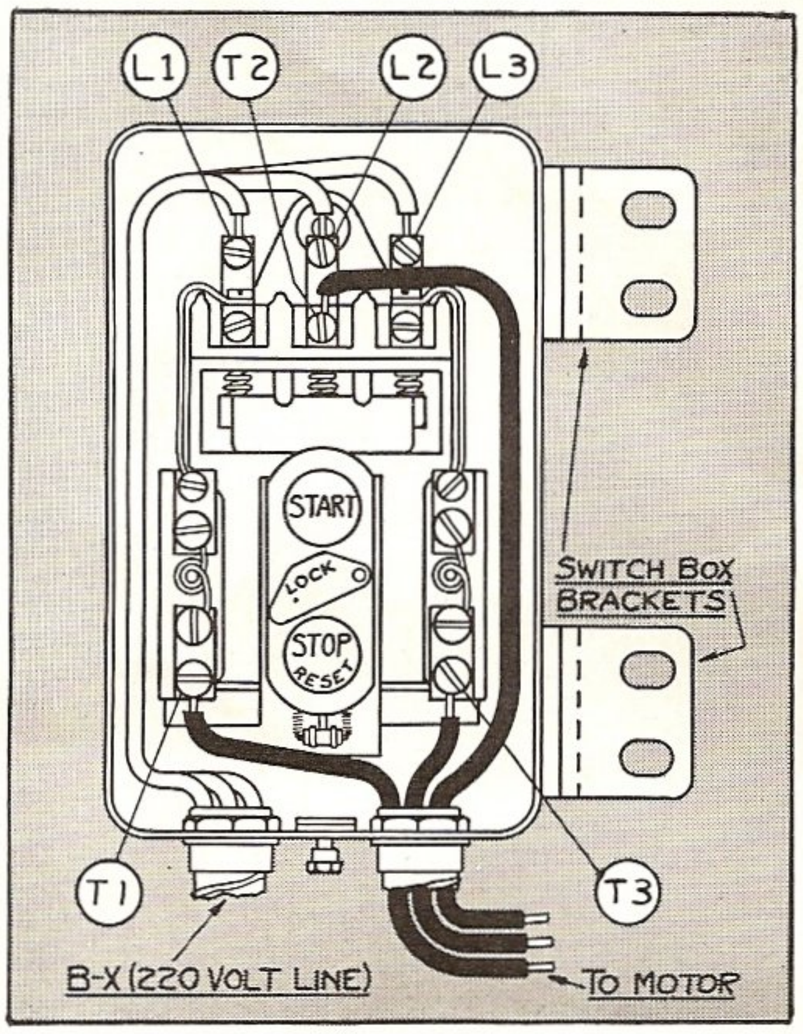


FIG. 11

Some three phase motors are wired for 220 or 440 volts. These motors have 9 leads at the junction box which are identified by small tags numbered from 1 to 9. The method of changing voltage is shown in Fig. 13. This wiring diagram also appears on the motor nameplate.

Three phase motors are also made in other voltage combinations such as 220 volt 380 volt. A motor of this type has 6 wires at the junction box and the wiring diagram for changing voltage is shown in Fig. 12. The same wiring diagram also appears on the motor name plate.

Changing Brushes

The 6-inch diameter frame repulsion induction motors No. 6400 series, have one pair of brushes. The 8½-inch diameter frame repulsion induction motors, Nos. 8000, 8050, 8100, 8200, 8250, 8300, 9000, 9100 and 9200 have two pairs of brushes. The brushes are removed by removing inspection cover and loosening the brush ring, then shifting brush ring until one brush comes under the opening. By raising the brush pressure spring as shown in Fig. 8 and shifting spring forward it is possible to pull out brush by the pig tail. After brush is removed leave pressure spring drop into brush holder slot. Shift brush ring to bring another brush under opening and repeat above procedure.

In replacing brushes be sure that the bottom face of the brush bears properly on commutator. Keep commutator and brushes clean at all times. If commutator is dirty, polish lightly by holding fine sandpaper against the surface while motor is running. Do not use emery cloth for cleaning commutator, because the abrasive material may clog the slots in the commutator and being a conductor cause a short circuit. Upon completion of all brush adjustments, tighten brush ring lock screws and replace inspection cover.

Installing Three Phase Motors

For use with three phase motors we recommend the Allen-Bradley three pole manual starter Bulletin 609, size O, type A, Catalog No. 1320, Code SWIPH. Price $8.20. This starter comes complete with overload protection thermal units which disconnect the starter when prolonged overload occurs, thus protecting the motors against burning out. The starter can be reset for operation by pressing lower button after a minute cooling period. Due to the fact that the thermal elements in the starter must be of the correct rating to give the proper protection to the motor, it is necessary that we know for which motor the starter is to be used, also in case of dual voltage motors, what voltage the motor is to be operated on. Mounting brackets Catalog No. 1322 shown in Fig. 17 are available for mounting the starter. These brackets are designed to fit our 14-inch and 17-inch Drill Press heads, fitting on top of the motor feet, being held in place with the same nut which holds the motor in place.

Two brackets are furnished, one for the top and one for the bottom, with holes to match those in the back of the starter box. No drilling is required and starter box can be mounted on either left hand or right hand side of the drill press head, as shown in Figs. 15 and 16.

The same brackets can be used for mounting the starter box on the circular saw or jointer stands and location of holes to be drilled in the stand for mounting are shown in Fig. 14 on the following page.

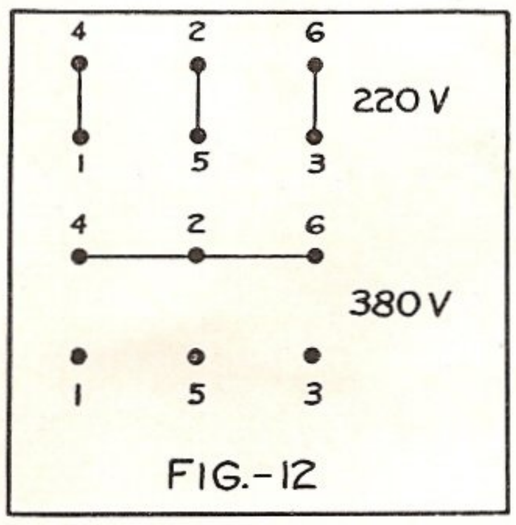


FIG.-12

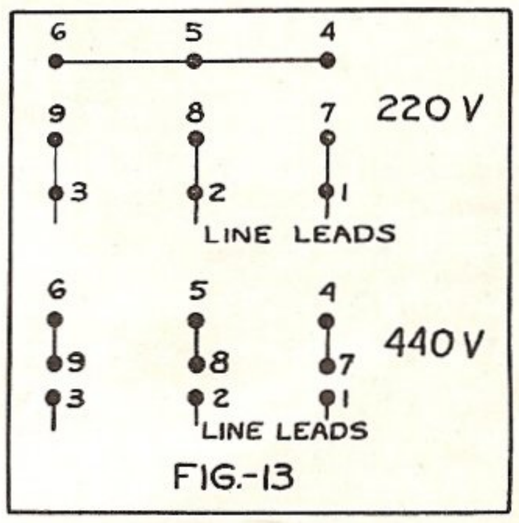


FIG.-13

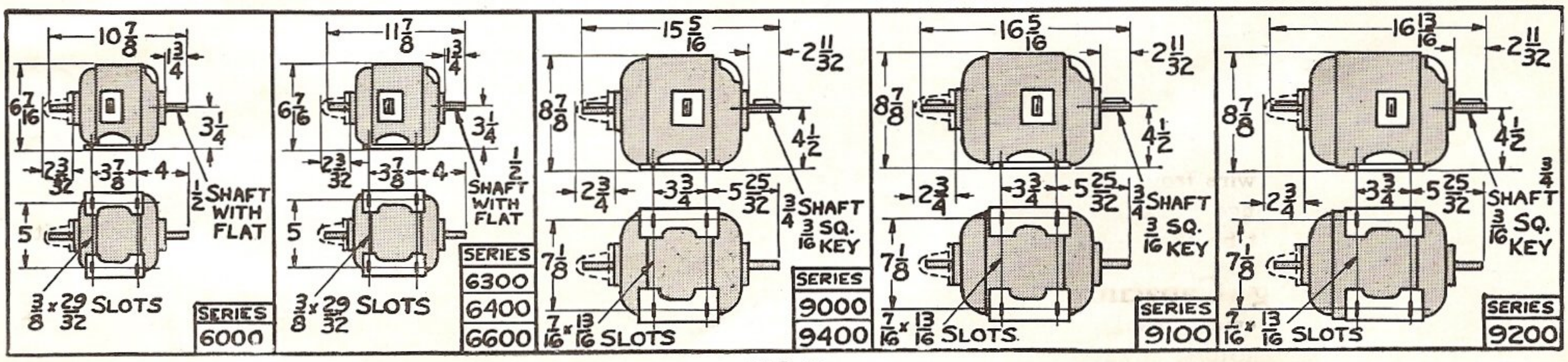


FIG. 10

FIG. 14

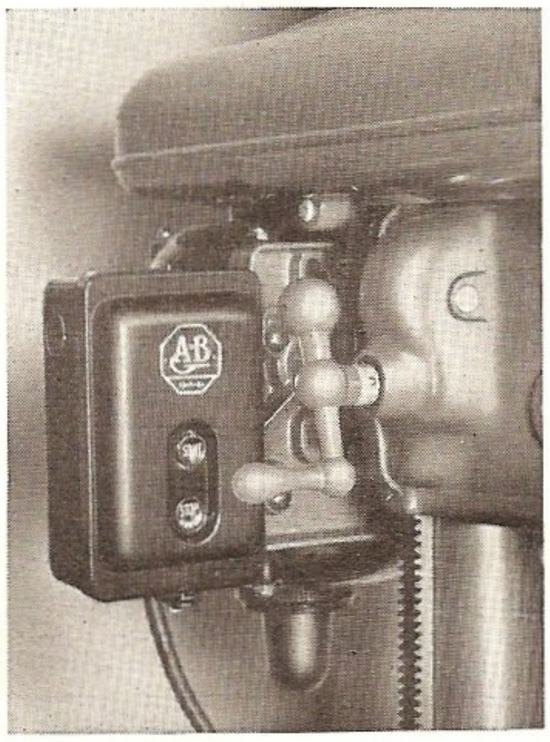


FIG. 15

FIG. 16

Lubrication

The ball bearings on our motors require no attention so far as lubrication is concerned. The ball bearings used are self-sealed and packed with special lubricant at the factory. This lubricant will last for the entire life of the bearing. Do not attempt to oil our ball bearing motors.

Motors of series 6000 and 8050 are fitted with high grade bronze sleeve bearings, and have oil reservoirs at each end.

These are packed with wool yarn which is soaked at the factory. Additional oil is also placed in the reservoirs before shipment. Motors with bronze bearings on continuous duty should be oiled with a good grade of light automobile engine or turbine oil every three months, and those used occasionally, oiled once or twice a year. Do not use a light household oil, which contains kerosene. See that the shafts do not run dry, or they will "freeze" in the bearings and be ruined. Bronze bearing motors are built for horizontal installation only, for all vertical installations use ball bearing motors.

Wiring for Motors

Many motor users assume that because our single phase motors are equipped with a cord and plug for attachment to an outlet box, it is merely necessary to attach the motor and operate. This may be true in using a ¼ or ⅓ H. P. motor; however, before using a ½, ¾ or 1 H. P. motor the user should check to see whether the line to which the motor is to be attached is sufficiently heavy to carry the load without a serious drop in voltage.

Some users also make use of a long extension cord in order to connect the motor to the outlet box, and care should be taken in a case of this kind that the extension cord is heavy enough to carry the load. The proper size wire to use for extensions up to fifty feet long is No. 14 gauge for motors up to ¾ H. P. and No. 12 gauge for 1 H. P. motors. For longer extensions for any motor use No. 10 gauge wire, to avoid too much voltage drop.

Our motors with a rating of 110 volts can be used on a line having a voltage with 10% above or below the rated voltage, as shown on motor name plate. This would permit the use of a line where the voltage would be from 100-120 volts approximately.

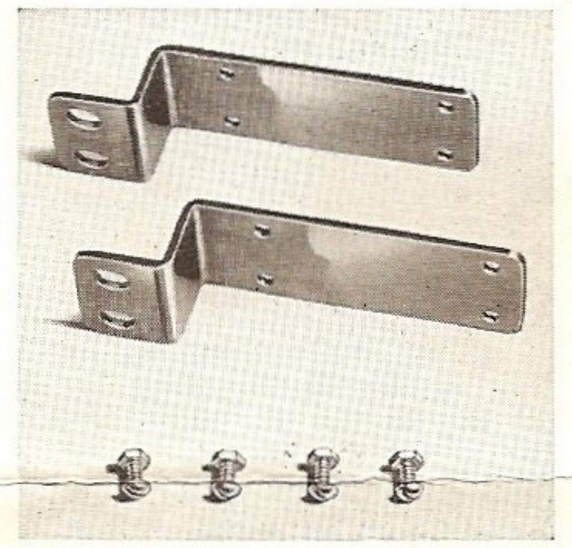


FIG. 17

No. 1322 switch box brackets, used for mounting No. 1320 switch box on 14" and 17" Drill Presses and Jointer stand No. 656, Circular Stand No. 891, shown in Fig. 17. Consists of 2 Brackets and necessary screws. **$2.00**
Code Word SWIDR.

However, the voltage should be measured at the motor terminal with a voltmeter with the motor running first, idle, and then, with the motor at full load to determine the actual voltage. If in making this test there is a voltage drop of more than 5% it shows that the line is not large enough to carry the load, and arrangements should be made for putting in a separate line to the outlet box used for the motor using at least No. 10 gauge wire.

Usually the line used for the motor is also used for supplying electric lights and other appliances, and while the line may be heavy enough to carry the current for the motor alone, it is not heavy enough to carry the motor current in addition to its normal load. Therefore, the check for voltage should be made with the normal full load in addition to the motor load. It should be borne in mind that a well designed motor will normally deliver from two to three times its rated power before stalling, which means that even a ½ H. P. motor will take up to 15 amperes of current, and a 1 H.P. motor will take up to 25 amperes of current before stalling. Therefore, it is important that the above check be made.

The most frequent cause of trouble is low voltage, which causes overheating of the motor and eventual burning out, whereas a voltage higher than the rated voltage within the limits will cause a slightly higher running temperature but will do no particular harm.

All our ***(Repulsion-Induction)*** motors are built to be connected for either 110 or 220 volts, it merely being necessary to change the connections in the switch terminal box.

This makes it possible in cases, where the local electric service company objects to the use of a large motor on the lighting circuit, to install an outlet box having 220 volts. In this way the amperage will be ½ of the amperage at 110 volts, thereby eliminating objections which sometimes come up. The motor as shipped is connected for 110 volts; however, if a change in voltage is necessary, instructions for making this change appear on the motor name plate. It has also been found that the connection made by the prongs on the plug with some of the outlet boxes is poor. This condition will create a resistance to the proper flow of current and may affect the voltage at the motor. It is well to check this point and if trouble occurs to make permanent connections to the outlet box in place of the detachable plug.

For use in schools and industrial plants where 3-phase current is available it is recommended that 3-phase motors be used and motors of this type are available up to 1 H. P.

Fuses

Instead of ordinary fuses, we strongly recommended the use of Buss "Fusetrons" in the motor circuit. These replace the ordinary fuses, but, while affording all the protection of fuses, they also protect the motor against overloads, and prevent useless "blows". Use a "Fusetron" of the same ampere rating as that shown on the motor name plate.

Grounding Motors

Protection to the operator from any possible shock caused by short-circuiting of the motor or by electrical leakage of any kind is afforded by grounding the motor. The simplest way of doing this is shown in Fig. 18. A No. 14 insulated wire is attached to one hold-down bolt of the motor, then taped along side the regular cord and fastened with a clamp to the lighting-circuit conduit. This can be done by anyone, as it does not necessitate any interference with the regular wiring or switch.

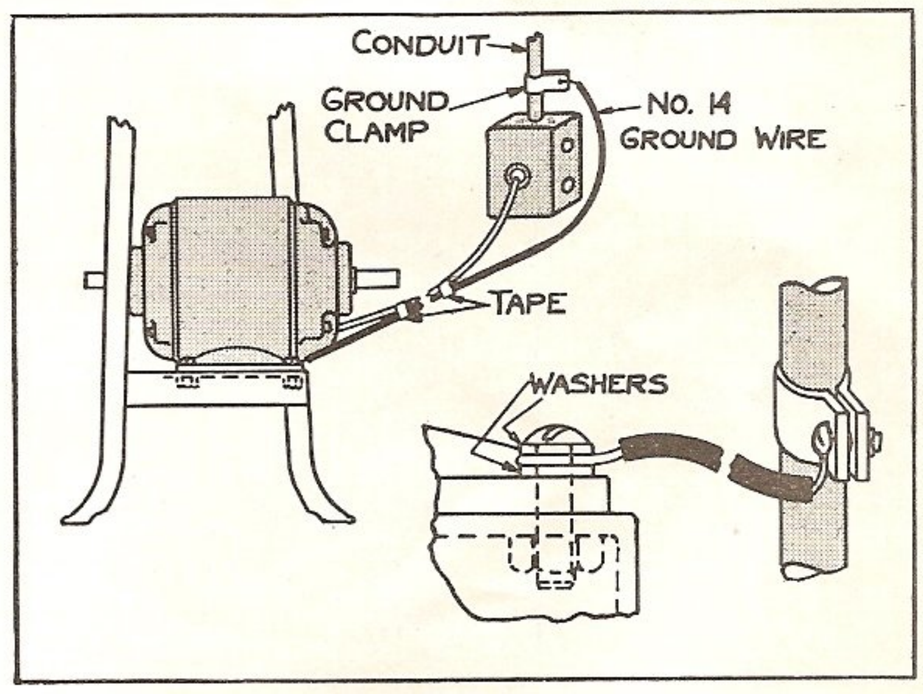


FIG. 18

MOTOR TROUBLES

If Motor Refuses to Start.

1. See that plug is in socket, and that plug prongs make proper contact with socket terminals.
2. See that switch is "on".
3. See that fuse is not blown.

If all the above points check and motor still will not start:

4. Examine plug terminals, and see that wires are firmly fastened and making good contact.
5. Remove switch from motor, and check condition of wire at switch terminals.
6. See that switch contacts are not burned, and that contact arm on old-type switches makes good connection with contacts.
7. Check rubber-covered cord for broken wires.
8. Remove cover plate and check connections at terminal block.
9. Remove end bell at switch end and check all internal connections.

If motor still will not start there is an open circuit somewhere in the motor, and it should be returned to the factory for repairs.

If Motor Blows Out Fuses When Switched On:

10. Throw off belt and see if motor will run without load. If it will, then check the load.
11. See that motor is not overloaded. If driving a lathe, slack off the tailstock a trifle, and help the motor to start by a flip of the hand wheel on the headstock spindle.
12. See that proper size fuse is in the line (approximately twice the amperage shown on motor name plate).
13. Check for possible short-circuits as described in 4 to 9.

If these tests fail to disclose the trouble, return to the factory for inspection and repair.

If Motor "Growls" And Will Not Come Up To Speed:

Starting winding is burned out. Return to factory for repair.

If Motor Runs Idle, But Blows Fuses When Under Slight Load:

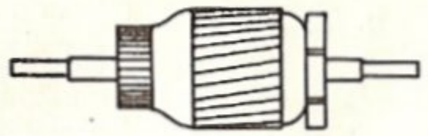
Internal short-circuit or ground. Return to factory for repair.

If Motor Runs Well When Idle and Under Normal Load, But Slows Down and Blows Fuses When Slightly Overloaded:

Motors is too small for work. Use a larger motor. Do not attempt to cure this by using larger fuses.

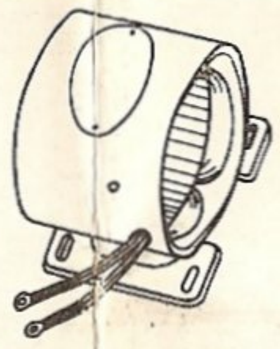
Servicing Motors

The manufacturer of our motors maintains a series of service stations, for servicing our motors, throughout the country. In case service on motors is required, we suggest that you obtain the address of the nearest service station from your dealer. This saves time and in most cases excessive freight charges. If, however, you fail to obtain the address of a service station or for other reasons you prefer to deal direct, you may send the motor to the factory for repair.



ARMATURE USED ON
D.C. AND REPULSION INDUCTION A.C.

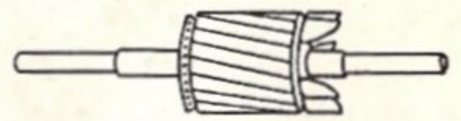
FRONT BRACKET



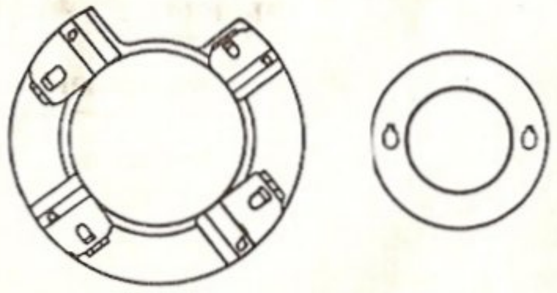
D.C.
BODY & FIELD

A.C.
STATOR

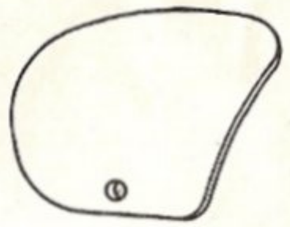
REAR BRACKET



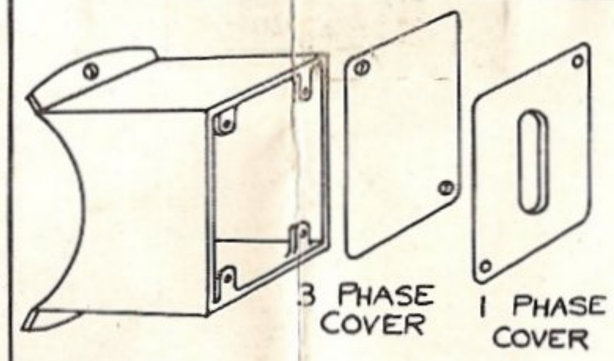
ROTOR USED ON A.C.
THREE PHASE, SPLIT PHASE, & CAPACITOR



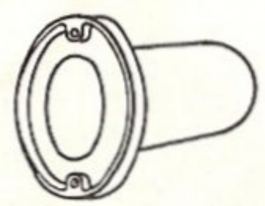
BRUSH RIGGING FOR 8½" FRAME
REPULSION INDUCTION MOTORS



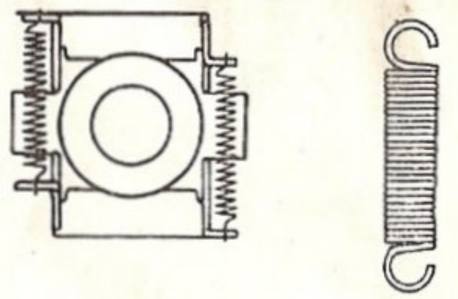
INSPECTION COVER



CONDUIT BOX AND COVERS



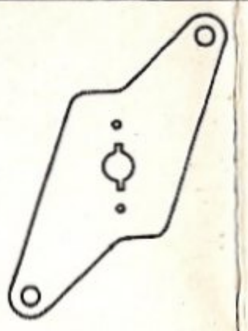
SHAFT EXTENSION GUARD



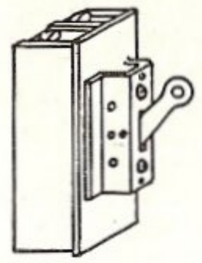
GOVERNOR FOR STARTING SWITCH

BRUSH RIGGING FOR 6" FRAME
REPULSION INDUCTION MOTORS

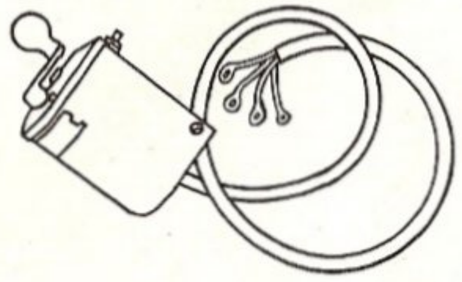
BRUSH PRESSURE SPRING



SWITCH MOUNTING
PLATE

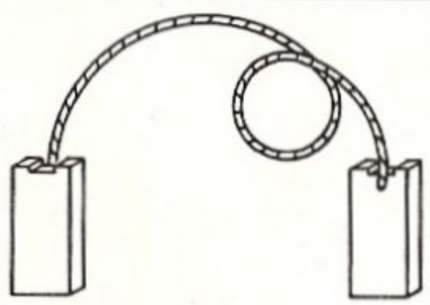


TOGGLE SWITCH

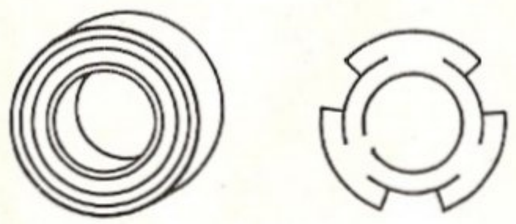


CAT. #1116
REVERSING SWITCH

CONTACT ARM FOR INTERNAL
STARTING SWITCH

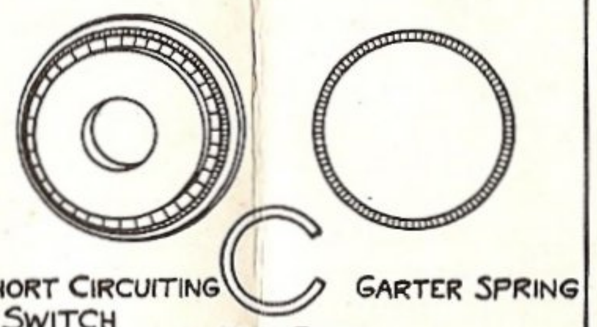


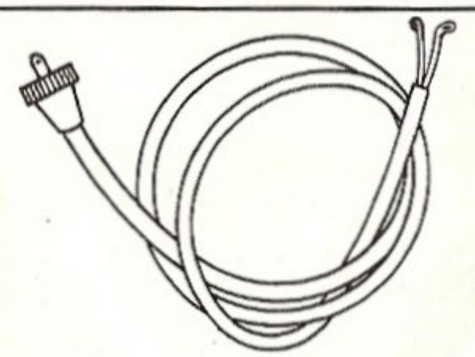
BRUSHES FOR REPULSION
INDUCTION MOTORS



BALL BEARING

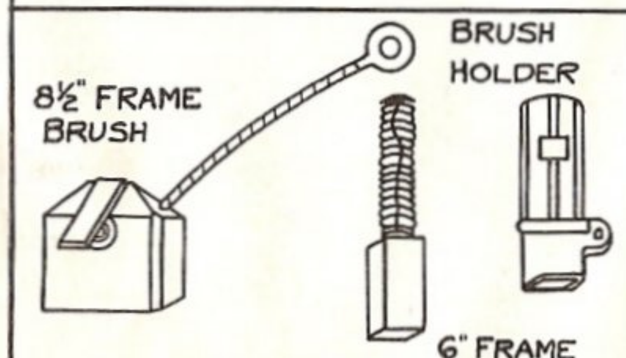
BEARING LOADING
SPRING



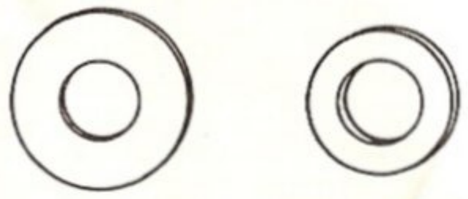


POWER CORD & PLUG

TERMINAL PLATE FOR INTERNAL
STARTING SWITCH

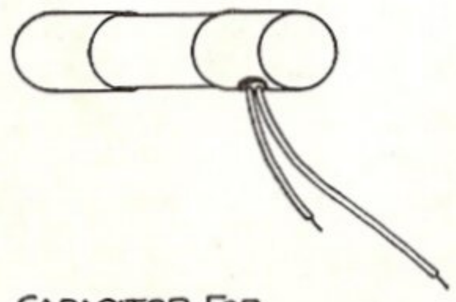


BRUSHES FOR D.C. MOTORS

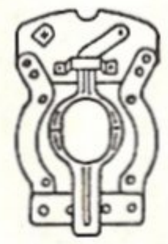


STEEL SPACER WASHER FELT WASHER

BUSHING FOR BRONZE BEARING
MOTORS



CAPACITOR FOR
6900 TYPE MOTORS



INTERNAL STARTING SWITCH
FOR 6000 TYPE MOTORS

TYPE OF MOTOR	Horse Power	6 DIA. FRAME						8½ DIA. FRAME							
		Std. Split Phase Sleeve Bearing	Std. Split Phase Ball Bearing	Std. Repulsion Induction Ball Bearing	Std. Three Phase Ball Bearing	Std. Direct Current Ball Bearing	Capacitor Motor for Shaper	Repulsion Induction Reversing for Shaper	Std. Repulsion Induction Sleeve Bearing	Std. Three Phase Ball Bearing	Rep.-Induction Tilting Arbor Saw Motor	Three Phase Tilting Arbor Saw Motor	Direct Current Tilting Arbor Saw Motor	Std. Repulsion Induction Motor	Std. Direct Current Motor
NAME OF PART	¼	6000													
	⅓		6300	6400	6500	6700									
	½				6600	6800	900		8050	9300	8200		8600	9000	9600
	¾							8000		9400	8250	8400	8650	9100	9700
	1							8100		9500	8300	8450	8700	9200	9800
	1½									8150		8500			
Rotor or Armature Body and Field or Stator	Owing to the fact that our present line of motors includes nearly 500 distinct models with varying specifications particularly on these two items, it is essential when ordering either a Rotor, Armature, Field or Stator that you furnish us with a complete description of the motor on which the parts are to be used. All the necessary information can be found on the motor name plate.														
Front Bracket		M–1040 1.50	M–1042 1.50	M–1044 1.50	M–1043 1.20	M–1046	M–1042 1.50	M–1080 2.50	M–1049 2.50	M–1047 2.00	M–1017 3.50	M–3013* 3.50	M–2013 3.50	M–1048 2.50	M–1051 3.00
Rear Bracket		M–1041 1.20	M–1043 1.20	M–1043 1.20	M–1043 1.20	M–1043 1.20	M–1043 1.20	M–1081 2.00	M–1050 2.00	M–1047 2.00	M–1018 2.50	M–1018* 2.50	M–1018 2.50	M–1047 2.00	M–1047 2.00
Brush Rigging less Brushes		.....	.....	M–1052 .60	.....	M–1053 .40	.....	M–1056 1.00	M–1056 1.00	.....	M–1019 1.50	.....	M–2014 2.50	M–1056 1.00	M–2014 2.50
Brushes		.....	.....	M–1054 .30 per pr.	.....	M–1055 .30	.....	M–1089 .50 per pr.	M–1089 .50 per pr.	.....	M–1020 .40 per pr.	.....	M–2015 1.50	M–1089 .50 per pr.	M–2015 1.50
Brush Pressure Spring		.....	.....	M–1057 .10	.....	.....	.....	M–1034 .10	M–1034 .10	.....	M–1034 .10	.....	M–1034 .10	M–1034 .10	M–1034 .10
Ball Bearing		.....	87502 1.65	87502 1.65	87502 1.65	87502 1.65	87016 1.65	87504 2.00	.....	87504 2.00	87504 2.00	87504 2.00	87504 2.00	87504 2.00	87504 2.00
Bearing Loading Spring		.....	M–1058 .10	M–1058 .10	M–1058 .10	M–1058 .10	M–1058 .10	M–1021 .10	.....	M–1021 .10	M–1021 .10	M–1021 .10	M–1021 .10	M–1021 .10	M–1021 .10
Steel Spacer Washer		.....	M–1059 .05	M–1059 .05	M–1059 .05	M–1059 .05	M–1059 .05	M–1022 .10	.....	M–1022 .10	M–1022 .10	M–1022 .10	M–1022 .10	M–1022 .10	M–1022 .10
Felt Seal Washer		.....	M–1060 .05	M–1060 .05	M–1060 .05	M–1060 .05	M–1060 .05	M–1023 .10	.....	M–1023 .10	M–1023 .10	M–1023 .10	M–1023 .10	M–1023 .10	M–1023 .10
Conduit Box		M–1061 .50	M–1062 .50	M–1062 .50	M–1063 .50	M–1062 .50	M–1063 .50	M–1082 .50	M–1065 .50	M–1066 .50	M–1031 .50	M–1031 .50	M–1031 .50	M–1065 .50	M–1065 .50
Conduit Box Cover		M–1032 .10	M–1067 .10	M–1067 .10	M–1032 .10	M–1067 .10	M–1032 .10	M–1083 .10	M–1067 .10	M–1032 .10	M–1032 .10	M–1032 .10	M–1032 .10	M–1067 .10	M–1067 .10
Inspection Cover		M–1064 .10	M–1064 .10	M–1064 .10	.....	M–1064 .10	M–1064 .10	M–1084 10	M–1069 .10	.....	M–1033 .10	M–1033 .10	M–1033 .10	M–1069 .10	M–1085 .10
Off and On Switch		SP–2459 .75	1115 .90	1115 .90	.....	1115 .90	.....	SP–2460 1.25	1115 .90	.....	SP–2458 1.00	.....	SP–2458 1.00	1115 .90	1115 .90
Short Circuiting Switch		.....	.....	M–1070 2.50	.....	.....	.....	M–1014 3.00	M–1014 3.00	.....	M–1014 3.00	.....	.....	M–1014 3.00	.....
Hog Ring for Short Circuiting Switch		.....	.....	M–1071 .10	.....	.....	.....	M–1016 .20	M–1016 .20	.....	M–1016 .20	.....	.....	M–1016 .20	.....
Internal Starting Switch Complete		M–1072 .60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Terminal Plate for Starting Switch		.....	M–1074 .30	.....	.....	.....	M–1074 .30	.....	.....	.....	.....	.....	.....	.....	.....
Governor for Starting Switch		M–1075 .60	M–1075 .60	.....	.....	.....	M–1075 .60	.....	.....	.....	.....	.....	.....	.....	.....
Power Cord and Plug		M–1076 .60	M–1076 .60	M–1076 .60	.....	M–1076 .60	.....	M–1030 1.50	M–1030 1.50	.....	M–1030 1.50	.....	M–1030 1.50	M–1030 1.50	M–1030 1.50
Garter Spring for Short Circuit		.....	.....	M–1086 .20	.....	.....	.....	M–1088 .30	M–1087 .30	.....	M–1087 .30	.....	.....	M–1087 .30	.....
Condenser for Capacitor Motor		.....	.....	.....	.....	.....	M–1091 3.00	.....	.....	.....	.....	.....	.....	.....	.....
Switch Mounting Plate		.....	M–1095 .20	M–1095 .20	.....	M–1095 .20	.....	.....	M–1095 .20	.....	.....	.....	.....	M–1095 .20	M–1095 .20
Bearing Bushing for Sleeve Bearing Motor		M–1092 .30	.....	.....	.....	.....	.....	.....	M–1093 .40	.....	.....	.....	.....	.....	.....
Contact Arm for Internal Starting Switch		.....	M–1094 .30	.....	.....	.....	M–1094 .30	.....	.....	.....	.....	.....	.....	.....	.....
Shaft Extension Guard		M–64 .20	M–64 .20	M–64 .20	M–64 .20	M–64 .20	M–64 .20	.....	M–63 .25	M–63 .25	.....	.....	.....	M–63 .25	M–63 .25

* M-3013 and M-1018 are drilled for ventilation on No. 8500 1½ H. P. Motor.

Motors Recommended for Delta Machines

Ma	MOTOR SERIES NUMBER		
	For Light Duty	Medium Duty	Heavy Duty
No. 1450 10″ Unisaw	8200 — 8600	8250 — 8400 — 8650	8300 — 8450 — 8500 — 8700
No. 1160 10″ Circular Saw	9000 — 8050 — 9600	9100 — 9400 — 9700	9500 — 9200 — 9800
No. 860 8″ Circular Saw	9000 — 8050 — 9600	9100 — 9400 — 9700	9500 — 9200 — 9800
No. 290 4″ Jointer	6300 — 6400	6400 — 6500 — 6700	9000 — 8050 — 6600 — 6800
No. 654 6″ Jointer	6400 — 6500 — 6700	6400 — 6600 — 6800	9000 — 8050 — 6600 — 9600
No. 1164 Combination Unit	9000 — 8050 — 9600	9100 — 9400 — 9700	9200 — 9500 — 9800
No. 368 Combination Unit	9000 — 8050	9100 — 9400 — 9700	9200 — 9500 — 9800
No. 1350 Combination Unit	9000 — 8050 — 9600	9100 — 9400 — 9700	9200 — 9500 — 9800
No. 1180 Shaper	6900 — 6920	8000 — 8100	8150
No. 1200 Scroll Saw	6000 — 6300	6000 — 6300	6000 — 6300 — 6500 — 6700
No. 1440 Scroll Saw	6000 — 6300	6000 — 6300	6000 — 6300 — 6500 — 6700
No. 1425—26 Disk Sanders	9000 — 9600	9100 — 9400 — 9700	9200 — 9500 — 9800
No. 1400 Belt Sander	9000 — 8050	9100 — 9400 — 9700	9200 — 9500 — 9800
No. 890 14″ Band Saw	6400 — 6300	6400 — 6600 — 6800	9000 — 8050 — 6600 — 9600
No. 768 10″ Band Saw	6300 — 6400	6400 — 6500	6400 — 6600 — 6800
No. 880 14″ M. C. Band Saw	6400	9000 — 8050 — 6600 6800	9000 — 8050 — 9400 — 9600
No. 930 14″ Lathe	6400	6400 — 6600 — 6800	9000 — 8050
No. 1460 12″ Lathe	6400	6400 — 6600 — 6800	9600 — 8050 — 9400 — 9600
No. 1248 Grinder 1282 Buffer	6300	6400 — 6600 — 6800	9000 — 8050 — 6600 — 9600
Standard 14″ Drill Presses	6300 — 6400	6400 — 6600 — 6800	6600 — 6800
Slo Speed 14″ Drill Presses	6300 — 6400	6400 — 6600 — 6800	6600 — 6800
2 and 4-Spindle 14″ Drills	6300 — 6400	6400 — 6600 — 6800	6600 — 6800
All 17″ Drill Presses	9000	9100 — 9400 — 9600	9200 — 9500 — 9800

BRONZE MOTORS

Note

Do not use 6″ frame motors for driving any circular saw, even for light duty, because you will not obtain satisfactory results. Not less than ½ H. P. should ever be used for the circular saw, and our recommendation is that you use not less than ¾ H. P. wherever possible except for very light work. Do not attempt to use a 6″ frame on the 17″ Drill Press. They will not fit the motor plate and will not prove satisfactory in use. 17″ Drill Presses require 8½″ frame motors as recommended.

Do not attempt to use 8½″ frame motors on the 14″ Drill Press, as they will not fit the motor plate without special work.

The above recommendations are for average conditions. Judgment must be used in consulting the table as in some cases two types of motors are recommended for the same duty. This is because while a three phase motor is preferable for every type of duty, in some cases a customer has no three phase line available and a single phase motor must be used.

Wherever possible, always specify a three phase motor.

THE DELTA MANUFACTURING COMPANY, 600-634 E. Vienna Avenue, Milwaukee, Wis.

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