Type AQZ Magnetic Timetactors

Sizes No. 2 and 4

For D-C Operation

INSTRUCTIONS

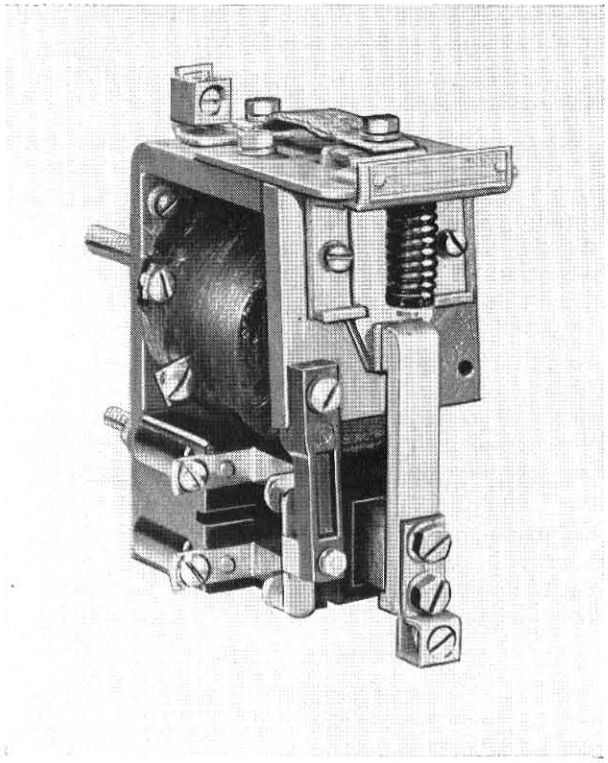

FIG. 1—TYPE AQZ-2110 FRONT CONNECTED TIMETACTOR (PHOTO 306985)

APPLICATION

The Type AQZ Timetactors are d-c magnetically operated devices which combine in one unit the functions of a definite time limit accelerating relay and a spring or normally closed magnetic contactor. These Timetactors are mainly used in d-c general purpose and marine definite time limit starters.

RATING

These Timetactors are manufactured with one normally closed main contact and on a small frame size. Timetactor assemblies are made with the main contacts rated at 50 and 150 amperes and provide a time delay period which is adjustable in a range from approximately ½ to 2¼ seconds. These and other characteristics are tabulated in the table, Fig. 2.

The main contacts are for circuit closing service only and should never be used to interrupt a circuit regardless of the current value.

The coils are suitable for continuous duty at rated voltage. The double-break auxiliary contacts will carry 5 amperes continuously and will interrupt a d-c inductive coil load of 150 volt-amperes maximum. The coil windings and the auxiliary contact parts are insulated from the frame for 600 volts.

CONSTRUCTION

The Type AQZ Timetactors are of exceptionally sturdy unit construction and have a knife-edge bearing between the armature and the frame. They are completely assembled and tested at the factory before shipment. The main moving contact also pivots on a knife-edge bearing. With this type of bearing and as there are very few moving parts, the Timetactors are mechanically suitable for withstanding a large number of operations. The ground surfaces of the armature, frame, and core are plated with hard chromium. In addition to providing good protection against corrosion and mechanical wear, the chromium plating provides some shim action and insures that the delay period will not vary with operation.

Size No.	Main Contact Continuous Carrying Capacity in Amperes	Frame Size	No. of Main Poles	Main Contacts Suitable for Closing a Circuit in Amperes of	Approximate Time Rating in Seconds*	
					Copper Ring Case	Brass Ring Case
2	50	Small	1	400	1 to 2¼	½ to 1¾
4	150	Small	1	400	1 to 2¼	½ to 1¾

* Time period initiated by opening coil circuit. The maximum time period for a Timetactor with normally closed auxiliary contacts is ¼ to ½ second less than the value shown.

FIG. 2—TIMETACTOR DATA TABLE

Type AQZ Magnetic Timetactors

Sizes No. 2 and 4

For D-C Operation

INSTRUCTIONS—Continued

The stationary and moving contacts are fine silver. The main moving contact has very little wipe or sliding action over the stationary contact as its bearing line is very close to the bearing line of the moving armature. It is very undesirable for silver contacts to slide excessively against each other when they close or open a circuit. The main stationary contact on all Timetactor assemblies also serves as the armature stop. The main moving contact is both electrically and mechanically connected to the armature and frame. It is for circuit closing operation only.

The auxiliary contacts have fine silver contact buttons and double-break contact gaps. The auxiliary contacts are suitable for either front or rear connection.

Only one type of hot moulded stationary contact base is required to build any of the various Timetactor assemblies. The base has provision for mounting a maximum of two auxiliary contact assemblies.

The size No. 2 Timetactors which have a rating of 50 amperes can be manufactured with either front or rear connection parts. The main contacts on the Size No. 4 Timetactors which are for current ratings of 150 amperes are for rear connection only.

The trade name "TIMETACTOR" was applied to these devices as they combined the functions of a **time** delay relay and a spring or normally closed contactor in one unit. The contact assembly and the frame size is indicated in the type numbers. The first number following the type letters-AQZ- indicates the main contact ampere rating and the frame size (see table Fig. 2); the second number means the number of normally closed main contacts; the third number designates the number of normally open auxiliary contact assemblies; and the last or fourth number shows the number of normally closed auxiliary contact assemblies.

The table in Fig. 3 illustrates the formation of type designations.

Single-winding coils are used to operate these Timetactors. The operating coil can be removed from the front of a Timetactor and the only tools usually required are a screw driver and a small wrench. It may be necessary on some Timetactor assemblies to remove the normally closed auxiliary contact assemblies in order to disengage the armature from the frame.

As these Timetactors are operated by means of a single-winding coil, a .005 inch thick non-magnetic spacer is permanently assembled under the core pole-face of each Timetactor frame. This construction protects the non-magnetic spacer from tampering or changing in thickness after operation.

These Timetactors operate upon an inductive time delay principle and a ring case and copper ring assembly installed between the coil and the core serves as a short-circuited low resistance winding.

OPERATION

When a Timetactor coil is energized with d-c voltage that is within the operating limits, the armature will be attracted toward and will seal against the core pole-face. The time delay period can then be initiated by either opening or shorting the coil circuit. When the magnetic field of the coil collapses, a current will be induced into the ring case and copper rings which are inside the coil and surround the iron core. This induced current flows in such a direction that it sustains the magnetic field and holds the armature closed even after the coil has been de-energized. When the decaying magnetic

Typical Type Designation	TYPE DESIGNATION COMPOSED OF					FOR THIS TIMETACTOR BASE				Weight of Timetactor with Coil in Pounds
	Letters	Normally Closed Main Contact Size	Number of Normally Closed Main Contacts	Number of Normally Open Aux. Contacts	Number of Normally Closed Aux. Contacts	Maximum Number of Normally			Total Number of Normally Open or Closed Aux. Contacts	
						Closed Main Contacts	Open Aux. Contacts	Closed Aux. Contacts		
AQZ-2111	AQZ	2	1	1	1	1	2	2	2	7
AQZ-4120	AQZ	4	1	2	0	1	2	2	2	7

FIG. 3—TYPE LETTER AND NUMBER DESIGNATION TABLE

Type AQZ Magnetic Timetactors

Sizes No. 2 and 4

For D-C Operation

INSTRUCTIONS—Continued

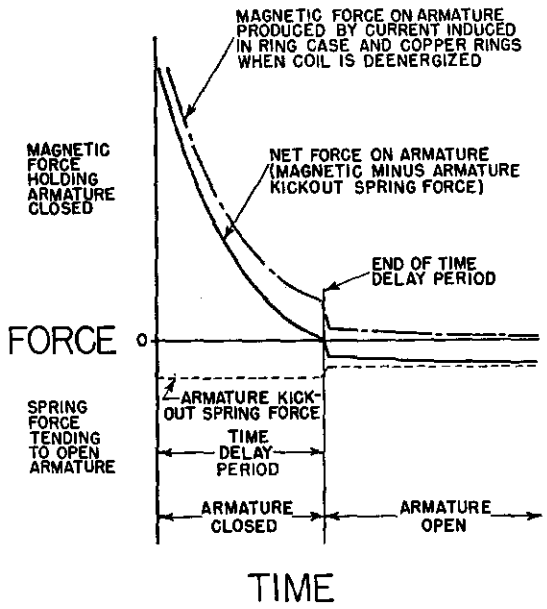

FIG. 4—OPERATION PRINCIPLE OF THE TYPE AQZ TIMETACTOR (DWG. 13-B-5876)

field force becomes less than the force of the armature kick-out spring, the armature will be released and will move to its open position to end the time delay period. This operation principle is illustrated in Fig. 4.

As these Timetactors operate upon an inductive time delay principle, they will provide very reliable operation and consistent time delay periods as the timing is based upon an electro-magnetic phenomenon. The timing is not dependent upon a mechanical system which is usually subject to wear and change with operation.

The non-magnetic spacer in the magnetic circuit provides a uniform drop-out characteristic and prevents the armature from being held closed by residual magnetism.

When a Timetactor is operated by short-circuiting the coil, the time delay period is longer than that given under similar conditions when the coil circuit is opened. This occurs as the coil winding itself acts as an additional short-circuited winding. When the coil is short-circuited, it must be connected in series with a motor armature or a resistor so that the voltage supply will not be short-circuited.

The control scheme in which these Timetactors are used must always be arranged so that the operating coils can not be energized if the main contacts are carrying any current.

Intermittently rated or quick-energization operating coils should be used for single step starters or when the control circuits are such that the normal operation does not energize the continuously rated Timetactor coils long enough to fully saturate the iron magnetic circuit. When the magnetic circuit is only partially saturated, the time delay period will be less than normal.

ADJUSTMENTS

The time delay period can be varied only by changing the number of copper rings in the ring case which is inside the coil and which surrounds the iron core. It is possible to obtain five different time delay periods by using various numbers of the copper rings in the ring case. The time delay period is a minimum when only the ring case is used and is a maximum when the maximum number of four copper rings are assembled in the ring case The effect of varying the number of rings in a brass or copper ring case is shown on Fig. 5 for operation when the coil circuit is opened.

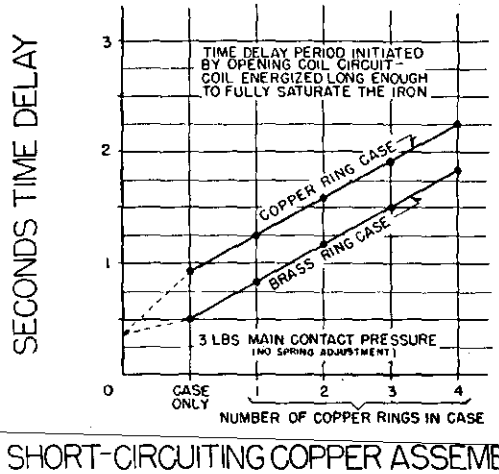

FIG. 5—APPROXIMATE TIME DELAY PERIOD FOR THE TYPE AQZ TIMETACTOR (FOR TIMETACTORS WITH NORMALLY OPEN AUXILIARY CONTACT ASSEMBLIES ONLY) (DWG. 13-D-6121)

Type AQZ Magnetic Timetactors

Sizes No. 2 and 4

For D-C Operation

INSTRUCTIONS—Continued

To change the time delay period, the armature assembly must be removed. This can be done by removing the bolt which connects the shunt to the main moving contact, by taking out the bolt which holds the stationary main contact to its support, and by compressing the armature kick-out spring until the ends of the spring stud yoke which engage in the slots in the top bearing plate are free of the plate; the complete armature assembly can then be removed by pulling it in a forward direction. If the particular Timetactor assembly has any normally closed auxiliary contact assemblies, these parts must be removed before any attempt is made to remove the armature assembly. Fig. 6 shows an armature assembly removed from the frame.

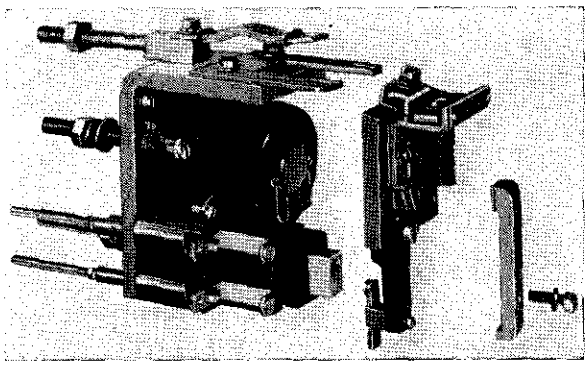

FIG. 6—TIMETACTOR WITH THE ARMATURE ASSEMBLY REMOVED FROM THE FRAME (PHOTO 290039)

A spring clip which snaps over and into a groove in the core holds the ring case in place. It also serves as a handle or bail for pulling the case and ring assembly out of the coil. THE COIL MOUNTING SCREW SHOULD ALWAYS BE LOOSENED AND THE RING CASE SPRING CLIP DISENGAGED FROM THE GROOVE IN THE CORE BEFORE ANY ATTEMPT IS MADE TO REMOVE THE COPPER RING CASE ASSEMBLY. Copper rings may be added or removed through the rectangular slot in the surface of the ring case as shown in Fig. 7. A maximum of four copper rings can be inserted into the copper or brass ring case.

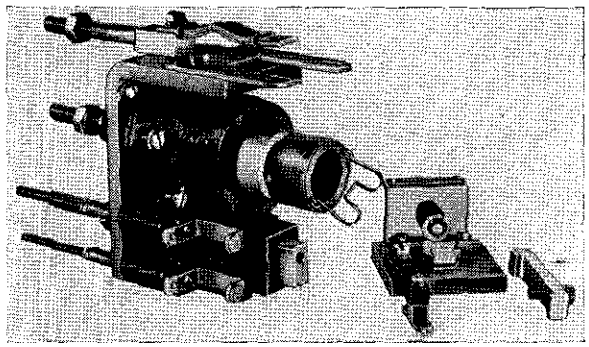

FIG. 7--VIEW SHOWING THE INSERTION OR REMOVAL OF A COPPER RING FROM THE RING CASE TO CHANGE THE TIME PERIOD (PHOTO 290041)

Fig. 8 shows the complete dis-assembly of the ring case from the Timetactor frame and the removal of all the copper rings from the ring case.

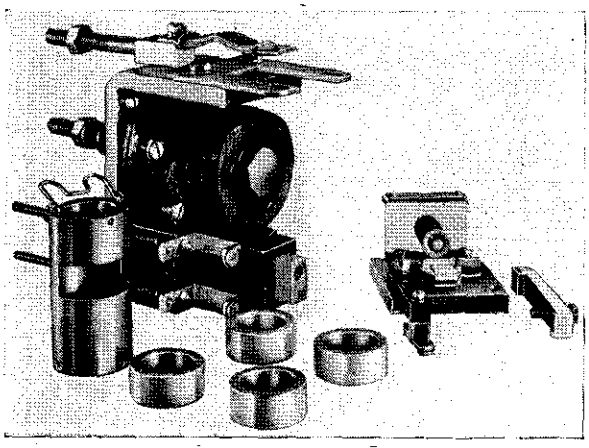

FIG. 8—VIEW SHOWING THE DIS-ASSEMBLY OF THE COPPER RINGS AND RING CASE (PHOTO 290042)

The armature kick-out spring is purposely supported in such a manner that the pressure can not be adjusted. A change in the spring pressure is very undesirable as it will change the force with which the main contacts are held together.

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Sizes No. 2 and 4

For D-C Operation

INSTRUCTIONS—Continued

MAINTENANCE

Mounting—When a Timetactor assembly has a stud at the top of the frame for rear connection, this stud should never be used as a mounting bolt. When a nut on this stud is drawn up tight against the rear of the panel, it is possible to spring the frame out of alignment and to introduce an air gap in the magnetic circuit which will generally reduce the maximum possible time delay period by a considerable amount. The single mounting stud which is threaded into the core is adequate for securely mounting the Timetactor to a panel. Clearance must always be provided between the mounting panel and the nuts and hardware that are used to make the electrical connection to the stud.

Failure to Operate—Failure of the Timetactor armature to close may be caused by the coil circuit being open, power failure or low voltage, or mechanical interference. Failure of the Timetactor armature to be released may result from the coil circuit being energized, mechanical interference, or a broken or weak armature kick-out spring.

Contact Pressure, Gap, and Overtravel—The main and auxiliary contacts should have the pressures, gaps, and overtravels indicated in Fig. 9.

CONTACT				
Description	Pressure in Pounds		Gap in Inches	Overtravel in Inches
	Initial	Final		
Main Contact	2½	3 △	3/32	1/16
Normally Open Auxiliary Contact	¼*	3/8*	½*	5/64 to ⅛
Normally Closed Auxiliary Contact	¼*	3/8*	½*	5/64 to ⅛

△Timetactors with normally closed auxiliary contacts have a stronger armature kick-out spring than those with normally open auxiliary contacts. Main contact pressure is approximately 4 pounds.

*Total for 2 contact buttons.

FIG. 9—CONTACT DATA TABLE

The main and auxiliary moving contacts should always move freely in their bearings or on their guide pins. Any binding or excess friction may prevent the contacts from having the proper overtravel.

Contact Replacement—The contacts should be replaced when they become severely burned or worn away. In general, the auxiliary contacts should be replaced when the overtravel decreases to 1/32 inch. Moderately burned and blackened silver contacts usually do not require replacement or dressing as the discolored surface is generally still a good conductor. To remove the auxiliary stationary contacts, the studs or screws which hold them to the moulded base must be removed. This can usually be done easiest by removing the complete base assembly from the Timetactor.

Lubrication is not required for the contacts. The use of oil or grease is very undesirable as it helps to collect dirt and dust.

Frame and Armature—For proper operation and to secure consistent time delay periods, the frame and armature sealing surfaces must be as clean as possible. Any dirt or foreign matter in the magnetic circuit will decrease the maximum possible time delay period.

Grease or oil should not be applied to the ground surfaces as it will collect dirt and dust. Also, the grinding is usually so smooth that a lubricant may cause the armature to seal and stick to the frame. The chromium plated surfaces should not be filed or sanded as that will destroy the corrosion-resisting chromium plated protective coating.

Coil Replacement—In order to remove the coil, the armature assembly should be removed as previously described under the paragraph heading of "Adjustments." After the coil mounting screw has been removed, the copper ring case assembly can be taken out by disengaging the spring clip which snaps over and into a groove in the core. The spring clip can be used as a bail or handle for pulling the ring case assembly out of the coil. After the leads to the coil terminals have been disconnected, the coil can be removed by pulling it in a forward direction.

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