DESCRIPTION • OPERATION • MAINTENANCE

INSTRUCTIONS

PNEUMATIC TIMING RELAYS

Type AM

With or Without Auxiliary Switch Units

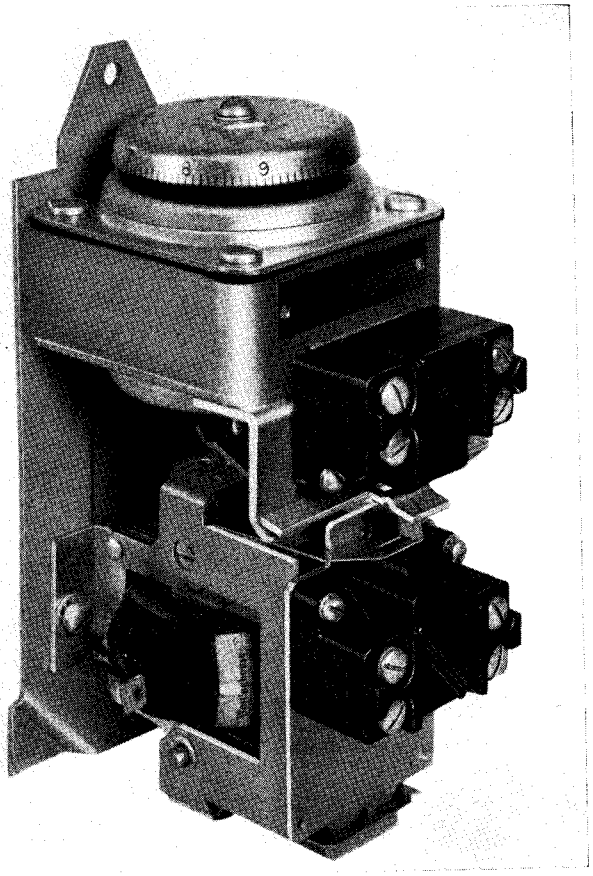

FIG. 1. Type AM Relay With One Auxiliary Switch Unit

TYPE AM PNEUMATIC TIMING RELAYS are for general use where it is desired to open or close electrical circuits following a definite time delay. The timing period is initiated by energizing the coil of the "on delay" Type AM Relay or by de-energizing the coil of the "off-delay" Type AM Timing Relay.

The switch unit, which has the alternating and direct current ratings shown in the table, contains a normally-open and a normally-closed contact.

The relay may be supplied with the time delay switch unit alone, or with the time delay switch unit accompanied by one or two auxiliary switch units. The units are identical in rating, but the auxiliary switch units are operated directly by the magnet without introduced time delay.

The magnet is designed for operating on alternating current only. The operating coils are rated for continuous duty and will operate the relays at from 85 percent to 110 percent of their rated voltage. The coils are insulated for 600 volts maximum.

INSTALLATION

Mounting. The relay may be mounted on either insulating or metal panels using the three mounting holes in the base plate. The relay should be mounted in the vertical position with the graduated regulating valve dial at the top.

OPERATION

"Off Delay". The operation of the "off delay" relay is as follows: When the magnet is energized the armature moves upward acting through the diaphragm pin to move the diaphragm upward and exhaust the air promptly from the lower half of the air chamber through the check valve. At the same time the main and auxiliary contacts transfer.

When it is intended to start the timing period, the magnet is de-energized, permitting the armature

RATINGS OF SWITCH UNIT CONTACTS

A-C VOLTS	AMPERES		D-C VOLTS	AMPERES CONTINUOUS AND INTERRUPTING CAPACITY	
	Continuous and Interrupting Capacity	Closing Capacity		For Inductive Coil Loads	For Non-Inductive Resistance Loads
110	15	40	125	.30	.60
220	10	20	250	.15	.30
440	6	10			
550	5	8			

Note: Switch unit insulated for 550 volts a-c and 250 volts d-c maximum. Both circuits of each switch unit must be wired for same polarity.

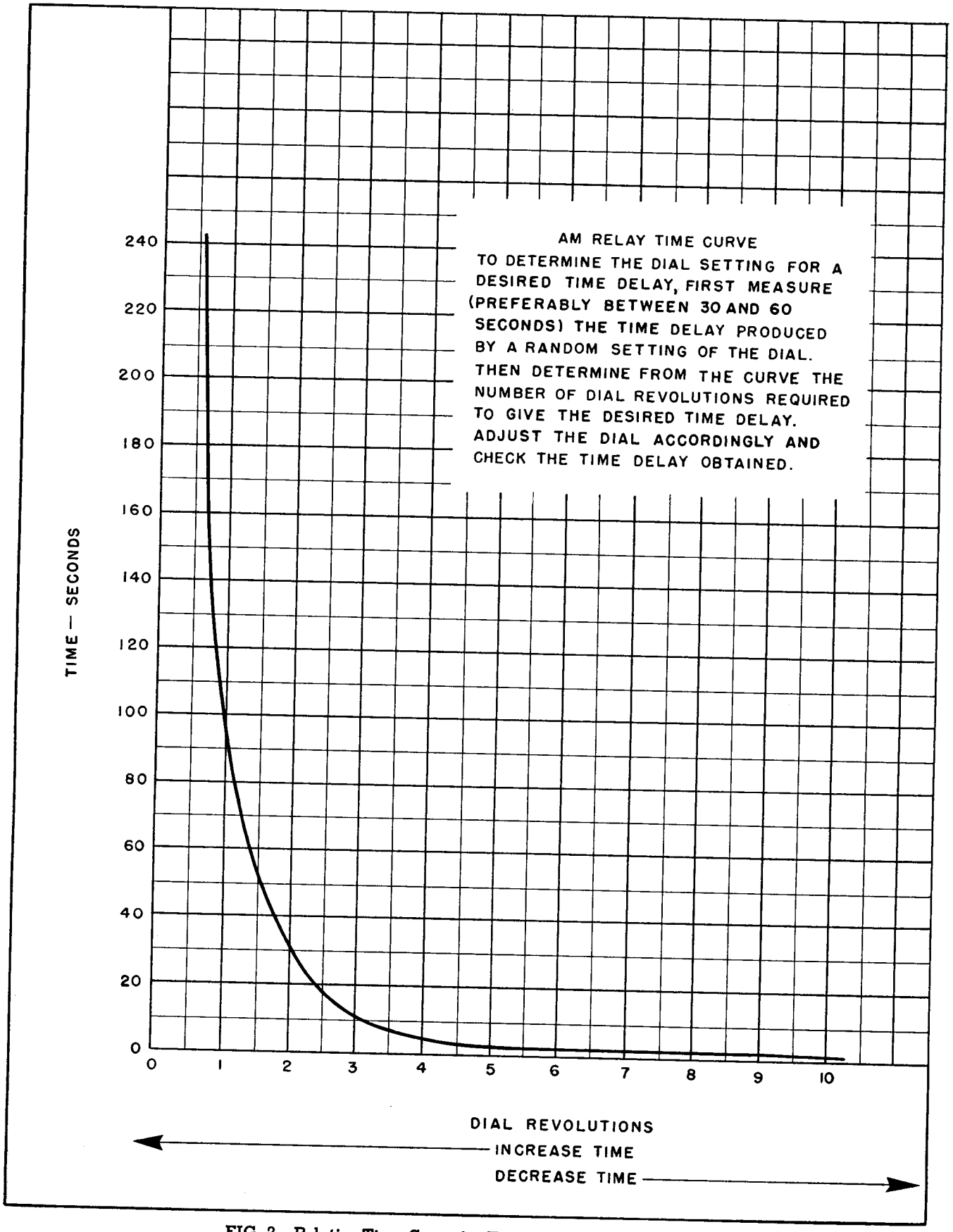

FIG. 2. Relative Time Curve for Type AM Relay Time Curve

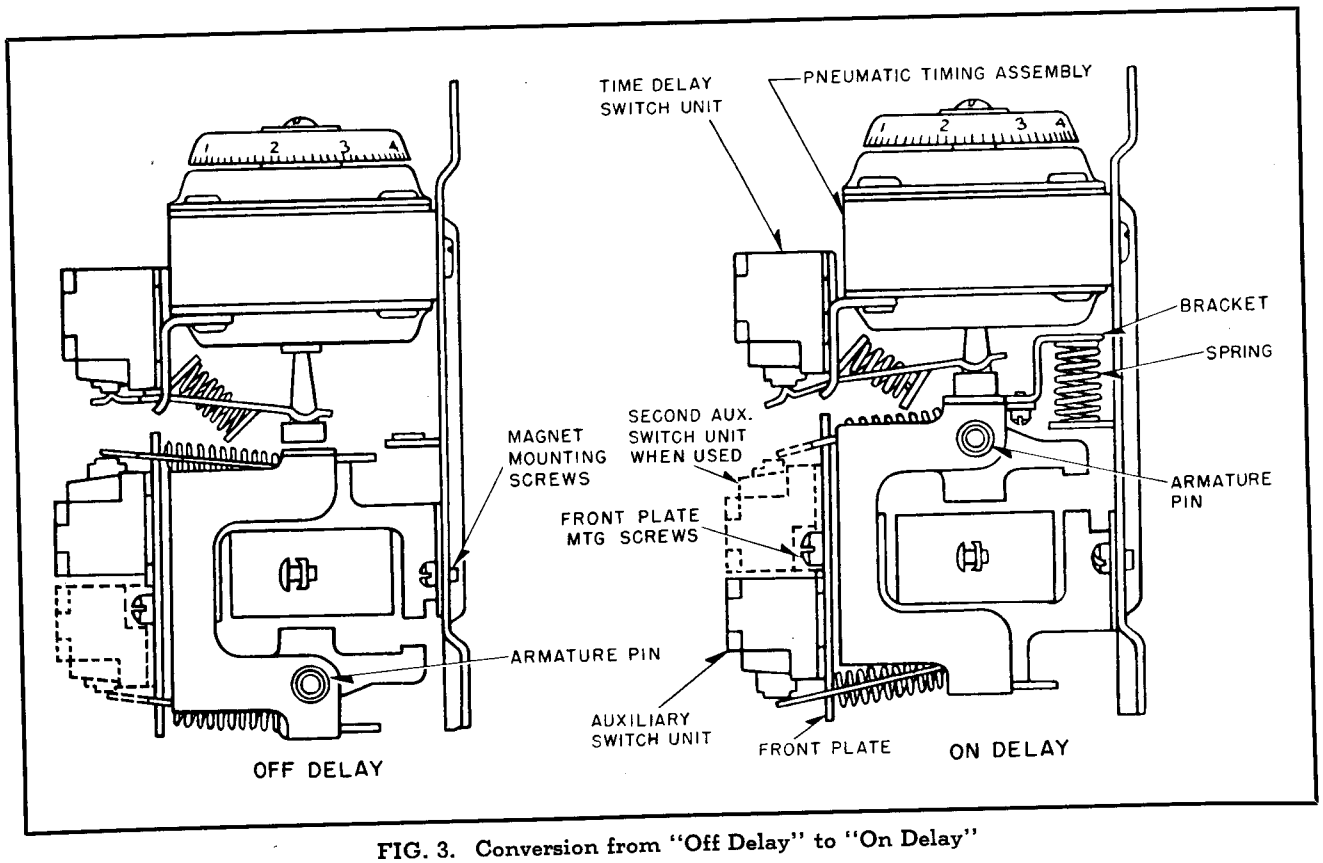

FIG. 3. Conversion from "Off Delay" to "On Delay"

to drop and actuate any existing auxiliary switch units. The operating spring then acts through a lever to retract the diaphragm pin downward. The movement of the diaphragm is retarded by the rate at which air can enter the chamber through a restricted orifice. Transfer of the main switch unit contacts to their normal position takes place before the final 1/32 inch travel of the diaphragm pin.

"On Delay". The "on delay" relay is similar to the "off delay" relay except that the magnet is inverted and an additional spring is used to hold the armature open. To start the timing period, the coil is energized and the armature moves downward, actuating any existing auxiliary switch units. Through the influence of the operating spring, acting through a lever, the diaphragm pin is retracted downward. The movement of the latter is retarded by the rate at which air can enter the chamber through a restricted orifice. Transfer of the main switch unit contacts takes place before the final 1/32 inch of the diaphragm pin travel.

When the magnet is de-energized, the return spring lifts the armature and diaphragm pin upward, exhausting the air promptly from the air chamber through the check valve. The action produces a prompt transfer of the contacts of both main and auxiliary switch units. The armature gap in this condition is normally 5/16 inch.

Adjustment. Setting of the time delay is afforded solely by turning the dial which controls the orifice of the regulating valve. The timing range is .2 to 200 seconds (except that the maximum time delay obtainable with relays having black anodized aluminum air chamber castings is 90 seconds).

To determine the dial setting for a desired time delay, first measure, preferably between 30 and 60 seconds, the time delay produced by a random setting of the dial. Then determine from the curve the number of dial revolutions required to give the desired time delay. Adjust the dial accordingly and check the time delay obtained.

The timing calibration of the relay is unaffected by changes in humidity and ambient temperature. The internal parts are kept free from dust by a wool felt filter through which the air entering the chamber passes.

Switch Units. The contacts of the switch units are of a modified transfer type. Adjacent terminals must be wired to have the same polarity.

Conversion. An "off delay" relay may be converted to an "on delay" relay by proceeding as

follows, referring to Fig. 3. Remove the magnet assembly from the base by taking out the two magnet mounting screws. Separate the armature and front mounting plate from the stationary magnet by removing two screws. Remove the armature from the armature frame by driving out the armature pin, exercising care to avoid bending the frame.

Assemble bracket S# 1619 347 using a .138-32 x 1/4" fillister head screw and lockwasher. Reassemble the armature and armature pin, making sure to replace the snap ring in the groove in the end of the latter. Reassemble the front plate and armature assembly to the magnet. Reassemble the magnet assembly to the base plate so that the armature is above the coil. Install spring S# 1619 346.

Energize the operating coil with the front plate mounting screws loosened. This permits the armature to seat itself squarely on the magnet. Tighten front plate mounting screws.

Parts required for conversion:

Bracket	S# 1619 347	1 Required
Operating Spring	S# 1619 346	1 Required
Fillister head screw	.138-32 x 1/4"	1 Required
Lockwasher	.138	1 Required

The initial design of the AM relay provided for the above described conversion using a tension spring. These relays may be converted as described above by ordering a new base plate which will have the angle bracket necessary to provide a seat for the compression spring.

Base plate	S# 1619 348	1 Required

MAINTENANCE

Failure to Operate. Failure of the armature to close may be caused by an open coil circuit, a power failure, excessively low voltage or mechanical interference. The armature and armature frame should move freely when the diaphragm pin is held up. The air chamber should not be dismantled for any reason. Introduction of dust particles into the check valve will cause a change in the time setting or may cause complete failure of the time delay mechanism.

The proper return spring must be used with the "on delay" relay. This spring exerts 1.75 lbs. at 1 inch initial length and 2.55 lbs. at $^{11}/_{16}$ inch final length.

Operating Lever. The operating lever is accurately adjusted at the factory. Should further adjustment be necessary, however, proceed as follows:

Grasp the tail piece of the operating lever with a pair of pliers, force the opposite end of the operating lever against the shoulder of the operating pin with the fingers. Bend the tail piece slightly and check to see that the switch unit operates when the operating lever is $^{1}/_{32}$ inch from the shoulder of the operating pin. Caution must be used in making this adjustment. Very little bending of the tail piece is required to correct the action of the operating lever.

Coil Replacement. In order to remove the coil, first remove the armature and front plate assembly by taking out the two screws securing the plate to the stationary magnet. Remove the coil by compressing the coil hangar clips, and pull coil out. Replace with the proper coil and reassemble. With those relays having two auxiliary switch units, it is necessary to first remove one of the switch units to expose the front plate mounting screws.

Pneumatic assembly complete with timing switch unit.	S# 1548 654
A-C magnet assembly with front plate without coil or switch unit.	S# 1437 766
Switch unit	S# 1622 954 or S# 1553 648
Kickout spring for "on delay" relay	S# 1619 346
Bearing retaining spring (Required 2 per relay)	S# 1553 647

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PNEUMATIC TIMING RELAYS

Type AM

With or Without Auxiliary Switch Units

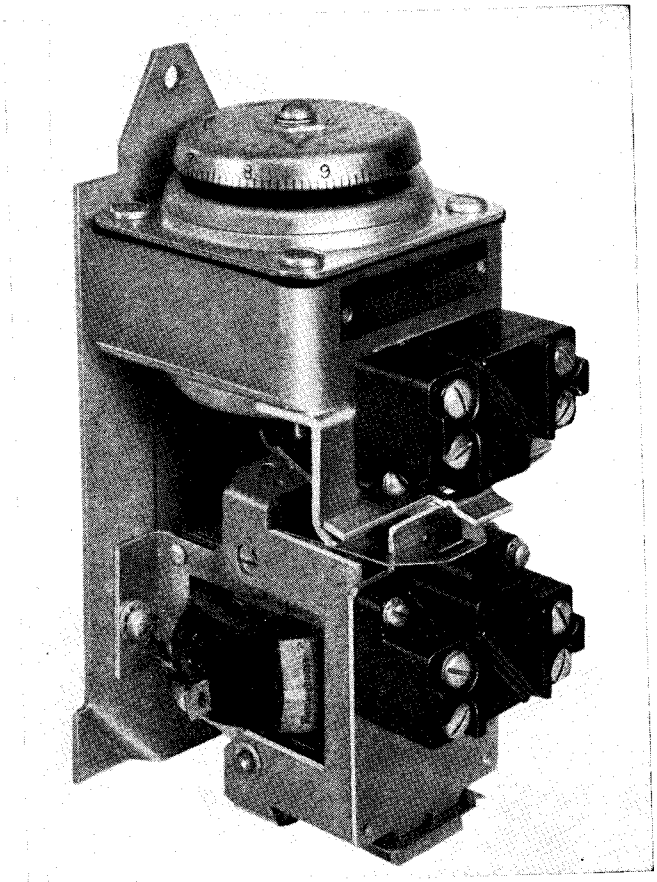

FIG. 1. Type AM Relay With One Auxiliary Switch Unit

TYPE AM PNEUMATIC TIMING RELAYS are for general use where it is desired to open or close electrical circuits following a definite time delay. The timing period is initiated by energizing the coil of the "on delay" Type AM Relay or by de-energizing the coil of the "off-delay" Type AM Timing Relay.

The switch unit, which has the alternating and direct current ratings shown in the table, contains a normally-open and a normally-closed contact.

The relay may be supplied with the time delay switch unit alone, or with the time delay switch unit accompanied by one or two auxiliary switch units. The units are identical in rating, but the auxiliary switch units are operated directly by the magnet without introduced time delay.

The magnet is designed for operating on alternating current only. The operating coils are rated for continuous duty and will operate the relays at from 85 percent to 110 percent of their rated voltage. The coils are insulated for 600 volts maximum.

INSTALLATION

Mounting. The relay may be mounted on either insulating or metal panels using the three mounting holes in the base plate. The relay should be mounted in the vertical position with the graduated regulating valve dial at the top.

OPERATION

"Off Delay". The operation of the "off delay" relay is as follows: When the magnet is energized the armature moves upward acting through the diaphragm pin to move the diaphragm upward and exhaust the air promptly from the lower half of the air chamber through the check valve. At the same time the main and auxiliary contacts transfer.

When it is intended to start the timing period, the magnet is de-energized, permitting the armature

RATINGS OF SWITCH UNIT CONTACTS

A-C VOLTS	AMPERES		D-C VOLTS	AMPERES CONTINUOUS AND INTERRUPTING CAPACITY	
	Continuous and Interrupting Capacity	Closing Capacity		For Inductive Coil Loads	For Non-Inductive Resistance Loads
110	15	40	125	.30	.60
220	10	20	250	.15	.30
440	6	10			
550	5	8			

Note: Switch unit insulated for 550 volts a-c and 250 volts d-c maximum. Both circuits of each switch unit must be wired for same polarity.

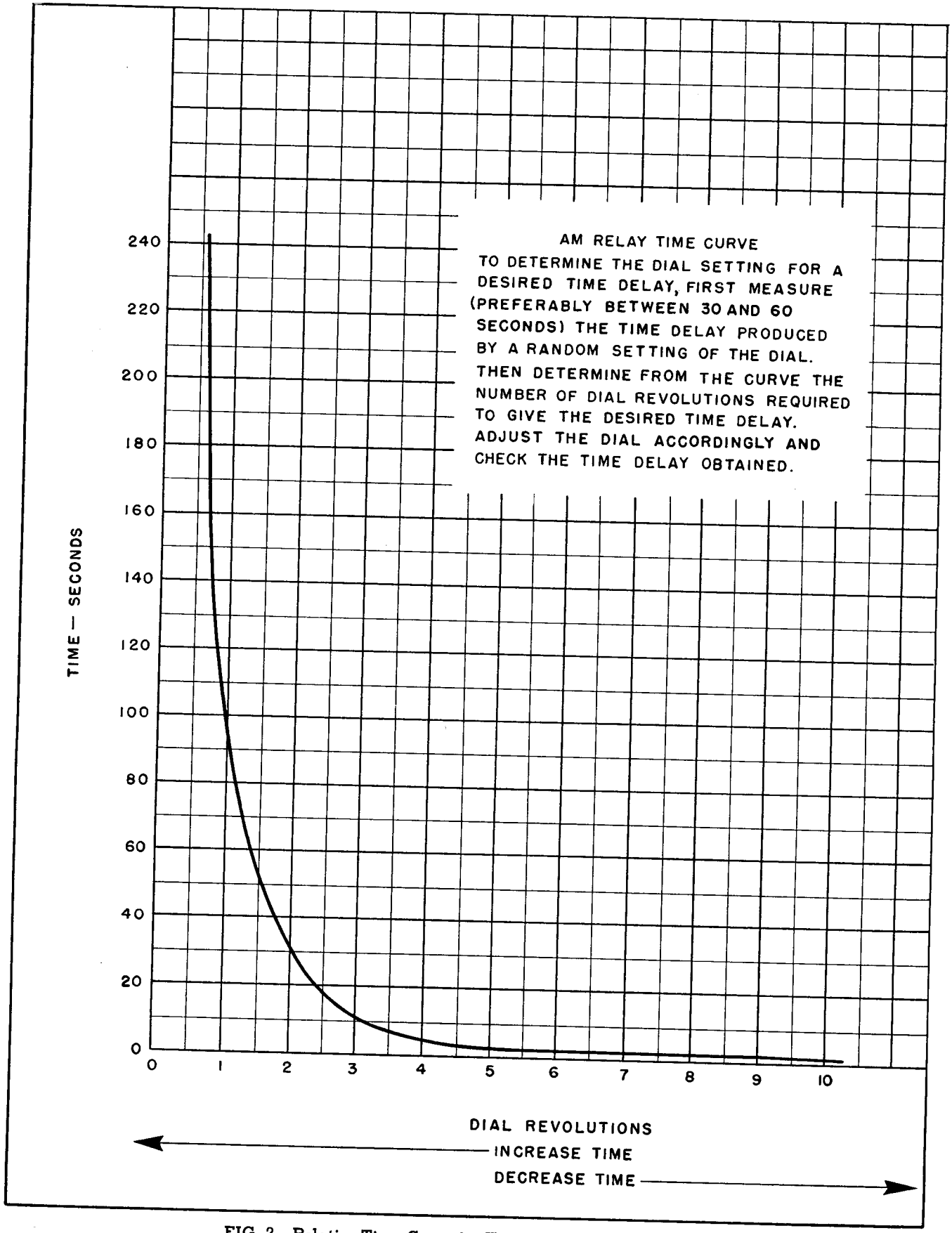

FIG. 2. Relative Time Curve for Type AM Relay Time Curve

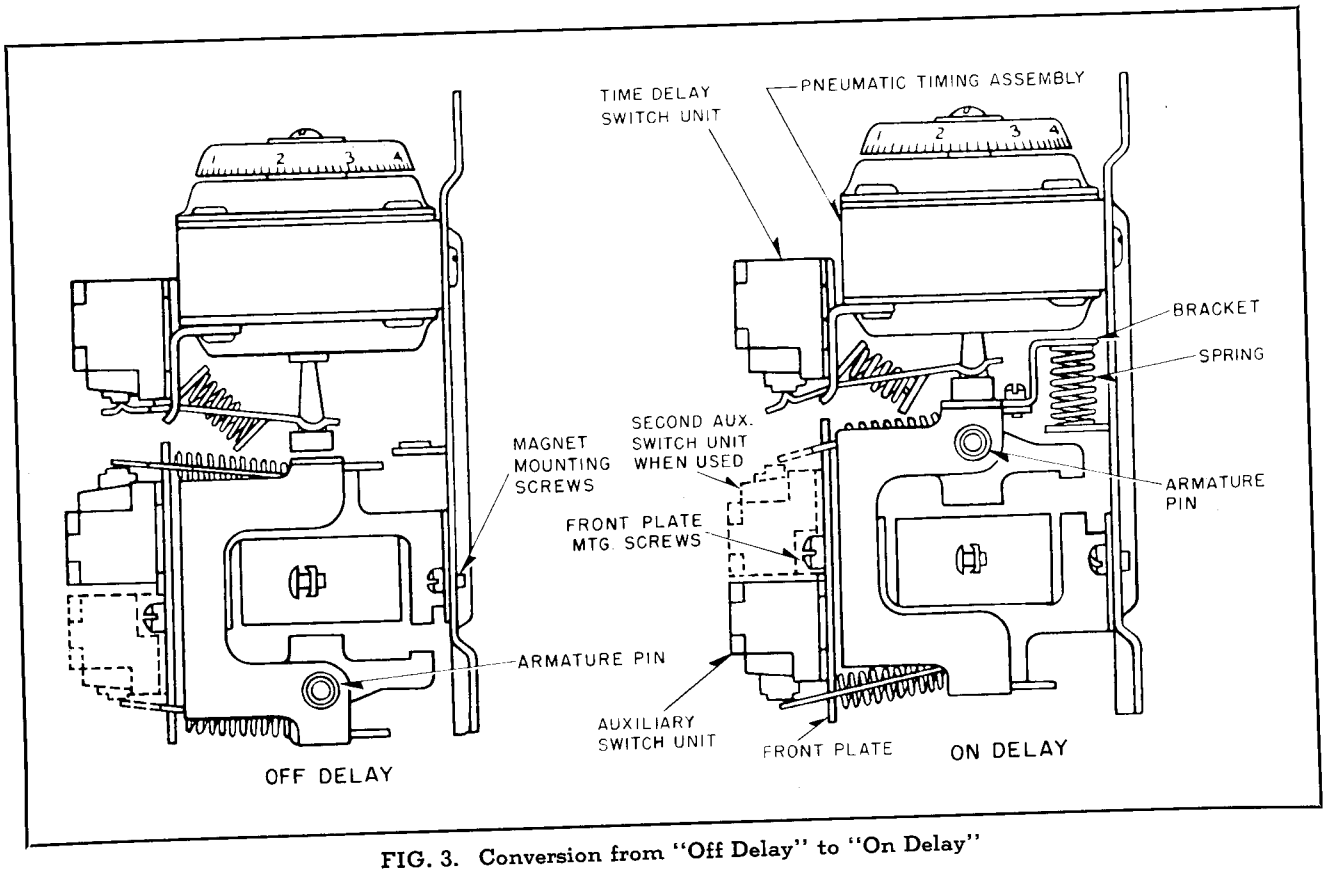

FIG. 3. Conversion from "Off Delay" to "On Delay"

to drop and actuate any existing auxiliary switch units. The operating spring then acts through a lever to retract the diaphragm pin downward. The movement of the diaphragm is retarded by the rate at which air can enter the chamber through a restricted orifice. Transfer of the main switch unit contacts to their normal position takes place before the final 1/32 inch travel of the diaphragm pin.

"On Delay". The "on delay" relay is similar to the "off delay" relay except that the magnet is inverted and an additional spring is used to hold the armature open. To start the timing period, the coil is energized and the armature moves downward, actuating any existing auxiliary switch units. Through the influence of the operating spring, acting through a lever, the diaphragm pin is retracted downward. The movement of the latter is retarded by the rate at which air can enter the chamber through a restricted orifice. Transfer of the main switch unit contacts takes place before the final 1/32 inch of the diaphragm pin travel.

When the magnet is de-energized, the return spring lifts the armature and diaphragm pin upward, exhausting the air promptly from the air chamber through the check valve. The action produces a prompt transfer of the contacts of both main and auxiliary switch units. The armature gap in this condition is normally 5/16 inch.

Adjustment. Setting of the time delay is afforded solely by turning the dial which controls the orifice of the regulating valve. The timing range is .2 to 200 seconds (except that the maximum time delay obtainable with relays having black anodized aluminum air chamber castings is 90 seconds).

To determine the dial setting for a desired time delay, first measure, preferably between 30 and 60 seconds, the time delay produced by a random setting of the dial. Then determine from the curve the number of dial revolutions required to give the desired time delay. Adjust the dial accordingly and check the time delay obtained.

The timing calibration of the relay is unaffected by changes in humidity and ambient temperature. The internal parts are kept free from dust by a wool felt filter through which the air entering the chamber passes.

Switch Units. The contacts of the switch units are of a modified transfer type. Adjacent terminals must be wired to have the same polarity.

Conversion. An "off delay" relay may be converted to an "on delay" relay by proceeding as

follows, referring to Fig. 3. Remove the magnet mounting screws.

Assemble bracket S# 1619 347 using the .138-32 x 1/4" fillister head screw and lockwasher. Reassemble the magnet assembly to the base plate with the armature above the coil. Install spring as per Fig. 3.

Energize the operating coil with the front plate mounting screws loosened. This permits the armature to seat itself squarely on the magnet. Tighten front plate mounting screws.

Parts required for conversion:

Bracket	S# 1619 347	1 Required
Operating Spring	S# 1619 346	1 Required
Fillister head screw	.138-32 x 1/4"	1 Required
Lockwasher	.138	1 Required

The initial design of the AM relay provided for the above described conversion using a tension spring. These relays may be converted as described above by ordering a new base plate which will have the angle bracket necessary to provide a seat for the compression spring.

Base plate	S# 1619 348	1 Required

MAINTENANCE

Failure to Operate. Failure of the armature to close may be caused by an open coil circuit, a power failure, excessively low voltage or mechanical interference. The armature and armature frame should move freely when the diaphragm pin is held up. The air chamber should not be dismantled for any reason. Introduction of dust particles into the check valve will cause a change in the time setting or may cause complete failure of the time delay mechanism.

The proper return spring must be used with the "on delay" relay. This spring exerts 1.75 lbs. at 1 inch initial length and 2.55 lbs. at 11/16 inch final length.

Operating Lever. The operating lever is accurately adjusted at the factory. Should further adjustment be necessary, however, proceed as follows:

Grasp the tail piece of the operating lever with a pair of pliers, force the opposite end of the operating lever against the shoulder of the operating pin with the fingers. Bend the tail piece slightly and check to see that the switch unit operates when the operating lever is 1/32 inch from the shoulder of the operating pin. Caution must be used in making this adjustment. Very little bending of the tail piece is required to correct the action of the operating lever.

Coil Replacement. In order to remove the coil, first remove the armature and front plate assembly by taking out the two screws securing the plate to the stationary magnet. Remove the coil by compressing the coil hangar clips, and pull coil out. Replace with the proper coil and reassemble. With those relays having two auxiliary switch units, it is necessary to first remove one of the switch units to expose the front plate mounting screws.

Pneumatic assembly complete with timing switch unit.	S# 1548 654
A-C magnet assembly with front plate without coil or switch unit.	S# 1437 766
Switch unit	S# 1622 954 or S# 1553 648
Kickout spring for "on delay" relay	S# 1619 346
Bearing retaining spring (Required 2 per relay)	S# 1553 647

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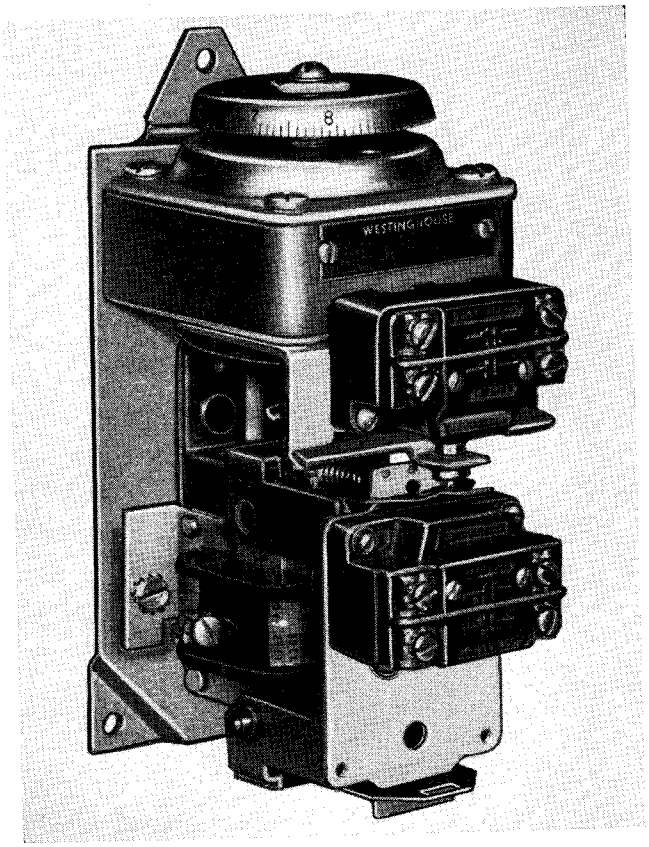
PNEUMATIC TIMING RELAYS

Type AM

With or without Auxiliary Switch Units



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The relay may be supplied with the time delay switch unit alone, or with the time delay switch unit accompanied by one or two auxiliary switch units. The units are identical in rating, but the auxiliary switch units are operated directly by the magnet without introduced time delay.

The magnet is designed for operating on alternating current only. The operating coils are rated for continuous duty and will operate the relays at from 85 per cent to 110 per cent of their rated voltage. The coils are insulated for 600 volts maximum.

INSTALLATION

Mounting. The relay may be mounted on either insulating or metal panels using the three mounting holes in the base plate. The relay should be mounted in the vertical position with the graduated regulating valve dial at the top.

OPERATION

"Off Delay". The operation of the "off delay" relay is as follows: When the magnet is energized the armature moves upward acting through the diaphragm pin to move the diaphragm upward and exhaust the air promptly from the lower half of the air chamber through the check valve. At the same time the main and auxiliary contacts transfer.

When it is intended to start the timing period, the magnet is de-energized, permitting the armature

RATINGS OF SWITCH UNIT CONTACTS

A-C VOLTS	AMPERES		D-C VOLTS	AMPERES CONTINUOUS AND INTERRUPTING CAPACITY	
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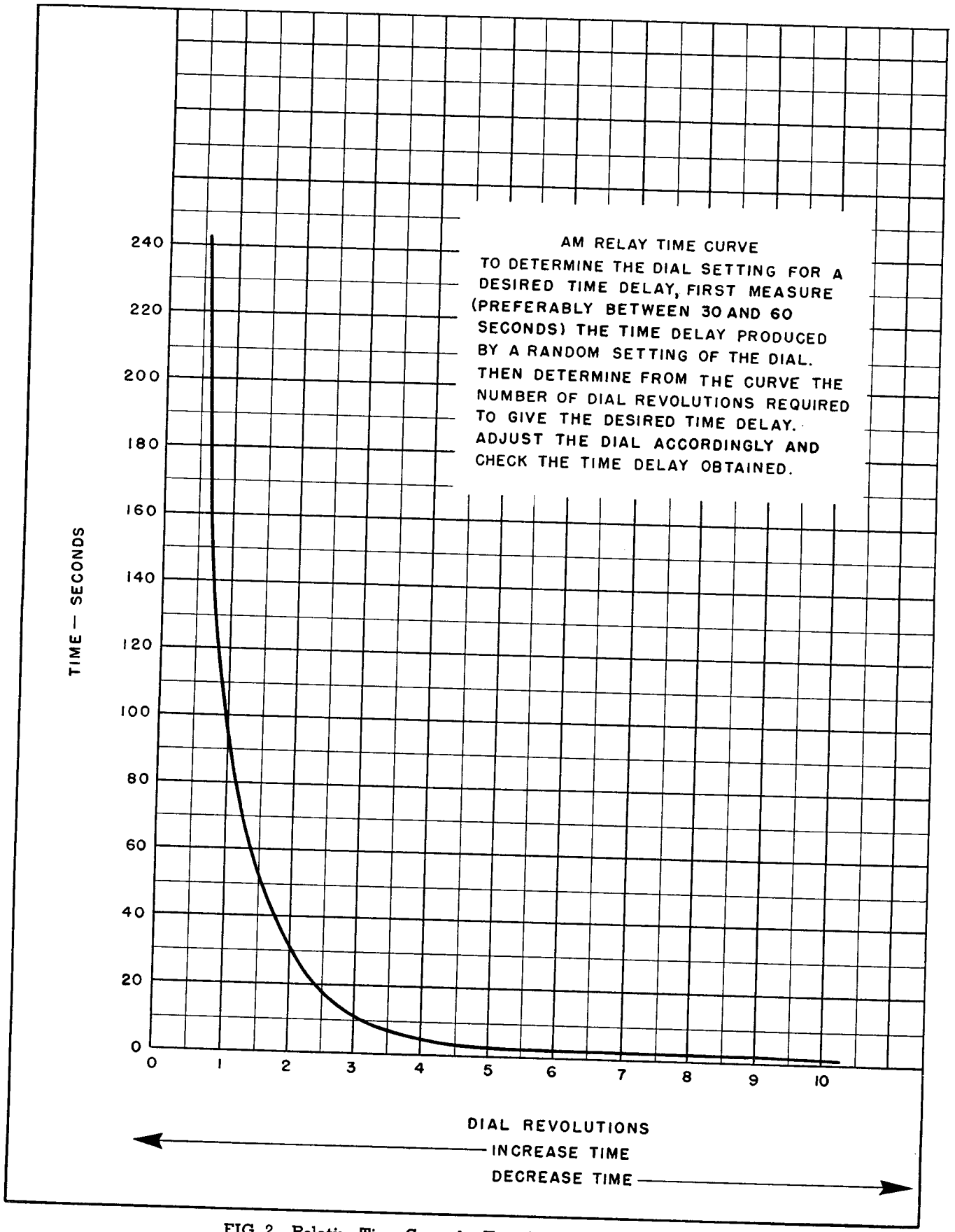
220	10	20	250	.15	.30
440	6	10			
550	5	8			

Note: Switch unit insulated for 550 volts a-c and 250 volts d-c maximum. Both circuits of each switch unit must be wired for same polarity.

SUPERSEDES I.L. 10234-C



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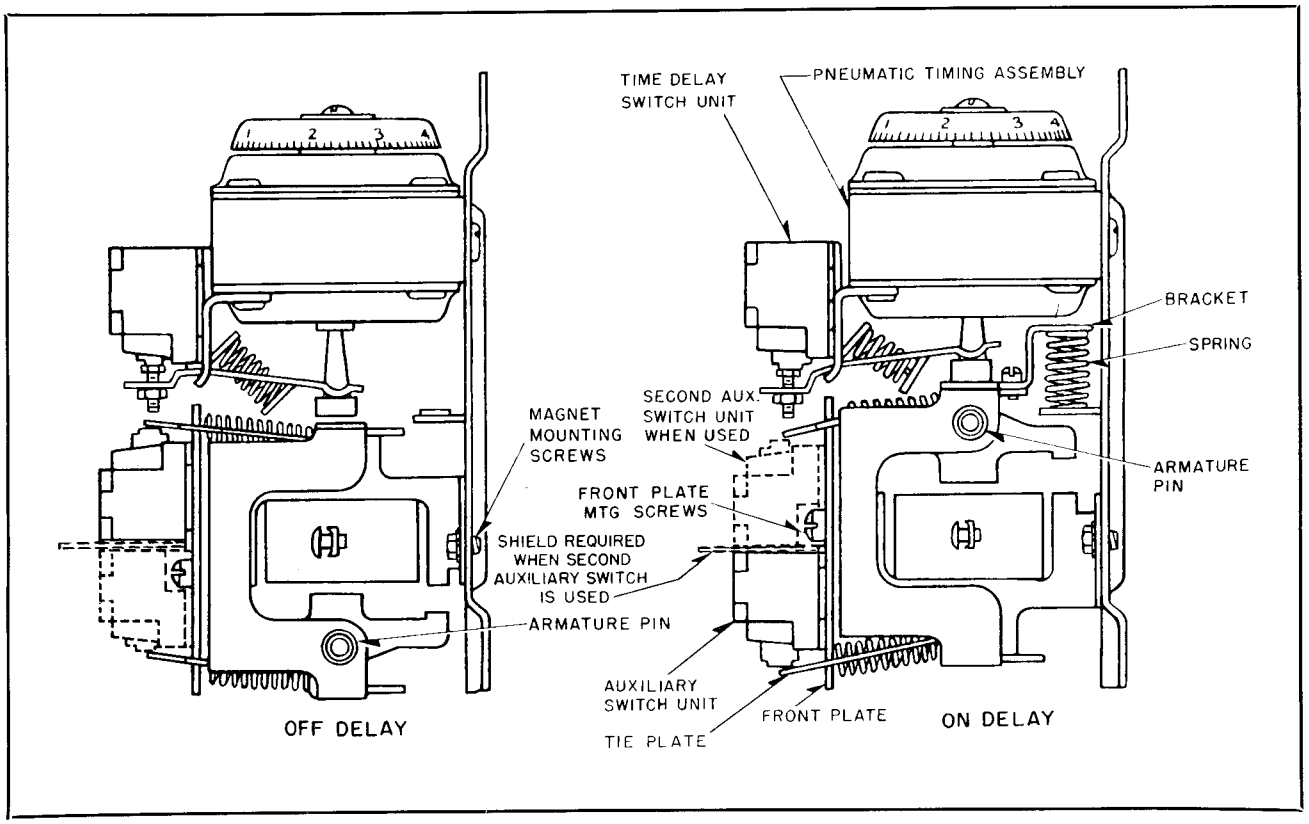

FIG. 3. Conversion from "Off Delay" to "On Delay"

to drop and actuate any existing auxiliary switch units. The operating spring then acts through a lever to retract the diaphragm pin downward. The movement of the diaphragm is retarded by the rate at which air can enter the chamber through a restricted orifice. Transfer of the main switch unit contacts to their normal position takes place before the final 1/32 inch travel of the diaphragm pin.

"On Delay". The "on delay" relay is similar to the "off delay" relay except that the magnet is inverted and an additional spring is used to hold the armature open. To start the timing period, the coil is energized and the armature moves downward, actuating any existing auxiliary switch units. Through the influence of the operating spring, acting through a lever, the diaphragm pin is retracted downward. The movement of the latter is retarded by the rate at which air can enter the chamber through a restricted orifice. Transfer of the main switch unit contacts takes place before the final 1/32 inch of the diaphragm pin travel.

When the magnet is de-energized, the return spring lifts the armature and diaphragm pin upward, exhausting the air promptly from the air chamber through the check valve. The action produces a prompt transfer of the contacts of both main and auxiliary switch units. The armature gap in this condition is normally 5/16 inch.

Adjustment. Setting of the time delay is afforded solely by turning the dial which controls the orifice of the regulating valve. The timing range is .2 to 200 seconds (except that the maximum time delay obtainable with relays having black anodized aluminum air chamber castings is 90 seconds).

To determine the dial setting for a desired time delay, first measure, preferably between 30 and 60 seconds, the time delay produced by a random setting of the dial. Then determine from the curve the number of dial revolutions required to give the desired time delay. Adjust the dial accordingly and check the time delay obtained.

The timing calibration of the relay is unaffected by changes in humidity and ambient temperature. The internal parts are kept free from dust by a wool felt filter through which the air entering the chamber passes.

Switch Units. The contacts of the switch units are of a modified transfer type. Adjacent terminals must be wired to have the same polarity.

Conversion. An "off delay" relay may be converted to an "on delay" relay by proceeding as

follows, referring to Fig. 3. Remove the magnet mounting screws.

Assemble bracket S# 1619 347 using the .138-32 x ¼" fillister head screw and lockwasher. Reassemble the magnet assembly to the base plate with the armature above the coil. Install spring as per Fig. 3.

Energize the operating coil with the front plate mounting screws loosened. This permits the armature to seat itself squarely on the magnet. Tighten front plate mounting screws.

Parts required for conversion:

Bracket	S# 1619 347	1 Required
Operating Spring	S# 1619 346	1 Required
Fillister head screw	.138-32 x ¼"	1 Required
Lockwasher	.138	1 Required

The initial design of the AM relay provided for the above described conversion using a tension spring. These relays may be converted as described above by ordering a new base plate which will have the angle bracket necessary to provide a seat for the compression spring.

Base plate	S# 1619 348	1 Required

MAINTENANCE

Failure to Operate. Failure of the armature to close may be caused by an open coil circuit, a power failure, excessively low voltage or mechanical interference. The armature and armature frame should move freely when the diaphragm pin is held up. The air chamber should not be dismantled for any reason. Introduction of dust particles into the check valve will cause a change in the time setting or may cause complete failure of the time delay mechanism.

The proper return spring must be used with the "on delay" relay. This spring exerts 1.75 lbs. at 1 inch initial length and 2.55 lbs. at 1 1/16 inch final length.

Operating Lever. The operating lever is accurately adjusted at the factory. Should further adjustment be necessary, however, proceed as follows:

Loosen locknut on the adjusting screw, turn the adjusting screw slightly, and check to see that switch unit operates when operating lever is 1/32 inch from the shoulder of the operating pin. Caution must be used when making this adjustment since very little turning of adjusting screw is required to correct the action of the operating lever. After correct adjustment is made, lock adjusting screw in this position using the locknut.

Tie-Plate. The tie-plate is accurately adjusted at the factory when an instantaneous switch is provided on the relay. Should further adjustment be necessary, however, proceed as follows:

Adjustment is accomplished by inserting a screw driver into the slot at the bendable portion of the tie-plate adjacent to the pushbutton of the switch and bowing out this section in the direction required. Check the adjustment by moving the armature frame assembly to the end of its travel in each direction. The pushbutton of the switch should have a minimum overtravel of .020" beyond the trip points, and have approximately .015" travel remaining to its bottoming position.

Care must be exercised in bowing out the bendable portion of the tie-plate to avoid bending of the tie-plate at the knife edge.

Coil Replacement. In order to remove the coil, first remove the armature and front plate assembly by taking out the two screws securing the plate to the stationary magnet. Remove the coil by compressing the coil hangar clips, and pull coil out. Replace with the proper coil and reassemble. With those relays having two auxiliary switch units, it is necessary to first remove one of the switch units to expose the front plate mounting screws.

Pneumatic assembly complete with timing switch unit.	S# 1548 654
A-C magnet assembly with front plate without coil or switch unit.	S# 1437 766
Switch Unit	S# 1776 715
Second Auxiliary Switch, includes switch, mounting hardware and shield	S# 1776 716
Kickout spring for "on delay" relay	S# 1619 346
Bearing retaining spring (Required 2 per relay)	S# 1553 647

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