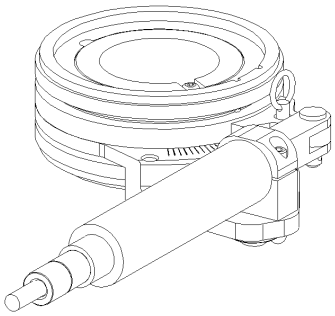
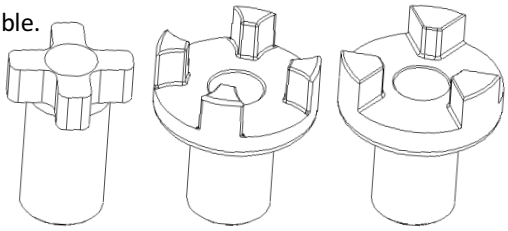


FIE Magneto Timing Mechanism

This mechanism mounts between a band clamp-style magneto and lower drive. The mag can then move a preset amount at a pre-determined rate and time. The mechanism can advance or retard ignition timing up to a maximum of 44 crankshaft degrees between stops.

Typical movement begins with the application of 12VDC to a solenoid valve (electric over air option), or application of pressure to the pilot port of the control valve (air over air option). This in turn supplies CO2 pressure to alternate sides of the pneumatic cylinder. One side is charged to hold the mag firmly against the zero stop. Once activated by a throttle switch, timer, RPM activated switch or some similar means, the other side is charged and the pressure bled out of the first side through an adjustable valve which provides control of the travel rate. Both directions have separate rate adjustment. When the voltage is removed from the solenoid valve (electric over air) or air is removed from the pilot port (air over air), the mechanism resets back to zero at the predetermined return rate and remains locked and stable as long as gas pressure is available.

Physically moving the magneto to alter timing avoids issues with rotor phasing that occur when changing ignition timing by electronic means (ie. MSD mags) and allows more change than electronic means can provide.



Mounting: Band clamp style MSD or Mallory magnetos. Adapters for Vertex mags available.
Travel: Up to 44 crankshaft degrees
Rate: Separate forward and reverse rate adjustment
CO2 pressure: 85 PSI minimum recommended
Port sizes: All solenoid valve and cylinder ports are 1/8”NPT female.
Height: The magneto mounts 1.40” higher than the stock location.
Driver: Standard Cross, RCD Rotex (4 prong) and RCD Lovejoy (3 prong) drive couplers available. Adapters for the Mallory pin-style lower drive are available.

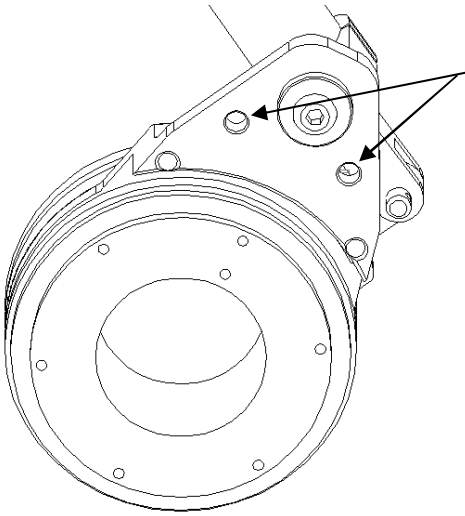
The travel extremes of the mechanism are determined by 1) the fully retracted position of the pneumatic cylinder and 2) the desired state of the provided spacer(s) and jam nuts on the other end of the cylinder. When CO2 pressure is available from the supply bottle/regulator (not included) and the unit is at rest (activation voltage or pressure is not available to the system), channel “B” of the solenoid valve is open and charged, as well as the clevis end of the cylinder, to hold the zero position of the mechanism. When activation voltage or pressure is applied to the system, the control valve charges channel “A” instead and opens exhaust port “EB”. The rate at which side “B” exhausts through the adjustable valve controls the rate of timing change in that direction. When the stop is reached and while control pressure or voltage remains available, the unit will stay in this position. As soon as control pressure or voltage is no longer available, side “B” of the valve and the clevis end of the cylinder is once again charged, and the return rate is determined by the adjustment of the valve on exhaust port “EA”.

The unit is symmetrical so that cylinder mounting can be reversed for different magneto rotation. The CO2 lines to the cylinder can also be reversed, so that the unit can be started from the extreme position and returned to zero if desired for fully versatile use.

In order to “buzz” the mag in without CO2 pressure, or to allow static operation in the absence of a pressure supply, a stop pin is provided to lock the mechanism. Two different stop pin holes are provided to facilitate reversal of the cylinder mounting.

Each engraved mark on the mech scale corresponds to FIVE crankshaft degrees. Because the location of the pneumatic cylinder and the zero point of the mech will vary depending on the end user’s desired port orientation, a pointer reference is not affixed to the mech as shipped. Three adhesive triangular decals are provided for this purpose and must be applied by the end user after initial setup. Additional pointers can be cut from old decals as required.

GROUNDING: Make sure the ground wire(s) from the magneto are grounded to the cylinder heads and that the negative side of the transformer is also grounded to this same source! The magneto will not ground through the mechanism. Current passing through the ball bearings of the unit could cause excessive premature wear, so the magneto harness must do ALL of the required grounding. In the case of Mallory mags, a 3-wire harness is recommended (but not required) as it provides another ground connection. MSD mags may benefit from an extra ground wire secured to the mag body or band clamp.



1/4" – 28 UNF holes for attachment of support brace(s).

Provided with the mechanism is a ball-joint and spherical rod end for use in bracing the magneto and mechanism. Due to differing length requirements per application, the rod or connecting hex shaft is not supplied. 3/8" round or hex material is recommended. FIE can provide hex aluminum by the foot as well as additional ball-joints and rod ends by request at additional cost.

RATE VALVES: Install a provided rate control valve in each exhaust port of the solenoid (ports EA & EB). Rough rate adjustment can be set with the motor off while moving the mag back and forth with air power, but since mags can create quite a bit of resistance to rotation, final adjustment should be made with the motor running. Each valve has a lock thimble to retain adjustment. Air lines in the exhaust ports are not required.

Installation and setup

Determine if you will be using the mechanism to advance or retard timing, consider magneto rotation and also available space to finalize the mounting and orientation of the cylinder. As shipped, the unit is setup to advance the timing on a clockwise ("right-hand") rotation magneto with the cylinder pushing the mag around against rotation. This same setup could be used to retard by swapping the air lines and starting at the fully "pushed" position. Or it could advance timing on a counterclockwise mag by "pulling" the magneto back.

If cylinder orientation is to be changed, simply remove the clevis from the push bar, loosen the clamp screw in the cylinder bracket, and unscrew the cylinder from the unit. Move the push bar to the other travel extreme and screw the cylinder into the other side of the bracket to the desired port orientation. Clamp down the cylinder in the mounting bracket and reattach the clevis. Affix a new zero decal to correspond with the timing mark of your choice when against the end of the cylinder travel.

Use the air line and connectors of your choice to plumb the CO2. A micro-plug harness is provided for wiring the solenoid valve (electric activation). Put a small dab of silicone on the plug after connection to insure that it won't come loose and fall out.

Once installed, initial setup of the unit can proceed as follows:

1. Use the lock pin or air power to put the mag in the starting location against the beginning stop.
2. Buzz the mag in to set the desired initial static timing.
3. Remove the lock pin or turn off the air source to allow free movement of the mech with the motor off.
4. Adjust the spacers and locknuts on the opposite end of the cylinder shaft so that the cylinder stops at the desired extreme. Each mark on the mech equals 5 crankshaft degrees.
5. Apply air pressure to lock the mech to the "zero" or first stop and start the motor to check the initial ignition timing with a timing light.
6. Using a "Manual" setup (see example schematic) or by using a jumper to provide 12VDC to the solenoid valve, cause the mag to move to the other stop. Check that desired timing is achieved at the desired rate. Pneumatic setups can simply use the desired air switch to activate/de-activate the unit.

Application ideas:

1. Traction control off the starting line (see included schematic) by starting out retarded and add timing after the first 1-2 seconds using a throttle pedal switch. Variation: Use a steering wheel push button to break the 12VDC to the solenoid to remove the added timing at the top end.
2. A top end timing retard activated by a high gear shift switch, RPM activated switch, timer or controller.
3. Subtract timing as boost increases using a pressure switch to set a threshold for activation.
4. Use as a "start retard" for easier starting when extreme amounts of timing are used. Timing is added once motor is started.