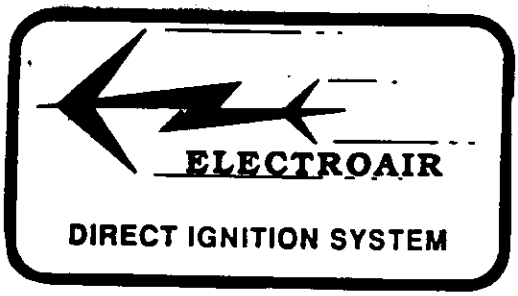

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INSTRUCTION MANUAL

D I S - 1

ELECTRONIC DIRECT IGNITION SYSTEM

Direct Ignition System Manual

ABOUT THE SYSTEM:

You are about to install an ignition system that is far superior to the ancient magneto, even superior to other electronic ignition systems. The Direct Ignition System has several advantages over maore primitive system and delivers some very impressive benefits:

- -No mechanical parts to wear.
- -No spark distribution losses.
- -Coils fire plugs directly.
- -High-energy spark.
- -Longer spark duration.
- -Automatic dwell adjustment.
- -Fully adjustable timing.

The DIS System uses two coils. Each coil fires two cylynders simultaneously: One is on its compression stroke and the other is on its exhaust stroke. This is called a "waste spark system" because one of the sparks is "wasted" on the exhaust-stroke cylinder. Actually, this system eliminates the need to distribute the spark to one plug at a time, and this does away with the distributor and all the other energy-robbing components of a traditional Kettering ignition system.

The coils fire directly into the spark plugs, delivering all the energy they have generated. The delivered spark is of longer duration than other systems. You get the benefits of:

- -Hotter pspark.
- -Cleaner plugs.
- -Less chance of fouling.
- -Better engine efficiency.
- -High resolution timing with a 60 tooth timing wheel.

The DIS System monitors its own performance, and adjusts to changing conditions. If it detects less than the optimum 8.5 amps built up in the coil at the moment of firing, it automatically varies the dwell angle to achieve the ideal coil current.

The DIS System also automatically sets the ignition advance to zero for easy starting. The ignition advance stays at zero up to 500 RPM. Above 500 RPM it switches to whatever initial advance setting you dial in and stays there up to about 850 RPM. Above 850 RPM it climbs in a straight line to whatever additional advance you dial in for 3000 and above. It levels off at 3000 RPM and stays at that setting thereafter.

In addition to the RPM timing curve, there is a maniforld pressure sensor which adds timing at low maniford pressures.

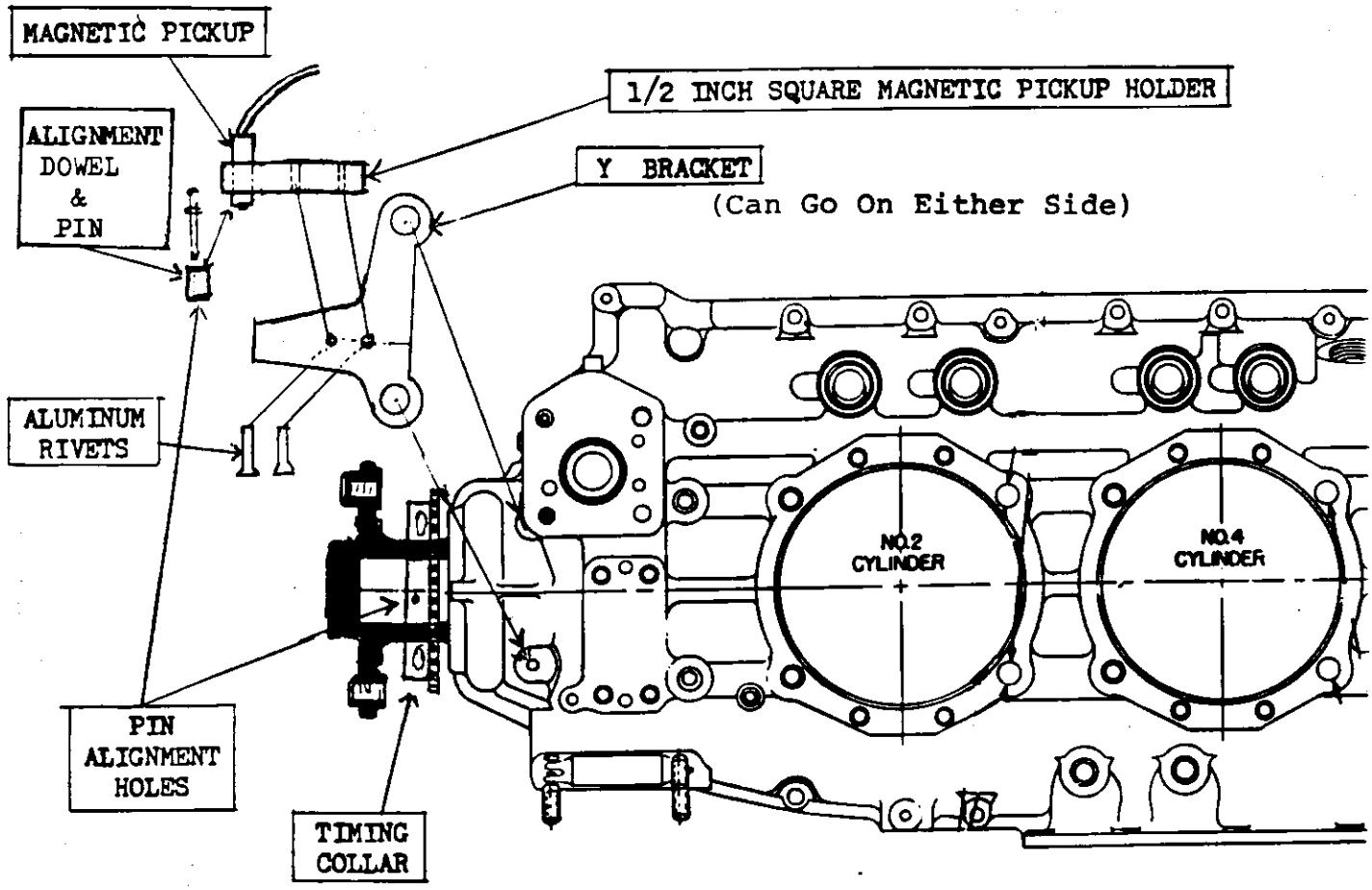
The heart of the DIS Syestem is a digital integrated circuit chip. The chip receives electrical impulses from the magnetic pickup. It recognizes the place on the wheel with two missing teeth and then keeps track of the remaining 58 teeth. By counting these teeth, it fires the coils in the proper sequence.

A calibration circuit works with the chip to determine what the RPM is and compute the spark advance. Controls are provided so you can optimize the timing.

WHAT'S IN THE PACKAGE?

Before you begin installing your DIS System, make sure you've received all the parts and components. You should have:

The DIS unit with coils.
The timing wheel.
The magnetic pickup.
The magnetic pickup holder, alignment dowel, and pin.
The pickkup holder mounting bracket with rivets ("Y" bracket).
Spark plug wires and wire end terminals.
Allen wrenches for the timing wheel collar and pickup holder screws.
A tie-wrap for securing the pickup wire.
Mag hole cover.
Instruction manual.


MAGNETIC PICKUP
1/2 INCH SQUARE MAGNETIC PICKUP HOLDER
ALIGNMENT DOWEL & PIN
Y BRACKET
(Can Go On Either Side)
ALUMINUM RIVETS
NO.2 CYLINDER
NO.4 CYLINDER
PIN ALIGNMENT HOLES
TIMING COLLAR

TIMING WHEEL AND MAGNETIC PICKUP INSTALLATION

THE TIMING WHEEL BOLTS ON THE CRANK BETWEEN THE BLOCK AND THE PROP FLANGE. IF YOU HAVE A STARTER YOU WILL HAVE TO REMOVE THE STARTER BELL TO GET TO THIS AREA. BE SURE AND MARK THE POSITION OF THE PROP EXTENTION AND STARTER BELL ON THE PROP FLANGE, SO YOU WILL BE ABLE TO PUT THEM BACK IN THE SAME POSITIONS.

CLEAN THE CRANK AREA JUST IN FRONT OF THE CRANK SHAFT SEAL. THE EXPOSED PORTION OF THE CRANK SHAFT IS TIN PLATED. ABRASIVE WILL REMOVE THE PLATING. RECOMMEND CLEANER ONLY.

TEMPORARLY FIT THE RING COLLAR ON THE CRANK WITH THE TEETH TOWARD THE BLOCK. Slide it toward the prop flange.

NOW TO MOUNT THE PICKUP BRACKET. REMOVE THE NUTS FROM THE TWO BLOCK THROUGH BOLTS JUST BEHIND THE MAIN SEAL, TEMPORARLY BOLT THE "Y" PICKUP BRACKET ON THESE 2 BOLTS.

LOOSEN THE TIMING COLLAR AND ROTATE IT ON THE SHAFT UNTIL THE HOLE IN THE COLLAR IS ALIGNED TO THE TIP OF THE "Y" PICKUP BRACKET.

TAKE THE HALF INCH SQUARE MAGNETIC PICKUP HOLDER AND PLACE IT SO THE MAGNETIC PICKUP IS ON THE TIMING TEETH, USE THE SHAFT OF THE POP RIVET AS A GUIDE AND PUT IT THROUGH THE HOLE IN THE WOOD DOWEL AND INTO THE HOLE OF THE RING COLLAR TO ALIGN AND HOLD IT IN PLACE WHILE YOU MARK THE POSITION OF THE TWO HOLES IN THE SQUARE BRACKET ONTO THE "Y" BRACKET.

AFTER YOU HAVE MARKED THIS REMOVE THE "Y" BRACKET AND DRILL TWO 3/16 HOLES FOR THE RIVITS.

COUNTER SINK THE TWO HOLES IN THE BOTTOM OF THE "Y" BRACKET WITH A HALF INCH DRILL BIT. BUCK THE 2 RIVITS WITH THE HEADS ON THE BOTTOM OF THE "Y" BRACKET. REPLACE THE "Y" BRACKET ON THE 2 THROUGH BOLTS AND TORQUE THE BOLTS TO MANUFACTURERS SPECIFICATIONS. THIS IS 300 INCH POUNDS ON MOST ENGINES.

REMOVE THE SPARK PLUGS FROM EACH CYLINDER THEN ROTATE THE ENGINE UNTIL NUMBER 1 CYLINDER IS ON TOP DEAD CENTER. COMPRESSION OR EXHAUST STROKE DOES NOT MATTER. OR SET TIMING MARK ON TOP DEAD CENTER MARK.

LOOSEN TIMING COLLAR AND ROTATE IT UNTIL THE PIN ALIGNS WITH THE HOLE IN THE TIMING COLLAR. THIS SHOULD PLACE THE 11TH TOOTH PAST THE TWO MISSING TEETH DIRECTLY UNDER THE CENTER OF THE MAGNETIC PICKUP.

REMOVE THE COLLAR AND APPLY LOCK TIGHT TO THE CRANK SIDE OF THE COLLAR AND TO THE 2 CAP SCREWS. REPLACE THE COLLAR AND HOLD IN POSITION WITH THE PIN WHILE TIGHTNING. TRY TO KEEP GAP IN COLLAR ON BOTH SIDES EQUAL.

REMOVE THE WOOD DOWEL AND INSERT THE MAGNETIC PICKUP.
SET THE GAP AT AROUND .030. THIS IS TEMPORARY.

ROTATE THE ENGINE AND CHECK THE GAP AT SEVERAL POINTS TO BE SURE IT IS NOT OUT OF ROUND MORE THAN .005 OF AN INCH. IF SO CUT THE HIGH POINTS DOWN WITH A FILE.

LOOSEN THE SET SCREW ON THE MAGNETIC PICKUP AND SLIDE THE MAGNETIC PICKUP UP AND APPLY LOCK TIGHT ON SIDES OF MAGNETIC PICKUP AND ON SET SCREW.

SLIDE CYLINDER DOWN AND SET THE GAP BETWEEN THE PICKUP AND TIMING WHEEL AT .015 OF AN INCH AND TIGHTEN SET SCREW.

ROUTE THE PICKUP WIRE UP THE CENTER OF THE BLOCK. HOLDING IN PLACE WITH PULL TIES OR RTV.

MOUNTING OF THE DIRECT IGNITION SYSTEM "DIS"

THE FIRE WALL IS THE MOST COMMON PLACE TO MOUNT THE DIS. TRY TO LOCATE THE UNIT IN A POSITION WHERE ALL SPARK PLUG LEADS WILL BE THE SHORTEST POSSIBLE. THE DIS UNIT SHOULD BE ON A FLAT SURFACE THAT IS GROUNDED. IF NOT RUN A GROUND WIRE TO BASE OF THE UNIT. DRILL THE 4 MOUNTING HOLES AND SECURE WITH FOUR 1/4 INCH BOLTS. THE BLACK WIRE ON THE UNIT IS THE GROUND WIRE AND SHOULD BE ATTACHED TO A VERY GOOD GROUND. THE RED WIRE IS THE 12 VOLT WIRE AND GOES TO A 15 AMP 12 VOLT TOGGLE SWITCH ON YOUR DASH FOR TURNING THE UNIT ON AND OFF. THE OTHER SIDE OF THE TOGGLE SWITCH GOES TO THE PLUS ON YOUR BATTERY. USE 20 GAUGE WIRE OR HEAVER. IF YOU HAVE TO EXTEND THE RED WIRE, BE SURE AND SOLDER CONNECTION.

THE MAP SENSOR "MANIFOLD ABSOLUTE PRESSURE" IS LOCATED ON ONE END OF THE DIS UNIT. THERE ARE THREE WIRES COMING FROM THE MAP SENSOR THAT ARE CONNECTED TO THE SERIES OF TERMINALS.

THE RED WIRE IS CONNECTED TO THE PLUS FIVE VOLT TERMINAL.

THE GREEN WIRE IS CONNECTED TO THE TERMINAL MARKED MAP.

THE BLACK WIRE IS CONNECTED TO GROUND.

THE TERMINAL MARKED ADV CAN BE USED TO READ TIMING ADVANCE WHEN CONNECTED TO A DIGITAL VOLT METER. (DC VOLTS) ".01 VOLT IS EQUAL TO 1 DEGREE OF TIMING."

THE TERMINAL MARKED TAC IS FOR TACHOMETER.

TERMINAL	FUNCTION
+5V	+ 5 VOLTS TO OPTIONS
MAP	MANIFOLD VACUUM INPUT
GND	COMMON GROUND TO OPTIONS
RTD	NOT USED AT THIS TIME
ADV	OUTPUT TO VOLTMETER TO READ ADVANCE ".01 VOLT = 1 DEGREE"
TAC	TACHOMETER DRIVE OUTPUT

SPARK PLUGS AND WIRES:

Because of the hotter spark, it is recommended that a spark plug at least two heat ranges colder be used. The plug gap should .030 to .035.

INSTALLATION OF SPARK PLUG LEADS

It is essential to use a spark plug wire with not less than 5000 ohms per foot. Route the spark plug wires to the cylinder, keeping away from the exhaust pipe and try to keep from running two wires in parallel. Cut with enough length for three inches to go into the spark plug. Insert the brass tack into the center core of the wire. Slide the brass nut on the wire. Then slide the rubber washer up on the wire about three inches. Insert the wire into the spark plug, holding the wire down in the spark plug, slide the brass nut down with the washer inside of it. Tighten the nut on the spark plug while holding the wire to keep it from twisting. Do not over-tighten the nut, for this will separate the core of the wire. Hand tighten and turn an additional one-half turn with a wrench.

INSTALLATION OF MANIFOLD PRESSURE HOSE

If you already have a vacuum line for a manifold pressure guage, cut the line and place a "T" in the line and run a vacuum hose to the MAP sensor on the end of the DIS Unit.

SPARK PLUG WIRE HOOK-UPS

ENGINE:	COIL A	B	C	D
4 CYL.				
CONTINENTAL	1&2	3&4		
LYCOMING	1&2	3&4		
ROTORWAY	1&3	2&4		
VW	1&3	2&4		
6 CYL.				
CHEVY 2.8	1&4	2&5	3&6	
CONTINENTAL	1&2	5&6	3&4	
BUICK 3.0,3.8	1&4	3&6	2&5	
FORD 2.8	1&5	3&4	2&6	
FRANKLIN	1&2	3&4	5&6	
LYCOMING	1&2	3&4	5&6	
8 CYL.				
LYCOMING	1&2	7&8	5&6	3&4
MOST G.M. CHRYSLER AND AMC	1&6	4&7	5&8	2&3

WARNING

ON SOME ENGINES SUCH AS LYCOMING 540'S THE MAGNETO DRIVE GEAR IS NOT ATTACHED TO THE MAGNETO, BUT MUST BE REMOVED FROM THE ACCESSORY HOUSING OR IT WILL DO DAMAGE.

TECHNICAL TIPS

YOU MIGHT WANT TO SHIELD 12 VOLT WIRE GOING TO THE DIS UNIT.

RUN ONE SMALL WIRE FROM THE DIS UNIT LUG "ADV" TO THE PANEL, SO YOU CAN MONITOR TIMING OCCASIONALLY. IF TIMING IS NOT STABLE YOU PROBABLY HAVE A VACUUM LINE LEAK. DO NOT FLY UNTIL FIXED.

A PIECE OF SMALL RUBBER HOSE 3/4" LONG AND A PULL TIE FIGURE 8 THROUGH CENTER OF HOSE MAKES GOOD WIRE SEPARATORS AND STAND OFFS.

SOME HAVE USED A RED LIGHT IN CONJUNCTION WITH THE TOGGLE SWITCH TO REMIND THEM WHEN IT IS ON.

SUPER IMPORTANT!

Never, under any circumstances, apply power to or operate this system unless the coil outputs are securely and correctly connected to spark plugs whose bases are grounded to the system through the engine case! Doing so will very likely destroy the electronics within the DIS Unit.

IF YOU HAVE A PROBLEM

Engine turns over **but does not fire.**
Check the voltage to red and black wires attached to DIS unit. Red should bread 12 to 18 volts; black should read 0 volts.

Check spark plug firing. Remove spark plugs. With their wires connected, lay them on the heads (to ground the plug bodies to the engine) so you can observe sparks. Crank engine and look for sparks.

If you see no spark, check the pickup tip for proper gap and for possible damage by timing wheel. Check for damage to the timing wheel, too.

Check for broken pickup wire. Measure resistance between red and black conductors of pickup cable. You should see 600 - 800 ohms. If there is no reading, a wire is broken.

ENGINE FIRES BUT RUNS POORLY OR ERRATICALLY

Check spark plug wires. Are they connected properly and securely? Are any of the wires damaged" Are you using the correct spark plug wires"

Check to make sure the timing wheel and pick up have been properly installed, and that are correctly adjusted.

Check to make sure the DIS Unit has been properly adjusted.

Make sure the coils are tight and providing a good solid ground for the coils.

Check the mixture for an over-lean condition.

CORRECTION FOR MECHANICAL ERROR

(For Fine Tuning Only)

During installation you could have been off slightly when setting the engine on top dead center or when tightening the timing collar or magnetic bracket, etc., which could give you a timing error of plus or minus 2 or 3 degrees.

This can be verified and corrected by the following:

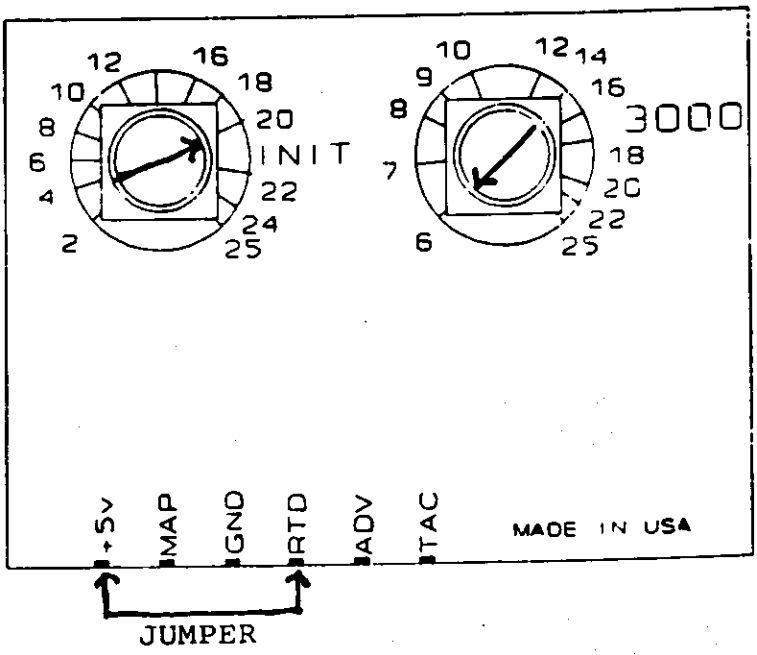
You will need an automotive strobe light attached to # 1 Spark Plug Wire for the Lycoming, # 4 Spark Plug Wire for the Continental.

Disconnect the red wire (+5 Volts) that goes to the Manifold Pressure Sensor. Apply a jumper wire between the +5 Volts and the RTD. This will eliminate electronic timing so the unit will fire at 0°.

On the back side of your starter ring there are some marks for timing. These marks line up with the top center seam of the block for timing.

Start the engine and strobe the timing mark. (Around 800 RPM's) This should be 0°.

If it is off -- EXAMPLE -- 2° before 0° you will need to subtract 2° from your base timing to compensate. If it is after 0° add the degrees to the base timing.



TO SET YOUR BASE TIMING:

Remove the 2 phillips screws on each end, at the base of the aluminum box. This will expose 2 knobs. One labeled "INT" and one labeled "3000". The one labeled "3000" will always be set at 6 degrees all the way down.

Attach a digital multi-meter on the DIS unit to the Lug marked "ADV" and to Ground. Set the multi-meter on DC Volt.

Turn the unit "ON". DO NOT START THE ENGINE. Take a reading from the multi-meter.

The knob labeled "INT" is the setting you see on the multi-meter.

Your base timing is figured like this:

Manufacturers recommended timing minus 4.5° + or - mechanical error = "INT" Setting.

EXAMPLE:

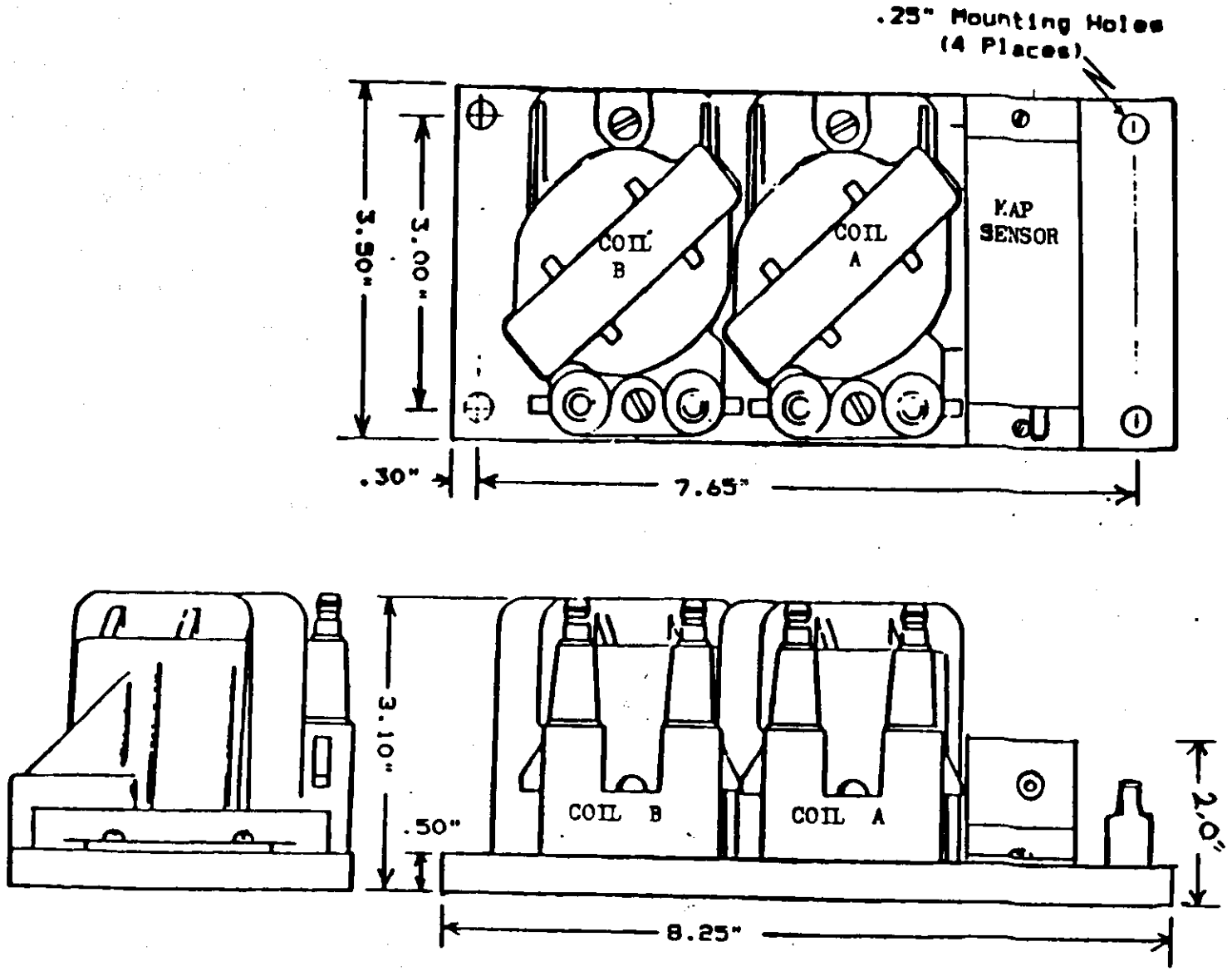
Lycoming timing of 25° minus 4.5° + 2° ATDC or - 2° BTDC Using - 2° BTDC =

Base Timing of 18.5°.

18.5° is the "INT" Knob Setting.

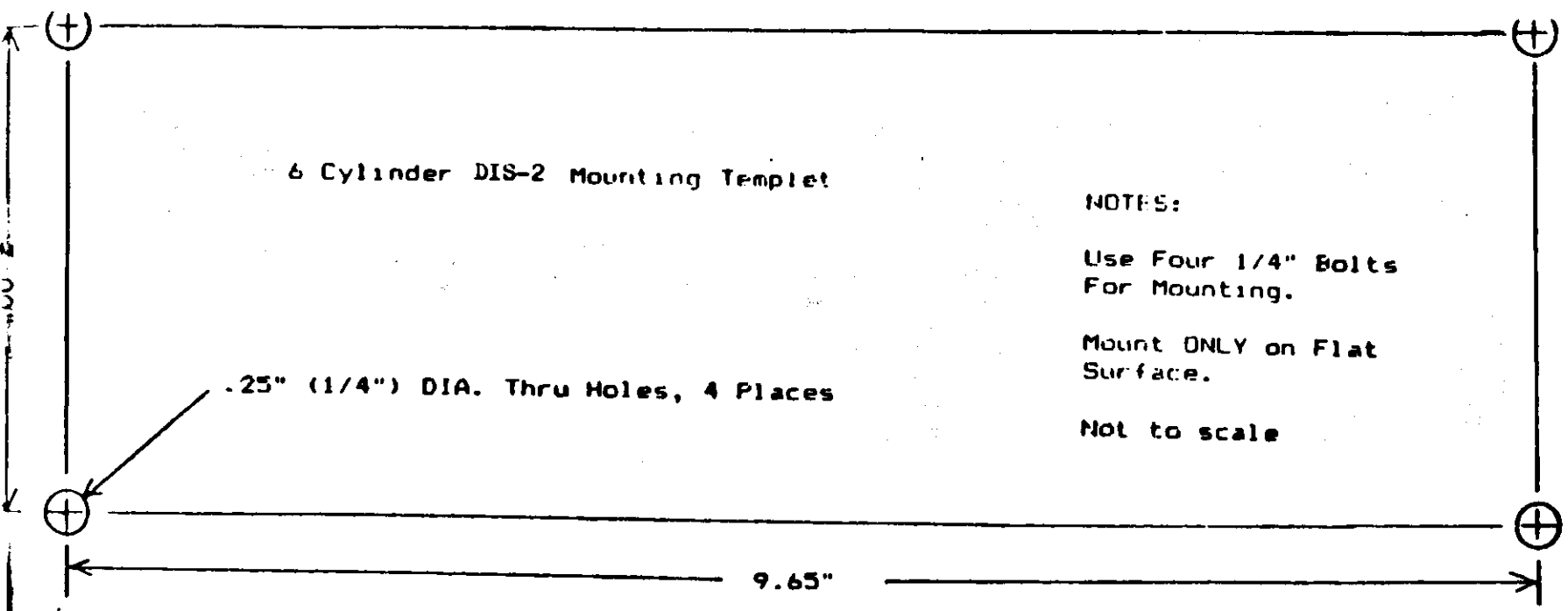
Replace the cover on the 2 Knobs with the 2 Phillips screws. Plug the red wire, +5 Volts, back on.

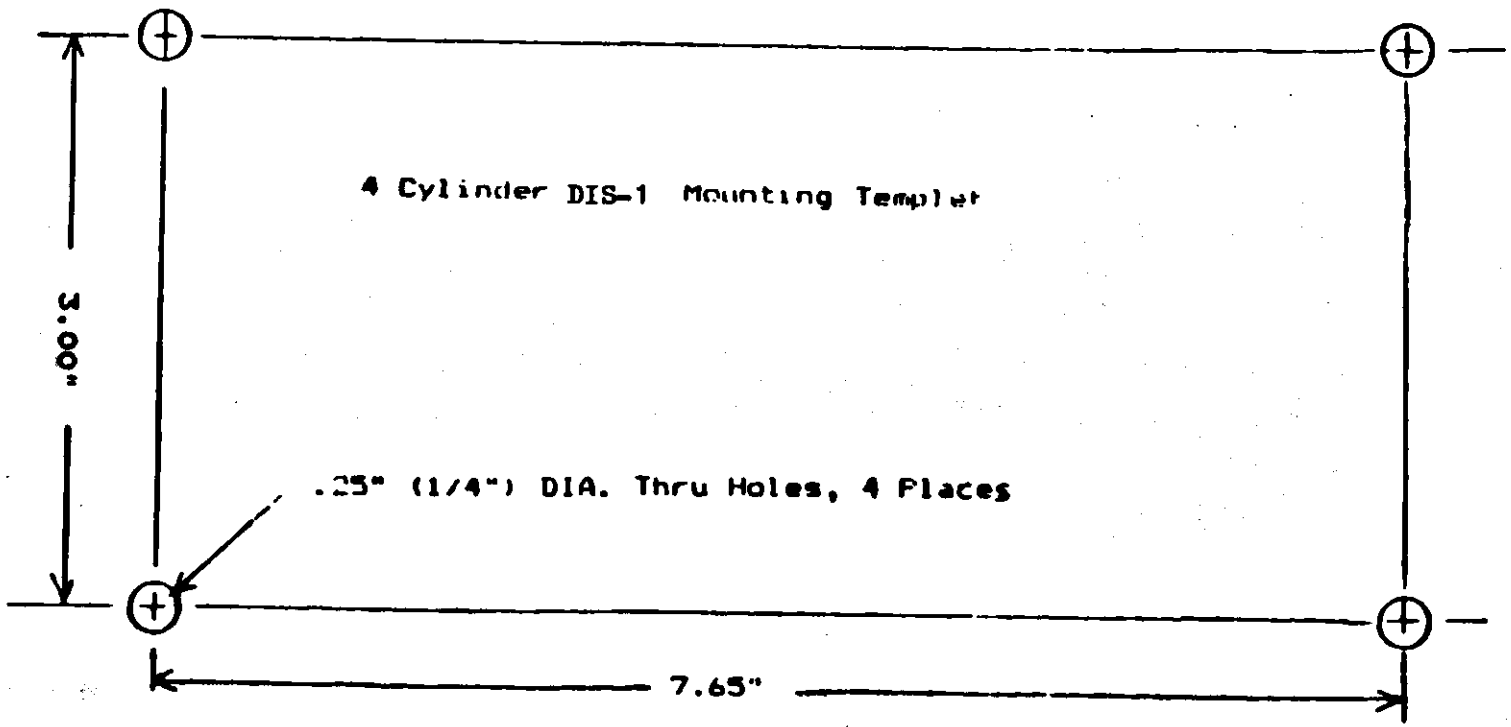
You must remember from now on the timing number you read on the DIS unit will be off by the mechanical error.



NOT TO SCALE

4 CYLINDER DIRECT FIRE & CALIBRATION UNIT
OUTLINE


6 Cylinder DIS-2 Mounting Templet
NOTES:
Use Four 1/4" Bolts For Mounting.
Mount ONLY on Flat Surface.
Not to scale
.25" (1/4") DIA. Thru Holes, 4 Places
9.65"


4 Cylinder DIS-1 Mounting Templet
5.00"
.25" (1/4") DIA. Thru Holes, 4 Places
7.65"