

The refined Turtle



Assembling the turtle produced a few problems for Stephen Thomas. So after a period of teeth-gnashing and hair-tearing he has made some mechanical and electronic modifications. He now has a refined pet, better trained than the original rascal.

Stephen Thomas

Mechanical modifications

I assembled the turtle as described (April, May and June issues of ETI) and found that the pen solenoid plunger not only touched the base plate, but was pushed in by about 4 mm. I thought that if I glued the grommet under the plunger, as was suggested, the plunger would have even less space in which to move.

So I figured out that the top plate could move up by 12.7 mm (that's half an inch) and would still fit comfortably under the dome. This led to the revised mounting arrangements shown in Figure 1(b).

A side effect of this method is that the pc board can be secured before the long bolts are installed, so that less juggling is required to get the top plate screwed down. This has benefits when you come to mount further pc boards in the Turtle at a later date.

And I found another problem with the solenoid. The bolts holding down the plate, which stops the plunger from twisting, made it difficult to mount the speaker. This situation was made even worse by using Silastic which, although it is an excellent sealant, is a somewhat dubious glue. So I made a little widget out of masonite to go between the solenoid and the speaker (with a cutout for the bolt head) and stuck them all together with epoxy as shown in Figure 2.

I had a problem with the pen alignment and could not persuade the confounded animal to produce coherent graphics. The main problem was at corners, where the pen would describe a sort of random small arc before setting off on a straight line again. Wobble in the solenoid plunger was part of the problem. I could not adequately adjust the centering of the pen either. I altered the pen assembly as shown in Figure 2. I cut and bent up a four-fingered 'claw' from sheet metal and attached it to the

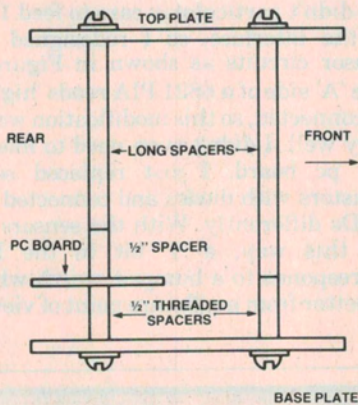


Figure 1(a). Original mounting arrangements.

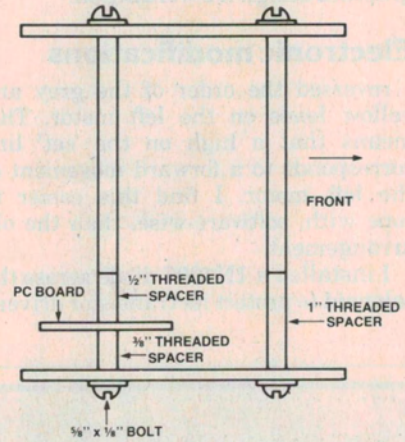


Figure 1(b). Better arrangement for mounting top plate to base plate.

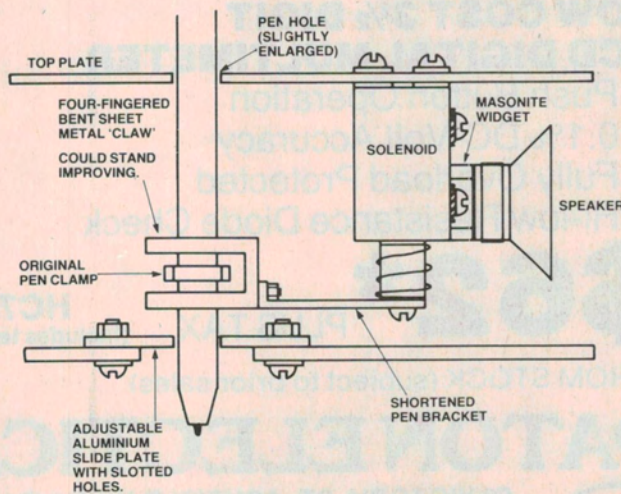


Figure 2. Modifications with aluminium slide plate and widget.

original pen bracket. The pen is held loosely in this claw with the original pen clamp permitting limited up-down movement. The bracket also permits an amount of horizontal movement. To pos-

ition the pen, I made an adjustable 'slidey' plate from aluminium and bolted this over the original pen hole in the base which I had enlarged. I cut slots in the base and corresponding slots in the

The refined Turtle

adjustable plate, but running at right angles to the slots in the base, as shown in Figure 3. This permits a considerable latitude of adjustment for perfect centering of the pen.

With the pen set up this way the graphics improve out of sight and any wobble in the solenoid plunger is immaterial.

If I can lay my hands on another wooden 'foot', I am going to put it on the back of the turtle. I have a rather long, heavy control cable and I find that the foolish reptile will occasionally lurch backwards, completely ruining the graphics design it's working on.

Electronic modifications

I reversed the order of the grey and yellow leads on the left motor. This means that a high on the 'set' line corresponds to a forward movement of the left motor. I find this easier to cope with, software-wise, than the old arrangement.

I installed a 1N4007 diode across the solenoid to protect its transistor driver.

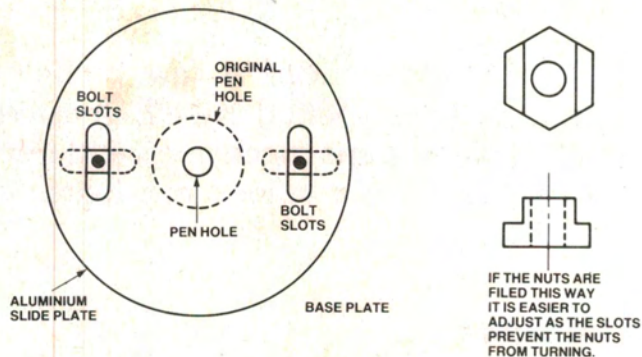


Figure 3.

I didn't particularly care to feed 12 V to the interface, so I redesigned the sensor circuits as shown in Figure 4. The 'A' side of a 6821 PIA reads 'high' if unconnected, so this modification works very well. I didn't even need to modify the pc board. I just replaced some resistors with diodes and connected the LEDs differently. With the sensors set up this way, a '1' bit in the PIA corresponds to a bumped switch which is better from a software point of view. ●

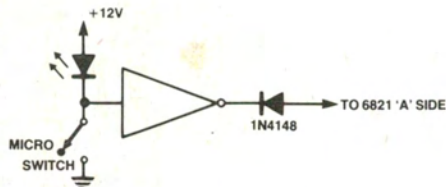


Figure 4. Redesigned sensor circuits.