Telling Time The American Way

By Joe Senner
Sometime in 1994

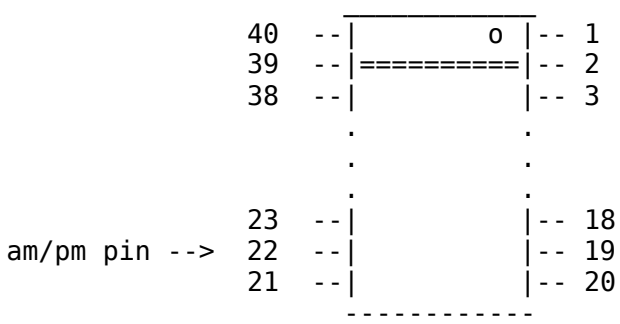
> Note: this article was written for the Hill Country BMW Riders newsletter and as such isn't really written as step by step instructions like a "how to" probably should be. If you can put up with the flowery jibberish you'll wind up with the basic information, so hang in there.

Everything has its place. You'd think that with degrees in both electronics and computer science, military style time would be the measure of choice for me. Most of the people I know like military time, they either grew up with it or they've been using it for so long it's no big deal any more. Of course, most of the people I know are computer nerds. Military time is great for computers. It doesn't take any extra effort on the computer's part to keep track of 13-23, but it does for me. Not once during my childhood did I hear the words, "It's 2130 hours! You get to bed right now!". I'm 'programmed' to understand 12 hour time plain and simple. Part of what sold me on my '92 K100RS was the attention to the little details that the other manufacturers tend to skip over as 'frivolous' or 'unnecessary'. A clock is one of those little details. As glad as I was to have the clock, I had a hard time adjusting to the 24 hour display. Something had to change, and as you probably guessed it wasn't gonna be me. Besides, I don't usually have trouble distinguishing AM from PM when I'm on my motorcycle.

Clocks are simple things, even if they're stuffed inside an expensive new BMW motorcycle. The hardest part of this project was tearing open the instrument cluster on that expensive new BMW motorcycle of mine. It's quite simple to pull the cluster off the bike, but actually opening it up brought on enough mental anguish to keep me sedated for more than a little while. I won't go into the details of actually getting the clock board out of your instrument cluster, it's a fairly straightforward operation involving pulling out some screws, unplugging a few connectors, and lifting out the tach assembly. With the tach out of the case the clock board pops out by pulling back on a couple of tabs. One note of caution, the chip used in the clock is sensitive to static electricity. It's very unlikely that you'll damage it performing this operation, but it'd be nice if you didn't rub ballons on your head just before you did this. Take your shoes off and you'll be fine.

The clock chip itself is made by Signetics, and is only sold in Europe. When the Signetics field tech told me that last part I began to worry that perhaps this chip was manufactured for a market where 12 hour clocks weren't a requirement. Luckily that's not the case. There is indeed a 12 hour mode for this clock chip. The first step in

converting this clock into what I like to call 'normal' time is to identify which one of those 40 little wires (yep, there's 40 of 'em) coming out of that little chunk of black plastic is the one you want. Just like a firing order, there's a specific order to the pins on the clock chip. With the clock board out and ready, hold it so you're looking at the side of the chip with the lettering on it. It'll have a bunch of stuff on it, amongst which you'll find the number '1171'. On one end you'll find a white line stamped across the chip. there may also be a small white dot on one corner of the chip. Hold the clock so that the writing on it is facing you, and the line (or dot) is up. The pin on the top right, that's #1. The pins are numbered down the right side, and up the left side like this (I left out the pins in the middle for this drawing):



The pin that controls the 12/24 hour format is pin #22. This pin is like a yes or no pin to the clock chip. If it's connected to ground, that means no. If it's connected to positive, that means yes. For this particular chip, 24 hour mode is selected when pin 22 is connected to ground. To convert to 12 hour mode you simply need to connect it to positive. There is one catch, these types of chips don't like to have their inputs connected to full positive voltage (i.e., the main voltage supply should be just a bit higher than the voltage on any of the input pins). According to the Signetics technician, this particular chip would probably be ok if the input voltage was the same as the main supply voltage, it's designed for rough use and harsh conditions, but to be on the safe side a 'pullup' resistor should be used. A pullup resistor is nothing more than a small resistor placed between the input and the main voltage supply to block a little bit of the voltage that gets to the input. The good news is, there's already a pullup resistor on the clock board and as luck would have it, it's connected to pin #23, right next to our all important pin #22.

Keeping track of exactly which pin is #22, flip the clock over and note where the pin is soldered to the board. Follow the thin metal trace that leads from the pin to where it meets up with another metal trace. You'll need to cut this trace between the pin and the connection with the other trace. it doesn't go very far before it meets up with the other trace, only about 1/8" of an inch and the trace itself is pretty thin. Get out your exacto knife and cut the trace. While the trace is thin it's still metal and will require firm pressure and probably two or three passes to cut all the way through. The good part is if you slip and run the knife across another trace you probably won't cut it all the way and make a mess of your clock board. After the trace is cut it's a good idea to take an ohm

meter and touch the probes on either side of the cut to make sure it doesn't conduct. Keep in mind that the meter will show that there's a little bit of a connection, like a bad connection on a battery. That's because the meter is reading a slight connection through the chip and back around to the other side of the cut. As long as you don't have a dead short across the cut you're ok.

The hard part's over. Now that you've got the pin disconnected from ground, you need to connect it to positive. Get your soldering iron warmed up and a piece of solder ready. Use a low wattage iron! 15 watts is best, 25 watts is ok, but 30 watts is probably on the high end of the scale. If you don't have a low wattage soldering iron and the accompanying small diameter electronics solder, grab your clock board and give me a call. I'd much rather you used my solder and iron than ruin your not so cheap BMW clock. With the iron fully heated and ready to go, solder pins #22 and #23 together. This is easiest if you just put a dab of solder on the pins where they're connected to the board.

That's it. When you get everything put back together and plug in the instrument cluster you'll have a 12 hour clock. Just to be sure, hit the hour set button and run it through all the hours. Maybe next month I'll get rid of the mechanical analog dials and replace them with digital instruments, yea, that's the ticket...