LUX-TX9000 With X10 MS12A Mod

By B. James 2009

Ever had a situation where you needed some kind of X-10 control but had no power line to tie to nor wanted exposed wires? This lets out the Power Flash and any other X-10 Module for this project. Well that was the boat I was in when I wanted to have my Wall Thermostat control a window Air Conditioner.

The Components used in this project were:

- LUX-TX9000 Programmable Thermostat (picked because it had lots of spare room in the case and was powered by 3VDC the same as the MS12A
- X-10 MS12A – To Send RF X-10 On/Off Commands
- X-10 TM751 – To Take the RF Commands and put them on the Power Line
- X-10 PAM04 – 220VAC 20A Appliance Module
- SPST Micro Toggle Switch (Optional)
- Solder, Soldering Iron, 10K Resister, 47K Resister(optional), 500K Resister
- Window Air Conditioner (Optional)

What I needed to do was use a good set-back thermostat to trigger an X-10 heavy appliance module for a window air-conditioner. So my solution was an X-10 module that did transmit RF, like a motion detector, and modify it to use the LUX AC ON/OFF Pins to trigger an X-10 MS12A On/Off RF command, and then use a TM751 plugged in out of the way to trigger the PAM04 220VAC 20A Appliance Module. It worked like a charm. (Note any X-10 module could be used in the place of the PAM04, just use what you need for what you want to control, could be a Lamp Module…)

I picked the X-10 MS12A Motion Detector, but a 14 or 16 will work just as well, you will just need to figure out where to get in to the trip/reset part of the circuit, this is not as hard as it sounds, but you can use the 12A if you think that might be a problem for you, since I show below where to tap in to it. The parts are all labeled on the Printed Circuit Board (PCB) in the MS12A. Also here is a link to a site that has all kinds of mods for motion detectors that will get you the same effect as this, in fact I used a couple of their pictures since they came out better than mine : **http://www.laureanno.com/x10-mod1.html**

Making the modifications:

1. Remove the batteries from the MS12A, remove the cover, and then remove the PCB.
2. Find and Cut Jumper D1 in the MS12A
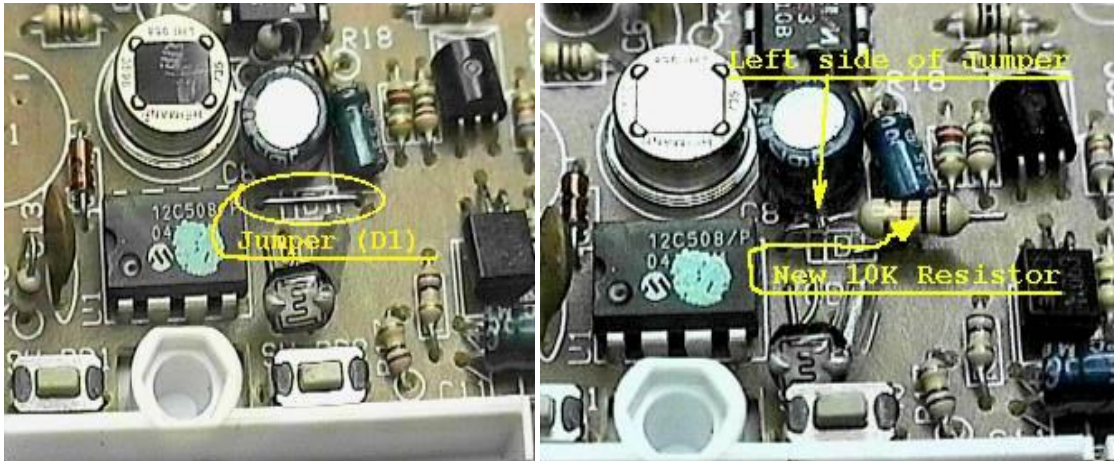
3.
4. Add the 10K Ohm resister to the LEFT side of the cut jumper D1
5. Next solder a wire on to the **Left** side of the 10K resister and route that to LUX **RC** Pin, then solder a wire from the **Right** Side of the 10K resister to V**-**. Also cut the **RC** pin so it no longer make contact with the LUX wall plate since you will not need that, that is only used to tie to a normal central AC control.
6. Next solder a wire to the V+ on the MS12A, that is easy to find, just follow the red wire from the battery area to the MS12A PCB. (If you want to be able the turn off the MS12A control, and then run the power wire through the SPST Micro Switch before going to the PCB, this will let you turn off power to the MS12A.
7. Next Solder another wire to the V+ on the MS12A and then solder that to the 500K Ohm Resister, from the other side of the resister, solder a wire to the resister and route it to Pin **Y** on the LUX, as with Pin RC, cut Pin **Y** on the LUX for the same reason.
8. That is it on the wiring, but there are 2 other things that are optional, refer to the included schematic below for these mods. On is you can remove the Light Sensor (CDS1) and replace it with a 47K Ohm resister, or optionally just put a piece of black electrical tape over it. The other Mod is you can cut the PCB trace that feeds power to the motion sensor (IR1), this will save power but again is not really needed for power save but I was a purest so did it anyway, you can optionally cover the motion sensor with a thick pad, like one of those little stick on felt pads to keep from scratching tables. The last thing you want is motion to get detected and trigger this…
9. Now look at my picture for a good place to mount the MS12A PCB.

10. Use double-sided stick ¼" foam tap pads for this to make sure nothing shorts out when mounted.
11. Now put the batteries in the LUX (2 AA) and program the MS12A per the instructions in the manual to send the House and Unit Code you want to use. (Make sure if you added the power switch in Step 6 that it is ON.)
12. You will also need to bend over any parts standing too tall on the MS12A, just take care doing this, there are a couple transistors, and a Cap you will want to bend down so the LUX Control unit snaps on to the Wall Plate ok. Plug the LUX TX-9000 in to its wall plate.
13. Next, Plug in the TM571 with the House Code you have picked
14. Next, Set the control module House and Unit code to what you picked the MS12A to send. Plug in the Module you have picked to control in to the wall, in my case it was the PAM04
15. Plug in your device (Air Conditioner in my case) to your module, turn it on.
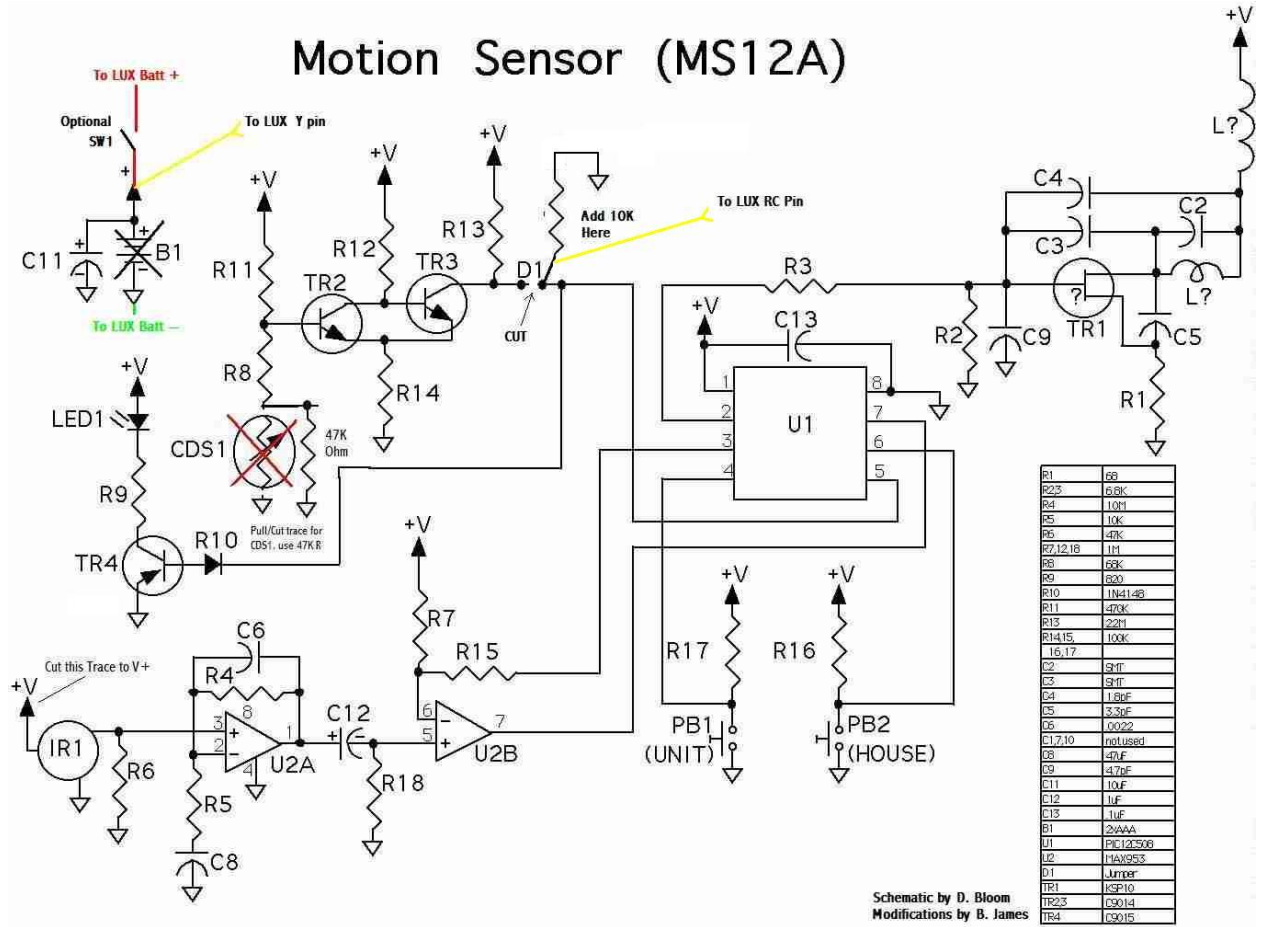
Testing

The X-10 Transmitter is mounted in the LUX TX-9000 case and attached to +3VDC as shown. Then 3VDC from +V is routed through pins "Y" and "RC" to R11, when the Air-Conditioning comes on +3VDC is sent to R11 as shown, this sends one X-10 On command. When the contacts between "Y" and "RC" open, the Transmitter sends one X-10 Off Command.

1. On the TM751, Hit the ON/OFF button to ensure it turns your module on and off. If that works you are now ready to see if you have the LUX and MS12A set-up right. Now turn the TM751 off. (Remember with AC units you should wait a few minutes before turning them on and off…)
2. Set the LUX to Cool Mode
3. Turn down the set point until the LUX "calls for AC" you will see the AC indicator in the LUX LCD display, this should trigger the X-10 On Command and you'll hear the TM751 click, then the AC Unit will come on.
4. Wait a few minutes and then Turn up the set point until the LUX stops calling for AC, you will see the AC indicator in the LCD display go out. Don't worry if it lingers a minute or so the LUX thinks it is controlling a central AC unit and usually runs for a minute or so when it's time to turn it off.
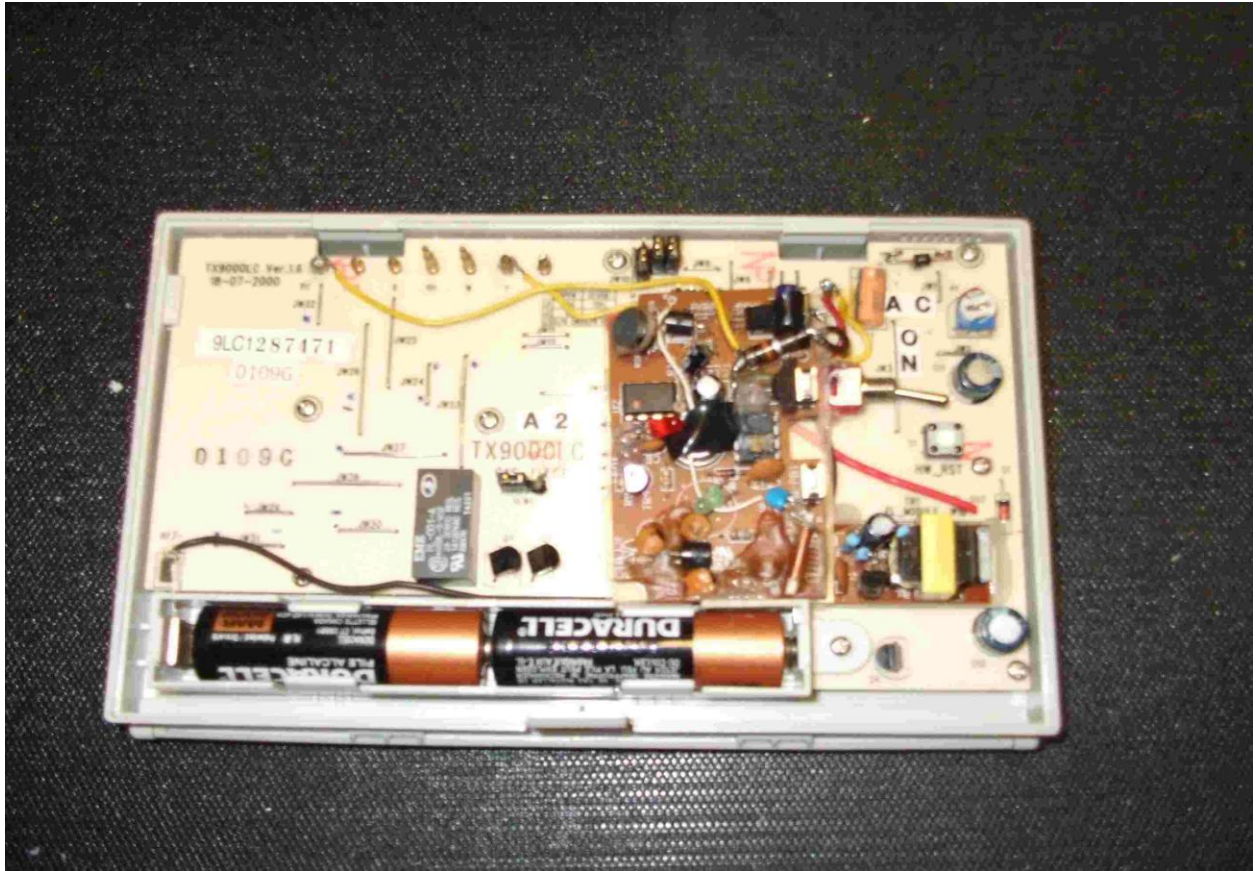
That is it; congrats you now have a remote controlled wireless rig from the control point. Now for a schematic and some pictures:
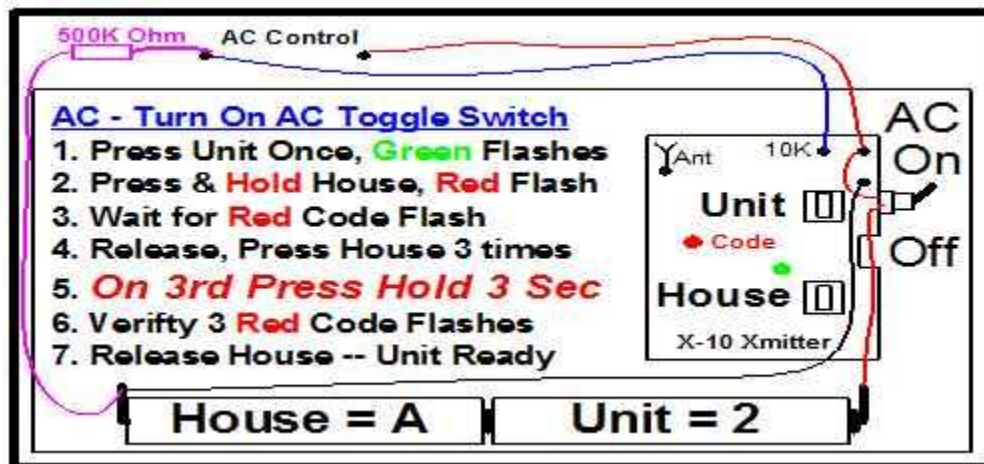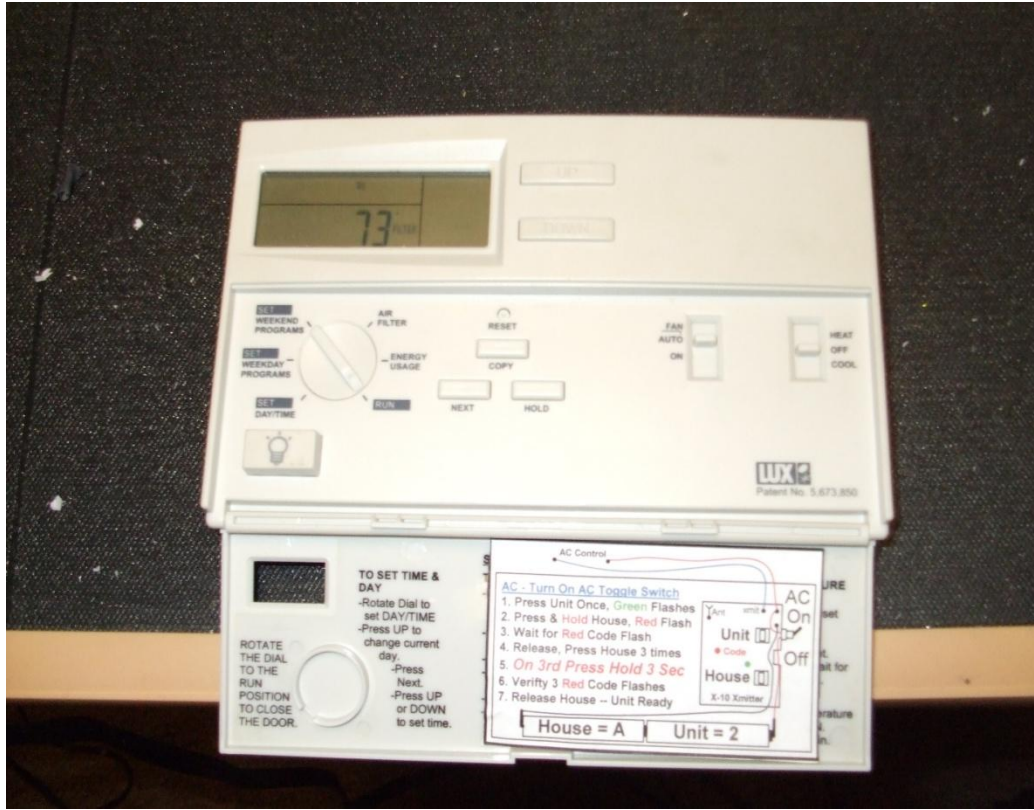
Schematic

Motion Sensor (MS12A)

Schematic by D. Bloom
Modifications by B. James

R1	68
R23	6.8K
R4	10M
R5	10K
R6	47K
R7,12,18	1M
R8	56K
R9	820
R10	1N4148
R11	470K
R13	22M
R14,15, 16,17	100K
C2	SMT
C3	SMT
C4	1.8pF
C5	3.3pF
C6	0022
C1,7,10	not used
C8	47µF
C9	47pF
C11	10µF
C12	1uF
C13	1uF
B1	2xAAA
U1	PIC12C508
U2	MAX953
D1	Jumper
TR1	KSP10
TR23	C9014
TR4	C9015

LUX Inside View

Settings Instructions

500K Ohm   AC Control

AC - Turn On AC Toggle Switch
1. Press Unit Once, Green Flashes
2. Press & Hold House, Red Flash
3. Wait for Red Code Flash
4. Release, Press House 3 times
5. *On 3rd Press Hold 3 Sec*
6. Verifty 3 Red Code Flashes
7. Release House -- Unit Ready

Ant   10K

AC On

Unit

Code

Off

House

X-10 Xmitter

House = A   Unit = 2

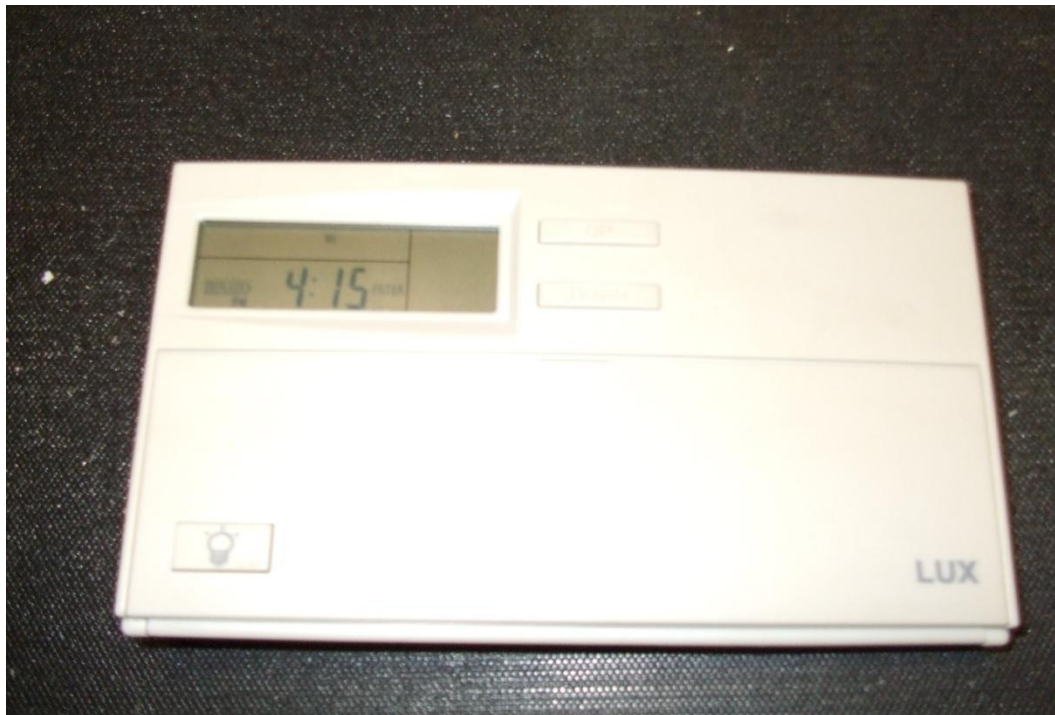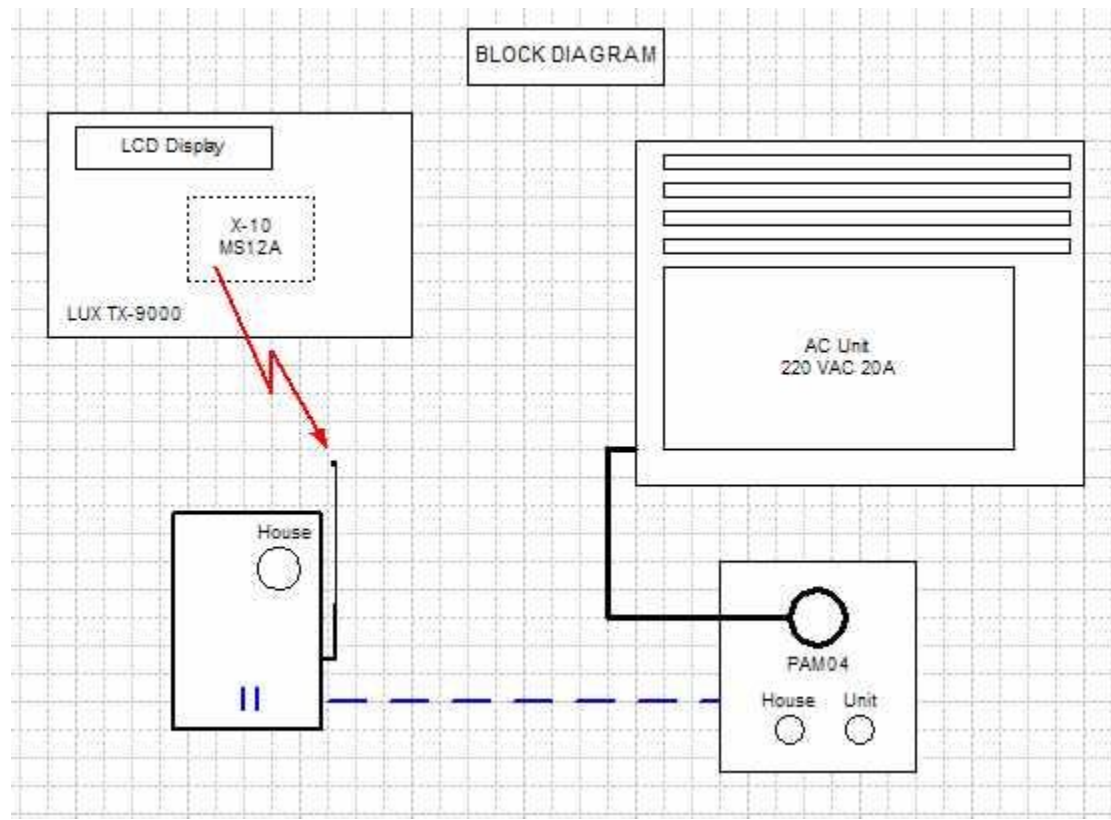## LUX Control Cover Open

LUX Finished

Block Diagram

Final Notes:

- This obviously voids any warranty on the LUX and X-10 MS12A
- There is no exposed high voltage, in the LUX when it is not on the wall mount; 3VDC is the max you are exposed to.
- Once it is mounted on the wall, there is 24VAC, but you really can't touch it since the LUX picks that up from the wall mount that is wired to your heating system potentially, still not high voltage but take care not to zap yourself when the wall plate is exposed.
- **You take full responsibility for all aspects of this project.**
- Look at the web site I provided at the top, you may prefer those modifications but take note, they are for DRY (no voltage) contact control and in this case you have 3VDC running around on RC and Y, don't fry your MS12A using a dry contact design!

Prepared and Designed by B. James with input from users on alt.electronics, X-10 Schematic, D. Bloom (photo of MS12A) – May be copied and posted provided credits are included. LUX & X-10 Retains all Patent and Copyrights to their devices. I release any rights to the use, re-use of this X10/LUX project, it is free to use!