MODERN ELECTRONIC PACKAGE FOR THE WANG 300 SERIES CONSOLES

The Modern Electronic Package connects to a Wang 300, 310, 320, 360 , or 362 console and brings it to life, without needing the original Wang Electronic Package. It closely emulates the original Wang calculator behavior and provides a digital nixie clock feature.

Robert Alexander

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Contents

INTRODUCTION

The Wang 300 Series calculators were built in the 1960s and '70s. They consisted of a large Electronic Package (EP) connected to multiple keyboard/display consoles. The calculations were all done in the EP. The consoles were merely "dumb terminals" with a keyboard, a nixie tube display, and nothing else.

Original EPs are rare, expensive, and frequently broken. They use discrete diode-transistor logic, three different voltage levels, and core memory, so they're a challenge to repair.

The Modern Electronic Package (MEP) is a small box that connects to Wang 300 series consoles and brings them to life without the need for an original EP. Not only does it closely (but not perfectly) emulate the original Wang calculator's behavior, but it adds features like a self-setting clock.

The MEP was developed by me, Bob Alexander. It did not have the benefit of a team of engineers and quality-assurance testers, so it's possible you will discover bugs. If you come across any, please contact me at WangCalculator@LoadAccumulator.com. While I cannot make promises, I take pride in my work and may be able to fix the bugs.

The MEP provides four applications:

- A Wang calculator emulator
- A clock
- A Configuration application
- A Keyboard Test application

You can see a video demonstration of the MEP at https://youtu.be/xaBMdnLtWFM.

The MEP supports the Wang 300K, 310K, 320K, 320KT, 320KR, 360K, 360KT, and 360KR consoles.

Wang 362K consoles will behave like 360K consoles, i.e. the register keys will control four registers, not 12.

The MEP has not been tested with a CP-1 Card Programmer. The CP-1 works in a similar way to the trigonometry consoles, so it is likely (but not guaranteed) to work with the MEP.

The MEP has not been tested with the 370 consoles, consoles with a connector for the Item Counter, T connectors, PT connectors, or MX multiplexers.

SETUP

Intact Wang 300 series consoles have a cable coming out the back with a Centronics connector at the end. This plugs directly into the front of the MEP. A 12V power adapter (included) plugs into the back. The ON switch is at the front.

Note that the Wang console also has an ON switch. Both the MEP's and console's ON switches must be on to use the calculator.

TESTING AND TROUBLESHOOTING

Once the MEP is set up, there's still no guarantee things will work. Keys might not work or nixie tubes might not work.

The MEP includes an app for testing the keyboard. To activate it, hold down any key on the console, except for ENTER, CLEAR ALL, or any trigonometry key, for three seconds. The display will go blank.

Now, when you press a key (other than a trigonometry key), its code will be displayed as an octal (base 8) number. The one exception is the CLEAR ALL key which is wired separately from the other keys. The code displayed for CLEAR ALL is 99.

 If any of the keys on your keyboard fail to work, their switches likely need to be replaced. This will require opening the console, removing the keyboard PCB, desoldering the switch, and soldering in a new one. The switch is a Honeywell 11SM1-T, and is still being manufactured. You can look for it at DigiKey, Mouser, or on eBay.

To exit the key testing app, hold the CLEAR ALL key down for three seconds.

If the number keys on your keyboard are working, it's easy to test the nixies. Just fill the display with all 1s, all 2s, etc.

If a specific nixie tube never displays anything, then either the tube is bad or the circuit driving it is bad. I have no experience fixing this, but Brian White has written up his work repairing the display at https://brianwhite94.wixsite.com/electronics/wang-320-calculator-ii.

If a single digit in a nixie tube doesn't work, it's possible that it's suffering from cathode poisoning, Please read about cathode poisoning at http://www.tube-tester.com/sites/nixie/different/cathode%20poisoning/cathode-poisoning.htm.

If a nixie does not work at all, you might need to replace it. Search the web for NL-840 nixie tubes.

THE WANG CALCULATOR APPLICATION

The Wang calculator has a manual of its own that you can download from https://www.galacticstudios.org/wp-content/uploads/2019/08/Wang-300-Series-Instruction-Manual-Vol.-1-1968.pdf. The emulator closely matches the Wang calculator's original behavior (the only deviation I'm aware of is that if you multiply large numbers by zero, the original Wang displays the answer with multiple digits before the decimal, like 000.0000000, whereas my emulator just shows .0000000000).

THE CLOCK

If the console is left unused for 5 minutes, it will switch to Clock mode. To return to Calculator mode, press any key (except a trigonometry key).

The clock gets its time from GPS. When you first turn the MEP on, it might take a few minutes for the GPS receiver to get a satellite fix. The time will flash 12.00 until it does. It's possible that the clock will initially get an incorrect time. Give it another few minutes and it should get the correct time.

If, after 10 minutes, the clock has not set the correct time, you might be in a building that blocks GPS signals.

The clock has several configurable options. See the Configuration section.

If the clock is displaying 12 hour time, the decimal point after the time will indicate PM. If the clock is displaying 24 hour time, there is no PM indicator.

At midnight, the clock will spend one minute cycling through all the digits. You will see it flash all 1s, all 2s, etc. This is to prevent cathode poisoning.

CONFIGURATION

The MEP has several configuration options. You enter the Configuration application by holding the ENTER key down for 3 seconds.

You will see either "12   1" or "24   1". The rightmost number indicates the option; the leftmost number indicates the current setting of the option.

For a given option, you can change the current setting by pressing the + (Plus) or – (Minus) keys. To advance to the next option, press the ENTER key. When you're done, hold down the CLEAR ALL key for 3 seconds to go to the Calculator app.

The options are:

Option Number	Option	Possible Values	Notes
1	Hour Mode	12 24	Indicates whether the time is displayed in 12 hour mode, with a PM indicator, or 24 hour mode.
2	Time Format	12.00 12.00.00 12.00 1.31	Indicates whether the time is displayed as hours and minutes; hours, minutes, and seconds; or hours, minutes, month, and date.

3	Time Zone	-12.00 -11.00 : : +14.00	Indicates the time zone offset from Universal Time. Set this to the *Standard Time* (not Daylight Saving Time) offset of your time zone from UT. For example, if you're in the Eastern time zone of the US, set this to -5.00 (even if you're doing this in the summer and DST is in effect).
4	DST	0 1 2	Indicates whether Daylight Saving Time is off (0), on (1), or automatic (2). If automatic, options 5 through 8 indicate when DST starts and ends.
5	DST Start Month	1 2 : : 12	Indicates the month that DST starts. Used only when DST is automatic.
6	DST Start Week	1 2 3 4 5	Indicates the Sunday that DST starts (1st, 2nd, 3rd, 4th, or last) when DST is automatic.
7	DST End Month	1 2 : : 12	Indicates the month that DST ends. Used only when DST is automatic.
8	DST End Week	1 2 3 4 5	Indicates the Sunday that DST ends (1st, 2nd, 3rd, 4th, or last) when DST is automatic.