

Replacement display for the Standard C58

I bought my C58 2m transceiver new in 1981 but over about 10 years the LCD display became unreadable. (*This was not uncommon with early generations of LCD – Ed*). Standard was acquired by Yaesu and the C58 replaced by the FT-290 – electronically almost identical but physically slightly larger. The FT-290 display was also prone to failure and a replacement display for that radio using 7-segment LEDs has previously appeared in *RadCom* [1]. Similar work was carried out by ZS1KE [2] between 2015 and 2019. **Photo 1** shows my (modified) Standard C58 and **Photo 2** shows the failed original display – note how segments are partially ‘lit’ even though it is disconnected from all circuitry. The C58 front panel display aperture is a mere 20 x 8mm and the original display has only 4 characters, plus a row of fixed values, to show memories, and various ‘significant’ dots.

Both the Yaesu and Standard use a custom chipset to process and display the frequency and other information. The display module is provided with four data lines, a chip select (CS) and strobe (STB). Six bytes of data are passed for each display cycle, of ~1.3ms, enabled by the CS line. These are passed as twelve nibbles [*sometimes ‘nybble’, to match ‘byte’ – Ed*], each nibble is validated by the STB line. In the C58, unlike the Yaesu, the ~8µs strobe pulses are equally spaced at ~100µs intervals. **Table 1** shows the data line relationships, for 146.000MHz.

This gives, in hexadecimal: 30; 30; 30; B6; 20; 20. The first four bytes contain the frequency information, as ASCII equivalent



PHOTO 1: My vintage Standard C-58 (after the display modification).

values (when viewing the six least significant bits). They are sent with the least significant value first. The MSB in the fourth byte signifies the decimal point. Hence, we have 6.000 (MHz).

Various bits within each of the six bytes are used to provide other information, as shown in **Table 2**.

Three other lines are provided to the display module: 5V, LCD bias and a clock. These three lines and the data are provided on two connectors to the motherboard, which can be seen in **Figure 1**.

The design

The replacement display is limited by available space and the viewing aperture. A MIDAS brand 8 character x 2 line display (MC20803A6W-GPR) was chosen for its small size and a custom PCB was designed to support this with a PIC based microcontroller (PIC16F627A-I/SO).

With eight characters available, I decided to display the whole frequency. On the original display, one cannot see the MHz value when the radio is selected to 100Hz steps. The odd and even MHz ranges are indicated by

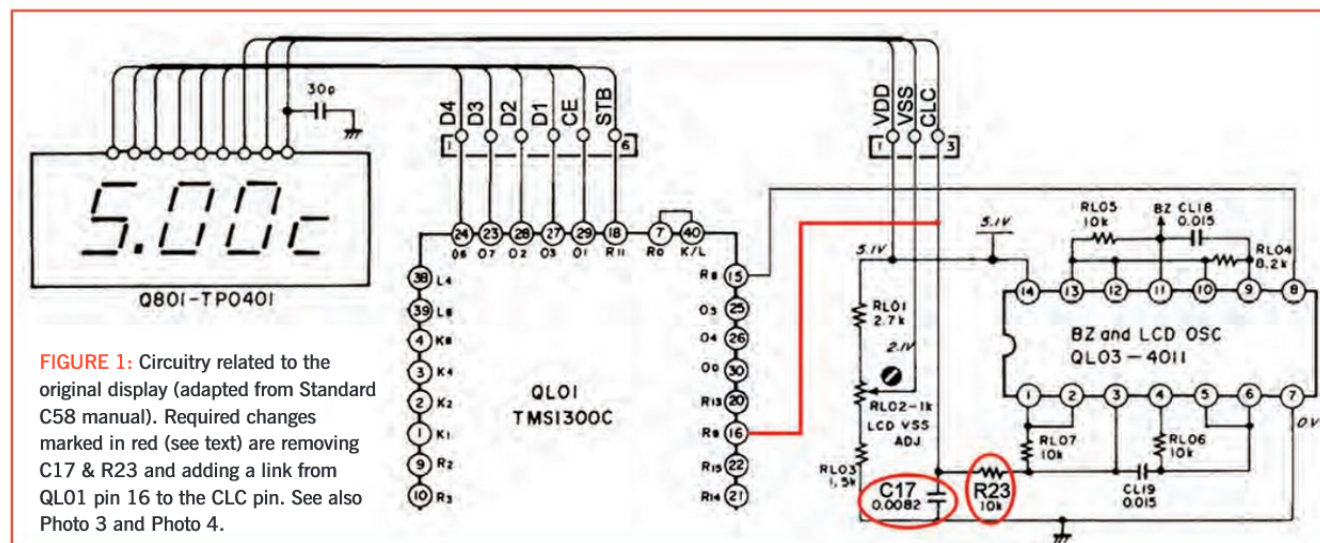
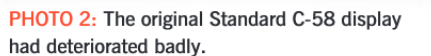
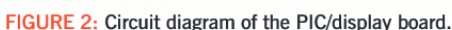
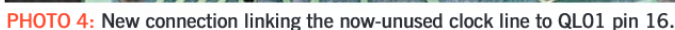


FIGURE 1: Circuitry related to the original display (adapted from Standard C58 manual). Required changes marked in red (see text) are removing C17 & R23 and adding a link from QL01 pin 16 to the CLC pin. See also Photo 3 and Photo 4.



It is important to note that the design requires the display module to be connected on the opposite side of the board from the copper. This is to maintain a minimum overall thickness of the assembly and, of course, to wire it correctly. In my prototype the circuit board to LCD PCB connections were made with individual wires, however it may be possible to source PCB connector strips with 1.27mm (0.05") spacing. All of the other components are surface mounted on the copper side.

Disconnect the old display and transplant the wires to the new board using [Figure 1](#), [Figure 2](#) and [Figure 3](#) as a guide. The board is a bit of a squeeze to fit in the space vacated by the original display but it does tuck in nicely, as can be seen from [Photo 5](#) and [Photo 6](#).



U1	PIC16F627A-I/SO or PIC16F628A-I/SO
LCD	MC20803A6W-GPR (Farnell 2425673)
D1 & D2	1N4148WS-E3-08
C1	100nF (SMT0805 ceramic)
C2	10nF (SMT0805 ceramic)
R1	10k (CRG0805)

Paul Abernethy, G8HGG
paul.abernethy.uk@gmail.com

Firmware

The firmware for driving the display was written using assembly language. It was programmed into the PIC directly using my old Velleman K8048, through the ICSP connector. Various other designs of programmer and software may be found by searching the internet.

I have made the assembly language file and the assembled code (ready to program into a PIC) available via [4].

Conclusion

The Standard C58 may be an old all-mode radio but it is still capable of providing decent service. Hopefully my modification will inject a new lease of life into a few and, maybe, inspire others to create similar modifications for other vintage radios with duff displays.

Websearch

- [1] Replacement display for the FT-290R, David Crump, G8GKQ, *RadCom* December 2016 (page 60)
- [2] www.retro.co.za/zs1ke/FT-290R/reverse-engineer.html
- [3] <https://www.rs-online.com/designspark/pcb-software>
- [4] <https://rsgb.org/main/publications-archives/radcom/supplementary-information/>

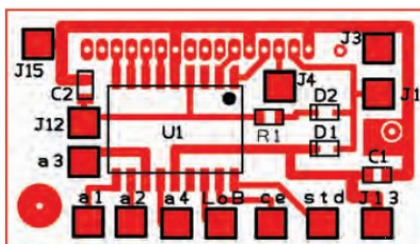


FIGURE 3: PCB details. The board is 36mm x 20mm. Download the files from [4] (see text).

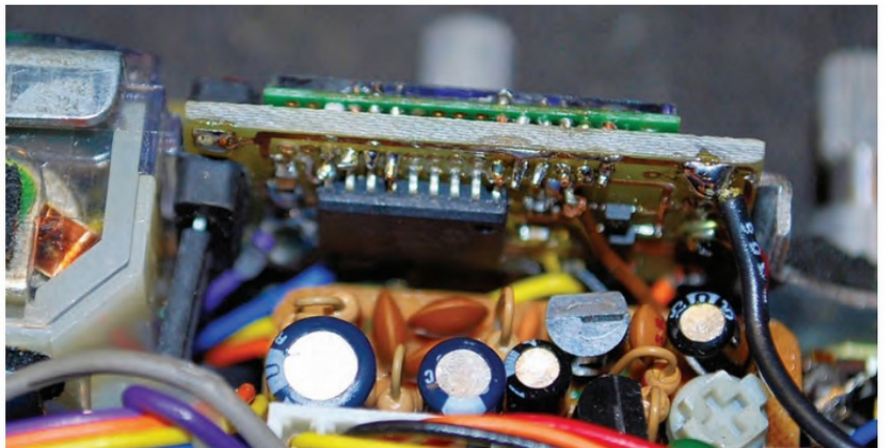


PHOTO 5: PCB in place, seen from the reverse (ie from the 'inside' of the radio looking out).

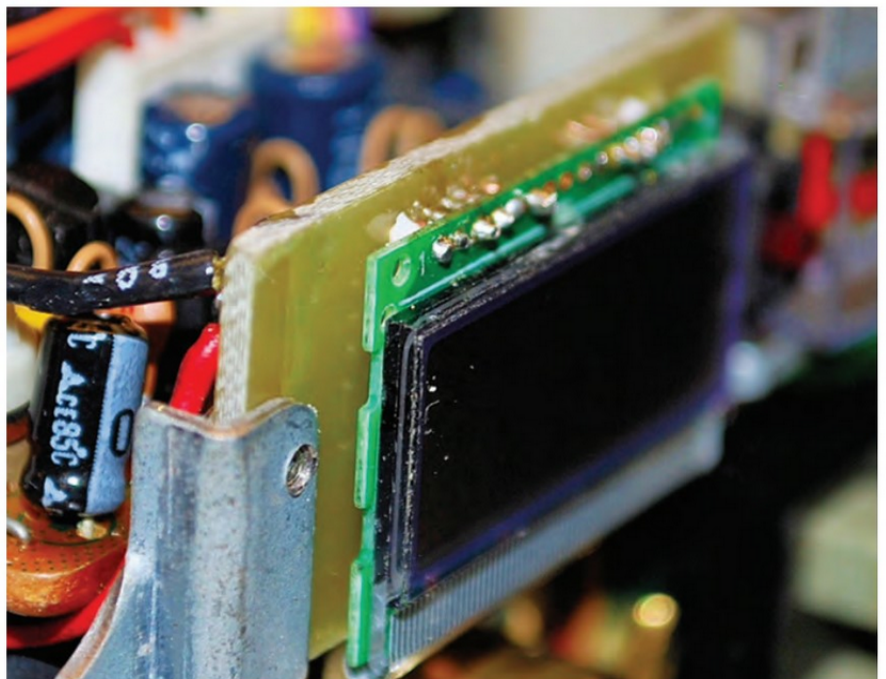


PHOTO 6: PCB in place, seen from front.

TABLE 2: Information contained in other bits (x=not relevant / don't care).

Bit	D4	D3	D2	D1
1	Scanning	M5	1	1
2	x	x	x	x
3	M4	M3	1	1
4	x	x	x	x
5		M2	1	1
6	x	x	x	x
7		M1	1	1
8	x	x	x	x
9	0	Odd MHz	1	0
10	0	0	0	Pulse for memory entry
11	0	0	1	Undisplayed 100Hz
12	0	0	0	0

TABLE 1: Data line relationships representing 146.000MHz.

Bit	D4	D3	D2	D1	Nibble
1	0	0	1	1	3
2	0	0	0	0	0
3	0	0	1	1	3
4	0	0	0	0	0
5	0	0	1	1	3
6	0	0	0	0	0
7	1	0	1	1	B
8	0	1	1	0	6
9	0	0	1	0	2
10	0	0	0	0	0
11	0	0	1	0	2
12	0	0	0	0	0