

Heathkit of the Month #107:
 by Bob Eckweiler, AF6C



AMATEUR RADIO - SWL

**Heathkit SB-630
 Station Console.**

Introduction:

The Heathkit SB-630 Station Console was designed to help control ham shack clutter. It is, in one cabinet identical in size to the SB-600 speaker, four ham accessories that would normally be separate, taking up desk real estate. It is an SWR bridge, a phone patch, a ten-minute timer, and a 24 hour mechanical digital clock. See **Figures 1 & 6**.

Heathkit announced the SB-630 in their 1967 catalog, mailed in early fall of 1966, noting: **“Expected Shipping Date: Late November”** [of 1966]. The 1968 catalog describes the SB-630 as a **“New Amateur Station Console, Four Control - Monitor Units In One”**. (**Figure 2**) It originally sold for \$74.95 mail order, and store retail. It was a popular accessory and many were sold. The SB-630 stopped production in 1974; at that time it was selling for \$89.95. It was replaced by the SB-634 which is styled to match the, then new, SB-104 transceiver.

Shortly after the SB-630 went into production Heathkit released a service bulletin, dated Dec. 2, 1966, to improve the timer operation. The update is discussed later in this article.

1. Notes are on page 8.

Here is a link to the index of Heathkit of the Month (HotM) articles:
http://www.w6ze.org/Heathkit/Heathkit_Index.html



Figure 1: Heathkit SB-630 Station Console combines clock, phone patch, SWR bridge and 10 minute timer into one package.

Photo courtesy of Gerhard Wagner - DF1DA

The Heathkit SB-630:

What follows is a brief discussion of each of the four station console units.

• **The SB-630 SWR Bridge Unit -**

The SWR section of the SB-630 is very similar to the stand-alone HM-15 SWR bridge discussed in HotM #037¹ (The AM-2). Refer to that article for its operation. Differences are only the non-critical values of the filtering capacitors and the addition of a switching circuit so the meter can be used to read both **SWR** and phone patch **VU**.

The SWR unit is powered with RF; the AC plug need not be connected for its operation.

• **The SB-630 Phone Patch Unit -**

Like the SWR bridge, the phone patch unit is almost identical to another Heathkit product - the HD-15 Hybrid Phone Patch discussed in HotM #031². Refer there for operation of the phone patch. It is worth repeating here the concept of the patch being “hybrid”: It isolates the receiver audio from the transmitter audio input, while allowing both access to the phone line. This prevents receiver audio from interfering with VOX operation when using the phone patch.

Deluxe SB-Series Amateur Station Console ... Four Separate Units In One!
 • Includes 24-hour clock, SWR meter, hybrid phone patch and an all-electronic 10-minute timer with audio/visual signaling in one compact unit • Matched in styling and performance with the Heath Deluxe SB-Series amateur radio equipment • Measures 6" H x 10" W x 11 1/4" D — same size as Heath SB-600 speaker and SB-610 signal monitor
 Kit SB-630, 9 lbs., no money dn., \$8 mo. \$74.95 Expected Shipping Date: Late November

Figure 2: The Introduction of the SB-630 in the Main 1967 catalog that was released in the fall of 1966. "Expected Shipping date: Late November"



The phone patch unit requires a phone line connection. Like the SWR bridge, the AC plug need not be connected for operation.

• The SB-630 Clock Unit -

The mechanical clock is a standard 24-hour clock using a Numechron movement. The clock is driven by a 120 VAC synchronous AC motor. Clock accuracy depends on the line frequency. While the 60 Hz line frequency used to be controlled tightly, restrictions have been eased in recent years affecting the short-term accuracy of the clock. Setting the clock is done manually. The Numechron movement is the same as used in the Pennwood Tymeter 24H clock, popular in 70's ham shacks (Figure 4).

For the clock to operate, the SB-630 must be connected to 120 VAC 60 Hz power.

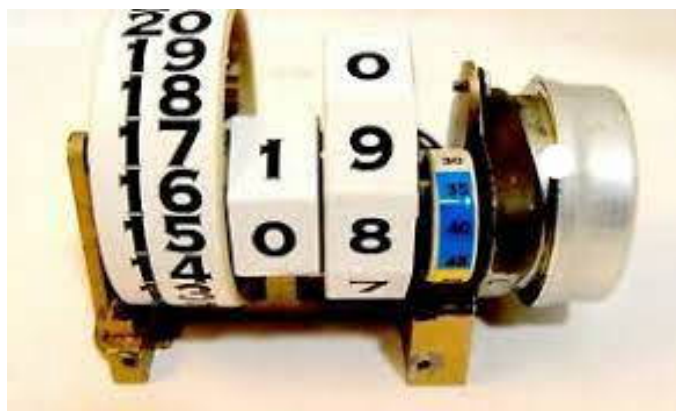


Figure 3: Numechron clock mechanism used in the Heathkit SB-630

• The SB-630 Ten-Minute Timer Unit -

The FCC requires that ham stations identify every 10 minutes minimum, when in QSO. Setting this 10 minute timer reminds the op-

erator to identify and stay legal. The SB-630 has a **RESET** button that, when pressed, restarts the timer. When first turned on, the timer function automatically starts. At the end of ten minutes the **IDENTIFY** lamps light, and, if **AURAL** is selected, a buzzer sounds, reminding the operator to identify with his/her call sign. Should you ID early, a push of the **RESET** button re-syncs the timer.

For the ten minute timer to operate, the SB-630 must be connected to 120 VAC 60 Hz power, and the **TIMER** rotary switch must be in either the **VISUAL** or **AURAL** position.

The SB-630 Front Panel:

TABLE I describes the layout of the front panel. The meter and SWR bridge controls are located vertically on the left side. On the



Figure 4: A vintage, circa 1970, Tymeter clock by Pennwood Numechron. The 24-hour version could be found in many ham shacks of the day.

Photo by AF6C

FRONT PANEL ITEMS	
<u>Left Column</u> (Top to bottom):	
Meter 0–100µA	
VU	- 20 dB to + 3 dB (Max at 0 dB)
SWR	1 to 3 at half scale (Max at 3) SWR SET - mark at full scale.
SWR METER:	
FWD - REV	Switch, SPDT, rotary
SENSITIVITY	Potentiometer, 50 kΩ
	MIN (full CCW), MAX (full CW)
<u>Center Column:</u> (Top to bottom)	
Clock:	hrs 0 - 23 , tens of mins 0 - 5 ; mins 0 - 9 ;secs 5 10 15 20 25 30 35 40 45 50 55 60
IDENTITY	Dual #47 pilot bulbs in parallel
Emblem:	HEATHKIT SB-630
<u>Bottom Center L to R:</u>	
RESET	Switch SPST NO pushbutton
TIMER	Switch 2P3T rotary OFF, VISUAL, AURAL
Pilot lamp	Neon, Ass'y with integral resistor [timer] ON
<u>Right Column:</u> (Top to bottom)	
MODE	Switch 3PST (no) + 3PDT rotary SWR METER - PHONE PATCH
PHONE PATCH GAIN:	
TRANS	Potentiometer Dual 1.5 KΩ - 200 KΩ
RCVR	Potentiometer 10 Ω
<i>(Bold items in table are printed nomenclature.)</i>	
TABLE I	

right side, also located vertically, are the meter selector switch and phone patch controls. A black escutcheon dominates the upper center with a cutout for the clock above a black window with the translucent word IDENTIFY that is lit from behind by the ten-minute timer. Below this window is the Heathkit logo. Below the escutcheon in a horizontal row (L to R) are the timer RESET button, the TIMER switch and the timer ON pilot light.

REAR PANEL ITEMS	
<u>Above Chassis</u> (Left to right - viewed from rear):	
SWR Meter OUTPUT	SO-239 UHF Connector
SWR Meter INPUT	SO-239 UHF Connector
<u>Rear Chassis</u> (Left to right - viewed from rear):	
Phone LINE x 2	2-Terminal Jones strip
NULL ADJUST:	Potentiometer 2 KΩ
Null Monitor Sw.	Switch, Slide DPDT
MON. - NULL	
Microphone Inputs:	
HI-Z	Dual RCA Jack (top)
600 Ω	Dual RCA Jack (bot)
Audio - speaker:	
RCVR	Dual RCA Jack (top)
SPKR	Dual RCA Jack (bot)
TIMER ADJUST:	
FINE	Potentiometer 10 KΩ - ↔ +
COARSE	Potentiometer 100 KΩ - ↔ +
120 VAC power cord	w/ Heyco strain relief
<i>(Bold items in table are printed nomenclature.)</i>	
TABLE II	

The SB-630 Rear Panel and Connections: TABLE II describes the layout of the rear panel. Besides a terminal strip to connect the phone line, and two UHF connectors to pass the RF through the bridge sensor that measures SWR, there are four RCA jacks that switch between the speaker and phone patch, and the microphone and phone patch. Also on the back are three potentiometers. One sets the maximum null for the phone patch (as discussed in HotM #31); the other two set the 10 minute timer interval. One is a **COARSE** setting and the other is a **FINE** setting potentiometer.

The SB-630 Circuitry:

Since the phone patch and SWR circuits have been covered in previous HotM articles, as mentioned earlier, This section will cover only the clock and the timer circuits.

• **SB-630 Clock:**

The clock is an off-the shelf, 24 hour, Nu-mechron mechanism. It is powered directly by the 120 V 60 Hz line power whenever the SB-630 is plugged in and a good fuse is present. The fuse is the pigtail type and is soldered in. The clock draws 3.7 watts (2.7 KWH/month). Setting the clock is done by manually rotating the numbered drums to the correct hour, tens of minutes and minute; the drums may be accessed from the open rear of the chassis. Be sure the seconds cylinder is not near zero as it will prevent the drums from being turned manually if near zero. Setting the seconds requires you to unplug the SB-630 and then plug it in when the time on the seconds cylinder corresponds with the realtime seconds. The clock accuracy is dependent on line frequency.

• **SB-630 Timer:**

The timer circuit consists of a power supply, a vacuum tube based timer and a relay controlled by the tube that provides the reset function and controls the IDENTIFY lights and AURAL buzzer.

• **SB-630 12/2/66 Timer Circuit Update:**

Shortly after delivery started on the SB-630 Heathkit released a circuit improvement to the timer. A four-page service bulletin dated 12/2/66 was included, along with updates to the original manual dated Sept 9, 1966. Also included was an additional 1N191 diode (Part # 56-26). The changes were incorporated in a later manual dated December 30, 1966. **Figure 5** shows the circuit changes. This update was likely sent to all SB-630 owners who had registered. The four page bulletin is available online³, along with a separate short repair bulletin⁴ that recommends replacing the timer relay (part # 69-38) with (part # 69-42) if the buzzer operation is erratic.

• **SB-630 12-2-66 Timer Circuit:**

The SB-630 has a power supply that is used

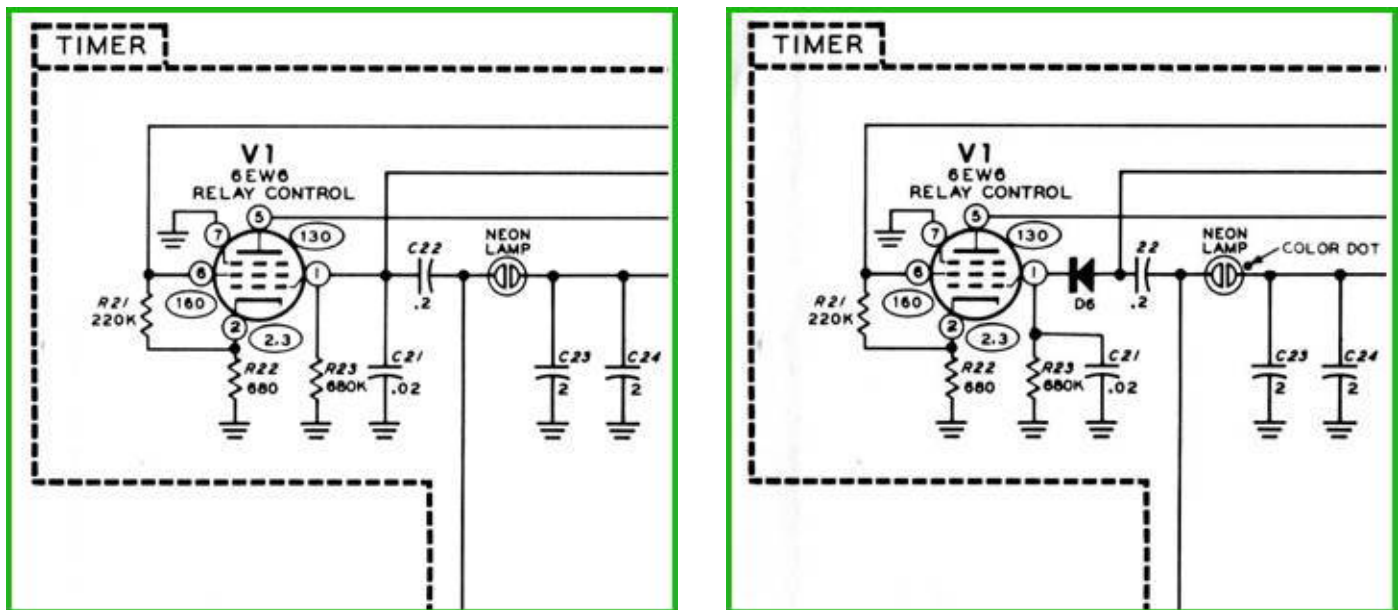


Figure 5: On the left is the original circuit as shown in the Sept. 9, 1966 manual. On the right is the updated circuit in the Dec. 2 1966 Service Bulletin and later in the updated Dec 30, 1966 manual.

only by the timer. **Figure 8** (Page 8) is a schematic of the SB-630 timer circuit including the AC primary wiring. It consists of a low power transformer producing 6.3 VAC at 0.8 A for filament voltage, the IDENTIFY lamps and the AURAL buzzer; as well as 120 VAC at 20 mA for the B+. In the primary is a pigtail fuse marked 1¼ amp on the schematic but a 3/16 amp fuse is supplied per the parts list. After the fuse, but before the switch, is the clock. One section of the 3-position TIMER rotary switch applies AC power to the transformer and a neon pilot lamp (timer ON), when in the VISUAL or AURAL position.

The B+ secondary winding is wired as a voltage doubler producing 330 and 160 VDC. The 330 volt output is regulated by a cold-cathode 0A2 voltage regulator tube. Along with dropping resistor R38 (22kΩ 2W) the 0A2 produces a stable 150 V at a few mA. The 160 volt output provides screen and plate voltage for the 6EW6 pentode.

When the timer is initially turned on, the filament is cold and the tube draws no current. A regulated voltage, set by the COARSE (R34) and FINE (R36) timer potentiometers, is placed on one side of the neon lamp. Meanwhile C25 charges rapidly through R32 and the normally closed contact of the relay.



Figure 6: A nicely restored Heathkit SB-630 Station Console sits between an SB-500 2 Meter Transverter and an SB-610 Monitor Scope in the Heathkit shack of WB4IUU. See the restoration at:

<https://wb4iuy.blogspot.com/2017/05/a-heathkit-sb-630-lives-again.html>

Photo Courtesy of Dave Hockaday - WB4IUU

From the moment power is applied C23 and C24 (which are in parallel) begin to charge slowly from the stable 150 volt source through R24, R25 and R26, a total of 144 megΩ. After a long period (ten minutes if the COARSE and FINE adjustments are set) the voltage across the neon bulb reaches its firing voltage and lights, sending a positive pulse to the grid of the now warmed up pentode (V1) through diode D6. When V1 conducts, current is drawn through the relay coil and the relay closes. the top set of relay contacts fully discharge C23 and C24 through R27. The bottom set of contacts turn on the IDENTIFY light, and, if set in the AURAL position, causes the buzzer to sound. The central set of contacts discharges C25 through R25, R27, and D6 keeping the grid positive and the tube conducting for about a second. After C25 discharges the tube stops conducting, the relay opens and the 10 minute timing process starts all over again.

When the RESET button is pushed, current is drawn through the relay coil by R29, activating the relay and resetting the circuit. When the button is released the ten-minute timing starts from the beginning.

The SB-630 Specifications:

Table III give the SB-630 specifications (mostly information from the manual.)

The SB-630 Today:

The SB-630 station console has been in existence for almost 55 years, even the newest of the kits has passed its 46th birthday. The most common problem encountered with these units is noise from the clock after decades of service. Since the Numechron clock-motor is sealed, it is difficult or impossible to lubricate the mechanism. The leaf springs that help the digits to stop in the proper place also weaken over time and use,

SB-630 Specifications:

CLOCK

Dial: 4-drum, 24 hour, digital readout
 Motor: 1 rpm at "seconds" drum, gear driven
 Power: 120 VAC, 60 Hz, 3.7 Watts

TIMER

Interval: Adjustable to 10 minutes.
 Stability: Less than 0.2% change per hour in normal ambient temperature.
 Cycle: Instant reset with pushbutton *.
 Signal: Visual (2 #47 lamps), and aural (buzzer), switch selected *.
 Circuit: R-C network. neon discharge, vacuum tube relay control
 Tubes: 0A2 voltage regulator (150v)
 6EW6 pentode relay control
 Supply: Transformer operated, VR regulated,
 Fuse: 3/16 amp, slow-blow
 Power: 120 VAC 60 Hz, 15 Watts
 * Front panel control.

SWR BRIDGE

Power Handling: 2 kilowatts P.E.P.
 Impedance: 50Ω or 75Ω nom. (resistor selected.)
 Band Coverage: 160 through 6 meters.

PHONE PATCH

Circuit:
 Line Impedance: 600Ω nominal.
 Null Depth: At least 30 dB isolation.
 Rcvr. Impedance: 3Ω - 16Ω.
 Xmtr. Impedance: 600 Ω or Hi-Z

GENERAL

Meter: 100 μA movement. Reads VU for phone patch and ratio for SWR.
 Front Panel Controls: See Table I.
 Rear Panel Controls: See Table II.
 Size: 6" H x 10" W x 11 1/8" D.
 Net Weight: 7 1/2 lbs.
 Shipping Weight: 10 lbs.

Table III



Figure 7: A view of the underside of the SB-630 on the workbench of WB4IUY.

Photo Courtesy of Dave Hockaday - WB4IUY

and need tending to to keep the digits stopping at the correct point. Numechron mechanisms are often available on sites like eBay, however the 12 hour mechanisms way exceed the rarer 24 hour clock mechanism desired for the SB-630. After years of service the dial plastic yellows and the numbers fade. A glue-on replacement number set is available on eBay⁵.

Other problems that occur with the SB-630 are consistent with those expected due to age. Capacitors go bad, vacuum tubes fail, resistors change value, etc. Heathkit seemed to have had a problem with their 2 μ F tubular (non-electrolytic) capacitors. They have been known to open, dropping in capacitance to picofarads. However, newer axial mylar⁶ replacements are available that work well and will outlive the unit.

No SB-630 Sold in Europe:

Heathkit sold most of the SB Ham line in Europe, However, the SB-630 was an excep-

tion. Since many places in Europe use some combination of 240 VAC and 50 Hz power, the SB-630 would have to have been re-designed to operate under those conditions. While the Heathkit inventory did include a 240 volt version of the 54-92 power transformer (54-92-24) which is also used in the European version of the IG-102 RF Signal Generator, a separate version of the Numechron that runs at 50 Hz appears not to have been available, and the cost to develop one probably wouldn't be recovered by the expected European sales.

Gerhard - DF1DA, a fellow fan of Heathkit with whom I often swap emails, has an SB-630 in his collection. He mentioned another reason the SB-630 wasn't sold in Europe. Many European countries have strict rules concerning the connection of user owned devices to the phone line. Also the handling of third party traffic is limited or illegal in many European countries.

The Solid-State SB-634 that replaced the SB-630 is very similar except it has an electronic digital clock using three, two-digit Beckman plasma displays and a separate 10-minute timer using a smaller three-digit plasma display. This kit may be covered in a future article.

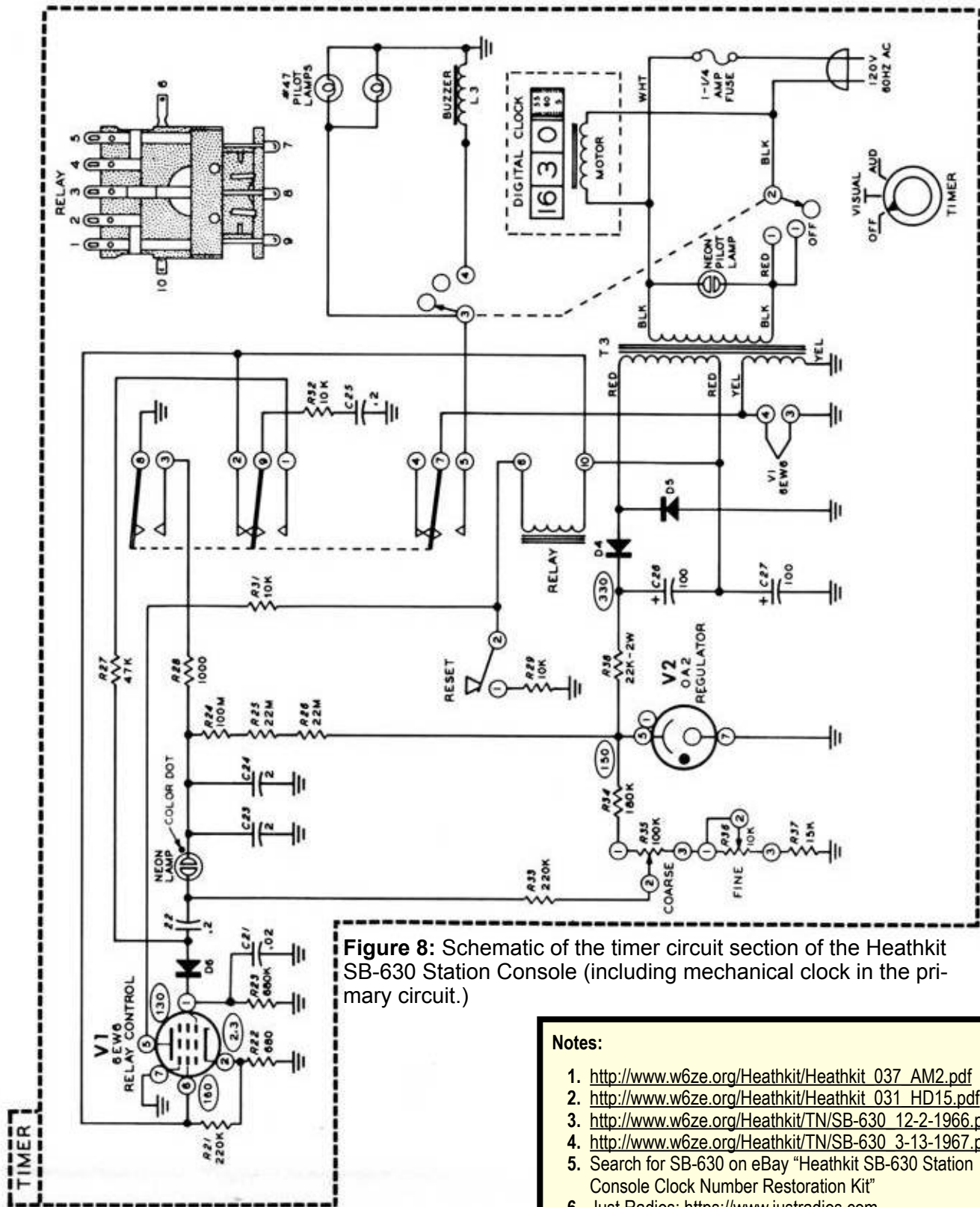
73, from AF6C



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Remember, if you are getting rid of any old Heathkit Manuals or Catalogs, please pass them along to me for my research.

Thanks - AF6C



- Notes:**
1. http://www.w6ze.org/Heathkit/Heathkit_037_AM2.pdf
 2. http://www.w6ze.org/Heathkit/Heathkit_031_HD15.pdf
 3. http://www.w6ze.org/Heathkit/TN/SB-630_12-2-1966.pdf
 4. http://www.w6ze.org/Heathkit/TN/SB-630_3-13-1967.pdf
 5. Search for SB-630 on eBay "Heathkit SB-630 Station Console Clock Number Restoration Kit"
 6. Just Radios: <https://www.justradios.com>