RF

ORANGE COUNTY AMATEUR RADIO CLUB, INC.

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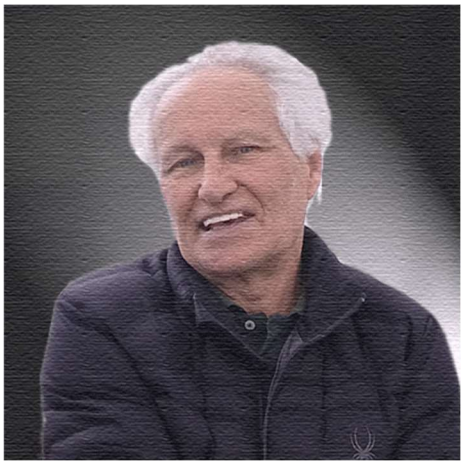
The Prez Sez...

By Nicholas AF6CF



Hello and Greetings to all!
We are in the last quarter of the year, and the Club is not going to slow down any time soon…

We had great meetings with fantastic speakers and now we look forward to the October Auction, where many treasures change hands. This will be an in-person event (no Zoom) and everybody is invited, holding a Ham radio license or not. There will be a lot of items donated to the Club, and as usual it is a buyer's market, so make sure that you attend and bid for bargains. Please see the flyer in this edition for a glance into the event and its rules.

As mentioned last month, we have big plans for the rest of the year with the Club Auction this month and an excellent speaker for the November meeting.

Speaking of the November meeting, we will have the elections for next year's Board of Directors. This is your chance to help the Club run its daily business by becoming one of the Directors (or even President). If interested, please contact any Board member or myself to be in the list. Any licensed Club member can have any position on the board.

The Christmas Party date has been set for Friday, December 9th. Mark your calendars early so you don't miss it. As usual, I look forward to an eyeball contact with you all at the next General Meeting.

73 DE AF6CF

NEXT GENERAL MEETING
IN-PERSON
OCARC
Ham Radio & Electronics
AUCTION
October 21st, 2022 at 7PM
at the
American Red Cross
Orange County Chapter
Santa Ana, Room 208*
Zoom is NOT provided for this event.

*see page 3

NEXT BOARD MEETING
Saturday, November 5th, 2022

SPECIAL NOTICE:
ALL OCARC Nets Remain Active!

In This Issue

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Monthly Events

Membership Meetings*
Time: 7:00 PM
When: 3rd Friday of each Month
Red Cross Orange County, Room 208
600 N Parkcenter Dr, Santa Ana

Board Meetings
First Friday of each Month
Board will handle Club business both IN-PERSON and/or ZOOM.

***OCARC Annual Auction (this October)**
See page 3 in Newsletter

Club Nets (Listen for W6ZE)

10M ~ 28.375 MHz SSB
Wed- 7:30 PM - 8:30 PM
Net Control: Corey, KE6YHX

2M ~ 146.55 MHz Simplex FM
Wed- 8:30 PM - 9:00 PM
Net Control: Corey, KE6YHX

75M ~ 3.883 MHz LSB
Tue @ 8:00 PM
Net Control: Corey, KE6YHX

Other Nets

Catalina Amateur Repeater Association (CARA)
147.090 MHz (+0.600 MHz) No PL
Monday - Friday
9:00AM & 9:00PM
Prg. Director. Tom W6ETC
COME JOIN US

OCARC 2022 DUES

Membership period is:
1 January to 31 December

Individual New or Renewal:	$30.
Family New or Renewal:	$45.
Teen New or Renewal:	$15.

New Member Dues are *prorated quarterly* and **includes a badge**:
Additional Badges:[1] $ 3.
Use one of our interactive online forms to calculate current prices, join the club and/or order badges:

Online Forms / Dues & Badges

[1] $3. plus mailing costs if applicable
Dues are subject to change without notice

OCARC 2022

Orange County Amateur Radio Club

ANNUAL RADIO AUCTION

LIVE AUCTION TO BUY & SELL NEW/USED HAM RADIO EQUIPMENT

FRIDAY OCTOBER 21st, 2022

7:00 PM

Held at the

American Red Cross

600 Parkcenter Drive

Santa Ana, CA

Second Floor Rm #208

SELLERS/BUYERS CAN REGISTER AT 6:00PM

FOR RULES & INSTRUCTIONS GO TO WWW.W6ZE.ORG

AUCTION RULES

October 21, 2022 OCARC Radio/Electronics

The room will open at 6:00 PM to allow registration, set-up, and viewing. All buyers and sellers are welcome.
The following rules for the 2022 OCARC auction will be in effect:

1. Only Ham radio or electronic equipment / items will be allowed.
2. Sellers and Buyers should register to receive a bid number. The bid number is also the Seller's number. **Registration is Free*.**
3. Sellers should tag each item in their lot. The tag should identified with the Seller's number, a dash and a sequential number starting at 1 for each item to be auctioned. The tag should also indicate a minimum bid or "No Minimum Bid", and if needed, a short item description.
4. Only 3 items from a Sellers lot will be auctioned during each turn and then the auctioneer will move on to the next lot. Once all lots have been offered the auctioneer will start the second round of auctioning with the next 3 items starting with Lot #1.
5. Auction bidding will take place as follows:
   (a) $0.00-to-$5.00 bidding will take place in $0.50 increments.
   (b) Over-$5.00-to-$50.00 bidding will take place in $1.00 increments.
   (c) Over-$50.00-to-$100.00 bidding will take place in $5.00 increments.
   (d) Over-$100.00 bidding will take place in $10.00 increments.
6. Rules 4 and 5 may be changed at the auctioneer's discretion to expedite the auction.
7. Payments for purchased items are due at the end of the auction and shall be by cash or check with the appropriate ID. No two-party checks or credit cards are allowed. Disbursements to the Sellers will be by OCARC check, only.
8. *Sellers will be charged 10% of the selling price for items sold by OCARC. A special table will be set up for items donated to the OCARC. Proceeds from the sale of donated items will go into OCARC operational funds.

Heathkit of the Month #114:
by Bob Eckweiler, AF6C

AMATEUR RADIO - SWL – *and* –
ELECTRONIC TEST EQUIPMENT

Heathkit IP-2715 Battery Eliminator

Introduction:

The Heathkit IP-2715 (**Figure 1**) is a 12-volt battery eliminator that can also function as a power supply for ham equipment requiring well regulated 13.8 VDC. Heathkit sold three power supplies, designed for the SB-104(A) and HW-104(A): the HP-1144 (circa 1974 -- 1978), the HP-1144A (circa 1978 - 1979 and the PS-1144 (circa 1979 - 1982). They share a lot of common circuitry and parts with the IP-2715, including the power transformer, bridge rectifier, filter capacitors, and partially the pass transistors and regulator IC[1,2,3].

The IP-2715 Battery Eliminator:

The IP-2715 was introduced in the Spring 1976 catalog (#808) for $134.95 (see **Figure 2)**. and remained in the catalog until 1984 when it was replaced by the IP-2760. At the end it was selling for $169.95, the same price as the IP-2760 was at its introduction. The specifications for the IP-2715 are shown in **Table I**.

There are only three controls for the IP-2715. They are located along the bottom third of the front panel and are (L to R) the **VOLTAGE ADJUST** potentiometer, the **POWER** toggle switch marked **OFF** - **ON**, and the **LOAD** toggle switch marked **STBY** - **NORM**. To the right of the LOAD switch are the red and black output binding posts marked with a **+** and **–** sign respectively. The upper two-

Here is a link to the index of Heathkit of the Month (HotM) articles:

http://www.w6ze.org/Heathkit/Heathkit_Index.html

1. Notes begin on page 15

Figure 1: Heathkit IP-2715 Battery Eliminator

Specifications for the Heathkit IP-2715 Variable Isolated AC Supply:
From Heath Manual 595-1845-06

Output Voltage:	Variable from approximately 9 to 15 VDC.
Output Current:	20 amperes intermittent , 12 amperes continuous.
Output Ripple:	Less than 1% at full load.
Output Regulation:	Less than 2% variation from no load to full load.
Power Requirement:	110 to 130 VAC, 7 amps; or 220 to 260 VAC, 3.5 amps 50/60 Hz maximum
Fuses:	7 ampere, 3AG, slow-blow primary. 20-ampere, 3AG, output.
Maximum Continuous Operation:	See chart on page 6
Net Weight:	26 lbs. (9.7 kg.)
Overall Dimensions:	5 ¼" H x 11" W x 11" D (13.34 cm x 27.9 cm x 27.9 cm)

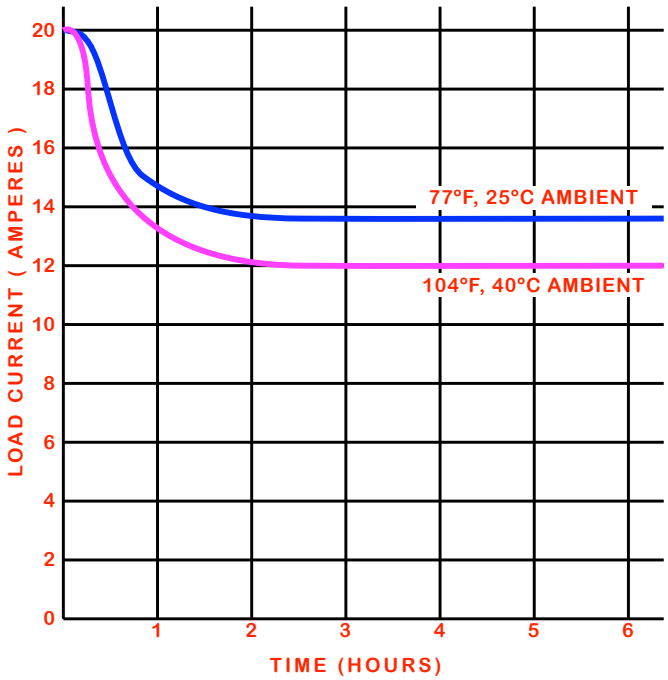
TABLE I

Figure 2: The IP-2715 announcement from the Spring 1976 Heathkit catalog #808

thirds of the front panel contains the two monitoring meters. On the left is a **0** to **15 D.C. VOLTS** meter. The scale has numbered marks every 3 volts with mid-tick-marks every volt and minor tick marks every ½ volt. On the right is a **0** - **25 D.C. AMPERES** meter. The scale has numbered tick marks every 5 amperes with minor tick marks every ampere.

The rear panel accommodates the 3-wire line cord, with its strain relief, at the lower right, a fuse holder for the load fuse (F2) at the upper left and the TO-3[4] power transistor, Q2, that drives the four output transistors, at the upper middle-right. Q2 is covered with a plastic insulator to prevent shorts since its case is above ground potential. While the load fuse is mounted on the rear panel for quick changing, the main 7 amp power fuse (a 3½ amp fuse if wired for 240 VAC.) is mounted internally in a clip-type fuse holder.

Each side panel contains a heavy heatsink that accommodates two TO-3 transistors. Q5 and Q6 mount on the left-side heatsink, and Q3 and Q4 mount on the right-side heatsink.



NOTE: This chart should be used to determine the maximum length of continuous operation at a given load current and ambient temperature. The battery eliminator must be allowed to cool an equal length of time before you do additional testing to prevent damage due to thermal overload.

Figure 3: This chart is recreated from the manual and shows the Maximum Continuous Operation.

Like Q2, these transistors are covered with an insulator to protect from shorts[5]. There are two plastic handles bolted to the top panel for easy carrying and four heavy-duty rubber feet on the chassis bottom.

The IP-2715 can supply a well regulated DC voltage adjustable from approximately 9 to 15 VDC. Regulation is better than 2% from no load to full load, and ripple is under 1%. Allowed output current is 20 amperes in intermittent service and up to 12 amperes continuous when the ambient temperature is at or below 40ºC (104ºF). At 25ºC (77ºF) it can supply 13.5 amperes continuously. The derating curve chart is shown in **Figure 3**.

Operating the IP-2715:

Operation is quite simple. The battery eliminator is plugged into 50 or 60 Hz AC power of the proper voltage. With the LOAD switch in STBY, the POWER switch is switched ON. The desired voltage between 9 and 15 volts is set using the VOLTAGE ADJUST potentiometer.

The device to be powered is connected to the binding posts on the front panel. Heath provided a 6', 12-gauge, 2-wire cable with ¼" spade lugs to fit the posts. The other end of the cable can be wired to suit the user; the IP-2715 doesn't provide remote voltage sensing capability. Once the device is connected, the LOAD switch is switched to NORM to apply power. Should excess current be drawn, the 20 amp fuse will blow. Access to this fuse is on the rear panel using a standard panel mount fuse holder. Replace the fuse with a 20 amp 3AG fuse. Do not use a slow-blow type. The IP-2715 does not provide any over voltage protection.

The Early IP-2715 Circuit:

The original IP-2715 circuit is based on the four pin Fairchild 78MGT4 voltage regulator IC (442-626). This chip is also used in the HP-1144A power supply, where it replaced the obsolete (and hard to find) six-pin MFC6030 regulator chip (442-48) used in the earlier HP-1144. Late in the production run of the IP-2715 the 78MGT4 IC itself became obsolete, and Heathkit redesigned the circuit to use the inexpensive LM317T (442-708) sourced by many manufacturers and readily available, even today.

Figure 4 (page 8) shows the schematic of the early IP-2715[6]. The power transformer (54-848) has dual primary windings and can be wired for 120 or 240 volt input. The output is about 20 VAC. This voltage is rectified by a Motorola MDA990-2 (57-88) sealed high-current full-wave bridge rectifier and filtered by two paralleled computer grade 10,000 µF electrolytic capacitors (25-263). The approximately 28 VDC output is fed to the four main pass transistors that control the output voltage. The four transistors are in parallel, collector to collector, base to base, and emitter to emitter, except in each emitter lead is a small resistance. This resistance is made up of four 0.33 Ω 5 watt resistors in parallel resulting in a resistance of about 0.09Ω[7] at 20 watts. These resistors force the transistors to better share the load. The parallel emitters are then connected through the output fuse, ammeter, and LOAD switch SW2, to the output binding posts. C7, a 0.1 µF mylar capacitor across the binding posts, adds extra high frequency filtering.

The regulator circuit is mostly contained on a circuit board (85-1752-1) that mounts with standoffs to the rear panel. A transistor socket mounted to the foil side of the circuit board plugs into the leads of transistor Q2 a 2N3055 (417-215) which is mounted on the rear panel. The circuit board is outlined by dashes on the schematic. Four leads connect to the circuit board, using connectors. They

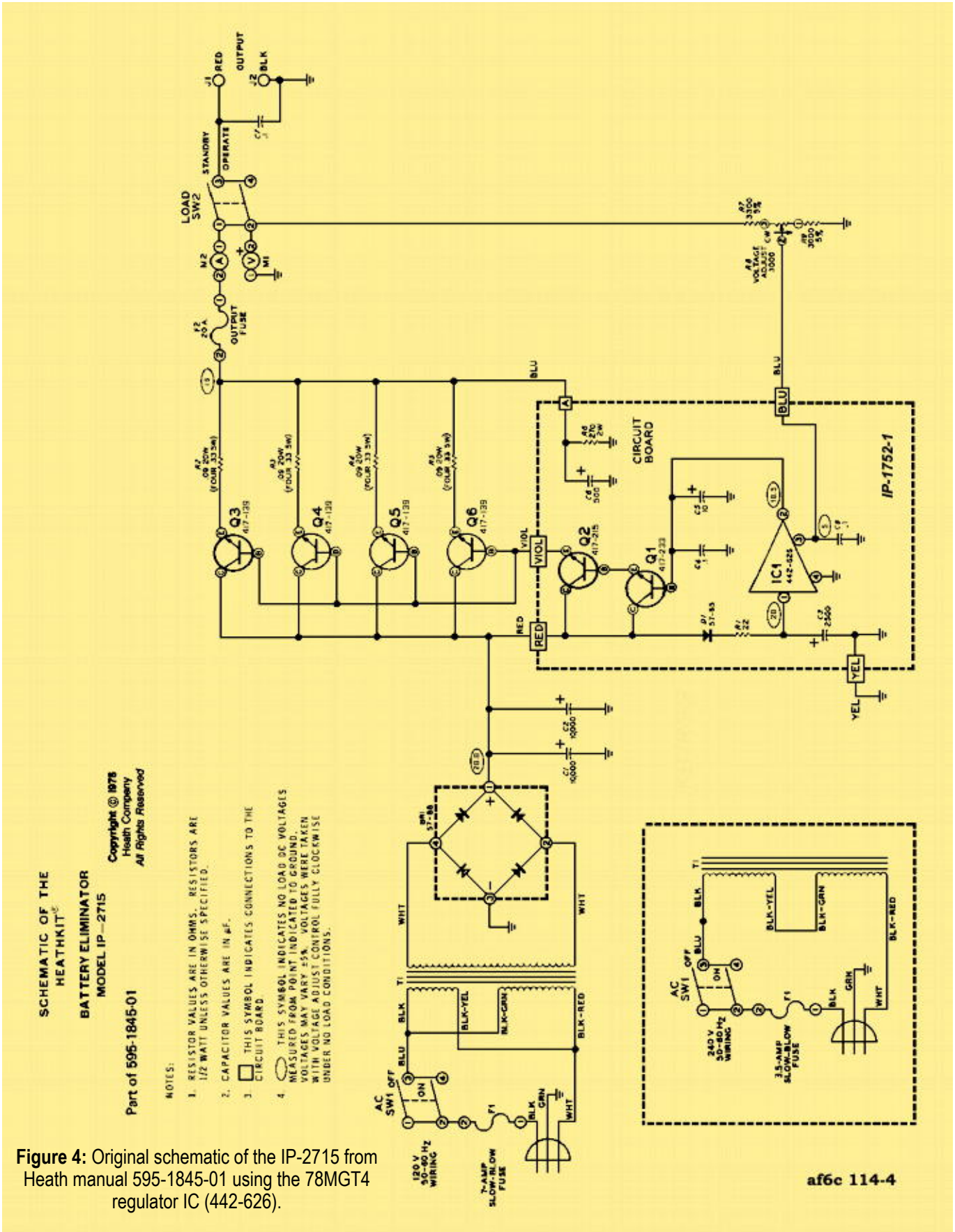


Figure 4: Original schematic of the IP-2715 from Heath manual 595-1845-01 using the 78MGT4 regulator IC (442-626).

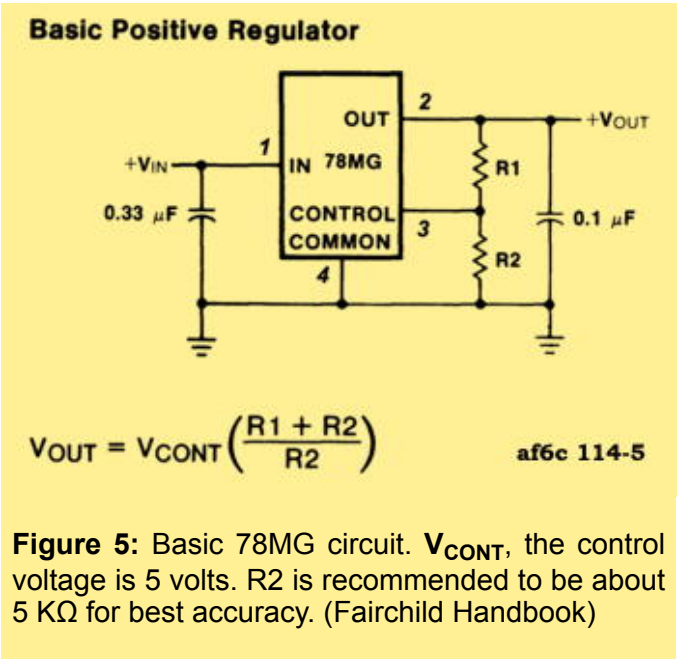


Figure 5: Basic 78MG circuit. V_{CONT}, the control voltage is 5 volts. R2 is recommended to be about 5 KΩ for best accuracy. (Fairchild Handbook)

are coded **YEL**, **RED**, **VIOL** and **BLU**. YEL is ground; RED is 28V power; VIOL is the output to the base of the pass transistors; and BLU is feedback from the output voltage. This feedback is fed through a voltage divider consisting of R7 (3.3 KΩ), the VOLTAGE ADJ. potentiometer R8 (3 KΩ) and R9 (3 KΩ) to ground. The BLU feedback signal to the circuit board is connected to the wiper of the potentiometer R8. A fifth circuit board lead, soldered directly to pad 'A,' connects to the common cathode lead of the four pass transistors after the cathode equalizing resistors.

The regulator IC, IC1 has four pins. Pin 1 is the input, pin 2 is the output, pin 3 is the control pin and pin 4 is ground. The basic regulator circuit is shown in **Figure 5**. The output (pin 2) is driven to a voltage so that the divided voltage at the control terminal (pin 3) equals 5 volts. In the IP-2715 circuit the regulator IC drives a Darlington pair consisting of Q1 and Q2, which in turn drives the four pass transistors to the voltage where the feedback coming in on the BLU terminal equals 5 volts.

The Later IP-2715 Circuit:

Late in the IP-2715 production the 78MGT4 regulator IC became obsolete and Heathkit was forced to update the regulator circuit. In a later manual [595-1845-06] the IC was re-

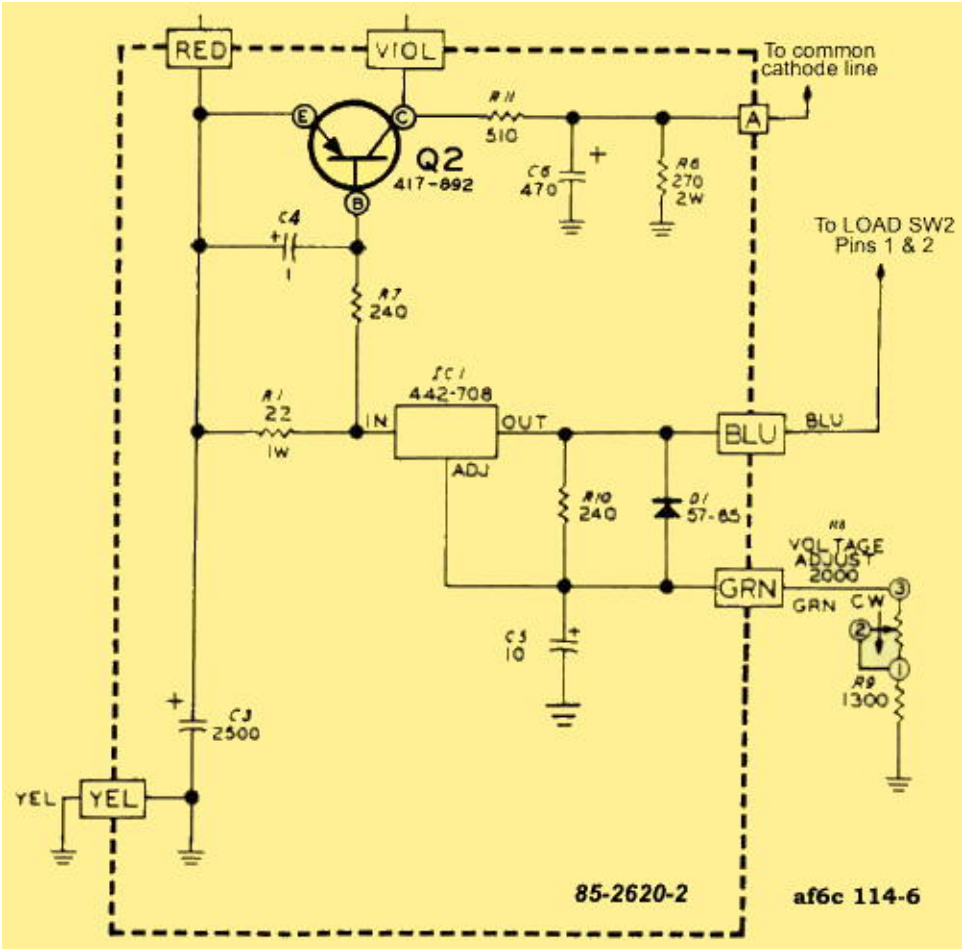


Figure 6: New regulator circuit as shown in schematic of -06 manual. Note that Q1 no longer is used. Also note that Q2 is shown as an NPN 2N3055 (442-708) transistor, which is incorrect.

placed with the common three-pin LM317T regulator. This change required significant modifications to the circuit resulting in a new circuit board (85-2620-1)[8]. The new circuit added an additional terminal **GRN** to isolate the VOLTAGE ADJUST control from the BLU feedback terminal. The circuit board and adjustment control as it appears in the schematic is shown in **Figure 6**. Note that there is no longer a Q1 or C4 in the circuit. **This schematic includes a critical error.** It shows Q2 as an NPN 2N3055 transistor (417-215) instead of the correct MJ2941 PNP transistor. This transistor is also a TO-3 style transistor and mounts identically to the 2N3055 it replaces. A corrected partial schematic of the regulator board is shown in **Figure 7**.

Using **Figure 6** it is impossible to understand how the circuit works. The error was caught by comparing the parts information with the schematic. Still, the circuit seemed hard to understand until a simple fact came to light. The LM317 has three pins, IN, OUT and ADJ. The sum of the currents for the chip must be zero. However, the ADJ pin current is very small, typically 50 μA, and if this is ignored since it is small compared to the 10s to 100s of mA for the IN and OUT pins, there is very little error in saying the IN and OUT currents are basically the same.

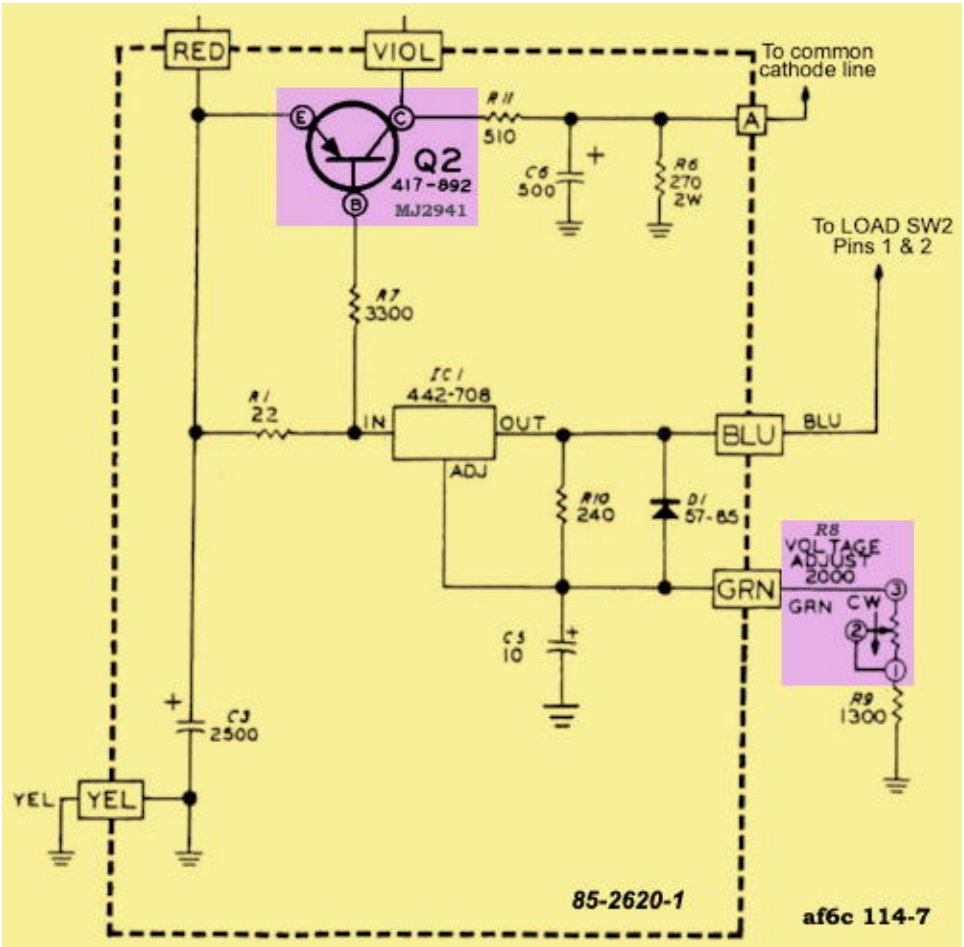


Figure 7: Corrected schematic of Figure 6. Note that Q2 is now a MJ2941 PNP transistor (442-892). Also note that the ADJUST CONTROL is now 2000 Ω (10-269); a correction that evidently came as an addendum to the manual (both are highlighted). Connections to RED, VIOLET and 'A' are as shown on the old schematic (Figure 4).

The LM317 provides a nominal constant 1.25 VDC between the output and the adjust pin. This voltage sets up a current through the 240 Ω resistor R10 of 5.2 mA (the manufacturer recommends a standard 5% value of 240 Ω for this resistor. This current (plus the small current from the adjustment terminal) flow through R8 and R9, which, when added to 1.25 volts, sets the output voltage. The formula is:

$$V_O = V_{REF}\,(1 + R_2/R_1) + I_{ADJ}\,R_2$$

Where: V_O = Output Voltage
V_{REF} = 1.25 V
$R_2 = R_8 + R_9$
$R_1 = R_{10}$ = 240 Ω
$I_{ADJ} \approx 0.05$ mA

Thus, when the output voltage is lower than the

voltage set for the regulator, IC1 draws more current to raise the voltage, resulting in more current being drawn through the base of Q2 and thus through the four pass transistors, raising the output voltage. Likewise, should the output voltage be too high, IC1 draws less current, reducing the current being drawn through Q2 and lowering the output voltage.

Capacitor C5 improves ripple rejection, and diode D1 protects IC1 should an output short occur. These components are recommended on the LM317 data sheet. The 22 Ω ½ watt R1 can only withstand about 3.3 volts across it which limits the current through R7 to about 800 μA. The MJ2941 has an hFE of 20 to 100. Should it be on the low side, IC1 would need to draw more, but is limited to 150 mA without exceeding the dissipation on R1.

Increasing the wattage of R1 is one of two weaknesses that stands out after the circuit change. The other is the location of the 20 ampere load fuse. Should it open under heavy load IC1 is asked to supply the whole load. It can't and shuts down due to its internal overload circuitry. However, there will still be stress on the chip. The fuse can be moved to a point past the junction of the BLU feedback point, but the fuse will add voltage losses outside the regulation loop. Instead, placing the fuse right after C2, the second filter capacitor, would provide protection without affecting regulation.

Assembling The IP-2715:

Due to the high currents in parts of the battery eliminator Heath supplied some heavy wire and heavy #14 AWG bare buss wire with sleeving for use where needed.

Construction starts with stuffing the small printed circuit board. Then parts are mounted to the chassis including the two heatsinks with transistors and sockets, and heavy leads are connected to the transistor sockets.

Next, two 20-lug terminal boards are wired, again with heavy buss wire, and then eight 0.33 Ω 5W resistors are soldered to each board. Each board makes up two 0.09Ω emitter resistors which are then mounted to the side panel board. The heavy power transformer is mounted along with the two large filter capacitors, and additional chassis wiring is added.

The rear panel then has the load fuse, printed circuit board and power cord with its strain relief installed and it is attached to the chassis. Wiring between the rear panel and chassis is added, as is the line cord and primary wiring for either 120 or 240 VAC.

Parts are then installed on the front panel including the two meters, toggle switches, voltage control potentiometer and binding posts. Wires are added.

Next, the front panel is attached to the chassis and additional wiring is completed.

IP-2715 RESISTANCE MEASUREMENT TABLE

#	Measurement	Resistance	Scale
1	Remove Fuse F2 from fuseholder.		
2	Connect negative ohmmeter lead to black banana plug		
3	Either line cord flat prong	Infinite	R x 1M
4	Other line cord flat prong	Infinite	R x 1M
5	Line cord round prong	0	R x 1
6	C1 lug 2	See Note	
7	Fuseholder F2 lug 1	3000 Ω	R x 100
8	Replace Fuse F2 into fuseholder.		
9	Fuseholder F2 lug 1	250 Ω	R x 10
10	Disconnect the ohmmeter from Battery Eliminator.		
	NOTE: Meter should rise slowly as capacitors charge and stop at a high resistance indication.		

TABLE II

IP-2715 OPERATIONAL CHECKS	
1	Set controls as follows: R8: VOLTAGE ADJUST Fully counterclockwise SW1: POWER switch to OFF SW2: LOAD switch to STBY
2	Plug line cord into a proper AC outlet.
3	Toggle SW1 POWER switch to ON: The DC VOLTMETER (M1) should read approximately 9 volts.
4	Slowly advance VOLTAGE ADJUST: The DC VOLTMETER (M1) should increase to approximately 15 volts when the control reaches its full clockwise position. The DC AMPERE meter(M2) should remain at zero.
5	Place the LOAD switch in the NORM position: Neither meter reading should change.
6	Toggle SW1 POWER switch to OFF: The DC VOLT meter should remain at its voltage position, then slowly move to zero as capacitors C1 and C2 discharge.

TABLE III

A series of resistance checks are made next (See **Table II**), followed by operational checks (See **Table III**).

Upon successful completion of the checks, plastic handles are attached to the top plate. The blue and white series label is attached to the underside of the top plate and the plate is attached to the chassis using black finished screws.

The IP-2715 and the HP-1144(A) (PS-1144):

As commented earlier, there are a lot of similarities and common parts between the IP-2715 and the HP-1144 series. The original HP-1144 uses an MC6030 6-pin regulator chip. However, most HP-1144 owners updated their power supplies to the 'A' version using the upgrade kit supplied by Heathkit[9]. It adds crowbar over-voltage protection and the 78MGT4 regulator chip. This chip is used in the early IP-2715s. Since this chip is also now very difficult to find, users owning units in which the chip has failed are looking for an alternative circuit in lieu of trying to obtain a replacement 78MGT4. The circuit of the later IP-2715 should offer a good clue to making that modification so the power supply uses a common LM317T. Perhaps some enterprising ham will create a modification kit using a new circuit board?

The IP-2760 Battery Eliminator:

When Heath discontinued the IP-2715 they replaced it with the IP-2760. As this article was near completion, Steve - N8FH sent a schematic and parts list for the IP-2760. The two units are very similar, but with some significant changes. The power transformer was changed. The PS-1144 had been discontinued, and the PS-9000 was being manufactured, so Heath used the transformer (54-971) currently in that power supply for the IP-2760. Some changes were made to the regulating circuit, though the circuit board remains the same except for new silk-screening. The two weaknesses in the circuit that were mentioned earlier have been corrected. R1 is now a 1-watt resistor, and F2, the 20 A load fuse, has been moved in the circuit to just after the large filter capacitors. The unit sits on a new chassis, but the rear panel, front panel and top panel are the same, the latter two sporting new style paint and thus a new part dash number.

The IP-2760 Circuit:

Other than the relocation in the circuit of the 20 ampere fuse, and changes due to the new transformer, the circuit, external to the printed circuit board, is identical. **Figure 8** shows a partial schematic of the IP-2760 regulator circuit board. With only one 1.0 µF tantalum capacitor (C4) added, and a few components changing value, the circuit is close to the later IP-2715 circuit. C4 actually mounts across the B and E pins of the the Q2 transistor socket. The regulator chip remains a three-lead LM317T.

The transformer in the earlier IP-2715 has a secondary voltage of 20 VAC with no center-

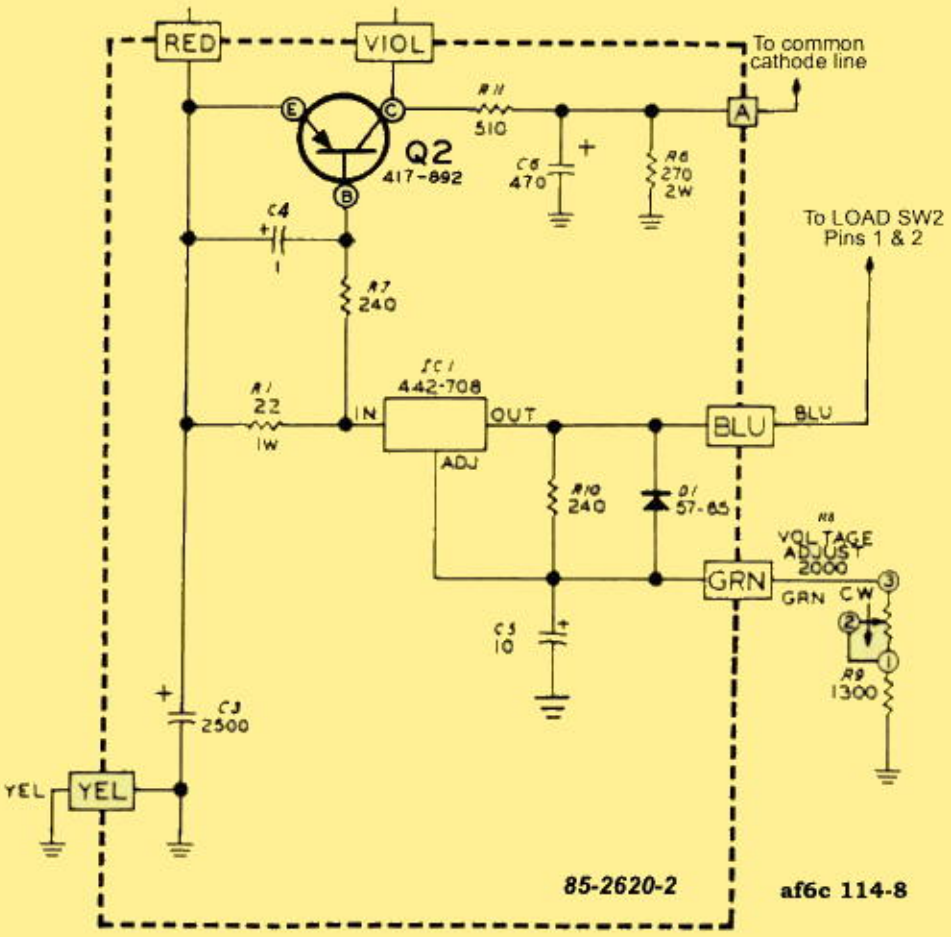


Figure 8: The regulator circuit of the IP-2760. R1 has been increased to 1-watt, C4 has been added. R7 has been changed to increase drive to Q2, and C6 has changed from 500 to 470 µF, likely do to a parts procurement issue as 500 µF is no longer a standard value.

tap. However the transformer used in the IP-2760 has a secondary voltage of 38.4 VAC with a center tap. Thus the rectifier circuit has been changed from full-wave bridge rectification to full wave center-tap rectification, with the center-tap of the transformer grounded. The IP-2760 still uses the same bridge rectifier part, but only two of the diodes are used; terminal 3 is no longer connected to ground. The modified secondary circuit is shown in **Figure 9**. This figure also shows the new location of the LOAD fuse (**F2**).

The biggest change is the lowering of the resistance of R7 from 3300Ω to 240Ω, tightening the feedback loop. C4, which was removed during the regulator circuit change in the IP-2715, is now used to add stability to the loop.

Restoring an IP-2715:

Last year the author picked up a rather battered IP-2715. This unit uses the older 78MGT4 chip, and, after checking the two large 10,000 µF capacitors, it was a pleasant surprise to find the unit powers up and functions properly. The VOLTAGE ADJUST control is a little noisy, and under examination it was found that the Sterling 0 - 25 A ammeter had been replaced with an Emico 0 - 20 A meter. Also, evidently one of the 40411 pass transistors must have failed and was replaced with a 2N3055. A replacement 40411 should be easy to find.

This unit was in heavy use by a commercial manufacturer and, as shown in **Figure 10**, (which was taken prior to any cleanup) is cosmetically poor. The plastic handles have been replaced with metal ones (unfortunately of a different size so new holes had been made. A cigarette lighter jack was added on the top. Also, the front and top panels have a lot of the paint and nomenclature worn off.

What's needed to clean up the unit is a replacement front and top panel (preferably with handles) and possibly the Sterling 0 - 25 amp meter. Has someone parted out an IP-2715 to repair an HP-1144 series power

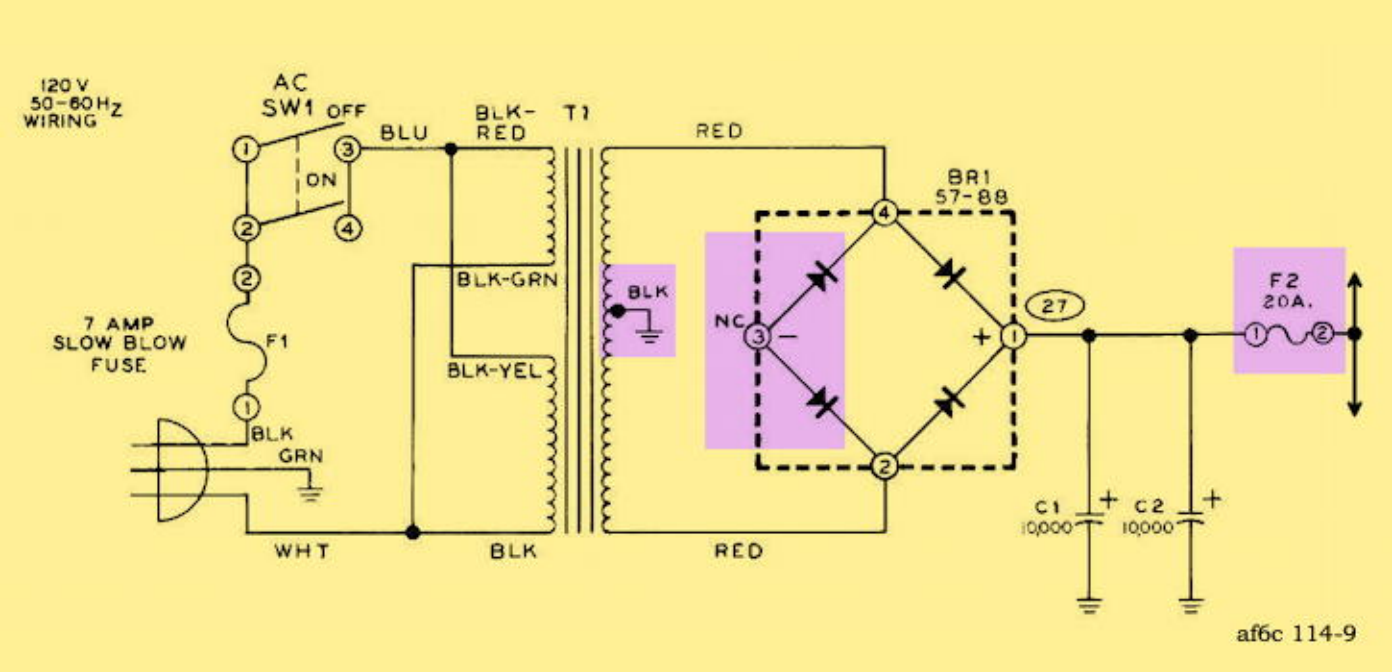


Figure 9: Highlighted are the changes to the rectifier circuit in the IP-2760 required to accept the new 54-971 transformer. Half of BR1 is no longer used (highlighted). Also highlighted is the new location of fuse F2.

Figure 10: The author's IP-2715 as it was when it arrived to the workbench. Dirt, grime and the cigarette lighter receptacle have since been removed, and the unit is working electrically.

supply and still has the carcass? If so the author would be interested in purchasing the needed parts[10]. Contact him using the link in the lower right corner of the pale yellow box on the last page of the article.

Summary:

Having a paper manual for any Heath product you own is worthwhile. Lately I've been purchasing them from the vintage manuals

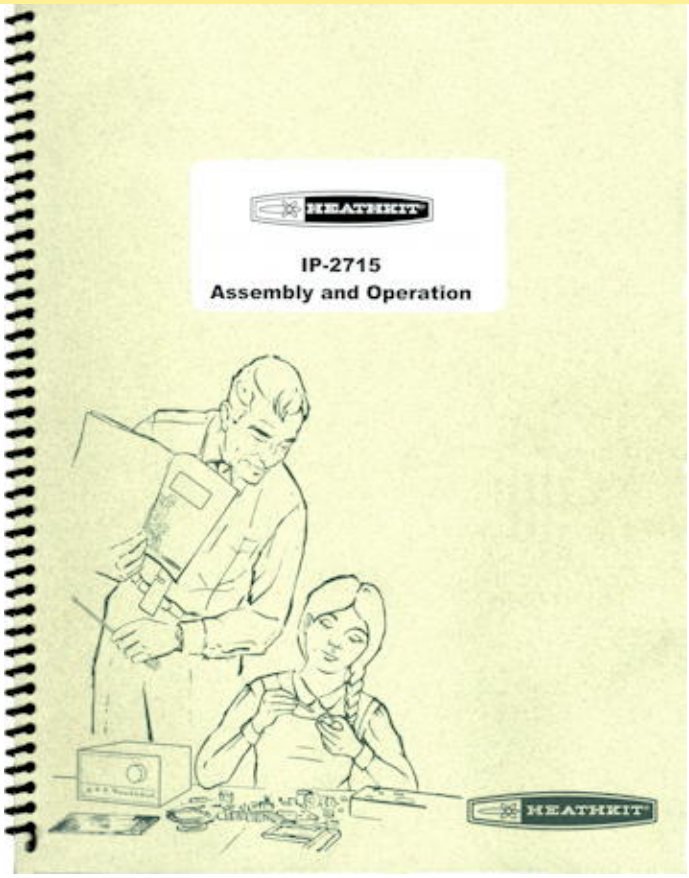


Figure 11: Reproduction of the IP-2715 manual cover from Don Peterson and heathkit.com's vintage manual section. Note neat spiral binding.

page provided by Don Peterson and linked on the new Heathkit website home page. It is there that a manual for the IP-2715 was ordered. (https://www.heathkit.com).

When the purchased IP-2715 manual arrived it was a real surprise. It was a late version [595-1845-**06**] (**Figure 11**). This was the first the author was aware of any change to a new regulator chip. One now has to wonder if the late PS-1144 may also have been updated; though the feeling is no as the timeline is a bit early.

So far all manuals received from Don have been clean, complete and nicely spiral-bound with Heathkit covers - with one exception: I ordered a manual for the GD-1110 Fireball Pinball Game to help write HotM #106[11] and while it arrived in very good shape complete with the thick illustration booklet, one page of the manual (page 45) was blank. Also pictorials 6-1 and 6-2 were missing. They are separate from the Illustration Booklet. They come "…folded inside the manual." Happily, enough information was provided in the GD-1110 manual to complete the article so I never pursued the missing page or pictorials. Even with that one incident I'd still recommend Don's manuals.

I'd like to thank Steve Gladstein - N8FH, Chuck Penson - WA7ZZE, Santos e Silva and Gerhard Wagner - DF1DA for all their help and support for this and many of the other HotM articles. As this article was nearing completion Steve provided the parts list and schematic for the IP-2760, which replaced the IP-2715. This allowed the brief discussion of the IP-2760 added to the article.

Update on IP-5220 Isolation Transformer:
Steve - N8FH peeked inside his IP-5220 and confirms the variable autotransformer is made by Staco of Dayton, OH.

73, from AF6C

Notes:

1. The HP-1144 uses the older MFC6030 regulator IC. The HP-1144A uses the same IC as, all but the latest IP-2715, the 78MGT4.
2. The HP-1144 uses the same pass transistors as the IP-2715, the RCA 40411. The HP-1144A uses the Motorola MJ802 pass transistor. The IP-2715 uses four pass transistors while the HP-1144 uses two.
3. The mod kit 830-33 that updates the HP-1144 to the A version changes regulator IC from the MFC6020 to the 78MGT4 and the two pass transistors to the MJ802.
4. TO-3 is the transistor style: 
5. All five TO-3 transistors mount using thermal compound for good heat transfer.
6. Figure 4 schematic is taken from manual 595-1845-01.
7. Heath rounded 0.0825 up to 0.09 assuming added lead resistance.
8. Heathkit 85-xxxx circuit boards without an ending dash # are un-silkscreened boards. the dash # signifies the silkscreening. If the silkscreening changes the dash# is incremented. Should the actual copper tracings be changed a new 85-xxxx number is used.
9. ***Modification Kit for the Heathkit HP-1144 Power Supply*** - Model 830-33: (http://www.w6ze.org/Heathkit/Mods/Mod_830-33.zip
10. Parts needed (one each except as noted). Parts are listed in order of need:
    1. 203-1849-1 Front panel
    2. 205-1657-1 Top plate
    3. 211-15 Plastic handle (2 ea.)
    4. 407-722 Meter 0-25 amperes
    5. 417-139 40411 Transistor.
11. https://www.w6ze.org/Heathkit/Heathkit_106%20GD1110.pdf

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

Thanks - AF6C

UPCOMING ACTIVITIES

October

- ***10-10 Int. 10-10 Day Sprint:** 0001 UTC to 2359 UTC Sunday Oct. 10
- **Oceania DX Contest, CW:** 0600 UTC Saturday Oct. 8 to 0600 UTC Sunday Oct. 9
- ***CQ World Wide DX SSB Contest:** 0000 UTC Saturday Oct. 29 to 2359 UTC Sunday Oct. 30

November

- **ARRL Sweepstakes Contest, CW:** 2100 UTC Saturday Nov. 5 to 0300 UTC Monday Nov. 7
- **10-10 Int. Fall Contest, Digital:** 0001 UTC Saturday Nov. 12 to 2359 UTC Sunday Nov. 13
- **ARRL Sweepstakes Contest, SSB:** 2100 UTC Saturday Nov. 19 to 0300 UTC Monday Nov. 21

* Indicates club entries are accepted.
** Indicates team entries are accepted.
Note: When submitting logs for ARRL Contests indicate your club affiliation as "Orange County ARC"

State QSO Parties:

- **Nevada QSO Party:** 0300 UTC Saturday October 8 through 2100 UTC Sunday Oct. 9
- **Arizona QSO Party:** 1500 UTC Saturday October 8 to 0500 UTC Sunday Oct. 9
- **Pennsylvania QSO Party:** 1600 UTC Oct. 8 to 2200 Sunday Oct. 9
- **South Dakota QSO Party:** 1800 UTC Saturday Oct. 8 through 1800 UTC Sunday Oct 9
- **New York QSO Party:** 1400 UTC Saturday Oct. 15 through 0200 UTC Sunday Oct. 16
- **Illinois QSO Party:** 1700 UTC Sunday Oct. 16 through 0100 UTC Monday Oct. 17

Repeating Activities:

- **Phone Fray:** Every Tuesday night at 0230 UTC to 0300 UTC
- **CWops Mini-CWT:** Every Wednesday at 1300 to 1400 UTC, 1900-2000 UTD and Thursday 0300-0400 UTC, 0700-0800 UTC
- **SKCC:** Weekend Sprintathon (Straight Key CW) on the first weekend of the month after the 6TH of the month, 1200 Sat. to 2359Z Sunday
- **SKCC:** Sprint (Straight Key CW) 0000Z to 0200Z on the 4th Tuesday night (USA) of the month.
- **K1USN Slow Speed Test:** (CW, 20WPM Max.) Every Friday 2000 UTC to 2100 UTC, Every Sunday night at 0000 UTC to 0100 UTC Monday

OCARC Club Nets:

- **75 Meter Net:** Every Tuesday night at 8:00 pm to 8:30 pm Local Time SSB 3.883 MHz
- **10 Meter Net:** Every Wednesday night at 7:30 pm to 8:30 pm Local Time SSB 28.375 MHz
- **2 Meter Net:** Every Wednesday night at 8:30 pm to 9:30 pm Local Time. FM Simplex 146.55 MHz

Other Nets:

- **Net-At-9:** Wellness & Support Net Monday thru Friday 9:00 am and 9:00 pm Local Time 147.090 MHz (+600 MHz) No PL

Send an email to *Ron W6WG, w6wg@w6ze.org to have your favorite activity or your recent RadioActivity listed in next month's column.*

73, Ron W6WG

10/20 @ 10:20am

This year's International ShakeOut Day is October 20, 2022.

At 10:20 a.m. on October 20, 2022, millions of Californians will "Drop, Cover, and Hold On" in The Great California ShakeOut, the state's largest earthquake drill ever! All volunteer radio groups are encouraged to participate in the drill (or plan a more extensive exercise).

Major earthquakes may happen anywhere you live, work, or travel. The ShakeOut is our chance to practice how to protect ourselves, and for everyone to become prepared. The goal is to prevent a major earthquake from becoming a catastrophe for you, your organization, and your community.

Why is a "Drop, Cover, and Hold On" drill important?
To respond quickly you must practice often. You may only have seconds to protect yourself in an earthquake before strong shaking knocks you down, or something falls on you.

Millions of people worldwide have participated in Great ShakeOut Earthquake Drills since 2008. The Great California ShakeOut is held on the third Thursday of October each year.

Everyone can participate! Individuals, families, businesses, schools, colleges, government agencies and organizations are all invited to register.

How to participate: https://www.shakeout.org/california/howtoparticipate/
Volunteer Radio Groups:
https://www.shakeout.org/california/downloads/ShakeOut_California_2022_radiogroups.pdf

Source: https://www.shakeout.org/california/downloads/ShakeOut_California_2022_radiogroups.pdf. Report and top image alteration by Tom W6ETC

OCARC GENERAL MEETING MINUTES 2022-09-16

The ninth General Meeting of the year, and the fourth in-person General Meeting since the pandemic, was on Friday, September 16, 2022, at the American Red Cross in Santa Ana, with Zoom for those who cannot attend. The meeting was called to order by club president, Nicholas Haban AF6CF at 7:08 PM PDT. Twenty-nine (29) members, guests and visitors were present, with fourteen (14) in-person, and fifteen (15) by Zoom including our speaker.

Pledge of Allegiance

Nicholas AF6CF leads the pledge of allegiance at 7:08 PM PDT.

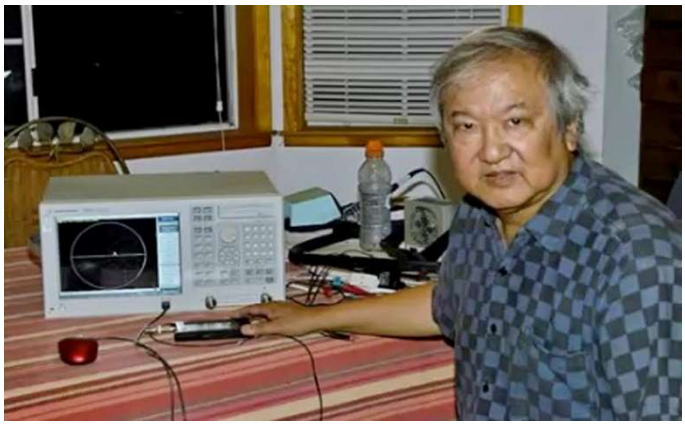
Introductions

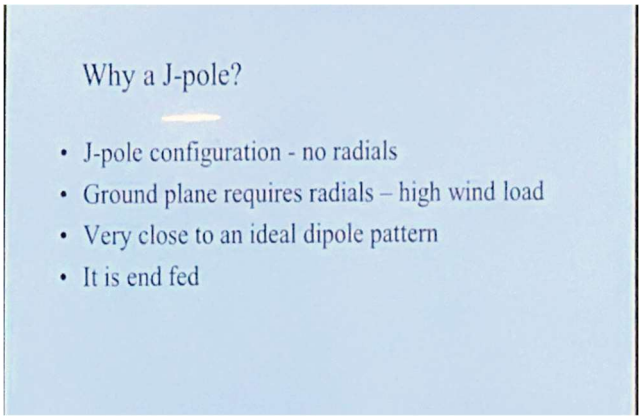
Nicholas AF6CF starts the attendee introductions. All fourteen (14) in-person members and visitors introduce themselves.

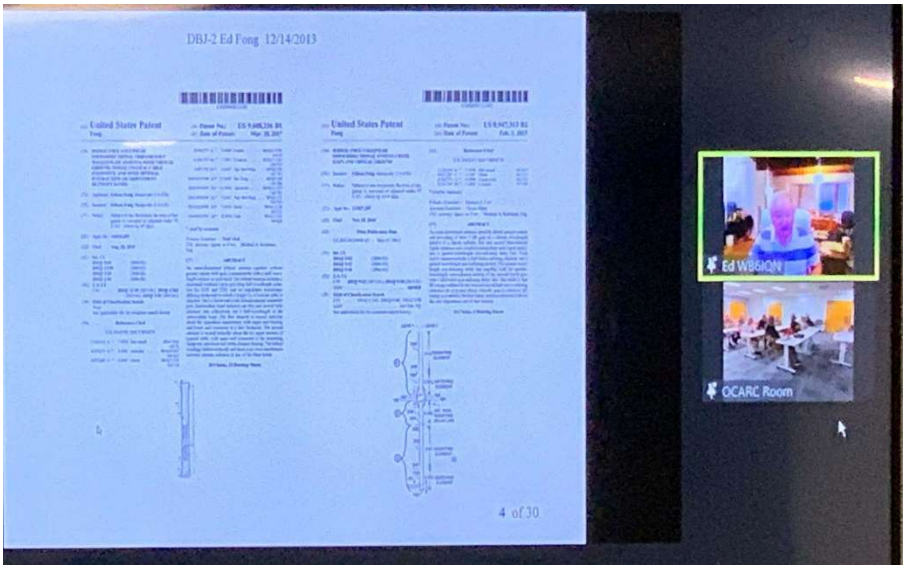
Meeting Presentation

Nicholas AF6CF passes the meeting to our vice president, Tim Goeppinger N6GP. Tim introduces our illustrious guest speaker in Santa Cruz via Zoom, Edison Fong PhD WB6IQN, who presents "J-Pole Antennas."

Ed Fong WB6IQN presents
"J-Pole Antennas"







Questions and Answers

Ed WB6IQN calls for questions from the audience.

-Chip K7JA and Tim G. N6GP have questions for Ed.

In closing, Tim G. tells Ed he has much expertise in his field, and his students are very lucky to have him as a teacher. We are fortunate to have him here tonight. We end with a round of applause.
Thanks again from the OCARC!

Recess
Nicholas AF6CF calls for a recess at 8:29 PM PDT.

Business Meeting
Club president, Nicholas AF6CF starts the business meeting at 8:30 PM PDT. Seven (7) board members were present for a quorum. Three (3) topics were brought to the board, tonight, including two (2) Director Reports and one (1) discussion. One (1) motion was carried, adjournment.

•Director Reports
Nicholas AF6CF calls for Director Reports.

-President: Nicholas AF6CF reports he will be out-of-town for the October 1st Board Meeting.

-Vice President: Tim G. N6GP reminds us of the auction in October.

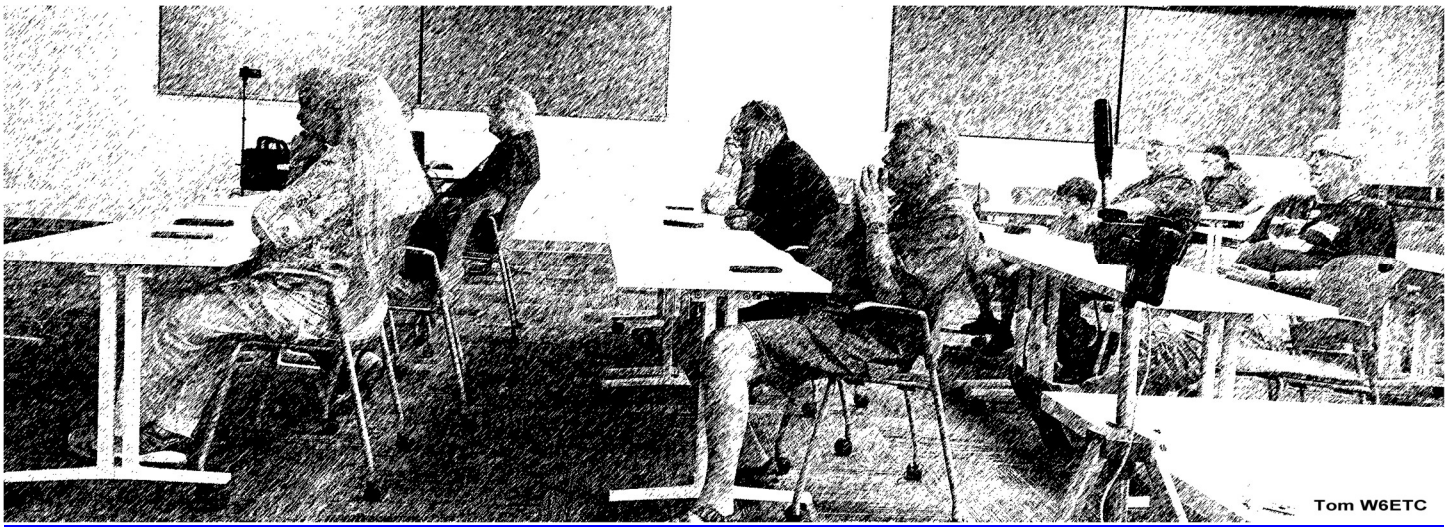
Club Donations
Nicholas AF6CF tells us we have two Hams wanting to donate equipment to the Club. We will need storage space, unless the Club Auction can be a direct point-of-sale. The board discusses the ways of selling the donated equipment.

The Club Auction may be successful, but other ways such as online auctions are very labor-intensive. If we don't sell the equipment, we will need storage until it can be sold.

Good of the Club/Ask the Elmer
There are no items for the Good of the Club or Ask the Elmer.

Adjournment
A motion to adjourn was made, seconded, and carried at 8:39 PM PDT.

--Respectfully submitted by Corey KE6YHX OCARC Secretary



OCARC group present at American Red Cross, Santa Ana during Ed Fong presentation. Image by Tom W6ETC

OCARC BOARD MEETING MINUTES 2022-10-01

The tenth Board Meeting of the year was in-person, on Saturday, October 1, 2022, at Tom W6ETC's QTH in Tustin, with Zoom for those who cannot attend. The meeting was called to order by club president, Nicholas Haban AF6CF at 8:17 AM PDT. Nine (9) directors were present for a quorum, including four (4) who attended by Zoom. Our technical chairman joined us via Zoom at 8:25 AM PDT. We had one visitor in-person, Jim KB6TKA. Fourteen (14) topics were brought to the board this morning, including two (2) Director Reports and twelve (12) agenda items. One (1) motion was carried, adjournment.

Fig 1 – All ten (10) Board Directors were present.
Five (5) directors attended by Zoom, and one guest in-person.

Director Reports

Our vice president and acting chairman, Tim G. N6GP calls for director reports.

-Treasurer: Ken W6HHC reports the Cash Flow Report was sent out. Our income since the beginning of the year totals $3,749. We have outflows totaling $2,710, for a net increase of about $1,038 [See page 26 - editor]. The treasurer has added some funds to the cash box in preparation for the Club Auction.

-Membership: Bob AF6C reports the membership is at 105 including one person who is paying by mail.

Old Business

•Newsletter Editors

October: Corey KE6YHX
November: Steve N1BKB
December: Dan KI6X
January: —open to volunteers—

•General Meeting Programs

October: Club Auction (not with Zoom)
November: Kevin Zanjani KI6DHQ presents "Bioenno Power $LiFePO_4$ Batteries"
December: Christmas Party at Mimi's Cafe in Tustin on Friday, December 9th
January: --to be determined--

•PayPal Account Ownership
This item is tabled indefinitely.

•In-Person Board Meetings at a Restaurant
Morning restaurant locations are considered, and we have an option in Orange. Polly's Pies Restaurant on Tustin St. is considered for next year's Board Meetings. Secretary Corey KE6YHX reports Polly's Pies in Orange has thirty-two 32 chairs and 7-1/2 tables in the breakfast room. The restaurant may be seating other guests in the breakfast room while we are holding our meeting. Publicity chairman, Tom W6ETC reports El Torito on 17th in Tustin has a suitable room. Director-at-Large Tim M. N6TMT reports this location is open at 8:00 AM on Saturday mornings. The management for this restaurant needs to be contacted regarding our Club Breakfast and Board Meetings starting in January 2023. Our visitor mentions a Saturday Special.

•Christmas Party Plans
Ron W6WG reports on the Christmas Party reserved for Friday, December 9th, at Mimi's Cafe in Tustin. An article needs to be written for the November RF Newsletter. One of our member donations is a suitable opportunity-drawing prize. The Icom IC-7000 is chosen. An Ameritron ATR-30 Antenna Tuner is also considered. These items should be posted in the auction at a reasonable opening bid then offered as prizes at the Christmas Party if they do not sell. Ron will buy the HRO Gift Certificates and prizes for the Club.

•October Annual Auction
The Club Auction is planned for the October General Meeting date, at the American Red Cross in Santa Ana. Chip K7JA accepted the auctioneer position. Nicholas AF6CF, Ron W6WG, and Bob AF6C will be his helpers. Ken W6HHC will be managing the finances, and Corey KE6YHX and Greg W6ATB are considered as a treasurer helper. Flyers were distributed at the TRW Swap Meet and HRO.

•Election Nominations Committee Report
Chairmen:
-Nicholas AF6CF
-Tim M. N6TMT
-Bob AF6C

-Current Board Nominations:

President:	**-- OPEN --**
Vice President:	**-- OPEN --**
Secretary:	Tim M. N6TMT
Treasurer:	**-- OPEN --**
Activities Chairman:	**-- OPEN --**
Publicity Chairman:	Ron W6WG
Technical Chairman:	Bob AF6C
Membership Chairman:	Corey KE6YHX
Director-at-Large 1:	Nicholas AF6CF
Director-at-Large 2:	Tim G. N6GP

Some proposed nominations are to be contacted.

•Tower and Other Donations
-We still have the donated tower being held on one of Gene KJ6OML's trailers. We have not found a buyer and it is planned on being disposed of.

-Secretary Corey KE6YHX has been in contact with a club member who needs his Kenwood TS-590SG advertised for sale. Web master Dan KI6X and web programmer Bob AF6C will post it on the w6ze.org web site "For Sale" pages.

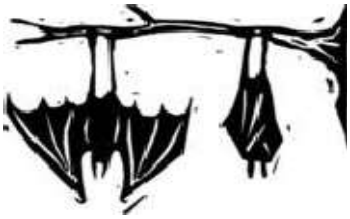
New Business
•Storage of Donations to the Club
Some storage is being arranged for yesterday's donations.

•Disposal of Leftover Donations
This item has been discussed under "Tower and Other Donations."

•ARRL Special Services Club Certification
Dan KI6X reports our ARRL Special Services Club certificate expired in July. Bob AF6C will take care of this.

GOOD OF THE CLUB

•Duty Substitutes
Dan KI6X raises the point about the door at the ARC needing to be opened. These duties need to be filled in a Board Member's absence. Also in the event we have a Zoom presenter, a computer needs to be arranged for the General Meetings.



Ask The Elmer
There are no items for Ask The Elmer.

Adjournment
A motion to adjourn is made, seconded, and carried at 9:31 AM PDT.

--Respectfully submitted by Corey KE6YHX, OCARC Secretary

Ed Fong Antennas – OCARC Group Buy Offer

Last month at the end of Dr. Ed Fong's excellent presentation on J-pole antennas, he announced this group buy offer for our club.
His J-pole antennas are offered at steep discounts from his regular prices – the $75 antenna is $60, and the $45 antennas are only $32.
He would like to see a minimum club order of five (5) antennas, and it will all be shipped to Tim N6GP's QTH. This offer is only valid to residents of the central orange county area.
Please contact Tim N6GP with your order: n6gp@w6ze.org.
Deadline for order is November 1. More details on his antennas here: https://edsantennas.weebly.com/about.html

J-Pole Antennas (pvc pipe not included)
TBJ-1 (ham) triband base antenna (144-148 MHz, 222-225MHz, 440-450 MHz)
Maximum power 75 watt **$60**

DBJ-1 (ham**) dual band base antenna** (144-148 MHz and 440-450 MHz)
Maximum power input 75 watts. - **$32**

DBJ-2 (ham**) dual band roll up antenna kit** - (144-148 MHz and 440-450 MHz) Includes adapters for BNC, SMA and SMA - female.
Also includes a 6 ft extension cable. Maximum power input 50 watts. - **$32**

DBJ - UHF (perfect for GMRS) +5dB Gain Antenna – US patent 8,947,313 +5dB gain no radial collinear – featured in CQ magazine (Summer 2012) **$40**

Accessories
Extra 6ft extension RF cables for the DBJ-2 (note - this only works with the DBJ-2 and is NOT compatible with our other antennas - this is because it is custom built with BNC male to BNC female) **$6**

BNC (female) to PL259 adapter - allows the DBJ-2 to adapt to most base and mobile radios. **$2.50**

SO-239 to BNC (male) **$2.50**

Antenna and Ed's images are from his website: https://edsantennas.weebly.com/about.html

Woody L. Hill
WB6ZCO
SK

Robert - AD6XJ recently notified the OCARC Board of Directors and its members of the passing of his good friend and former OCARC member **Woody Hill - WB6ZCO** on September 8, 2022, at the age of 72, in Ventura County, CA.

Woody joined the OCARC at the June 20, 1969, club meeting, in time to participate in the ARRL Field Day the next weekend. His participation in the club was short, since he soon moved to the Inland Empire, then to Camarillo in Ventura County. See the image below that recognizes his club participation.

Woody and Robert started the WB6ZCO 51.84- MHz repeater at the Camarillo State Hospital. The repeater later moved to Triunfo Peak, in Ventura County.

The OCARC Board of Directors and it's membership offers condolences to
Woody Hill WB6ZCO family and friends.

●●●▬●▬

The following was pulled from an old OCARC RF Newsletter
June 20, 1969, Page 3

Minutes of Meeting - June 20, 1969

The meeting was called to order at 1945 hours by our President, Jerry WA6ROF. The officers of the club were introduced by Frank, WB6TBU. New members in the club are Glenn Wisniewski WB6YWQ, and Woody Hill WB6ZCO.

Ron WB6FIT, spoke about an outing planned for August 3rd. to the San Onofre Nuclear Power Plant, with swimming and a wiener roast afterwards. The majority of the members present were in favor of this outing, and it should be very interesting.

The future ham fest was discussed. Jack, WB6UDC, and Kay, W6NGO, are lining up some manufacturers for donations of ham gear to be raffled.

The remainder of the meeting was devoted to plans for Field Day.

Respectfully submitted

Frank O'Leary - WB6TBU
Secretary

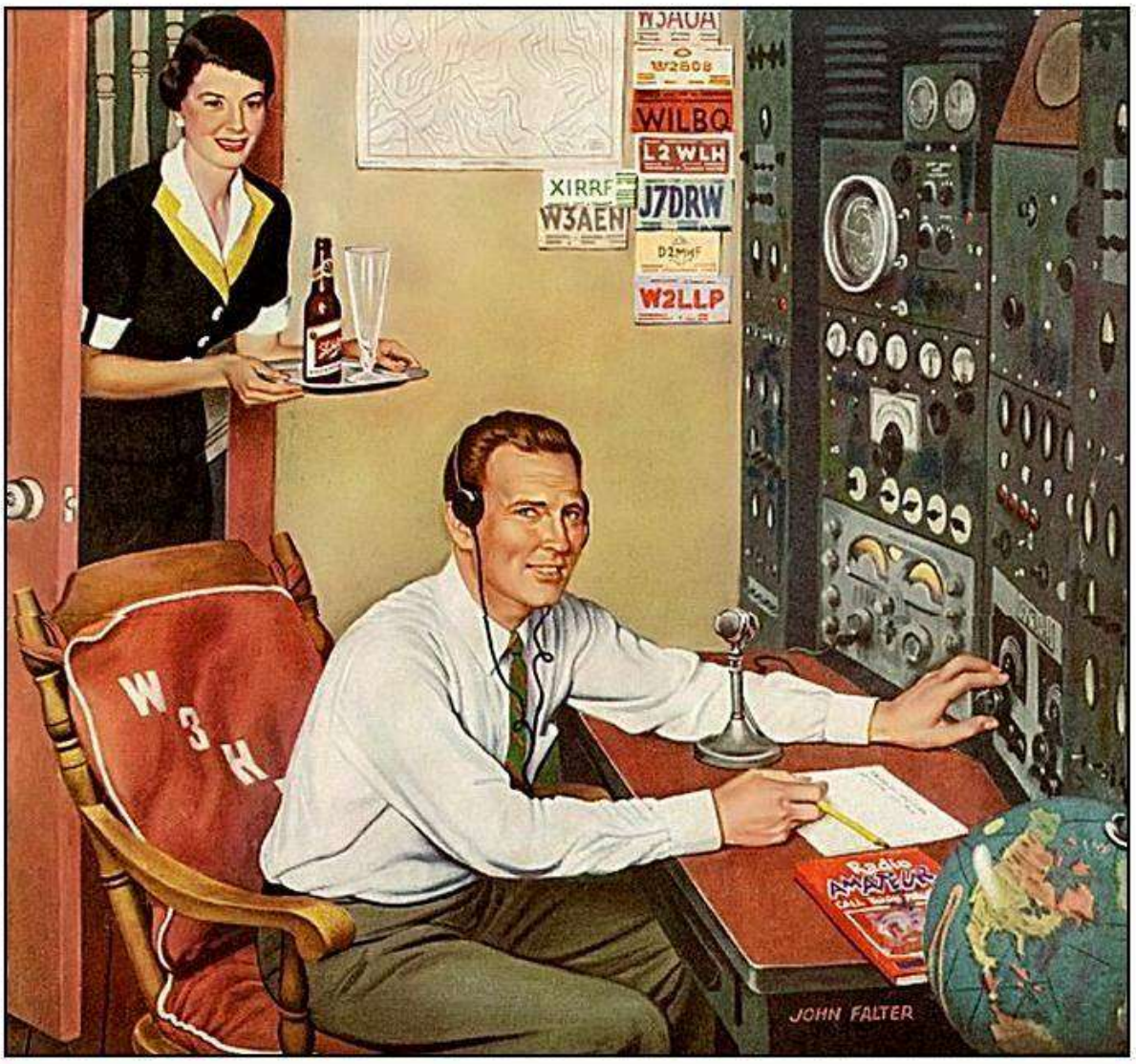
OCARC Cash Flow - Year to Date

1/1/2022 through 9/27/2022

Category	1/1/2022-9/27/2022
INFLOWS	
Badge Income	3.00
Donations - FD Food	724.00
Dues, Family (PayPal)	136.06
Dues, Membership	360.00
Dues, Membership (PayPal)	2,339.96
Dues, Membership (PayPal) 2023	99.86
Opportunity Drawing -Monthly	87.00
TOTAL INFLOWS	**3,749.88**
OUTFLOWS	
Christmas Party- Deposit	300.00
Field Day - Propane	73.22
Field Day Equipment	20.00
Field Day Food	758.05
Field Day Rental - Tent	500.00
Opportunity Drwng Expenses	117.46
PO Box Rental	156.00
Publicity	37.64
Refreshments Expense	28.98
Storage of Equipment - Ann Millard	250.00
Web Site Hosting	161.95
Web Site SSL Fee	69.99
WFD	26.68
WFD - Food	17.90
WFD - Propane	43.06
WFD Rental - Tent	150.00
TOTAL OUTFLOWS	**2,710.93**

Farid Ghanbari
Jan 2019

A BLAST FROM THE PAST



"Here's a message from Milwaukee"

This thoughtful wife knows that the moment her husband tunes in on Schlitz the reception is good. For Schlitz has a very good taste that beer-lovers are changing to with ultra high frequency. Taste Schlitz yourself. You'll soon know why --

Schlitz tastes so good to so many people, it's first in sales in the U.S.A.

Schlitz

The Beer that made Milwaukee Famous