



RF



ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. LVII NO. 07

P.O. BOX 3454, TUSTIN, CA 92781-3454

July 2016

The Prez Sez.....

By Nicholas AF6CF



Hello!

We are now in the period after Field Day 2016.

This year's ARRL Field Day was outstanding, with lots of fun, contacts and excellent food. Thanks again to all our participants we had another successful Field Day. It was safe, with tons of fun and a PR success. Again the capricious Gods of Propagation helped, with sporadic openings in a couple of bands. We even made a satellite contact thanks to the efforts of Tony N2VAJ. We had over seventy participants and visitors and many were impressed with the setup and operations, and again we have attained our operational

objectives and Public Relations goals. Thanks to the co-operation of the OC RACES group we made a bunch of VHF / UHF contacts. The GOTA station was very active too with many "first timers" testing the waters before they get their radio licenses. I would like to extend a Special Thank You to the Centralia School District for allowing us to use their school grounds, all the Band Captains, GOTA and logistics persons. Ron and Don both did a great job as organizers and the Boy Scouts Troop 440 helped a lot, besides providing all the meals and coffee. The scores, the results, QSO's, Bonus Points, etc are being tallied so we have them ready on page 4, but I can tell you that this year's effort was one of our finest, given the conditions and personal circumstances of several of our members. The VP and Activities chair are working on some new and exciting activities with great speakers. I look forward to an eyeball contact with you all at the next General Meeting. Again, thanks to all.

73 DE AF6CF

The speaker at next General Meeting will be

Carl Gardenias WU6D
ARRL Orange Section Manager

Carl will be our speaker at the OCARC July 15, 2016 meeting. The topics will include ARES EmComm, ARRL Orange Section update, internet and YouTube resources, what is happening at HQ, and an Open Forum.

The next General Meeting will be on:

Friday, July 15, 2016
@ 7:00 PM

ENTER from the WEST SIDE entrance of the
Red Cross Building, Room 208
Take elevator to the 2nd Floor. See you there!

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rf_feedback@w6ze.org

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Monthly Events:

General Meeting:

Third Friday of the month
at 7:00 PM held at:
American Red Cross
600 Parkcenter Drive
Santa Ana, CA
(Near Tustin Ave. & 4th St.)

Club Breakfast (Board Mtg.):

Normally First Saturday of month at 8am
Marie Callender's Restaurant
1821 North Grand Ave
Santa Ana, CA
(Between 17th & Santa Clara)

Club Nets (Listen for W6ZE):

28.375 ± MHz SSB
Wed- 7:30 PM - 8:30 PM
Bob AF6C, Net Control

146.55 MHz Simplex FM
Wed- 8:30 PM - 9:30 PM
Bob, WB6IXN, Net Control

7.086 ± MHz CW **OCWN**
Sun- 9:00 AM – 10 AM
Ann K6OIO, Net Control



Club Dues for 2016:

Regular/New Members* - - - - - \$30
Family renewal/Join** - - - - - \$45
New Member Join Jul-Dec*** - - \$15
Replacement Badge**** - - - - - \$ 3

* New members Jan-Jun, w/badge.

** Two members or more, w/badge.

*** New members Jul-Dec, w/badge.

**** There is a \$1.50 charge if you'd like to have your badge mailed to you.

OCARC Field Day 2016

Walter Knott Education Center - Buena Park

W6ZE (with AF6CF for GOTA)



(collage by Ken W6HHC)

FIELD DAY SUMMARY
FOR
THE ORANGE COUNTY AMATEUR RADIO CLUB - W6ZE

by: Ken / W6HHC & Bob / AF6C

NOTE: Adjustments have not been made for duplicate contacts, and bonus points. Final scores appear in QST.

YEAR	160M SSB	80M CW	75M SSB	40M CW	40M SSB	20M CW	20M SSB	15M CW	15M SSB	12M SSB	10M CW	10M SSB	6M CW	6M PHN	2M CW	2M PHN	220 PHN	440 PHN	UHF CW	UHF PHN	ATV	RTTY/PSK Dig	SAT- ELLITE	GOTA	---- TOTAL ---- QSO's / (POINTS)
2016	0	29	18	163	342	206	760	15	18	0	0	0	1	36	0	44	0	1	0	0	0	188	1	52	1,874 / 4,952
2015	0	53	121	115	507	661	1161	190	324	0	1	71	3	60	0	45	0	6	0	0	0	77	0	1	3,396 / 8,992
2014	0	111	122	756	723	1059	1113	559	382	0	57	134	25	133	0	43	0	11	0	0	0	121	23	47	5,419 / 16,214
2013	0	269	339	655	1052	895	1960	484	614	0	38	67	6	60	0	60	15	11	0	0	0	144	4	186	6,859 / 18,700
2012	0	14	51	125	78	215	735	185	330	0	0	12	1	50	0	37	5	5	0	0	0	13	0	408	2,264 / 5,634
2011	0	58	176	168	217	253	703	32	198	0	16	40	0	57	0	37	0	16	0	0	0	0	0	139	2,110 / 5,278
2010	0	0	0	240	342	223	727	49	0	0	0	0	1	96	0	32	1	7	0	0	0	0	0	160	1,878 / 4,786
2009	0	277	126	838	807	974	970	495	368	0	5	450	11	375	0	125	18	20	1	0	0	0	2	130	5,992 / 17,446
2008	0	179	204	690	405	411	878	141	43	0	22	68	15	135	0	34	2	14	0	3	0	0	5	16	3,265 / 9,468
2007	1	356	310	910	830	988	1285	381	320	0	18	150	9	145	2	175	40	70	2	9	0	2	11	142	6,156 / 17,648
2006	0	28	20	89	512	156	664	16	10	0	0	0	0	38	1	85	0	7	0	0	0	114	0	113	1,853 / 4,514
2005	0	113	6	158	481	337	534	122	17	0	0	0	0	74	0	36	16	20	0	0	0	0	0	31	1,945 / 5,350
2004	0	166	239	37	412	131	477	31	105	0	1	114	0	0	0	46	12	20			0	0	1	0	1,792 / 4,316
2003	0	0	85	52	127	27	295	0	191	0	0	41	0	52	0	64	1	13			0	0	0	0	948 / 2,054
2002	0	26	69	192	279	76	229	0	485	0	0	18	0	62	0	68	6	10			3	2	0	3	1,528 / 3,648
2001	0	0	25	101	251	0	432	0	675	0	0	109	0	48	0	28	1	0			0	0	3	-	1,673 / 3,548
2000	0	19	20	88	91	0	625	0	794	0	0	121	0	36	0	72	7	15			0	0	1	-	1,889 / 3,992
1999	0	13	20	15	237	0	996	0	724	0	0	22		5	0	2	0	0			0	0	0	-	2,034 / 4,124
1998	0	24	75	65	136	100	250	0	624	0	0	82		0	0	46	17	12			0	7	1	-	1,439 / 3,270
1997	5	81	131	83	306	150	853	14	275	0	0	106		32	0	79	4	0			0	32	1	-	2,152 / 5,024
1996	-	146	228	104	125	283	673	40	605	0	0	217		121	0	32	0	40			0	13	1	-	2,628 / 6,428
1995	-	145	272	203	94	443	572	51	451	0	0	131		66	0	93	29	8			0	33	6	-	2,597 / 6,944
1994	-	114	114	208	45	486	748	85	761	0	13	312		58	0	94	33	0			0	31	0	-	3,102 / 8,078
1993	-	150	100	159	81	530	700	131	812	0	0	179		40	0	86	12	16			0	35	0	-	3,061 / 8,132
1992	-	0	294	200	110	541	555	0	840	0	0	232		13	0	74	0	1			2	41	80	-	2,983 / 7,530
1991	-	105	308	182	182	400	623	9	463	0	0	104		4	0	141	23	11			0	48	0	-	2,626 / 6,740
1990	-	0	0	70	144	0	370	0	747	0	0	131		39	0	114	14	26			0	2	-	-	1,657 / 3,454
1989	-	30	0	98	5	0	906	21	172	0	0	238		3	0	121	24	9			1	18	-	-	1,646 / 3,590
1988	-	127	0	93	75	2	359	0	570	0	144	81		0	0	32	0	-			-	14	-	-	1,497 / 3,726
1987	-	22	0	0	39	0	708	0	18	1	117	0		1	0	51	0	-			-	5	-	-	962 / 2,202
1986	-	0	46	219	78	0	488	0	45	10	0	0		0	0	82	0	-			-	0	-	-	968 / 2,374
1985	-	85	0	315	91	35	662	78	0	-	0	0		0	0	22	0	-			-	-	-	-	1,288 / 3,602
1984	-	18	0	313	0	32	196	32	350	-	0	0		0	0	0	0	-			-	-	-	-	941 / 2,672
1983	-	3	93	200	0	0	776	0	995	-	0	43		18	0	16	1	-			-	-	-	-	2,145 / 4,696
1982	-	0	105	59	238	40	352	19	515	-	0	72		0	0	155	27	-			-	-	-	-	1,582 / 3,400
1981	-	0	167	200	265	60	699	77	717	-	0	105		0	0	197	0	-			-	-	-	-	2,487 / 5,648
1980	-	20	149	205	235	471	318	52	1,025	-	0	226		12	0	100	36	-			-	-	-	-	2,849 / 7,194
1979	-	0	195	198	92	42	773	0	737	-	0	95		0	2	124	8	-			-	-	-	-	2,266 / 5,016
1978	-	16	196	246	170	30	981	57	558	-	13	145		0	1	164	23	-			-	-	-	-	2,600 / 5,926
1977	-	25	243	182	199	0	843	81	486	-	4	309		0	4	234	0	-			-	-	-	-	2,610 / 5,812
1976	-	99	254	152	487	21	600	64	210	-	2	54		0	0	2	0	-			-	-	-	-	1,945 / 4,566
1975	-	80	120	154	274	40	863	140	259	-	0	123		0	0	0	0	-			-	-	-	-	2,053 / 4,934
1974	-	6	161	6	333	0	630	12	342	-	0	110		0	0	0	0	-			-	-	-	-	1,600 / 3,248
1973	-	90	226	0	452	0	932	0	273	-	0	0		0	0	46	0	-			-	-	-	-	2,019 / 4,218
1972	-	0	50	0	350	0	521	0	530	-	0	0		0	0	94	0	-			-	-	-	-	1,545 / 3,090
1971	-	0	274	0	106	0	530	0	136	-	0	0		0	0	0	0	-			-	-	-	-	1,046 / 2,092
1970	-	0	272	0	0	0	531	0	426	-	0	0		0	0	0	0	-			-	-	-	-	1,229 / 2,458
1969	-	0	98	0	50	0	375	0	301	-	0	0		0	0	169	0	-			-	-	-	-	993 / 1,986
1968	-	10	224	62	396	93	328	24	430	-	0	68		0	0	145	0	-			-	-	-	-	1,780 / 3,938

Here are Field Day Quotes

"At least two agency (Orange County Sheriff's Department) paid officials visited our Field Day site. They included Dave Fontneau, the recently appointed Director of the OCSD Communications & Technology Division, and Lee Kaser, the OCSD Emergency Communications. Another agency official who attended our Field Day was Delia Kraft, Program Support Manager, Orange County Sheriff's Department, Communications & Technology Division.

Thanks again for inviting OCRACES to participate with OCARC in Field Day. We see some things that we could have done better. For example, we should have had an "overnight" person to keep the VHF/UHF station humming, but our scheduled person had to stay home with a very sick wife. If you want OCRACES to participate with OCARC again next year, we will be honored to do so. The Sheriff's officials were very impressed with the overall setup (especially with the OCARC antenna arrays), and agreed that OCARC and OCRACES make a great Field Day team!"

73, Ken Bourne W6HK, OCRACES

"The weather was just right, the bands were open, the food was great, the people were friendly, and overall, a perfect Field Day!"

Corey Miller KE6YHX

"OCARC Field Day 2016 was fantastic. Club participants shared their expertise. Food was good. A lot of action on various bands. Thanks to the OCARC Board of Directors for their direction and continued support. Also thanks to OC-RACES for their participation with UHF/VHF. Can't wait for next years 2017 ARRL Field Day :) 73"

Tom W6ETC

"Tremendous teamwork plus a lot of planning and preparation yielded a fantastic and a safe Field Day. It was great to see other members go from never operating Field Day to making QSO's at the rate of 60 per hour in a very short amount of time. - It was a great Field Day for OCARC!....Well done!!!"

Tim N6GP

"With GOTA, 20 CW, 20 Phone and PSK31 all operating on 20 meters simultaneously, as well as a nearby plasma TV spewing out radiation every 15 or so KHz, hearing the weak stations on 20 meters was difficult to say the least. Used for its seventeenth consecutive Field Day operation, our generator ran very well, consuming only a bit more than one-half gallon per hour. FD 2016 was a fun and safe activity. A good time was had by all."

Bob - AF6C

"DIGITAL 82 79 67 75 83 (ascii caps)"

73, Greg W6ATB

"It was a great OCARC Field Day, lots of fun! But 20M Phone was very noisy this year ...sounded like a nearby plasma TV all over the band? The 100 degree temperatures never appeared, thank goodness for the nice sea breeze that did appear."

...de Ken W6HHC

"Besides plenty of radio time, I think the best part of Field Day is the opportunity to have the time to get to know and work with other club members. I had a great time and I looking forward to next year. 73"

Ron Mudry, W6FPS

"FD 2016 was a fun and safe activity. A good time was had by all."

Nicholas AF6CF

"Field day is one of my favorite camp-outs because scouts get to talk on the air and serve the OCARC. Troop 440 cooks hot meals for the club and this helps the scouts practice their cooking skills."

Adrian Mendez, 2nd Class rank scout Airborne Eagles patrol

"The Field Day event in Buena Park that the OCARC took part in was very well organized and professional. The Amateur Radio operators impressed upon me the scale and the scope at what Amateur Radio operators can do. Amateur Radios are not just for fun but also one of the most important ways to communicate in a time of disaster; it was an impressing sight to see.

Brian Ahn KM6CXL - Program Coordinator Disaster Resiliency for Vulnerable Populations

TechTalk121

DATV-Express on Windows using Express_DVB-S_Transmitter software

by Ken W6HHC

The old technology of analog-ATV suffers from susceptibility to snow and multi-path ghost images. Digital-ATV (DATV) using new technologies like digital modulation, and Forward Error Correction (FEC) can result in robust video reception where analog-ATV fails, as well as providing more narrow bandwidths on the ham bands. **Figure 01** shows the difference between receiving weak signals on analog-ATV and Digital-ATV using the same RF power amplifier and the same antennas.

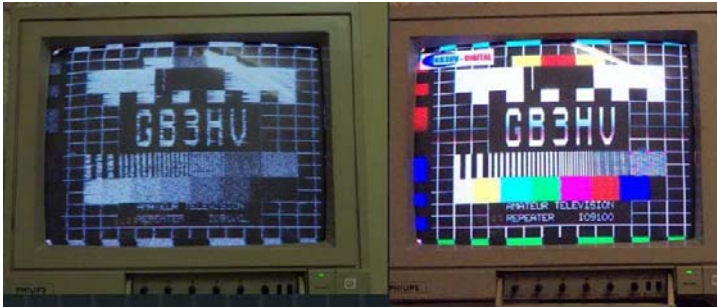


Fig 01 - Comparison of analog ATV video and DATV video using the same antennas with weak sigs (courtesy of G8GTZ & GB3HV)

The DATV-Express Digital-ATV exciter board was introduced in January 2014 to provide a more-affordable product for hams to transmit DATV. The original DATV-Express software product ran on LINUX operating system...a very useful OS, but 95% of hams do **NOT** use LINUX...and most of those hams do **NOT WANT to learn** a new OS!!

Express_DVB-S_Transmitter software

The new **Express_DVB-S_Transmitter** software was written by Charles G4GUO to allow the DATV-Express transmitter board to operate in Windows (Win7, Win8, and Win10). A block diagram of a typical set-up is shown in **Figure02**. An important feature of this new software is that the video-capture-to-encoder function no longer needs to be performed on a Hauppauge video-capture board. The Express_DVB-S_Transmitter software uses the FFMPEG CODEC library that is available in a Windows environment to perform the video encoding/compression (no more Hauppauge unit needed!).

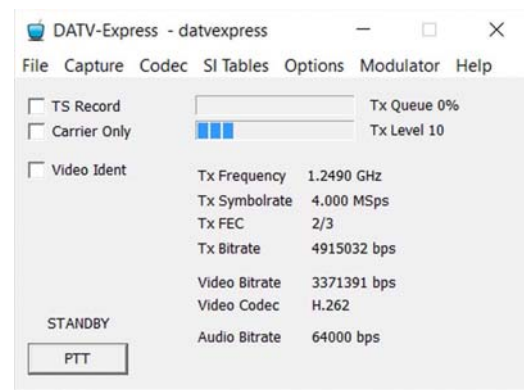
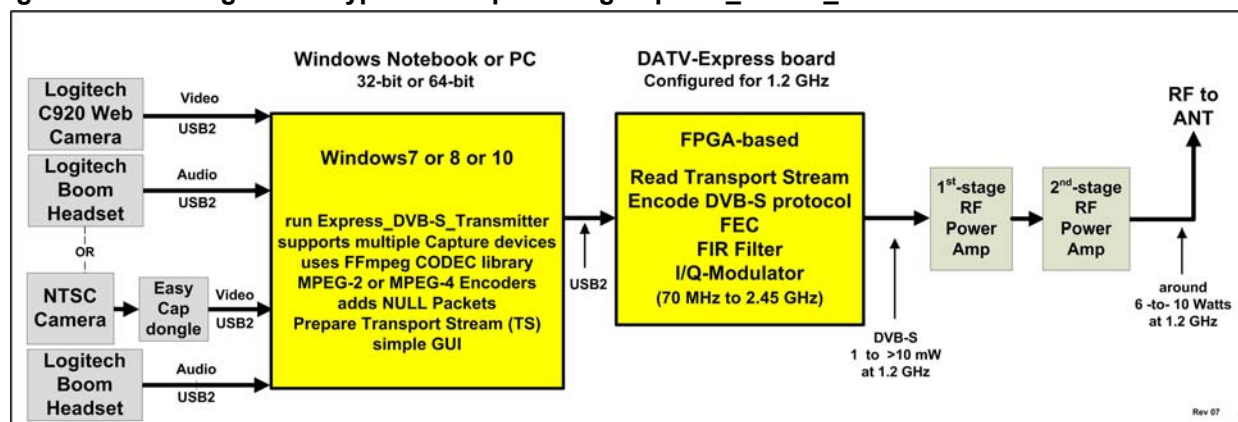


Fig 03 - The Main screen of Express_DVB-S_Transmitter software

The Main screen of the Express_DVB-S_Transmitter software displays all of the settings that the owner has made - as shown in **Figure03**. There are seven tabs across the top of the Main screen that control the actual settings for the DATV transmission. For example: the **CAPTURE Tab** allows selecting the video and audio device and the **MODULATOR Tab** allows selection of frequency, Symbol Rate, FEC, etc.

Fig 02 – Block Diagram for typical set-up running Express_DVB-S_Transmitter software on Windows



Choice of Cameras and Microphones

One big improvement made by this new Windows software for the DATV-Express hardware board is that there are many more camera models that can be used. Use a USB-based web-camera such Logitech C920 and HD hand-cameras as well as using your old NTSC hand-camera through a video-capture dongle like EasyCap (USB-based). Even the camera and microphone on your notebook computer can be selected.

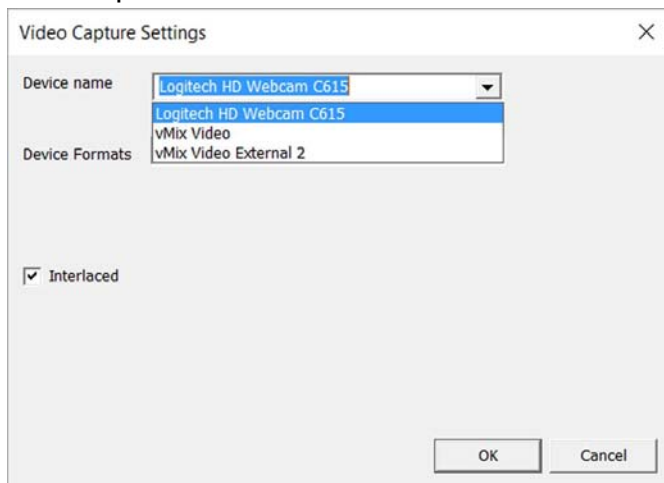


Fig 04 – CAPTURE Tab allows you to choose among cameras attached to the Windows PC

Choice of CODEC

A CODEC is a compression encoder. The CODECs Tab allows you to send H.264 (MPEG-4) video as the video-payload even though the software is using DVB-S protocol. In the commercial DTV world, the DVB-S protocol does NOT transmit H.264 CODEC, but DVB-S2 and DVB-T2 do transmit H.264.

The radio buttons along the top of the **Figure05** allow you to select one of three different CODEC VIDEO encoding technologies for your transmission.

- **H.262** is the standard MPEG-2 video encoding that is used by commercial DVB-S DTV transmissions. It works well but does not compress as efficiently as H.264 or H.265. H.262 is more compatible on older SetTopBox receivers (such as FTA before MPEG-4 was introduced).
- **H.264** is the newer MPEG-4 video compression that is used by commercial DVB-S2 HDTV transmissions. H.264 encoding provides higher bit stream compression efficiency than H.262, but may have a little longer latency (video delay)

than H.262. The good news is that H.264 CODEC can be used as the “payload” video stream inside the DVB-S protocol...as long as the receiver is capable of receiving both DVB-S and H.264...such as a DVB-S2 STB. Another advantage of the H.264 CODEC is that it works better (than H.262) in low Symbol-Rate environments under 1M Symb/sec. The significantly better low-SR video quality seen on the receiver is due to H.264 design using a more suitable macro block size. One caution is that if you insist on using HDTV quality video as an input, then the video bitrate will be very large and may require a 6 MHz BandWidth on the spectrum to receive that quality. Hams can tweak the video capture format and SR and frame-rate (FPS) to achieve acceptable BW and video quality as the RB-DATV hams do on 2 Meters and have shown to reduce DATV spectrum bandwidth requirements on other ham bands like 70 CM and 10 GHz.

- **H.265** is a more recent video compression encoder that is also known as High Efficiency Video Coding (HEVC) can encode 4Kp60/10-bit video in real-time (with hardware encoder). H.265 can compress 480-line video with 50% more reduction and 1080-line video is reduced by 60% (both compared to H.264 CODEC). H.265 software encoding is very computer intensive and typically results in latencies nearly 10 seconds.

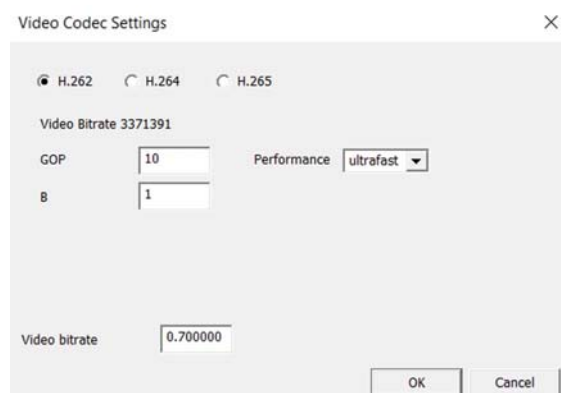


Fig 05 – The CODEC Tab allows selecting H.262 or H.264 or H.265 encoding.

Simple Call Letters Overlay

Another new feature introduced in this Window software application is a simple video overlay for your call letters. This feature can be enabled by “checking” the VIDEO IDENT box on the

Main window. **Figure06** shows how the video overlay field appears (shown as the call **W6HHC**) on the receiver's screen.



Figure 06 – The VIDEO IDENT feature can be enabled to display your call letters on the received transmission

Adding optional vMix Video software

vMix is a great optional companion software tool. vMix Basic is a free video-editor software package for SDTV format video (Standard Definition) is available from vMix.com. There are more-professional HDTV products of vMix available for sale, including the vMix Basic HD for US\$60. The free video-managing software allows you to control multiple cameras and audio microphones, create call letter overlays, create blue-screen and green-screen tricks, and perform fades-between-cameras. You can capture any video that you can get onto your Windows computer via USB, Firewire, ASI, or HDMI (using a HDMI-USB capture card). When running, vMix will display as one of the available devices under CAPTURE – Video Devices and CAPTURE – Audio Devices.

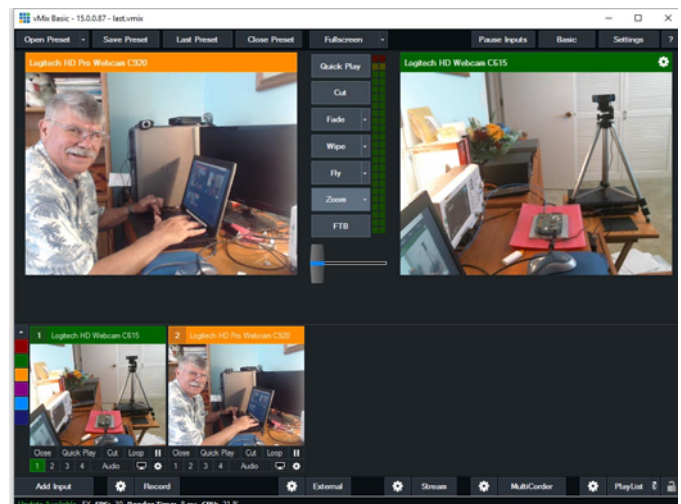


Fig 07 - Typical window for vMix Basic optional software can control multiple cameras and also create “green screen” video effects.

Downloading Software and Manual

The Express_DVB-S_Transmitter software is currently available (and free) as a “BETA release” of v1.11. This beta software does already have many successful users around the world and is expected to be “production released” by September. The software install package, a beta-grade Users Guide for Windows and a readme file, called NOTES.txt can all be downloaded from the **www.DATV-Express.com** web site on the **DOWNLOADS** page. Installation instructions are included in the Users Guide for Windows. The instructions also explain how to use the ZADIG free tool to easily install a Windows device driver for the DATV-Express hardware board.

Finally, a reminder that you can order the DATV-Express hardware board for US\$300 + shipping on the **PURCHASE** page....but you have to be registered and logged-in to the web site in order to make the PayPal purchase.

Useful URLs

- British ATV Club - Digital Forum – see www.BATC.org.UK/forum/
- CQ-DATV online (free monthly) e-magazine – see www.CQ-DATV.mobi
- DATV-Express Project for Digital-ATV (User Guide and downloads) – see www.DATV-Express.com
- G4GUO github for DATV-Express source code – see https://github.com/G4GUO/datvexpress_gui.git
- Chris MWØLLK discussions on vMix and FFMPEG software on Windows to create transport stream – see <http://www.tannet.org.uk/using-ffmpeg-to-generate-a-transport-stream-more-details-and-how-to-add-text-overlays/>
- Orange County ARC entire series of newsletter DATV articles and DATV presentations – see www.W6ZE.org/DATV/
- vMix Basic free optional video software tool download – see www.vMix.com
- Yahoo Group for Digital ATV - see groups.yahoo.com/group/DigitalATV/

Coming in August Show and Go

What is Show and Go: A remote activation followed by a fox hunt.

Members will arrive at the appointed time and place where the Board members will be waiting. We will assist you to activate on HF with just your normal "go kit" gear. No generators, towers or fancy gear needed; just the basics. Then all participants will have the opportunity to further hone their skills by joining a "fox hunt". Saturday August 20th probably 8:30 am.

2016 OCARC SHOW & TELL SCHEDULE

This is a list of suggested Show and Tell activities for the 2016 calendar year. Bring your item to show and tell! *

July: Station accessories

August: **Morse Code**

September: Digital Modes

October: **Auction – no "S-n-T"**

November: Linear Amplifiers

December: **X-MAS Party - no "S-n-T"**

*If you wish to participate in the "Show & Tell", please contact the Activities Chairman Tim, N6TMT N6TMT@w6ze.org, or just bring your "treasured stuff" to OCARC meetings to share with the other members.

Note: Topics are subject to change without notice.

Quick-View OCARC 2016 Calendar and Topic Schedule

	OCARC Member- ship**	Board of Directors Meeting B
7	7/15	7/09*
8	8/19	8/06
9	9/16	9/03
10	10/21	10/01
11	11/20	11/05
12	Christmas Party 12/09	??

*Indicates Change to normal schedule. OCARC Board of Directors schedules breakfast meetings on the 1st Saturday of each month. B Indicates Breakfast available at extra cost, meeting held offsite at a location; Marie Calanders.
**OCARC membership meetings are typically held the 3rd Friday each Month.

Heathkit of the Month #73: by Bob Eckweiler, AF6C



AUTOMOTIVE TEST EQUIPMENT

Heathkit ID-29

Automotive Tune-Up Meter

Introduction:

In late 1970 I ordered my first new car, a Datsun 240Z; being in high demand at the time, it finally arrived the next June, the day before Field Day. In April of 1971, my previous car, a 1964 Volkswagen bug, swallowed a valve severely damaging the engine. With the help of a neighbor I got the block repaired and the engine rebuilt, and with the help of Jack - W6LOH, I got the engine back into the car. That got me started on doing my own tune-ups and mechanical repairs that didn't require major facilities.

The '71 240Z has standard point ignition and a six-cylinder engine with dual Hitachi SU carburetors. The engine compartment is uncluttered and working on the engine is a joy. One could even easily change the oil filter from above. When I was told a gentleman was starting a 240Z sports car club, I quickly got involved as one of the charter members of **Group Z**. The club had many attractions, one being a class offered by **Our Pride**, a garage specializing in the Datsun. They taught us how to tune our Z up. Of course, setting the point gap with a feeler gauge versus an instrument left a lot to be desired. So when I saw an automotive tune-up meter offered by Heathkit I ordered one pronto. That kit is the ID-29 - Figure 1.

The Heathkit ID-29:

The Heathkit ID-29 Automotive Tune-Up Meter was introduced in 1969, too late to make that year's major catalog. The first reference I found was in an ad in the Milwaukee Journal for June 26th 1969. This ad was placed by the local



Figure 1: Heathkit ID-29 Automobile Tune-up Meter (Shown less plastic case).

Heathkit retail store showing a retail price of \$35.95. Another ad was found in Popular Science in January of 1970 (figure 2) with a price of \$29.95. The ad still called the kit 'new'.

The ID-29 provides three functions:

- The dwell function measures the dwell of the points. This is the percent of distributor rotation the points stay closed, charging the coil, prior to opening. This determines the energy that gets stored in the coil, especially at higher RPM, and can affect performance. Dwell is measured in degrees of one revolution of the distributor that the points remain closed.
- The tachometer function measures engine RPM. Just as you adjust an IF transformer for maximum audio output, you make carburetor adjustments by RPM. The ID-29 has two RPM ranges, 0 - 1,500 RPM and 0 - 4,500 RPM full scale.
- The volts function is that of a simple 0 - 15 VDC voltmeter. A handy tool to have right there at the car when checking wiring.

The ID-29 mounts in a brown injection molded plastic case (more about that later). It has a meter on the left and two rotary switches vertically aligned on the right. A storage compartment below the panel houses a two conductor test lead with red and black insulated alligator clips. It also has room for the calibration cable

METER SCALES (Top to Bottom):

Scale 1 (top):	0 - 15 (x100 RPM) also
Scale 1 (top):	0 - 15 Volts DC
Scale 1 (bottom):	0 - 45 (x100 RPM)
Scale 2 (top):	Dwell 8-cyl. 10° - 45°
Scale 2 (bottom):	Dwell 4-cyl. 20° - 90°
Scale 3 (top):	Dwell 6-cyl. 15° - 60°
Scale 3 (bottom):	Dwell 3-cyl. 30° - 120°

SWITCHES:Upper switch**CYLINDERS:** 4 position rotary switch
3, 4, 6, 8Lower switch**FUNCTION:** 4 position rotary switch
DC VOLTS, LOW RPM, HIGH RPM, DWELL

Heathkit Automotive Tune-Up Meter Layout
Table I:

and any adapters one may want to keep handy. Table I shows the meter scale and switch information. The meter is a large 4-1/2 inch 100 degree movement meter making the scales easy to read, even outdoors or in dim light.

One nice feature of the ID-29 is that it contains no batteries to go dead, or worse leak. Power is derived from the unit under test. When the **FUNCTION** switch is in the **LOW RPM, HIGH RPM** and **DWELL** positions the ID-29 draws about 10 ma average power. When in the **VOLTS DC** the meter is a passive 1,000 Ω per volt 15 volt full scale meter - ample for automobile circuit checking. Also included is a connection diagram that attaches to the inside lid of the case, showing the proper way to connect the meter to the distributor coil (See figure 3). It contains enough information that the manual may remain on file while using the instrument.

While most cars of the day used 12-volt negative ground electrical systems, the ID-29 is designed to also operate with vehicles having a six-volt and/or positive ground electrical system without modification.

ID-29 Voltmeter Circuit:

A copy of the schematic is shown in figure 6. When the **FUNCTION** switch is in the **DC VOLTS** position, the positive test lead is connected through a filter composed of L1 and C1 to remove any spikes that may occur, and on to the positive terminal of the meter through a precision 15 K Ω resistor. The negative test lead is connected to the negative terminal of the meter through another set of contacts on the **FUNCTION** switch.

This voltmeter is a low impedance type of meter with an input impedance of 1,000 Ω /V or 15 K Ω since there is only one 15 volt range. Add to that, that some active circuitry is still connected to the input leads and is lowering the impedance even more. Still, for normal car measurements, like measuring the battery voltage, tracing out battery power to a lamp or another load, it will perform quite acceptably.

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with
Heathkit®
Automotive Electronics



NEW Heathkit
3-in-1 Tune-Up Meter
Measures DWELL
RPM
VOLTAGE
Kit only
\$29⁹⁵*

New ID-29 measures Dwell, RPM & DC Volts on all 4-cycle, 3, 4, 6 & 8 cylinder engines with standard ignition. Uses no batteries. 3% accuracy. Builds in only 5 hrs. with famous Heathkit manual. 4 lbs.

Figure 2: Heathkit Ad (Partial) in the January 1970 issue of Popular Science

ID-29 Dwell Circuit:

The dwell is measured simply by applying a fixed voltage to the meter while the points are closed. If the points are closed for a longer period (higher dwell), the voltage is applied longer and the meter, which responds to the average current will read higher. Since the distributor rotates at half the speed of the crankshaft, the maximum dwell time for an 8-cylinder engine would be $360^\circ \div 8$ or 45° . the maximum dwell time for engines with less cylinders is shown in Table I.

When the FUNCTION switch is in the DWELL position, the test leads are connected across the coil with the proper polarity and the engine is running, square wave pulses appear across the test leads. Due to the inductance of the coil, these square waves contain high voltage transients. A filter composed of L1 and C1 reduce these spikes to a safe level for the electronics. Diodes D1 and D2 protect the dwell circuit from accidental polarity reversal due to misconnection of the test leads.

When the points are closed, a positive voltage is present across the red to black test leads. This voltage is fed to transistors Q1 and Q2, which are wired as a constant current source. As long as the input voltage is within a range of about 5 to 15 volts, the Q2 collector current will remain constant at about 6.5 ma. About 5.5 ma of that current will flow in series through special diodes D3 and D4. These "Stabilator" diodes will have a constant and stable voltage drop across them of about 1.4 volts each at that current. This keeps the voltage at the collector of Q2 at 2.8 volts while the points are closed. When the points are open this voltage is zero. About 1 ma of the voltage at the collector of Q2 is fed through D5, D6 and D7, R3 and the dwell calibration potentiometer. The three diodes provide temperature compensation; their forward voltage drop varying as the temperature changes in balance with the semiconductor junctions in the current regulator. A small part of the remaining voltage is tapped off from the dwell calibration pot and fed to the positive terminal of the meter. The negative meter terminal is connected to the negative test lead.



Figure 3: Inside view of the ID-29. L1 choke is partially visible mounted on the chassis bottom, left of center. Note that the circuit board, top, mounts to the two long meter terminals and the switch wafers.

Meter inertia, and the large capacitor across the meter terminals, cause the meter to respond to the average current.

When the test leads are connected across the coil of a running automobile, the collector of Q2 will be at 2.8 volts when the points are closed and zero volts when the points are open. The resulting current will average out through the meter to represent the ratio of the time the points are closed to the time the points are open PLUS the time the points are open. The longer the points are closed the higher the meter reads. This reading is independent of the number of cylinders and its related switch and is calibrated in degrees of distributor rotation. The meter has four scales, one each for 3, 4, 6 and 8 cylinder engines. Full scale for each of these scales is 360 degrees divided by the number of cylinders.

ID-29 Tachometer Circuit:

RPM is measured by sending a fixed current through the meter for a fixed period each time the points close. The meter reads the average current, and since the points close more often per minute when the engine is running faster, the meter reading rises with rising engine speed.

When the FUNCTION switch is in either the LOW RPM or HIGH RPM tachometer position, the current regulator acts as it did in the previous section. The voltage at the top of D3 switches between 2.8 volts and zero with the operation of the points. The collector of Q2 is also connected to the base of Q3 so that when the points are closed the emitter of Q3 will be at a regulated voltage of about 2.2 volts. This voltage turns on Q5. The same voltage feeds current through the **TACHometer CALibration** control, a temperature compensating circuit consisting of R19 and R21, through the meter and Q5. The same voltage is also feeds current through one of eight precision timing resistors depending upon whether LOW RPM or HIGH RPM is selected and whether 3, 4, 6 or 8 cylinders are selected. Current through the timing

resistor charges C3; when the voltage across C3 reaches about 0.6 V, Q4 turns on turning off Q5. Thus each time the points close a fixed pulse for the selected range and cylinder count passes through the meter. This pulse is short enough that it ends significantly before the points open even at the highest RPM of the range selected.

Heathkit got clever here. This circuit will only be stable if there is a way to discharge C3 between pulses. I have to admit I was at a loss until I read Heathkit's own abbreviated circuit description in the ID-29 manual. Discharging C3 relies on the negative spike produced when the points open and the coil field collapses. This reverse voltage passes through L1 and places a large reverse voltage across Q3, breaking it down due to the zener effect and allowing a negative current to travel through the selected timing resistor charging C3 in the opposite direction until D8 starts to conduct. Thus C3 is discharged and actually charged to a slightly negative voltage regulated by the forward voltage drop of D8. Thus after the first pulse, C3 has a stable starting point for each pulse repetition.

Since the meter, when in the DWELL and RPM modes reacts to average current, a 500 μ F capacitor is across the meter circuit to help even out the current; otherwise at low RPMs the meter may visibly fluctuate.

ID-29 Calibration:

When the FUNCTION SWITCH is in the DC VOLTS position calibration is determined by

*** Note:**

For safety you may want to be sure the AC line neutral terminal is connected to the non-resistor side of the calibration cable.

This kit was manufactured before AC power cords were normally polarized. However, even that should be checked with a voltmeter as through my lifetime I have encountered AC wall sockets that have been wired backwards.

the precision fixed resistor R18 and no adjustment is necessary.

Calibration in the DWELL position is performed by applying a steady DC voltage across the input terminals and adjusting the **DWELL CAL**ibration pot for full-scale on the meter. Heathkit recommends you do this with a voltage of 6 V and then 12 V. Both should give very close to the same results if the current regulator is working properly.

Calibration in the two RPM positions are performed using a test cable. This cable is built as part of the kit assembly. The cable consists of a short AC power cord with a 10K Ω resistor in series with the hot lead. With the meter in the LOW RPM position, and the **CYLINDERS** switch set to 6, the calibration cable is connected to the meter (red lead to the open end of the 10K Ω resistor). The TAC CAL potentiometer is

next adjusted until the meter reads 12 on the 0 - 15 RPM x 100 scale. The calibration cable is then removed; Heathkit warns about leaving the cable hooked up for too long of a period as the cable's resistor may overheat.

ID-29 Assembly:

So much of the fun of buying a Heathkit is the assembly. You have the satisfaction of assembling the kit and see it working. At the same time you acquire hands on experience soldering and identifying and learning about various electronic components. The "Stabilator diode" was new to me prior to building this kit.

This is not a difficult, nor time consuming kit to assemble. It could easily be assembled in one evening by a builder with moderate kit-building experience. Many of the components mount on a circuit board. And since the switch lugs solder directly to the board, and the meter terminals bolt directly to the board, the only

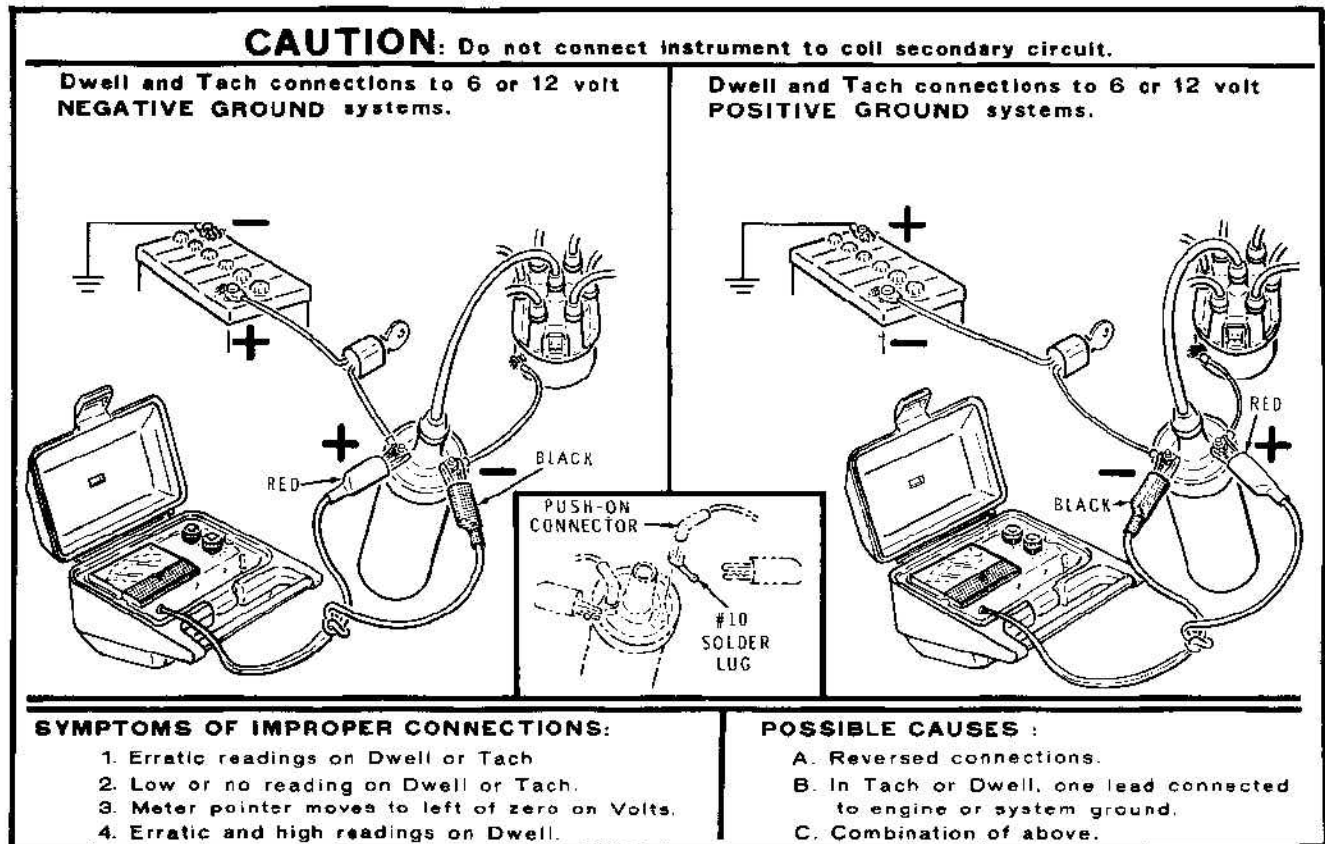


Figure 4: Placard label showing proper connections to automobile coil that is located under the ID-29 lid.

wires you deal with is one jumper on the board, the two leads from the external choke coil (L1), the test leads and the small calibration cable.

First the components are soldered to the circuit board. This consists of 38 components and one 3-7/8" jumper wire.

Next the chassis is assembled. It involves first mounting the meter, the choke, the two rotary switches and sticking on the "Blue and White" serial number label. This assembly is set aside while the test leads have one end prepared for connection to the circuit board and alligator clips and insulating boots attached to the other end.

Finally, the circuit board is attached to the chassis (See Figure 3). It mounts to the two extra long meter terminal screws on one end, and the PC board solder-type lugs on the two rotary switches on the other end. The knobs are then installed and the kit is set aside while the calibration cable is assembled.

After calibration the meter is placed into its case and is ready for use. The kit includes 1 terminal adaptors to handle distributors with less common types of terminals.

ID-29 Operation:

The operation of the ID-29 automobile tune-up meter is quite basic if you are at all familiar with cars of the early seventies and prior. Of course the voltmeter may be used to measure battery voltage and whether voltage is getting to a lamp, or upon further investigation why it is not doing so, but any VOM can do that. The true value is its other two functions.

Both the dwell and the tachometer functions require the same connection to the car. The two test leads are connected to the terminals of the coil. Red to plus and black to minus. Sometimes this connection requires special adapters some of which are supplied with the kit. The basic connections are shown on a sheet that is attached to the top of the plastic case of the ID-29 (See figure 4). Note that it also shows the

connection for positive ground vehicles (You know who you are!)

To measure dwell, set the FUNCTION switch to DWELL and the cylinder switch to the number of cylinders of the car under test. (The cylinder switch really doesn't matter during the dwell test, but if you forget to set it later you will not get the right RPM reading.) with the engine running, the dwell is indicated in degrees on the correct meter scale for the correct cylinder count. Adjust the point gap until the dwell is within the recommended range published by the car manufacturer. Follow their directions on adjusting the point gap, some cars allow you to do it when the engine is running (Be careful of the fan if that is the case). The dwell is usually given over a reasonable range. I always tried to set my 240z at 3/4th the way to the top the recommend range. This setting is usually done at a fast idle. Always rev the engine some to be sure the dwell stays reasonably constant.

To measure engine speed, so handy when adjusting the carburetor, you only need to turn the FUNCTION switch to the LOW RPM or HIGH RPM setting. Tuning multiple SU carburetors is a thesis all on its own. Being able to see small changes in RPM as well as how steady the RPM is staying makes the tuneup much easier.

ID-29 Plastic Case:

If there is one fault with this kit it is the injection molded plastic case that holds the instrument. After a few years of use, even though the unit was stored indoors, the case began to show deterioration. After just moderate use the cover hinge cracked and the cover disconnected from the case. A few years later a large crack developed in the bottom of the case. I never got around to ordering a replacement case from Heathkit. Recently when I went into the cabinet where I store the ID-29, the case had disintegrated into about twenty-five pieces. This same case, Heathkit Part #95-35 (\$1.60 in the 1969 manual replacement parts list), is used in the IM-17 VOM and possibly other kits.



Figure 5: Heathkit ID-29 shown in brown case with compartment for storing test leads and spare fittings.
(Photo from an unknown source)

Some later kits, such as the CM-1045, CM-1073, IM-5217 and perhaps others use a newer blue style case that appears identical but perhaps a bit more immune to disintegration.

ID-29 Conclusion:

Except for the disintegrating case problem, the ID-29 served me for many years keeping the Datsun running for a full 240K miles. Right now the car sits in my garage but is going away soon.

Heathkit continued to build the ID-29 until 1975 when it was replaced with the CM-1073 which appears to be almost identical except for appearance and a new plastic case. It sold for \$24.95 in the December 1976 catalog. I have not been able to find a schematic nor manual to compare it with the earlier ID-29. Heathkit also made tune-up meters for small engines.

73, from AF6C



What's Happening at the NEW HEATHKIT?:

Every once and awhile I take a look at the web-page for the new Heathkit Company. I thought I was in the *Heathkit Insider Group*, but alas, even though the website hints at more new kits: ***"New-product announcements are out to Heathkit Insiders. (Checked your spam folder?)"***, my mailbox nor my spam bucket received nothing.

The new Heathkit Company does offer some products and parts for existing kits, including replacement cups for their weather stations, an updated dial kit for the HG-10 series of VFO, a display upgrade for the Nixie tube display in the AJ-1510 Stereo Tuner. An upgrade kit for the IG-18 Distortion Analyzer and more. You can view these on their website. You can also buy manual copies from Heathkit for many of their vintage products.

One series of parts I'd like to see them reproduce and resell is replacement meter covers. I know of a few good Heathkit products that have scratched or damaged meter covers. A good place to start would be a cover that fits the V-7A VTVM and other products that use the same style meter.

It will be interesting to see what new products will be introduced soon. One hint of some new ham kits is encouraging!

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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

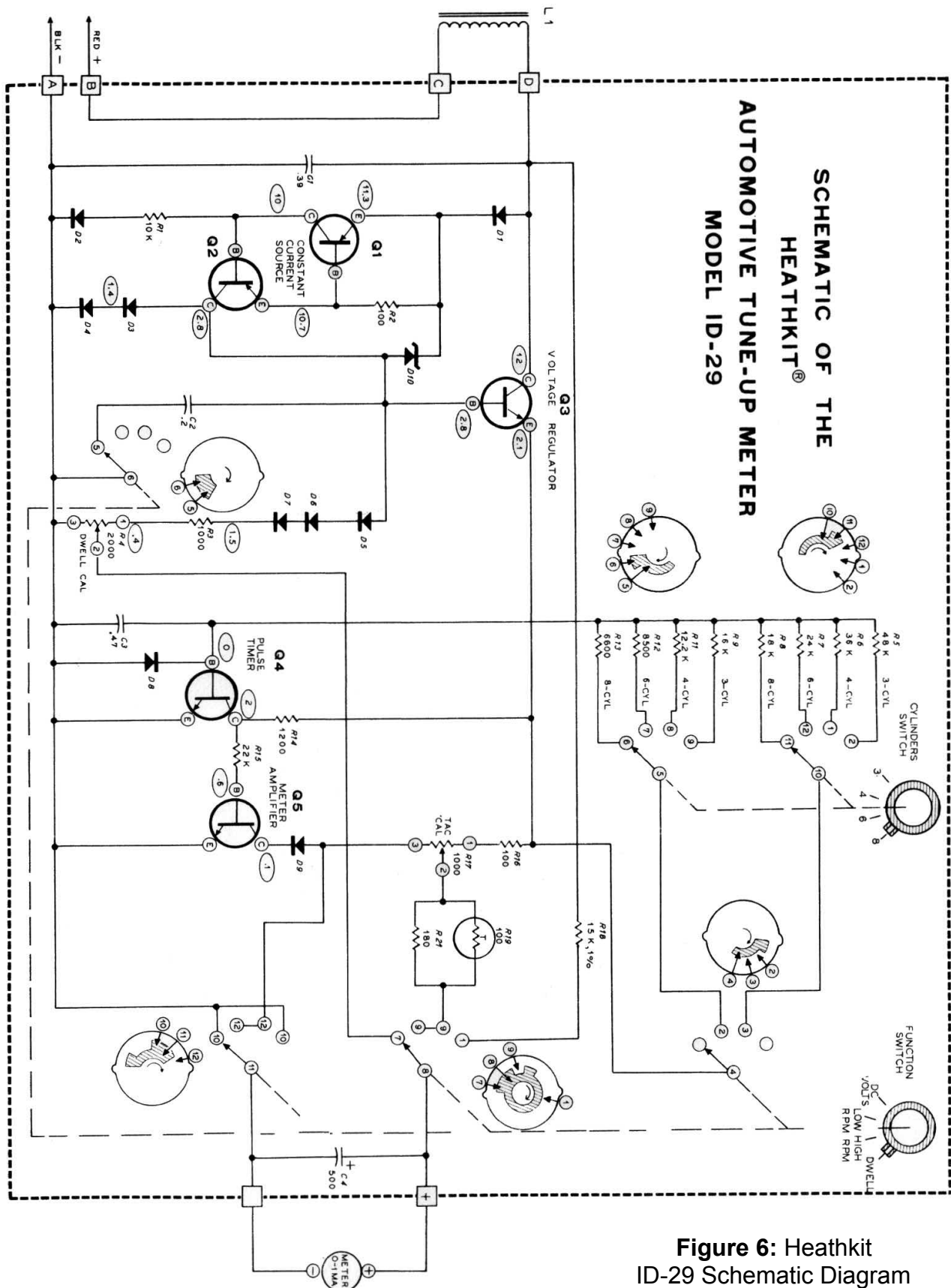


Figure 6: Heathkit
ID-29 Schematic Diagram

OCARC General Meeting Minutes

June 17, 2016 by Ken W6HHC

The OCARC General Meeting was held at the Red Cross Complex on June 17th 2016. There were a total of 28 members and visitors in attendance. There was a quorum of officers, with all directors present except Tom W6ETC.

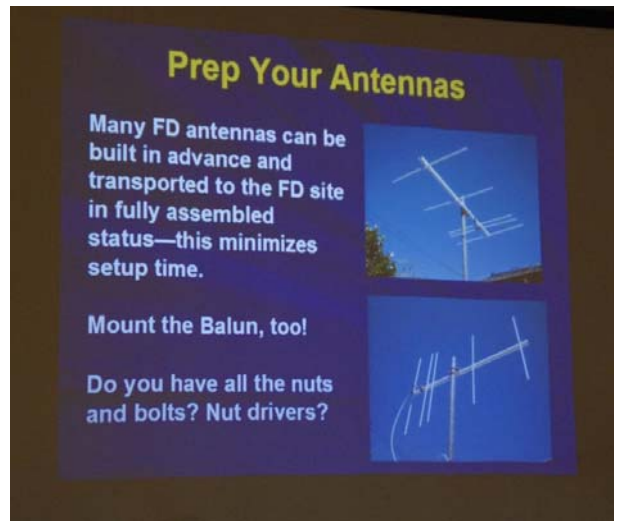
Prior to the General Meeting, Tim N6GP prepared a Field Day University “hands on” session on using N3FJP FD Logging software.



Tim N6GP conducted a Field Day University class before the main meeting



Chip K7JA explains that FD is “all in the Planning”



PROGRAM:

Our main speaker for the evening was Chip Margelli K7JA speaking on:

”Preparing for Field Day...”

Chip really enjoys Field Day and Chip has been on countless FD's....so he has plenty of FD experience. Chip focused on things to do before FD. From the basics...to useful tips:

- “FD is all in the Planning”
- ALWAYS write up a list of needed equipment
- Checkout your entire station before FD
- Test your antenna before FD
- Using the “rocket launcher” to push up military masts
- Paint military mast sections white to stay cool in sun
- How to coil coax cable the correct way.

Club Business:

• Field Day Planning

- Jesse KB6MQY from BSA Troop 440 explained that the scouts will again prepare meals at FD. There will be a total of five meals, beginning with Friday dinner (after set up), for a package price of \$30. Individual meals can be purchased for \$7.50 each.
- Set up will begin at 9AM on Friday morning.

• Historian Report – Corey KE6YHX, the club's new historian, presented a brief report on progress he has made to put club history items into a database

- **Show-n-Tell** – Nicholas AF6CF was able to show members a small 10 Meter rig.

Respectfully submitted **by Ken W6HHC**



An ARRL Special Service Club

OCARC 2016 Club & Special Event Calendar

July 09, 2016 OCARC Board of Directors Meeting

<http://www.w6ze.org/MeetingInfo.html>

July 15, 2016 OCARC General Meeting @ the ARC

<http://www.w6ze.org/MeetingInfo.html>

July 16-17, 2016 North American QSO Party (RTTY)

<http://ncjweb.com/NAQP-Rules.pdf>

Aug. 06, 2016 OCARC Board of Directors Meeting

<http://www.w6ze.org/MeetingInfo.html>

Aug. 06-07, 2016 North American QSO Party (CW)

<http://ncjweb.com/NAQP-Rules.pdf>

Aug. 19, 2016 OCARC General Meeting @ the ARC

<http://www.w6ze.org/MeetingInfo.html>

Aug. 20-21, 2016 North American QSO Party (SSB)

<http://ncjweb.com/NAQP-Rules.pdf>

Sept. 03, 2016 OCARC Board of Directors Meeting

<http://www.w6ze.org/MeetingInfo.html>

Sept. 16, 2016 OCARC General Meeting @ the Red

<http://www.w6ze.org/MeetingInfo.html>

Sept. 20, 2016 SHOW-and-GO OCARC Activity

Sept. 24-25, 2016 CQWWDX-RTTY CQ WW RTTY DX

Contest <http://www.cqwwrtty.com/>

Oct. 01, 2016 OCARC Board of Directors Meeting

<http://www.w6ze.org/MeetingInfo.html>

Oct. 01-02, 2016 California QSO Party

<http://www.cqp.org/> rules: <http://www.cqp.org/Rules.html>

Oct. 21, 2016 OCARC Auction (Link Pending)

Oct. 09-11, 2016 The 34th Annual ARRL & TAPR Digital

Comm. Conference <https://www.tapr.org/dcc.html>

Oct. 14-16, 2016 ARRL Pacific Division Convention

(PACIFICON) <http://www.pacificon.org/>

Oct. 22-23, 2016 JOTA (Jamboree-on-the-Air)

<http://www.scouting.org/JOTA.aspx>

Oct. 26-27, 2016 CQ Worldwide DX Contest, SSB

<http://www.cqww.com/>

Nov. 05, 2016 OCARC Board of Directors Meeting

<http://www.w6ze.org/MeetingInfo.html>

Nov. 05-07, 2016 ARRL CW November Sweepstakes

<http://www.arrrl.org/sweepstakes>

Nov. 19-21, 2016 ARRL November Sweepstakes Con-

test, SSB <http://www.arrrl.org/sweepstakes>

Nov. 20, 2016 OCARC General Meeting @ the ARC

<http://www.w6ze.org/MeetingInfo.html>

Nov. 26-27, 2016 CQ Worldwide DX Contest, CQ

<http://www.cqww.com/>

Dec. 02-04, 2016 ARRL 160-Meter Contest

<http://www.arrrl.org/160-meter>

Dec. 10-11, 2016 ARRL 10-Meter Contest

<http://www.arrrl.org/10-meter>

Dec. 09, 2016 OCARC Holiday Party

(booking pending)



BSA Troop 440 with GOTA at FD - Doug K6PGH
(photo by Jesse KB6MQY)



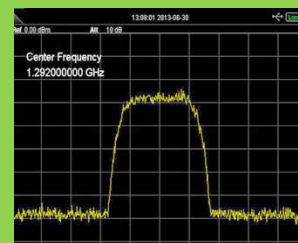
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Historic and Educational



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- "Software-Defined" allows new features to be added over the next few years, without changing the hardware board
- Symbol Rates from 100K to 8000K Symb/sec allows RB-DATV
- Requires PC running Windows or Ubuntu Linux (see User Guide)
- Price is US\$300 + shipping – order using PayPal

For more details and ordering
www.DATV-Express.com

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 to be able to see
 the PURCHASE page

