

# The SKYHOOK



HOLIDAY CITY AMATEUR RADIO CLUB

[www.hcarc.us](http://www.hcarc.us)

June 2016

Toms River, NJ

## Software Defined Radio At Our June Meeting

A radio with no knobs, dials, or S-meter. A radio that has parts that can be re-arranged, without even opening its cabinet, to do different or additional functions. A radio that depends on a personal computer for control and display. It's an SDR. Steve Molo, KI4KWR will introduce us to such a device, the Apache ANAN-100D, at our June 2 meeting.

### The Apache ANAN-100D SDR HF/6m Radio

The Heart of the ANAN-100D is the Angelia SDR:

ANGELIA is a state-of-the-art soft core uP 4th generation DDC/DUC, Hermes-like, transceiver board that incorporates an Altera Cyclone IV FPGA and dual LTC2208 ADCs.

The large FPGA and dual ADCs permit exceptional versatility and performance.

The FPGA is large enough to allow on-board, soft-core processing, if desired, and the dual ADCs allow true coherent receiver operations.

Highlights:

100W RD100HHF1 Based 160M - 6M rugged Linear amplifier

Rugged Extruded aluminum housing, Weight: 4.5Kgs approx, Dimensions: 265.5mm (W) x 220mm (D) x 80mm (H)

Combination of 7 LPF and 5 HPF Banks for front end Filtering (User Configurable as well)

6M LNA

Dual Phase Synchronous LTC2208 16 Bit ADCs

Large 115K (EP4CE115) Cyclone IV FPGA

Supports 7 High performance Independent Receivers on a single ADC

Supports 2 Coherent Receivers using independent ADCs/antennas for beam forming/diversity

FPGA has enough space to add on multiple soft core processors for standalone operation

Onboard 128MB Flash

Onboard 32Mbit Synchronous RAM

## SDR Glossary

ADC Analog-to-Digital Converter

Byte A group of eight bits of binary data

DAC Digital-to-Analog Converter

DDC/DUC Digital frequency Down-Converter/Digital frequency Up-Converter

FPGA Field-Programmable logic Gate Array

HF High Frequency; *strictly 3MHz to 30MHz, but often including the 1.8 to 2.0 MHz band also*

HPF High Pass Filter; a filter that only allows higher frequencies to pass through

LNA Low-Noise Amplifier; a pre-amp

LPF Low Pass Filter; a filter that only allows lower frequencies to pass through

MB MegaByte; 1,048,576 (2 to the twentieth power) bytes. *"Mega" normally means "million", but in binary, this is neater, and plenty close enough.*

SDR Software-Defined Radio ; a set of digital logic and analog radio parts, the arrangement of which is controlled by a computer program, to form a radio receiver or transceiver.

uP microProcessor; a computer's master IC . Note the common use of 'u' in place of a 'µ', for "micro"

### NEXT MEETING:

**Thursday June 2 at 7:00 PM**

**Bldg A, Meeting Rm. #1**

**Holiday City South Clubhouse A**

**Santiago Drive at Mule Road**

**Toms River, NJ**

## Ocean County ARES® News

June, 2016



June 1<sup>st</sup> marks the beginning of Hurricane Season. Make sure you are prepared and have a checklist for your family needs and one for your radio needs.

KUDOS to Glen - KD2FFR, for his communications support service to SNJ ARES during the Joint Base Air Show. Glen was the only volunteer from Ocean County. He was very impressed by the SNJ ARES POD System.



The next meeting of Ocean County ARES will be Wednesday, June 15<sup>th</sup>, 7:00 PM, at the Ocean County EOC, Robert J. Miller Airpark. There will be no training nets that evening because of the meeting. Refreshments will be served, as usual.

Those of you who have signed up for Ocean County ARES email via Yahoo Groups may have noticed a recent change. I've changed the OCARES group defaults to allow attachments in email. Not sure how long this will last, but if it is abused, it will be turned off. It's a nice feature, especially to get the word out on events, distribute forms, etc. My plan right now is to also distribute the monthly ARES News the same way starting in July 2016.

KC2OON and I recently made a visit to the 145.170 Manchester site to install two 80 amp-hour backup batteries for the repeater. The previous, smaller battery, was destroyed after a circuit breaker was tripped and allowed the battery to become completely exhausted. Additionally, a power amplifier was added,

allowing the Yaesu Fusion repeater to be operated at low power, which is 5 watts output. The 50 watt power amplifier will save the repeater final, which Yaesu has downgraded to 100 percent duty cycle ONLY with medium power output or 20 watts. The power amplifier has triple cooling fans controlled by a digital temperature controller to conserve fan life and power draw. The receiver side of the repeater was also enhanced with a six stage pre-selector and pre-amplifier to narrow the wide Yaesu receiver window that many users have complained about.

The MS-150 is September 24<sup>th</sup> and 25<sup>th</sup> of 2016. Joe – KC2SFB, is asking for communications operators for this event. He needs 125 operators to cover this two day tour. If you are interested, you can sign up on line at: <http://main.nationalmssociety.org/HAMS>

Also a big thanks to the operators in the Ocean County area who assisted with the MS-170 bicycle tour as it passed through our area on Saturday, May 21<sup>st</sup>. My apologies if I left anyone off the list: KC2OON, KD2FFR, N2LSA, K2DCM, N2XW, WA2AJL, W2TET, WX2NJ, N2OZ and K2HES.

73 de WX2NJ

Bob Murdock

Ocean County Amateur Radio Emergency Service® EC

## Our May Luncheon



Our group of twenty-one really enjoyed the May luncheon at the Fortune Buffet, so we're planning to do another. July 13 is a likely date, but "stay tuned".



## Field Day Is Coming June 25-26



Field Day is a public demonstration of traditional amateur radio operation under adverse conditions.

It involves erecting antennas and setting up stations in public park shelters, trailers, RV's, or tents, and generating power, and also having a great picnic. There's also a taste of contesting. It's an opportunity to teach, test, and learn operating skills.

We didn't have enough people interested in participating this year, so the club decided not to have our own Field Day setup.

However, the Old Barney Amateur Radio Club

([www.OBARC.org](http://www.OBARC.org)) invited us to join them in their

Field Day activities at Wells Mills Park in Waretown.

They plan to start setting up between 8 and 9 AM Saturday, June 25, and begin break down at 2 PM Sunday.

You don't have to schedule operating time, but I expect Saturday afternoon to be busiest, and overnight the least active.

The site is in Wells Mills County Park, which is on Wells Mills Road, between the Garden State Parkway's Wells Mills Road exit and NJ Route 72. Talk-in may be provided on 146.835 (-,127.3).

Urb suggested wearing a shady hat, long pants and sleeves. I'd include some sun-block and DEET spray (such as OFF!). For more information, contact Urb LeJeune W1UL at 609-937-5487 or [urb@W1UL.com](mailto:urb@W1UL.com).



To order a holiday City ARC badge, call Capital Engraving at 1-800-628-4985 after 1PM M-F. Use your credit card to pay. Cost is \$12.50 plus \$2 S&H. Al Ross WA7UQE will take care of you and put your callsign and name on the badge.

### Our VE Crew

Murray [KD2IN](#), Ed [W1EAP](#), Larry [K2QDY](#),  
John [KQ4WR](#), Stan [KB2PD](#), Steve [N2WLH](#),  
Paul [N2QXB](#), Larry [WA2VLR](#).

License exams are given by appointment at 7pm on the second Wednesday of each month at Holiday City South Clubhouse, Bldg A, which is at the corner of Mule Rd. and Santiago Dr. Call Larry Puccio, K2QDY, at 732-349-2950 for information.

**Directions:** From either Route 37 W or Davenport Road, take Mule Road to Santiago Drive. Turn into the parking lot from Santiago Drive, and park near the pool. Enter the building nearest the intersection.

### CLUB COMMITTEES

**Refreshments:** John Rogers & Tony Kuzinski  
**Webmaster:** Steve [N2WLH](#) [N2WLH@yahoo.com](mailto:N2WLH@yahoo.com)  
**Publicity:** Paul [N2QXB](#) 732-279-3911  
**Programs:** Tony [KD2GSO](#) 732-930-5779  
**Sunshine:** Dave [WA2DJN](#) [WA2DJN3@verizon.net](mailto:WA2DJN3@verizon.net)  
**Field Day:** Larry [K2QDY](#) 732-349-2950  
**VE Sessions:** Larry [K2QDY](#) 732-349-2950  
**Membership:** Doug [KC2TZC](#) 732-928-2316

### Holiday City Amateur Radio Club Toms River, New Jersey

Web Site [www.hcarc.us](http://www.hcarc.us)

President	John Roberts	<a href="#">KQ4WR</a>	732-350-1162 ext 33
Vice President	open		
Secretary	John Rogers	<a href="#">KD2HWR</a>	732-269-5717
Treasurer	Larry Puccio	<a href="#">K2QDY</a>	732-349-2950
Executive Board	Doug Poray	<a href="#">KC2TZC</a>	732-928-2316
Executive Board	Tony Kuzinski	<a href="#">KD2GSO</a>	732-930-5779
Executive Board	Paul Hansen	<a href="#">N2QXB</a>	732-279-3911
Executive Board	Stan Stafiej	<a href="#">KB2PD</a>	732-270-5395
W2HC Trustee	Larry Puccio	<a href="#">K2QDY</a>	732-349-2950

**Membership** is open to all interested persons. Ham license is not required. Dues are \$25.00 per year, payable Jan 1<sup>st</sup>. Members joining during the year will have the dues prorated. Family membership \$30.00 per family.

**Meetings** are held on the first Thursday of every month, at 7:00 pm.

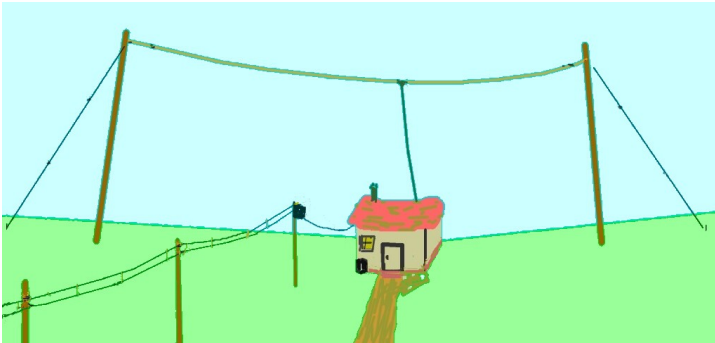
**Location:** Meeting Room #1 in the Holiday City South Clubhouse.

**Directions:** From either Route 37 W or Davenport Road, take Mule Road to Santiago Drive. Turn into the parking lot from Santiago Drive and park near the pool. Enter the building nearest the street corner:-

The SKYHOOK is published monthly as the HCARC's official newsletter.  
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## Dear Elmer, Explain Sidebands



Dear Friend,

Let's start with a simple example.

When one signal, such as audio, controls the amplitude of another signal, such as a radio frequency, it's called amplitude modulation (AM). From a math view point, the voltage waveform of one is multiplied by the voltage waveform of the other.

AM produces additional signals, called sidebands, at frequencies which are at the sum and difference frequencies of the original signals.

As an example, let's use a 2kHz audio signal to amplitude modulate a 3800kHz radio frequency signal.

The sidebands produced would be at 3798kHz (the lower sideband) and 3802kHz (the upper sideband).

Because we used AM, we would also get the original 3800kHz, called a carrier.

One sideband is enough, because the sidebands are mirror images of each other, with the carrier being the mirror.

If we had used Single Sideband (SSB), instead of AM, we would only get either the lower sideband (LSB) or the upper sideband (USB), and no carrier.

SSB requires more circuitry, but doesn't waste transmitter power on the continuous carrier and redundant sideband.

All types of modulation produce sidebands, so be sure your sidebands are within the band limits.

73,

Elmer

## Circuit Basics

### Voltage and Current

1. **Current** ( $I$ , in **Amperes**) is what flows through the circuit. An ampere of current represents a flow rate of over 6 billion electrons per nanosecond.
2. **Voltage** ( $E$ , in **Volts**) is what attracts the current of electrons to flow.
3. Positive voltage attracts electrons, which are negative charges.
4. You can trace the voltage signal through the circuit from positive to negative, or trace the electrons from negative to positive. Take your choice, but convention is to trace the voltage from positive to negative, especially in modern automotive work.
5. Voltage is measured from one point to another.
6. The strength of the magnetic field that current produces around a conductor is proportional to the current.

### Circuits

1. In a **series** circuit, such as a flashlight (with a 3volt bulb and two 1.5 volt D cells and a switch), the current is the same throughout the circuit.
2. In a series circuit, the sum of all the voltages on loads equals the sum of all voltages from sources ( $3V = 1.5V + 1.5V$ ). But if you count the voltage sources as being the opposite of loads, the sum of all voltages equals zero ( $3V - 1.5V - 1.5V = 0$ ). OK so far?
3. Resistances in series divide the available voltage according to their resistances.
4. In a **parallel** circuit, such as an automobile, if we consider the battery as one item, the voltage is the same (about 13 volts) for all the parts.
5. In a parallel circuit, the sum of all the currents to loads equals the sum of all currents from sources. But if you consider the source currents as negative, opposing the load currents, the sum of all the currents equals zero.
6. Resistances in parallel divide the available current according to the reciprocals of their resistances.

### Schematics

1. Circuit diagrams "**schematics**" are only

diagrams, and not intended to picture the actual physical layout of parts. Signal paths are usually shown flowing from left to right, and dc voltages are usually shown with the most positive voltages nearer the top of the page, and the most negative ones nearer the bottom. Non-electrical items, such as mechanical linkage, are shown by dotted lines. Usually, but not always, lines crossing each other at 90 degrees are not connected. Lines ending at a label are connected to all others with the exact same label.

2. On diode and transistor symbols, the arrowhead indicates the *direction of conduction* by pointing toward the (negative) cathode. If you'd rather think in terms of electrons, the arrow is like a weathervane, pointing toward the source of electrons.

### Resistance and Impedance

1. **In a DC circuit**, how much a part resists the flow of current through it is called **resistance**. Specifically, the **resistance ( $R$ ) in ohms ( $\Omega$ ), equals the voltage ( $E$ ) in volts ( $V$ ), divided by the current ( $I$ ) in amps ( $A$ )**. (That's called *Ohm's Law*). So insulators have very high resistance, and conductors have very little resistance.
2. **In an AC circuit**, including audio and radio, how much a part impedes the flow of current through it is called **impedance ( $Z$ )**. Resistance ( $R$ ) is one dimension of it, but impedance also includes another dimension, called reactance ( $X$ ). This isn't Einstein theory or science fiction, so bear with me.
3. Resistance, reactance, and impedance are all ratios of a voltage (in volts) to a current (in amps), and so the unit of measure is ohms in all three.
4. **Reactance** is related to **resistance**, like a picture's *width* is related to its *height*. **Impedance** has to specify them *both*, so like "8.5 by 11", it has two dimensions.
5. **Resistance (ohms)** equals the portion of **voltage (Volts)** that is **in phase** with the current, **divided by the current (amps)**.
6. **Reactance (also in ohms)** equals the portion of **voltage** that is a **quarter-cycle out of phase** with the current, **divided by the current**.
7. So, both Reactance and Resistance are ratios of voltage to current, but they **are 90 degrees**

**apart.**

8. **Impedance ( $Z$ , in ohms)** can be expressed as either **resistance & reactance ( $R+jX$ )**, (like width and height).
9. Impedance can also be given as the **absolute value of impedance  $|Z|$**  (like a diagonal measurement) **and the (phase) angle ( $\theta$ )**.
10. Impedance can be expressed in still other ways, such as **standing wave ratio (SWR)**, which is a measure of the amount of deviation from a desired resistance.
11. Impedance varies with frequency, especially near resonance.

### The Wonderful AC/DC Superhet



Two of the greatest breakthroughs in old radio technology were the superheterodyne principle, and the pentagrid converter tube that made it practical.

Early radios had several Radio Frequency amplifier stages, and each had to be tuned to the station's Radio Frequency (RF). That was quite a job. The AM broadcast band goes from 550 kHz to 1.6 MHz, and that means the tuning capacitor of each stage had to cover a 9:1 range of capacitance, and ideally, all had to be "gang" tuned by a single dial. Worse yet, if even a small amount of amplified signal from the last stage got to the first stage, the radio would oscillate.

The solution was to convert, in the first stage, the station's frequency to a fixed frequency, like 455 kHz.

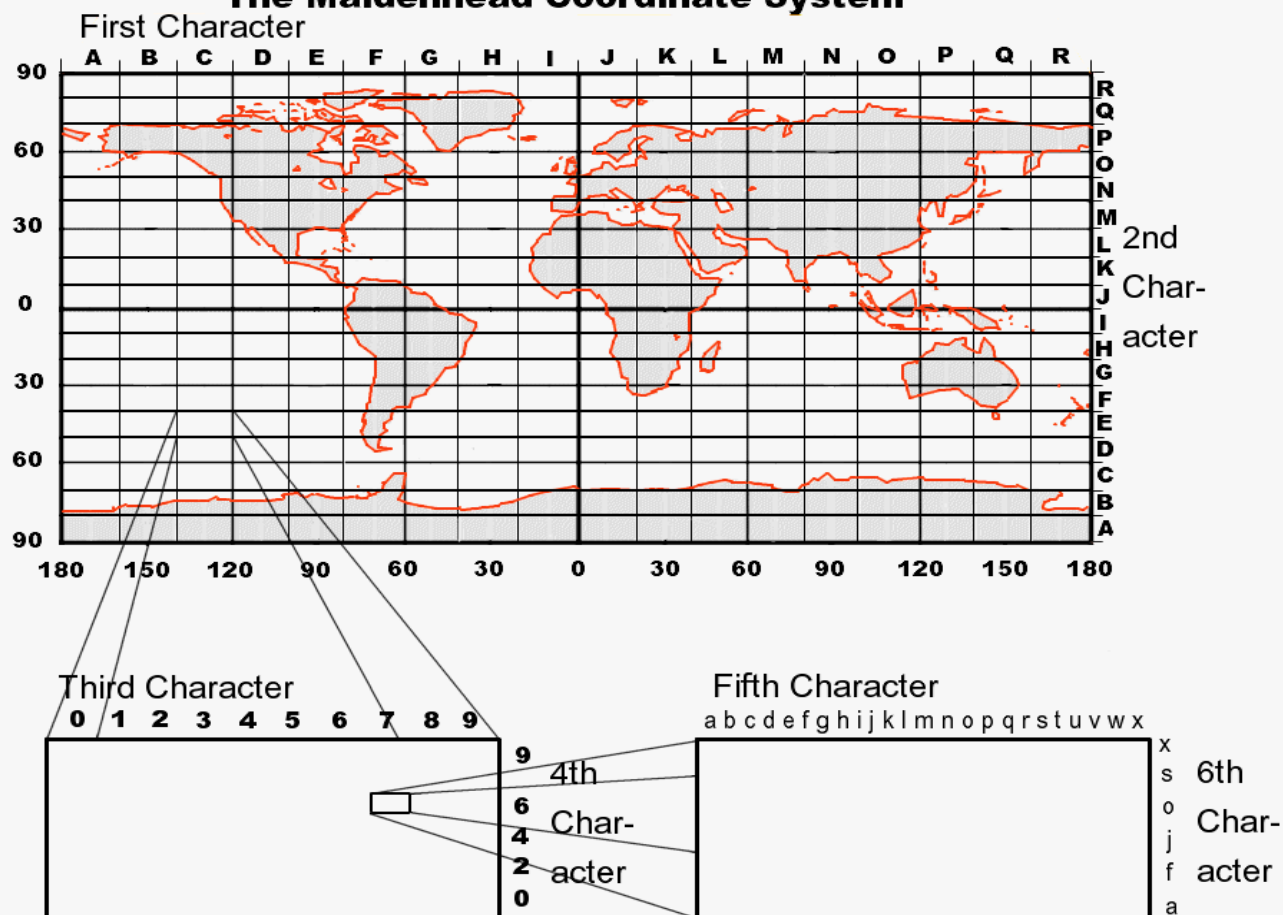
To do that, there had to be a tunable oscillator, called the Local Oscillator, to generate a higher frequency which, when modulated by the incoming signal, would produce the fixed frequency, called the Intermediate Frequency.

The intermediate frequency signal is actually the lower sideband of the local oscillator frequency. A vacuum tube, called a Pentagrid Converter, was designed to be used for the local oscillator, and be the frequency converter at the same time, and even amplify the intermediate frequency somewhat.

Only one more tube was needed to increase the signal level to around a volt. With the addition of only a 2-tube audio amplifier and a rectifier for the power supply, you had a complete inexpensive 5-tube AC/DC AM radio.



## The Maidenhead Coordinate System



Russ Young WA2VQV worked:

## APR-MAY DX REPORT

CALLSIGN (GRID)	DATE DIST	TIME DIR	MODE	BAND	ENTITY
LZ1700SIP (KN22jp)	22APR16 4892 NE	2052Z	CW	20M	BULGARIA
HG225M (JN97mn)	22APR16 4491 NE	2102Z	CW	20M	HUNGARY
EP2A (LM47vk)	25APR16 6120 NE	2250Z	CW	30M	IRAN
CE2AWW (FF47fa)	06MAY16 4972 S	2247Z	CW	17M	CHILE
9A6C (JN73wt)	13MAY16 4493 NE	0106Z	CW	30M	CROATIA
HR5/F2JD (EK65ec)	13MAY16 1803 SSW	0114Z	CW	30M	HONDURAS
OM3SEM (JN97cs)	13MAY16 4451 NE	0121Z	RTTY	30M	SLOVAKIA



Editor's note: The higher frequency HF bands keep getting worse as solar cycle 24 continues to decline, but the lower frequency ones hold up well, and even improve.

## DX Opportunities For June

Begin	End	Call	Entity	QSL via	Bands	Modes*	IOTA	Grid
Jun 15	Jul 14	3B8/MØRCX	Mauritius	EB7DX,eQSL	40-6m	S,R,J,P	AF-049	LG89sq
May 25	Jun 12	5X10	Uganda	EA5GL	40-10m	Q		KI88sm
Jun 20	Jun 28	8Q7HW	Maldives	DK1HW	80-10	C,S,P	AS-013	MJ63oe
Jun 28	Jul 4	9H3G	Malta	JH3FUK	40-10m	C,S,R,P	EU-023	JM75ex
Jun 23	Jul 8	C6AUX	Bahamas	VE3IKV	6m,hf	C,S	NA-113	FL14ak
Jun 17	Jun 29	FJ/W9AEB	St Barthelemy	W9AEB	40,10m	C,S	NA-146	FK87nv
Jun 17	Jun 29	FJ/W9DR	St Barthelemy	W9DR	6m	B*,C,S	NA-146	FK87nv
May 23	Jun 3	FM/DL7VOG	Martinique	Club Log		C,R	NA-107	FK94mq
Jun 5	Jun 23	FS/K9EL	St Martin	K9EL,LotW	80-6m	C,S,R	NA-105	FK88lb
Jun 11	Jun 25	FS/W5LAC	St Martin	W5LAC	80-10m		NA-105	FK88lb
Jun 22	Jul 11	J79XE	Dominica	WB4WXE	40-6m		NA-101	FK95ij
Jun 19	Jun 24	OX/NA80	Greenland	JK1FNL	40-10m		NA-018	GP44de
May 16	Jun 6	PJ2/PB0AEX	Curacao	LotW	20-10m	S	SA-099	FK52md
Jun 11	Jun 25	PJ7/W5LAC	St. Maarten	W5LAC	80-10m		NA-105	FK88lb
May 23	Jun 1	PZ50X	Surinam	LotW	160-60m	C,s	SA-092	GJ13kw
Jun 9	Jun 14	T88AN	Palau	EB7DX	40-6m	C,S	OC-009	PJ77bi
May 12	Jun 2	TZ5XR	Mali	LotW	80-10m	C		IK63aa
Jun 14	Jul 15	V47JA	St Kitts & Nevis	W5JON,LotW	160-6m	S	NA-104	FK87pf
Jun 7	Jun 9	V63AN	Micronesia	EB7DX	40-6m	C,S	OC-011	QJ96cv
Jun 10	Jun 18	V63DX	Micronesia	JA7HMZ,LotW	80-6m	P,J	OC-010	QJ96cv
Jun 10	Jun 18	V63IM	Micronesia	JA7EPO,LotW	80-6m	P,J	OC-010	QJ96cv
Jun 2	Jun 7	V73HA	Marshall Is	EB7DX	40-6m	C,S	OC-029	RJ39me
May 24	Jun 24	VK9WI	Norfolk I	VK3PC	80-10m		OC-002	RG30xx
May 27	Jun 15	VP2V	Br Virgin Is	LotW	40-10m	C	NA-022	FK88lg
May 15	Jun 1	YB9/PB5X	Indonesia	PA1AW	20-15m		OC-022	OI71oi
Jun 3	Jun 17	ZF2MN	Cayman Is	MØOXO	80-10m		NA-016	EK99sm

\*Modes: A= AM, C= CW, D= "Digital", F= FM, J= JT, P= PSK, Q= QRPCW, R= RTTY, S= SSB

June						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2 HCARC Meeting 7PM	3	4
5 JSARS Hamfest	6 Noon get- together at HC Diner	7 NJ Primary Elections	8 License Exams by Appoint.	9	10	11
12	13	14	15 OC ARES Meeting 7PM	16	17	18
19 Fathers Day	20 Noon get- together at HC Diner	21	22	23	24	25 Field Day begins
26 Field Day continues	27	28	29 Exec Board Meeting 10AM	30		