July 2020

County of Orange RACES
NetControl

Newsletter of the County of Orange Radio Amateur Civil Emergency Service

OCRACES Online Meeting on Zoom:
Monday, July 6, 2020, at 7:30 PM

Orange County Sheriff's Department Technology Division

Captain's Corner
*by RACES Captain Ken Bourne, W6HK, Chief Radio Officer*

Bias Tees

Hams occasionally have trouble communicating with distant or low-power stations because of very weak received signals. A receive low-noise amplifier (LNA) with a signal-to-noise ratio better than the basic receiver will often improve reception. However, due to coaxial-cable loss, a weak signal might be so weak by the time it reaches the ham's transceiver that it can't even be "brought out of the noise" with a low-noise preamplifier—unless the LNA is mounted at the antenna to amplify the signal before it is lost because of cable attenuation. The LNA needs direct current (DC) voltage to power it, and that's where bias tees come in handy, allowing the coaxial cable to carry not only the RF but also the DC, eliminating the need for a separate DC cable. This is one of the most common applications for bias tees, but there are others.

An example of an LNA is the Scanner Master LNA-WIDE-O preamplifier covering 25 to 1300 MHz. It comes in a weatherproof housing with metal

DX Engineering FV-1 feedline voltage injector is a bias tee that places DC onto a receive antenna system's coaxial cable. Voltage is applied to the receive antenna feedline F connector, and the RCA phono jack connects to the receiver input with that DC voltage blocked, while passing RF in the 500 kHz through 50 MHz range.
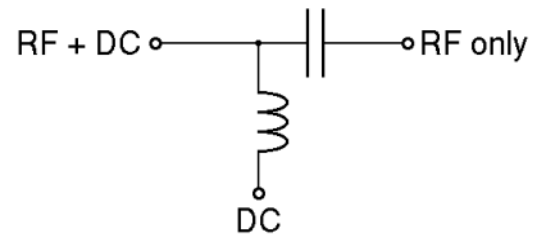
Equivalent circuit of a bias tee.

baseplate with N connectors. DC power can be through a separate cable or via the RF coaxial cable, using bias tees.

With the antenna-mounted LNA, a bias tee is needed at the transceiver to inject DC onto the coaxial cable, and another bias tee is needed at the antenna to couple the DC into the LNA's power port. Note that the RF+DC ports of both bias tees are connected to each other through the coaxial cable.

During transmit, DC needs to be switched off to disable the LNA, to avoid destroying it. Some LNAs have a built-in relay that bypasses the RF circuit when DC is removed, especially important with high transmit power.

Besides powering an antenna-mounted LNA, bias tees have many other applications, such as sending DC signals up a transmission line to control an antenna tuner or rotator, or adding a DC bias to a high-speed serial line.

A bias tee is a diplexer or a three-port network designed to inject

Scanner Master LNA-WIDE-O preamplifier.

Captain's Corner *Continued from page 1*

DC into an RF circuit (such as a remote LNA) without affecting the RF signal through the main transmission path (such as coaxial cable). The DC is carried on the coaxial cable, thus eliminating the need for a separate DC line. The device is called a "bias tee" because the three ports are often arranged in the shape of a "T," as shown in the equivalent circuit on page 1.

Wideband bias tees are usually more complex than what is shown in the equivalent circuit, because of para-

MFJ Enterprises offers bias tees that send up to 1 A/50 V DC through coaxial cable to use with a remote antenna tuner, switch, relay box, preamplifier, etc. One bias tee is required on each end of coax to *inject* DC power and to *retrieve* DC power. The MFJ-4116 with SO-239 connectors covers 1-60 MHz. The MFJ-4117 adds a switch to turn remote equipment on/off. The MFJ-4118 provides +12 V and –12 VDC. The MFJ-4119N (shown above) with N-type connectors covers HF, VHF, and UHF and switches DC on and off. The MFJ-4113TR has an on/off position to switch between transmit or receive for different T/R antennas, which lets you power an active receive antenna, or power a remote tuner on one port and switch to another antenna on the other port, or switch between a receive antenna and a transmit antenna.

sitic characteristics of the components in a simple network. Basically, though, the capacitor in the equivalent circuit passes the RF but blocks the DC, and the inductor blocks the RF but passes the DC.

The characteristic impedance of a bias tee used in transmission-line applications is typically 50 ohms or 75 ohms. The capacitor impedance is much less than the characteristic impedance, and the inductor impedance is much greater than the characteristic impedance.

Components in a bias tee are chosen in accordance with the range of operating frequencies. The reactances are chosen to have minimal impact at the lowest frequency.

The inductor in a wide-range bias tee must be large at the lowest frequency. But a large inductor has a self-resonant frequency because of its stray capacitance. At higher frequencies, the stray capacitance presents a low-impedance shunt path for the signal, causing the bias tee to be ineffective. To avoid this shunt path, wideband bias tees are designed with a series string of inductors, rather than using just one inductor. Additional resistors and capacitors are added to prevent resonances.

The important specifications of a bias tee for professional applications, especially at
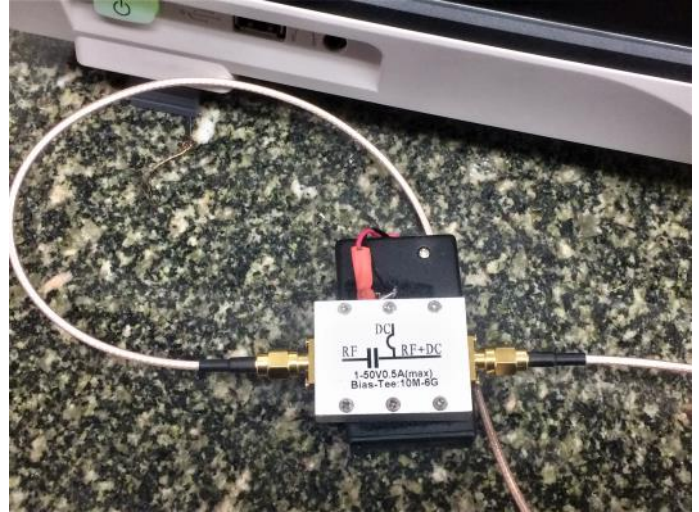
In this application, Ray Grimes, N8RG, powers a homebrew GPS amplified corner-reflector antenna from a three-cell AAA battery pack in a black box connected to a bias tee, while he observes GPS signals on a Siglent SSA 3021X spectrum analyzer. This broadband bias tee consists of high-frequency inductors and capacitors to cover 10 MHz to 6 GHz with no resonant point. Isolating capacitance prevents DC voltage from leaking to devices under test or to test instruments. Isolating inductance prevents high-frequency signals from leaking into the power-supply system. Applications include broadband amplifier, optical fiber communications, optical modulation drive, and other test and measurement applications.

higher frequencies into the gigahertz microwave range, include insertion loss, insertion-loss flatness, group-delay flatness, and return loss between the high-frequency and common ports, isolation between the DC port and high-frequency port, and power handling for both the DC port and high-frequency port. For digital data applications, a bias tee needs to have sufficient bandwidth on both the low and high frequencies and flat group delay across the band to prevent signal degradation.

Some professional applications include: DC bias for diode detectors, laser diodes, field-effect transistors (FETs), amplifiers, etc.; adding DC offset to ground-referenced signals; adding low-frequency signal for jitter simulation; 10X inline signal pick off; and as an essential lab tool for working with microwave and broadband digital circuits.

Although usable for amateur radio applications, this Marki Microwave BT-0018 bias tee is a typical professional device. It is constructed using a small resonance-free conical inductor to achieve broadband performance from 40 kHz to 18 GHz. It is suitable for biasing amplifiers, lasers, and modulators driven with high-frequency data patterns.

July 6th OCRACES Meeting to Be on Zoom

Due to the COVID-19 pandemic and Sheriff's Department orders to stand down on all RACES activities outside the home, the next OCRACES meeting again will be online, using Zoom, on Monday, July 6, 2020, at 7:30 PM, with the meeting ID and password sent to the mailing lists for OCRACES members and city RACES and MOU officers and selected members. Joe Selikov, KB6EID, will once again be the meeting host. Everyone who wishes to participate should download and install the Zoom software at https://zoom.us. The "Basic" plan is free.

No Sheriff's Department business will be conducted during OCRACES Zoom meetings, due to security concerns. Zoom meetings are for socializing only, such as discussing amateur radio technical projects and on-the-air activities. We will not discuss activation policies and procedures, EOC RACES equipment, etc.

Zoom claims to have substantially increased the security of its system. Nevertheless, we will continue to use Zoom with caution. If you installed the Zoom software on your computer, be sure it is the newest version, currently 5.1.1.

OCRACES 220 Repeater Is Back on the Air

OCSD Senior Telecommunications Engineer Erik Schull, KE6BVI, announced on the OCRACES 2-meter net Monday night, June 22, 2020, that the new OCRACES 1¼-meter repeater is now operational. Replacing the old Spectrum Communications SCR1000 repeater, it is a brand new BridgeCom system, installed on Sierra Peak. The output frequency is 223.760 MHz. You can access it on 222.160 MHz input, with a PL of 110.9 Hz.

Since June 22nd was a fourth Monday, we had scheduled adding roll calls on the 449.100 MHz repeater, followed by the 52.62 MHz repeater. The new 220 repeater was a surprise to us, but we still managed to have four check-ins that Monday. It has good coverage and we urge you to get active on the system.

Coronavirus Data Site Gets Revamped

In previous issues of *NetControl*, we have mentioned Orange County's public coronavirus data dashboard at https://occovid19.ochealthinfo.com/. This website has now been redesigned to allow you to see how the county's case and hospitalization numbers compare to state benchmarks, where cases are by ZIP code, and how nursing facilities are affecting the numbers in each community. RACES members have been clicking on the "COVID-19 Case Counts and Testing Figures" on the site before the redesign, to check on the latest case counts and hospitalizations in Orange County, which backs up our resolve to remain sequestered at home as we see cases ramping up. The redesigned website continues to provide that information.

The new site shows the county's performance on several metrics next to the state benchmarks for them: the case rate per 100,000 residents, the percentage of tests that are positive, the percentage of intensive care beds and ventilators that are available, and the change over time in the hospitalization rate.

It also breaks out cases among the homeless as well as in jails and nursing homes from the county's total cumulative case count, and positive case numbers are broken down not just by city but by ZIP code, with nursing-home cases separated so you can see how much institutional outbreaks may be driving a community's numbers up.

The county also is adjusting statistics so positive tests and deaths are added to statistics for the day they occurred, because any lag time before they get reported to the county can skew the results.

K0NEB Uses 3D Printer to Make Face Shields

CQ Kit-Building Editor Joe Eisenberg, K0NEB, has been writing in his column about using his 3D printer to make face shields for local first-responders in his hometown of Lincoln, Nebraska. His efforts were recognized by the Lincoln Fire & Rescue Department with a post on its Facebook page, including a photo and the following message:

"This is Joe, a citizen hero who lives in Northeast #LNK. Joe has been making protective face shields on his 3D printer since #COVID19 began. He says he has been running his 3D printer 24 hours a day to produce the forehead piece of the mask. His printer can make six per day. He then takes the other components and assembles the face shields. Joe stops by Station #5 every couple of days to drop off his shields. He says he is honored to be able to use his time and materials to help our first responders and other medical providers during this global crisis. Joe, we are honored to know you. We thank you for your generosity and your talents. Your kindness is greatly appreciated! #LFR City of Lincoln - Government Jeff Leaf."

Guidance for the Use of Face Coverings

RACES members must continue to lock down during the COVID-19 pandemic. RACES outside group activities away from home property are canceled until further notice. New cases are ramping up at an alarming rate, and we want everyone to stay safe. The increasing number of Californians who are leaving their homes increases the risk for COVID-19 exposure and infection. The California Department of Public Health (CDPH) points out that people who are infected but are asymptomatic or presymptomatic play an important part in community spread. The use of face coverings by everyone can limit the release of infected droplets when talking, coughing, and/or sneezing. Physical distancing is important.

On June 18, 2020, CDPH released a document that updates their existing guidance for the use of cloth face coverings by the general public when outside the home, especially in high-risk situations.

Good quantities of disposable face coverings are readily obtainable. Unfortunately, many RACES members have not found a source of cloth face coverings. Reportedly, some dry cleaners have been making cloth masks for their customers, and members (or their spouses) who are handy with sewing machines have been making their own, following patterns that are available online.

In their June 18th update, CDPH provides an informative background on cloth face coverings:

What is a cloth face covering?

A cloth face covering is a material that covers the nose and mouth. It can be secured to the head with ties or straps or simply wrapped around the lower face. It can be made of a variety of materials, such as cotton, silk, or linen. A cloth face covering may be factory-made or sewn by hand or can be improvised from household items such as scarfs, T-shirts, sweatshirts, or towels.

How well do cloth face coverings work to prevent spread of COVID-19?

There is scientific evidence to suggest that use of cloth face coverings by the public during a pandemic could help reduce disease transmission. Their primary role is to reduce the release of infectious particles into the air when someone speaks, coughs, or sneezes, including someone who has COVID-19 but feels well. Cloth face coverings are not a substitute for physical distancing, washing hands, and staying home when ill, but they may be helpful when combined with these primary interventions.

When should I wear a cloth face covering?

You should wear face coverings when in public places, particularly when those locations are indoors or in other areas where physical distancing is not possible

How should I care for a cloth face covering?

It's a good idea to wash your cloth face covering frequently, ideally after each use, or at least daily. Have a bag or bin to keep cloth face coverings in until they can be laundered with detergent and hot water and dried on a hot cycle. If you must re-wear your cloth face covering before washing, wash your hands immediately after putting it back on and avoid touching your face. Discard cloth face coverings that:

- No longer cover the nose and mouth
- Have stretched out or damaged ties or straps
- Cannot stay on the face
- Have holes or tears in the fabric

MARS Announces HF Skills Exercise

Members of the Military Auxiliary Radio System (MARS) will conduct an HF skills exercise July 20-24, 2020, to hone their operating skills and messaging-handling capabilities.

MARS members will be reaching out to the amateur radio community via the 60-meter Channel 1 Net (5330.5 kHz dial) twice a day, via the SATERN HF net (14.265 MHz), and by contacting various stations via HFLink throughout the exercise. MARS members will be requesting assistance with collecting county status information as well as airport weather information, called METARs. MARS members will also be passing ICS 213 messages to numerous Department of Defense (DoD), federal, and amateur radio addressees.

This exercise will be announced via WWV at 00:10 and via WWVH at 00:50 starting on or about July 13. WWV and WWVH listeners will be asked to take an online listener survey. This HF radio training event will not impact regular communications. — *Thanks to Paul English, Chief, Army MARS, as posted on the ARRL website*

Choosing Saddle Clamps for Building Projects
by Wayne Marks, KE8JFW, DX Engineering

In DX Engineering's ongoing exploration into the importance of paying attention to details when constructing an antenna, we would be remiss not to showcase the saddle clamp—the versatile fastener designed to grab onto piping/tubing and hold on for dear life.

When antenna-building or planning other station modifications, it's best to first recognize that not all clamps have been designed with ham-radio projects in mind. So before you make an investment that could compromise your build—or require major rehabbing down the road—ask yourself:

DX Engineering saddle clamps.

- Are the clamps made from materials that are prone to rust?
- Is the clamp's surface designed for maximum grip of the tubing or is there possibility of slippage under significant axial load?
- Are the clamps substantial enough to prevent elements from rotating during high winds?
- How much of the saddle area comes in contact with the surface to which it is attached?
- Are U-bolts or V-bolts long enough to attach tubing or components to thick mounting plates?
- Are compatible bolt and nut sets readily available?
- Are they made in sizes that fit most ham-radio applications, such as mounting antennas or other apparatus?

Some hams have made the mistake of using less-robust muffler-type clamps that come with the antenna or guillotine-style clamps that are fine for some uses but aren't ideal when a stronger hold is needed. Often, tightening these clamps for a firmer grip only serves to damage the tubing. Then there are countless stories of plain steel clamps rusting long before their time.

Unsatisfied with these options, many operators turn to DX Engineering's family of tested and proven saddle clamps, including U-bolt, V-bolt, heavy-duty, and super-duty varieties.

Featuring 18-8 grade stainless-steel bolts (1/4″, 5/16″, and 3/8″ long) and 535 aluminum saddles, both DX Engineering U-bolt and V-bolt saddle clamps offer hams rust-resistance and high strength for antenna and other projects. Unlike stamped or machined types, the saddles' rippled surface grips tubing closely for a secure fit. These clamps are sold as a set with stainless-steel nuts, bolts, flat washers, and lock washers. These clamps must be used on a flat surface or mounted on a customer-supplied backing plate.

For projects that demand an even greater clamping force, DX Engineering offers its super-duty and heavy-duty saddle clamps. Super-duty clamps are ideal for building large Yagi or LPDA antennas. Combined with a DX Engineering stainless-steel saddle clamp reinforcement plate (sold separately), super-duty clamps attach to tubing and establish a secure mounting point on booms, masts, and element tubing. Cast from rugged aluminum and featuring a textured surface for better grip, the clamp's two saddles deliver a premium fit that is resistant to torque, wind, and weather. They're available to fit 2″, 2.5″, and 3″ O.D. tubing. Heavy-duty clamps have all the benefits of the super-duty clamps but fit smaller diameter tubing (.750″, 1″, 1.250″, 1.500″, 1.750″, and 2″). Builders can choose from stainless-steel bolt and nut sets designed specifically for DX Engineering heavy-duty and super-duty clamps.

Also available are DX Engineering stainless-steel V-clamps, which are perfect for mounting accessories to steel pipe. DX Engineering also carries galvanized economy clamps from Cycle 24.

Note: With all DX Engineering saddle clamps, the use of a lubricant and sealant, such as Jet Lube (JTL-2555), is required to achieve proper torque and prevent galling.

What Do Hams Think?

"Good quality stainless steel. Saddle is "toothed" for extra gripping power."

"I buy these DX Engineering super-duty clamps by the caseload…and so should you. The single-plate setup, using muffler clamps, is a pain to install. The double-plate scheme, using DXE super-duty clamps, is the real ticket. Bullet proof."

"These heavy-duty element saddle clamps are just great. I have used them in various antenna projects, most recently a 20-meter rotatable dipole. They are just perfect for the job. Excellent and made for quick and easy installation. I will be buying more of these for sure."

"I used these clamps for the radial ground plate and to mount the tilt base. Don't even think of using muffler clamps! These are stainless steel, others will rust overnight!"

"Very heavy duty and fit great. Used them to connect my homemade rotor cage to the antenna mast."

RACES/MOU News from Around the County

Huntington Beach RACES

Huntington Beach RACES Member Steve Albert, KE6OCE, announced on the OCRACES 2-meter net on June 29, 2020, that the city was canceling their annual 4th of July parade and fireworks show this year, due to the COVID-19 pandemic and current State and County health and safety guidelines. The City and the 4th of July Executive Board have now planned an alternative to their traditional celebration. HBRACES has always supported the City with communications on the 4th of July, and will now support the alternative event as well.

In lieu of the traditional parade down Pacific Coast Highway and Main Street, this year's "OneHB Neighborhood Parade" will tour among neighborhoods throughout Huntington Beach with a salute to a nostalgic "Front Yard 4th of July" celebration. A caravan of parade favorites showcasing local elected officials, public-safety vehicles, military/veterans, front-line heroes, high-school seniors, live entertainment, and other community dignitaries will travel neighborhood to neighborhood, promoting a camaraderie of good will among neighbors.

The parade will travel from south Huntington Beach to north Huntington Beach starting at 8:30 AM and continue through approximately 12:00 PM. An exact route will be announced on https://www.hb4thofjuly.org/ on the morning of July 4th. HBRACES members will provide APRS tracking of a couple of public-safety vehicles along the route.

Placentia RACES

The new Placentia RACES Coordinator is Patrick Powers, Emergency and Health Services Manager, Administration. He is also the city's CERT Coordinator. His responsibilities include interfacing with the 911-Paramedic provider and assisting with Placentia Fire and Life Safety Department.

Cal OES Southern Region

John Hudson, WA6HYQ, Cal OES Regional Emergency Communications Coordinator, Mutual Aid Region VI, reports that on Thursday, October 29, 2020, there will be a full activation of Southern Region for a communications exercise with stations in Region I and VI. There are currently 32 specific items for AUXCOM that might include Winlink (HF and UHF), deploying cache equipment, HF communications from State to local Operational Areas, etc.

Orange County Amateur Radio Club (OCARC)

During the COVID-19 pandemic, the Orange County Amateur Radio Club has been holding its third-Friday meetings online via Zoom at 1900 hours. The July 17th meeting will include a presentation by Michael Rickey, AF6FB, on Digital Mobile Radio (DMR).

OCARC weekly radio nets are held on 10 meters, 2 meters, and 75 meters. Net control is operated by Corey Miller, KE6YHX, using the club's call sign of W6ZE. At 7:30 PM each Wednesday, the 10-meter net is on 28.375 MHz USB. At 8:30 PM, the 2-meter net is on 146.550 MHz FM simplex. At 9:15 PM, the 75-meter net is on 3.883 MHz LSB. Additional 2-meter nets are being run on 146.550 MHz FM simplex during the duration of the current COVID-19 (coronavirus) crisis on Mondays at 8:30 PM and on Fridays at 8:30 PM (except when other club activities are scheduled, such as the third-Friday Zoom meetings).

Orange County Fair

The 2020 Orange County Fair won't be held this summer because of ongoing concerns about the coronavirus and uncertainty over when the state may lift its ban on large events. The OC Fair and Event Center's board of directors may offer some of the fair's traditional entertainment online. Held annually in Costa Mesa since 1890, the OC Fair in 2019 attracted 1.39 million visitors over its 23-day run. It was canceled from 1942 to 1947 because of World War II.

July 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4 Independence Day (no net)
5	6 Weekly 2 m ACS Net & OCRACES Zoom Mtg	7	8	9	10	11 Weekly 60 m ACS Net
12	13 Weekly 2 m ACS Net	14	15	16	17 Orange County Amateur Radio Club Meeting	18 Weekly 60 m ACS Net
19	20 Weekly 2 m ACS Net	21	22	23	24	25 Weekly 60 m ACS Net
26	27 ACS Net on Four Bands	28	29	30	31	

Upcoming Events:

- **July 4:** Independence Day (no 60-meter net)
- **July 6:** OCRACES Meeting on Zoom, 1930 hours
- **July 17:** Orange County Amateur Radio Club (OCARC) Meeting, 1900 hours, on Zoom
- **October 29:** Cal OES Southern Region communications exercise with stations in Region I and VI.

https://ocraces.org

Mission Statement

County of Orange RACES has made a commitment to provide all Public Safety departments in Orange County with the most efficient response possible to supplement emergency/disaster and routine Public Safety communications events and activities. We will provide the highest level of service using Amateur and Public Safety radio resources coupled with technology, teamwork, safety, and excellence. We will do so in an efficient, professional, and courteous manner, accepting accountability for all actions. We dedicate ourselves to working in partnership with the Public Safety community to professionally excel in the ability to provide emergency communications resources and services.

County of Orange RACES Frequencies

60 m: 5371.5 kHz USB (dial) (Channel 4) (OC ACS Net—Saturdays, 1000 hours)
40 m: 7250 kHz LSB
10 m: 29.640 MHz output, 29.540 MHz input, 107.2 Hz PL (out of service)
6 m: 52.620 MHz output, 52.120 MHz input, 103.5 Hz PL
2 m: 146.895 MHz output, 146.295 MHz input, 136.5 Hz PL*
2 m: 146.595 MHz simplex
1.25 m: 223.760 MHz output, 222.160 MHz input, 110.9 Hz PL (out of service)
70 cm: 446.000 MHz simplex
70 cm: 448.320 MHz output, 443.320 MHz input, 141.3 Hz PL (private)
70 cm: 449.100 MHz output, 444.100 MHz input, 110.9 Hz PL (private)
70 cm: 449.180 MHz output, 444.180 MHz input, 107.2 Hz PL (private)
70 cm: 449.680 MHz output, 444.680 MHz input, 131.8 Hz PL (private)
23 cm: 1287.650 MHz, 1287.675 MHz, 1287.700 MHz, 1287.725 MHz, 1287.750 MHz, and 1287.775 MHz outputs, –12 MHz inputs, 88.5 Hz PL

*Primary Net—Mondays, 1900 hours

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"W6ACS ...
Serving
Orange County"

Meet Your County of Orange RACES Members!

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