W5YI

America's Oldest Ham Radio Newsletter

REPORT

Up to the minute news from the world of amateur radio, personal computing and emerging electronics. While no guarantee is made, information is from sources we believe to be reliable.

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The 2000 Amateur Radio Year in Review

Every year about this time we pause to reflect on what has happened to Amateur Radio during the past 12 months. Being tied to technology trends, ham radio is naturally always changing. And 2000 was no exception! Here are what we feel were the major stories of the past year.

JANUARY 2000

● Without question, the biggest story of the year was the FCC's streamlining and restructuring of the Amateur Service. The *Report and Order* (released on the last working day of 1999) continued all six license classes, but effective April 15th, applicants for ham licenses would only be able to be examined and receive licenses in three: (no code) Technician, General and Extra Class. Tech Plus licenses are being renewed as Technician, but still would retain their (Novice) HF privileges.

The telegraphy requirement was reduced to 5 words-per-minute for the General and Amateur Extra Class. This had the effect of eliminating the controversial high speed (13 and 20 wpm) code waivers. And the number of license exam elements was cut down from eight to four: Element 1 (5 wpm code), 2 (Technician, 35 questions), 3 (General, 35 questions) and 4 (Extra Class, 50 questions.) Responsibility for determining the written exam topics was transferred to the VECs rather than being mandated by the FCC in the Part 97 rules.

A unique feature of the new lineup was that Tech Plus and Advanced Class operators could take the existing General (Element 3B) and Extra Class (Element 4B) tests and use the exam credit towards the new General and Extra Class exams after April 15th. It set off a study material buying frenzy which (to the delight of publishers and dealers) liquidated the old material from the marketplace. Advanced Class VE's were also permitted to administer the General Class examinations for the first time.

Under the new structure, Technicians licensed prior to March 21, 1987 automatically qualified for the General Class without further examination after April 15th. The FCC elected not to go along with the ARRL proposal that certain HF subband allocations be "refarmed" or realigned. RACES station licenses were eliminated as being unnecessary.

● On January 3, 2000, the FCC issued a Public Notice inviting organizations to apply to become ham club and military rec call sign administrators. Some groups applied, but so far, the Commission has taken no applications on these applications.

● At the end of 1999, there were 677,392 licensed radioamateurs (75,392 Extra Class, 103,471 Advanced, 110,386 General, 133,359 Tech Plus, 202,409 Technician and 52,375 Novice operators.) The American Radio Relay League elected a new president, Jim Haynie W5JBP of Dallas, Texas at their January 21st Board meeting.

FEBRUARY 2000

• There was much mass confusion in the ham community as news of the FCC's Amateur Service restructuring became more widely known. Amateurs wanted to know exactly what the Commission had done and how their license and privileges were impacted. Tens of thousands of letters, e-mails and phone calls were sent to various Amateur organizations and the FCC. It took many weeks to clear the log jam. The new Technician Class caused the most confusion to licensees, exam applicants and VEs since, over the years there had been four different versions and each is accorded different examination credit.

But as a general rule, amateurs were pleased with the FCC's new regulations ...that is, all except long term Extra Class operators who had passed the old, more comprehensive examinations.

• On February 1st, the VECs Question Pool Committee (QPC) released new Technician, General and Extra Class examination questions. They had to be used in all examinations administered after April 15, 2000.

• The ARRL filed a *Petition for Partial Reconsideration* of the FCC's Amateur Service restructuring. The League asked the FCC to maintain records that indicate whether a Technician licensee has passed a Morse code exam. The ARRL also wanted the FCC to stipulate that any amateur who provides proof of having passed an FCC-recognized telegraphy exam prior to April 15 would be entitled to receive Morse exam credit when applying for future upgrades even if the license is long expired.

• The United Kingdom began making plans to link Amateur Radio with the Internet. It would be the first time that ham radio repeaters and mailboxes would be permitted to connect to and travel over non-amateur networks.

• Originally suggested by two Extra Class radioamateurs, Nicholas Leggett N3NL of Reston, VA and Rodger Skinner W4FM of Pompano Beach, FL., the FCC created a new Low Power FM broadcast radio service that would broadcast to their local communities. The Commission voted to establish two classes of non-commercial LPFM stations with power levels of 1 to 10 watts (LP10) and 50 to 100 watts (LP100). The threat of interference to existing FM broadcasters persuaded the FCC to back away from the possibility of 1,000 watt (LP1000) stations.

Previous "pirate" radio stations are permitted to apply for a LPFM license provided they had voluntarily ceased unlicensed operations. It is anticipated that up to one thousand new LPFM could be accommodated into the current (88-108 MHz) FM band. The FCC began phasing in the new service by accepting applications from a few states at a time.

The National Association of Broadcasters violently opposed the new low tech service - mostly because of their belief that it would compete and/or interfere with existing FM broadcast stations.

MARCH 2000

• The AMSAT Phase 3D next generation amateur satellite arrived at the European Spaceport in Kourou, French Guiana after being shipped from Orlando, Florida by way of Paris, France. It was originally planned that the launch would take place in July.

• Another *Petition for Reconsideration* of the FCC's Amateur Service restructuring was filed. Three amateurs (N5LF, NY2V and N 9BOR) say the new rules compromise the purpose of the Amateur Service, discourage technical innovation and fail to address major issues in the comments. They asked that the written examinations be made more difficult and that the 20 wpm code exam be reinstated. And like the ARRL, they want a distinction made in the FCC's Amateur Service database between the Technician and Tech Plus license classes. At year end, the FCC still had not ruled on any of the petitions.

• KW5G and W5XK filed a joint *Petition for Rulemaking* requesting that the amount of Amateur high frequency spectrum reserved for CW (Morse code) operation be reduced about fifty percent.

• A Russian ham radio call sign (RZ3DZR) was issued for the amateur station that will be installed on the International Space Station.

• NØMHS filed a *Petition for Rulemaking* suggesting the establishment of a new "Communicator" class license which would offer voice and digital communications on 20 simplex 70-cm (445-446 MHz) channels. The "Communicator" license exam would be based on 25 fairly simple questions.

APRIL 2000

• Following the lead of the United States, many countries reduced their Morse code examination requirement to 5 words-per-minute. South Africa looks toward licensing beginning radioamateurs based on constructing a radio transceiver. The new learner's license will be directed at schools. Australia adopted a new policy supporting an end to mandatory telegraphy testing

• On April 15th, radioamateurs began upgrading to the General and Extra Class in big numbers! These primarily were applicants who had passed the old Element 3B (General) and Element 4B (Extra Class) examinations and received exam credit certificates. Since the Morse code exam speed was reduced to 5 wpm effective April 15, they needed to only hand in their *Certificates of Successful Completion of Examination* (CSCE) to upgrade. Many long term Technician Class amateurs also were able to upgrade to the General Class without further test-

ing by providing evidence to a VE team that they had been licensed as a Technician prior to March 21, 1987.

MAY 2000

● Radioamateurs were very interested to learn what the FCC had to say about the newly restructured Amateur Service at the Dayton HamVention on May 21. Some 30 thousand amateurs attended. Most agreed with the changes.

● VECs were overwhelmed with the number of license upgrade applications they received from their VE teams as a result of the new rules. Several had to hire temporary help to assist in the handling and electronic filing. Instead of just a few days, the processing time lengthened out to several weeks as the applications piled up in VEC offices.

JUNE 2000

● Although predictable, the number of Novice, Tech Plus and Advanced Class radioamateurs began declining since these licenses are no longer issued. The number of General and Extra Class amateurs had corresponding increases (about ten percent) due to examinees taking and passing the old examinations and trading in their exam credit certificates. Over 40,000 amateurs upgraded during the first three months of the new restructured rules. While the number of upgrading amateurs surged, the total number of amateurs increased very little as about the same number joined the service for the first time.

● The ARRL entered into an agreement with the FCC which would allow amateurs to assist the FCC by checking TV signal levels. If a local broadcast signal levels is inadequate, a consumer could request satellite TV delivery which is generally prohibited.

JULY 2000

● Low Power FM broadcast license applications began pouring in to the FCC. More than 750 license applications were received in the first of five groups of states. The second filing group is planned for August, third November, fourth February 2001 and the last, May 2001. It is apparent that there will be far more LPFM applications than available spectrum.

● On July 5th, Don Beatie G3OZF (president of the *Radio Society of Great Britain)* sent a letter to all IARU Region 1 (basically Europe and Africa) national ham radio societies notifying them that it appeared the Region 1 Conference agreements were being "manipulated" by the IARU. The International Amateur Radio Union is managed by the American Radio Relay League. He said the delegates attending the 1999 Lillehammer (Norway) Conference agreed "...that mandatory Morse testing was not relevant for an HF license in the future..." A conference report, however, reflected that radio telegraphy was still a needed operating skill and he asked that it be removed

from the document.

● Australian radioamateurs within a hundred miles of Sydney were officially notified that effective July 12th the 70-cm ham band (440-450 MHz) would be off limits until October 30. It was used for logistical communications during the 2000 Summer Olympics. A similar restriction is anticipated on Utah amateurs during the February 2002 (Salt Lake City) Winter Olympics.

● The ARRL Board (at their July 21-22) meeting voted to expand its relationship with the Boy and Girl Scouts. The Lambda Amateur Radio Club, an ARRL-affiliated club for gay and lesbian radio enthusiasts, took issue with the plan and asked that the League "...officially and publicly distance" itself from the Boy Scouts and their policy of excluding gay scouts and scoutmasters. It set off a uproar which included the ham radio media.

● The VECs held their annual conference on July 21st. It was agreed that multiple choice Morse code exams would be ended by July 1, 2001. The FCC discussed the new CORES (Commission Registration System) and the FCC Registration Number (FRN). CORES is a web-based, password-protected registration system that assigns a unique 10-digit FCC registration number for use when doing business with the FCC. Eventually, the FRN will be mandatory and used in place of the TIN (taxpayer's identification number.)

AUGUST 2000

● On August 21st, the FCC released an order denying a petition requesting that the 150-mile 27-MHz Citizen's Band communications distance requirement be eliminated. The ARRL opposed the petition on the grounds that it would undermine the core distinction between the CB Radio Service and the Amateur Radio Service.

● The FCC created a new 2-meter VHF-CB Radio Service officially known as MURS ...an acronym for the "Multi-Use Radio Service." This Part 95 service allows unlicensed 2 watt FM operation on five crystal-controlled (151-4 MHz) channels that previously was allocated to the Part 90 business band. The FCC said the objective of the new voice/data/image service was to provide low-cost communications for local and state governments, large and small businesses "...and other diverse users of two-way radio systems." But hobby and personal use was not prohibited. Station identification is not required.

SEPTEMBER 2000

● Hosted by the Wireless Institute of Australia, the IARU Region 3 (Asia and the South Pacific) Conference got underway In Darwin, Australia, on August 28th ...ending on September 1st. RSGB President Don Beatie G3OZF was there representing tiny Pitcairn Island. He undoubtedly told those in attendance of his belief that the IARU Region One agreement on radio telegraphy was

mysteriously changed by IARU officials. In any event, the Region 3 Conference resolved to support immediate lowering of the Morse code exam speed as a temporary measure ...followed by total removal when possible under international law. A motion holding that "...Morse as a qualifying criterion for an HF amateur service license is not relevant to the healthy future of amateur radio" further recommended that the IARU leadership adopt their position as IARU policy. Except for the ARRL which voted against, the motion passed unanimously. HARTS (the Hong Kong Amateur Transmitting Society) abstained because their membership voted three years ago to support retention of the Morse requirement. Even though the IARU Region1 and 3 Conferences voted to end Morse testing, the IARU Administrative Council declined to vote on the motions at their September 3rd and 4th meeting. Instead, the AC will act on these recommendations after the IARU Region 2 Conference scheduled to be held in Guatemala next fall.

• On September 8th, Amateur Radio on the International Space Station (ARISS) took another step towards reality when the space shuttle Atlantis dropped off a 5-watt dual band (2-meter/70-cm) hand held transceiver at the orbiting space station along with other supplies needed by the first permanent crew. The Expedition One crew, Bill Shepherd (KD5GSL) and two Russian cosmonauts, will spend four months on the ISS.

OCTOBER 2000

• Word began circulating in the Amateur community that the long awaited launch of the AMSAT Phase 3D ham radio satellite was imminent. The orbiting of Phase 3D hamsat was delayed earlier this year when a defect was discovered in an upper stage of the Ariane 5 heavy lift vehicle. The European Space Agency scheduled October 31 as the launch date, but it was postponed when the primary payload - a 5-ton commercial communications satellite - failed to arrive at the Kourou (South American) spaceport on time.

NOVEMBER 2000

• The launch of the Phase-3D hamsat finally took place on November 15th, the last of four birds to be successfully separated from the Ariane 5 launcher. The Phase 3D satellite, dubbed OSCAR-40, was placed in a temporary transfer orbit normally used for geosynchronous satellites. It will be changed over the coming weeks to a highly inclined elliptical path. Once it reaches its operational orbit, the satellite will provide predictable communications coverage to North America, the Far East and Europe. The Phase 3D satellite weighs nearly 1,400 pounds, is some 20 feet across and its many transponders have a peak power level of 600 watts. The telemetry indicated that the launch went well and the satellite is in perfect health. AMSAT said there was much work that still had to be done before the satellite can be opened to general Amateur Radio communications.

DECEMBER 2000

• Various countries around the world began looking ahead to Amateur Radio without a manual telegraphy requirement. It is becoming apparent that a greater majority of the ITU nations want to end the "send correctly by hand and to receive correctly by ear" requirement in the International Radio Regulations. The American Radio Relay League said their Board will be taking another look at the Morse requirement at their January 2001 Board meeting. And it is expected that the ARRL will also abandon their long held support of demonstrated Morse proficiency.

• At year end there were 24% more Extra Class, 21% more General Class and 8% more Technician Class radioamateurs than a year ago. There also were 14% less Advanced Class, 24% less Tech Plus and 13% less Novice operators. The difference, of course, can be attributed to the U.S. Amateur Service restructuring. While the number of first-time licensed amateurs increased about 15,000 during 2000, the total ham census increased only 3,000 indicating that many amateurs may not be renewing their licenses.. The statistics as of press time:

AMATEUR RADIO CENSUS BY LICENSE CLASS AND MONTH FOR YEAR 2000

2000	Extra	Advanced	General	Tech Plus	Tech	Novice	Total
December	93,391	88,853	133,572	101,693	217,535	45,602	680,646
November	93,417	89,032	133,689	102,580	217,083	45,362	681,163
October	92,903	89,310	132,818	104,321	214,054	46,776	680,182
September	92,541	89,605	132,144	105,942	213,560	47,180	680,972
August	92,015	89,937	131,361	107,541	212,046	47,670	680,570
July	91,142	90,320	129,789	109,738	210,093	47,839	678,921
June	90,451	90,837	128,652	112,054	208,838	48,441	679,273
May	83,104	96,759	117,903	123,921	206,646	49,016	677,349
April	77,530	101,725	111,337	132,013	205,857	50,077	678,539
March	75,985	103,048	109,787	133,688	204,646	50,630	677,784
February	75,609	103,215	110,047	133,220	203,492	51,263	676,846
January	75,428	103,360	110,201	133,153	202,814	51,762	676,718

CUTTING EDGE TECHNOLOGY

Moore's law to continue into the future. Intel, the largest manufacturer of computer chips has built the world's smallest and fastest transistor. Today's fastest chip, the Intel Pentium 4, contains 42 million transistors onto a particle of silicon and runs at 1.5 GHz..

Intel's latest chip will have 400 million or more transistors and run at 10 GHz on less than a volt of power. The new chip is .03 microns wide, or about three atoms thick. A pile of 100,000 of them would equal the thickness of a sheet of paper. With these chips, computers will be able to translate verbal commands or conversations from one language to another in real time, or search massive and complex optical databases.

Luggage tracked by RF waves. London's Heathrow Airport offers an RF-based tracking system called Baggage Direct. A "smart label," or RF-based identification device, is attached to each piece of luggage. This lets the system track individual pieces throughout the airport. Passengers can find out instantly where their luggage is, and have it delivered for an extra service fee anywhere in the Greater London area within just a few hours. The RF tags are disposable, containing bits of data about the baggage owner, destination, weight of cargo and also a serial number. Baggage Direct operates in the 13 MHz band.

Trivia Time. Sensors have been built to measure just about everything imaginable. The most commonly measured parameter is time. Can you guess what the second most-measured parameter is? (Answer elsewhere in this issue.)

New type of scanner used by Federal Express. In a clever use of human factors engineering, FedEx now equips many of their employees with scanners that are built into rings that fit onto their fingers. Workers who load trucks from conveyors are no longer tied to a workstation; they can move about freely and log a package into their database by merely pointing their ring scanner at it. This is very fast and lets FedEx track thousands of packages at a moment's notice.

You think house paint is expensive? Try buying a gallon of metal-filled paint used to shield portable, plastic-shelled devices from RF waves. Nickel-filled or copper-filled paint can run up to $90 a gallon. But that doesn't come close to the paint filled with the best conductor in existence: silver. Silver-based paint can cost over $500 a gallon!

Where's the second source? Too many production managers have been "burned" over the years to permit them to use an electronic device that is available from only one source. The production line can come to a screeching halt if the sole source suddenly dries up, and it's costly to go back and totally re-engineer a circuit board to make a replacement fit. Many engineers won't even bother talking to sales reps about a product if a second source isn't easy to find. Think about it: Would you buy a car that used a special type of gas that was available only from one gas station in town? What if that gas station shuts down?

Here comes the sun! NASA recently launched $600 million worth of solar panels into space. They are now attached to the International Space Station. 240 feet long and 38 feet across, the solar array is just the first of four to be installed. They will produce about 65 kilowatts of electricity. The entire structure weighed 35,000 pounds on the launch pad, one of the heaviest payloads to ever be launched by the Space Shuttle. You'll soon see these solar panels from the ground; such a large mirror in space is guaranteed to be as bright as Venus, at times. Someone surely will set up a Web site, showing exactly when you can see a "Space Station flare" from your location.

How Times Have Changed. Dept.: Aerospace used to be the driving force behind new advances in sensor technology. But now the automobile industry has taken its place. Sensors in cars measure speed, combustion, RPM, door closures, cabin temperature and more.

Best Way to Prevent RFI: Make the circuit smaller. Today's integrated circuit technology low lets circuit designers cram more components into smaller spaces. Interconnections between RF stages in a transmitter or receiver are a common source of RF interference. By putting as many RF stages on the same die as possible, the interconnects are minuscule (no leaky cables!) and less likely to transmit radio waves.

New uses for old technology. Nikon makes equipment that polishes semiconductor wafers, very much the same way as glass lenses for telescopes have been polished for decades.

Mercedes-Benz is putting Doppler radar in some of their cars. The new type of cruise control not only keeps the car's speed constant, it also examines the road ahead for any other cars that are too close. If it finds one, it slows down the car accordingly.

Shuji Nakamura, inventor of the light-emitting diode believes that white LEDs will eventually replace incandescent bulbs. "In the past, electronic circuits were based on vacuum tubes in spite of poor reliability and durability," he said. "With the advance of solid-state semiconductor materials, all electronics are now highly reliable circuits. Only light sources are still made of an old traditional technology." White LEDs are twice as bright as incandescent bulbs, use non-toxic materials, and are more energy efficient. Light-emitting diodes are estimated to last at least 100,000 hours, or just under 12 years of constant operation, before their brightness dims to 50% of its original value.

Time to change tools. Machine-tool operators use high-speed machinery to cut metal. For every second they are cutting air instead of metal, they lose money. It's often difficult to predict when a cutting tool is getting too dull or is about to break. A new technique, called Sensor Tool, embeds resistance elements into the cutting edge of a tool. Resistance changes as the edge wears down. Since computers operate machine tools, they can also monitor this device and alert the operator when it's time to change the tool. It saves money in several ways: it prevents part damage from broken cutting edges, and it also prevents changing out tools that have not yet reached the end of their useful life.

Trivia Answer: The second most-measured quantity is temperature. Your temperature is taken when you are born;

we measure air temperature every day to determine the weather; we cook our food at different temperatures; we sterilize with heat and preserve by freezing; and your body tells you when it's sick by heating up.

Trivia Question, Part II: Pick the next letter in this sequence: B, B, R, O, Y, G, B, V, G, __.

Countermeasure for countermeasure. One way of making a ship at sea less susceptible to detection in the infrared region is to surround it with a fine water mist. One program, called Sea Wraith, already makes use of this technique.

The perfect insulator. For the ultimate in precise frequency control, try the EMXO -- the Evacuated Miniature Crystal Oscillator. It's a sealed unit that surrounds a quartz crystal with a vacuum, thus isolating it thermally and lowering the amount of energy needed to keep the frequency stable.

New uses for old instruments. Microwave radiometers are normally used for measuring blackbody radiation of objects. But they're also being used to determine the age and thickness of ice at sea. They do this by measuring the amount of salt (salinity) in the ice. Radiometers also measure hurricane wind speeds by examining the amount of foam created on the water by the winds.

Drilling for electricity. "No-clean" solder flux is now in common use. While it doesn't require chemicals to remove any flux, it does leave behind a thick layer of residue on circuit boards that some test probes can't readily penetrate. Sharper tip probes can do it, but they soon wear out. Rotating a probe tip also works... but it can damage the board or the parts on it if not done correctly.

Buy or rent? For electronics labs, there are many items to consider when it comes to obtaining valuable test equipment. If you buy an oscilloscope, for example, will you use it often enough to justify its expense? Will it be obsolete next year? Large companies won't sell old test equipment until its value has depreciated enough, which could take years. Renting test gear can be done very

quickly, for "emergencies," and when new equipment won't be otherwise available for a while. And you can return it when you're finished with it. This frees up storage space.

As the world turns.... One estimate says 70% of all electricity generated worldwide is used to do one thing: to turn electric motors.

Laser diodes replacing laser tubes. The first visible helium-neon (HeNe) lasers used glass or metal tubes several inches long. Today's red HeNe lasers use diodes. You can get one milliwatt of optical power out of both a laser diode and a laser tube, at identical currents. But it takes only about 2 volts for the diode to operate, compared to several hundred volts for the tube. A laser diode can be as much as 50 times more efficient -- and takes up less space.

Trivia Question, Part II Answer: The letters are the first to appear in the names of the color codes for resistors. Black is 0, Brown is 1, and so on: Red, Orange, Yellow, Green, Blue, Violet, Grey, and of course 'W' for White. Bet you could kick yourself, huh?

What does the driver see? Viewers of NASCAR races often see real-time graphics of individual cars' driving parameters, such as speed, g-forces, and tachometer readings. At least one company specializes in making racecar telemetry available for television viewing as a graphic overlay.

EMERGING COMMUNICATIONS

What are you paying for? According to the Consumer Electronics Association, we use less than one third of the features on the electronic devices we buy. For instance, a cellular phone can hold as many as 99 phone numbers; do you know 99 people whom you like that much? How often do you use the picture-in-picture function on your new TV set? It may look great on the showroom floor, but may not get much use at home in the den.

Practical limits. It's practically a given that speech-recognition technology will

never reach 100% accuracy. Even people can't recognize spoken words and names 100% of the time!

Over 60 million pagers are currently in use across America. That number continues to grow; about one out of every four people in the U.S. uses a pager.

What is the world's largest-selling consumer electronics device? It's not the Sony PlayStation 2; not the desktop PC; not the laptop PC; not pagers. It is the mobile phone. It's estimated that over 500 million people will be using mobile telephones worldwide by 2002.

New type of solar power. Earth-orbiting satellites require electricity to operate. It's easier and safer to use solar power than on-board nuclear power, so solar cells are the clear favorite. But the environment of space is extremely harsh; it not only subjects delicate solar cells to bitter cold and blistering heat, it also means doses of powerful radiation. And strikes from bullet-speed micrometeorites are one reason why satellites don't last much longer than a few years, on the average.

Having less solar-cell acreage on a satellite reduces the risk of damage, but it also lowers the amount of electricity generated. A new technique concentrates solar cells in a central location on a satellite, using a "solar collector" to gather light and send it to a series of photovoltaic cells. The glass-and-acrylic light collector can take everything that outer space can dish out, while sending valuable sunlight to where it's needed. The solar cells are thus shielded from radiation, and satellites can live longer.

Light weight. A fiber-optic cable weighs about 1/25th as much as a metal waveguide (microwave frequencies), and about 1/10th as much as a coaxial cable.

How you do test telephone equipment in the lab? You can run up a whopping bill, trying to adjust prototype telecommunications equipment to work with extremely long-distance calls. Telephone line emulators are devices that you can plug an ordinary phone into, and they will behave just as though you were using a real phone line. They create dial tone, handle Caller ID, simulate echoes and satellite delays. Everything is controlled via

computer and serial port.

No wonder video has been looking smoother lately. One of the video camera operator's jobs is to keep the camera steady. That isn't always easy to do, particularly in rough weather or if you're using a shoulder-mounted camera. Tripods aren't always available or easy to use. ShakeOut, by Snell & Wilcox, takes rough video footage and uses digital technology to "smooth out" the shakiness. It can do this with live broadcasts, estimating motion and automatically correcting for it.

COMPUTER INFO

Is your printer jamming frequently? One reason may be high humidity. Too much moisture in the air can make paper expand and stick together. Paper has a shelf life, just like almost everything else; it won't last as long in humid climates.

What causes software bugs? There are many reasons, but most programming errors can be traced to a handful of sources.

‣ **Wrong number of loops.** A subroutine may perform a specific task a certain number of times, changing data values as it goes. When the final number of loops is reached, that data value's final update is returned to the main program. But it is very easy to misinterpret how many times such a loop will run. If a program is meant to loop 100 times, it may actually do so only 99 times or 101.

‣ **Not anticipating strange results.** A subroutine may generate a result that the main program isn't written to handle. If an arithmetic program isn't designed to handle a "divide-by-zero" error, for example, it will "crash."

‣ **Mixing integers with floating-point numbers.** Often times, a program must be told in advance exactly what type of numbers it will be dealing with. Floating-point numbers require more data space because of their high precision and decimal places. Integers take up less room. But performing math operations on such numbers and mixing them up can lead to confusion.

‣ **Working on a copy of a variable, instead of the variable itself.** This is one of the most common of all software bugs. A subroutine can change a variable in many ways, but may not return the new value to the host program. This can disrupt program flow, causing the microprocessor to look for an instruction in an area that it's not supposed to.

‣ **Forgetting to initialize variables.** If a program doesn't get references for certain numbers, it may make up its own. Try reading a variable that doesn't officially exist in a program and see what interesting results you get.

You may not be able to buy your next car over the Internet. Over half the states in the U.S. have laws preventing car manufacturers from selling directly to customers; they must go through dealers. Ford had to shut down its online system after Texas threatened to impose stiff fines.

A clock that is designed NOT to keep perfect time? A spread-spectrum clock generator chip is ideal for high-speed laptop computer applications because it drastically cuts down on EMI and RFI. Most computers use a constant clock frequency to drive the digital electronics, but harmonics of that signal can create RF waves that can tear up a program on a nearby AM radio receiver. But by modulating the clock signal with another, low-frequency signal, the microprocessor's clock can slowly change from one frequency to another. A 100-MHz clock signal can gradually shift from 95 MHz to 105 MHz and back, for example. It doesn't affect the computer's overall performance very much and the modulation spreads out any potential interference over a much greater frequency range. Most of the latest laptop computers are already using this new type of clock chip.

More is "less." You can actually extend the life of the battery in your laptop computer by adding more memory. This may sound ludicrous until you learn that RAM consumes less power than a hard drive. If a computer can't store enough data in its RAM, it will put it on the hard drive and keep referring to it. The laptop always looks inside its RAM first, because it is faster. A hard drive can consume 30 times more power than 64 megabytes of RAM. Adding more memory can extend battery life by as much as a third.

Computer printers with RF links are on the way. Infra-red links are popular with handheld computers and scientific calculators, but they require an unobstructed view between the host computer and the printer. An RF-based printer can be networked into an office environment or taken on the road, and the only limit is distance.

Don't pull on that printer paper! Studies have shown that the slower a printer works, the more often people tend to pull on the paper. This can damage the printer's electronics or print head. This is one reason why the medical industry demands high-speed printing. (Such printers must be easy to refill, also.)

Deep Thoughts. Incredible though it may seem, there are still engineering problems too complex for today's supercomputers to solve efficiently. They are waiting for the next generation of supercomputer technology, which is limited to "teraflops" -- trillions of operations per second. If you're studying nuclear physics, astronomy, petroleum engineering, seismic activity, or anything else on a grand scale, you need a computer capable of working at 1 petaflop -- 1,000 trillion operations per second! Biological simulations will be ideal for such a machine. And, yes, engineers are already working on such a computer.

Your computer could be part of a worldwide supercomputer. Software developers are programming an operating system that uses the Internet, and certain subscribers connected to it, to share individual processing time as needed. The average PC spends most of its time just waiting for a keystroke. Multiply that idle time by millions of computers, and you've got a lot of processing power that's going to waste. Users share processor time, just as old mainframes used to do.

New method of pricing software. Microsoft is experimenting with selling their next update of Office by means of a "subscription license." It will cost less than buying a copy from a store, but you will not actually own the program. You just "subscribe" to it. After a year has passed, the program will stop working unless you renew your subscription by paying another fee.

Would you buy a worn-out machine? It depends on what you want to

get out of it, of course. It may be less expensive to attach a computer-based controller that's programmed to account for the amount of wear in a gearbox, for example, than it would be to replace the gearbox itself. A computer's parameters can be changed by a few keystrokes to allow for a bit of "play" anywhere in the system, and keep track of it all to cut metal smoothly and precisely. And it continuously updates itself as wear increases.

Self-examining jet fighter. The F-22 features a self-test function built into its computer system. It begins monitoring all of the on-board systems as soon as the plane is turned on, and continues to do so even while the plane is in flight. If the self-test function finds a failure, it isolates the bad circuitry and bypasses it. The computer's software automatically reconfigures itself to work about the failure. This lightens the pilot's workload.

Semiconductors outracing designers! The technology behind integrated-circuit processing is advancing faster than the tools required to design the chips. It's relatively easy now to build a chip that contains over 100 million transistors, but it's still tough to figure out where each transistor will go and what it will do so the chip will function properly. Computers are already being used to design next-generation computers.

From conception to completion, engineers must know exactly what a product will do. "Concurrent engineering" is a name given to the concept of knowing how a product will be used. It's similar to human-factors engineering, except that C.E. determines precisely how much it will cost to manufacture the product; how end users will accept it; where it will be used; and how to repair it efficiently. It keeps track of manufacturing schedules and component prices. And all of this is done before the idea gets out of the designer's desktop C.A.D. file and onto the production floor.

So be good, for goodness' sake. It's technically possible to determine what's being displayed on your computer monitor from over half a mile away, without even seeing it. It isn't easy, but it can be done by examining its RF emissions.

Bit by bit... To save battery power, infra-red data ports on portable computers employ a different strategy to determine "ones" from "zeroes." For a desktop computer, you can stretch the pulse width of a bit as much as you want, because you have power to spare. Battery-operated devices don't. That's why they shrink the "on" time of a bit as much as possible; it means the infra-red LED doesn't have to stay on for as long a time. Not only that, but synchronous data transmission formats keep a constant clock -- meaning that they don't depend on the data bits themselves for synchronization. To reduce power consumption even more, only "0" bits are transmitted. If the receiver doesn't get an expected bit, it interprets it as a "1." Therefore, information has technically been received, even though it wasn't really transmitted. This lets the IR-LED stay off when it's not needed.

So much for the "paperless" office. Half of all e-mail messages are still printed on paper before they're even read.

INTERNET NEWS

The "Tech Wreck" collapse continues. What a difference a year makes! "Ask Jeeves" the friendly Internet butler that answers questions instead of responding to search words joins the many online sites that are doing poorly. A year ago, advertising-supported "Ask Jeeves" was selling for $144.00 a share. At press time ASKJ (Nasdaq) was selling under $10.00 and losing millions every month. Their business model is being questioned and their CEO Rob Wrubel is being replaced.

Another problem for the economically depressed online world to deal with. With more and more Internet companies falling by the wayside, dot-com workers are now turning to labor unions. Tens of thousands of young, bright, overworked employees have lost their jobs during the past six months alone. Instead of being lured by the big payoff that resulted from employee stock options (most now worthless due to stock price declines), workers are now turning toward better hourly pay, working hours and conditions.

Internet on the road. One of the giants in telecommunications, Ericsson, predicts that mobile Internet use will overtake fixed Net use by 2003. Handsets and other mobile devices are becoming more prevalent and powerful, and laptop computers may soon have RF links built-in.

How do I know they won't steal it from me? One problem with setting up a Web site on the Internet is how easy it can be for anyone accessing it to copy any of the digital images within. One click of the mouse button is all it takes for anyone to copy a photograph and store it on his own hard drive. This is one reason why artists and photographers are hesitant to post high-resolution copies of their work on Web sites. You may see "Do Not Distribute" or some other term digitally embedded within the picture, so that anyone reading it elsewhere will see a great deal of the image, but not the whole thing. Software blockers exist that allow users to see an image on a Web site, but won't let them download it or copy it or print it out in any way.

NFL photographs on-line. The National Football League's Photo Service used to issue official photographs of teams, players, coaches and owners on CD-ROMs for the thousands of journalists who requested them. While still faster and cheaper than mailing out 8" x 10" glossies as they did in the past, the turnover among players due to trading, signing, retirement and injury can make all CD-ROMs obsolete in a day. That's why the NFL put their photo archives on-line. Photos can be updated week by week, and databases help keep track of it all.

Your child's worst nightmare. Many schools are putting each day's homework assignment onto their Web sites. This lets parents double-check what's being completed with what's been assigned.

What's in a name? Say you want to start a new company but don't have a catchy name for it. What do you do? Internet startup companies often turn to "naming professionals" whose job is to create high-tech names for high-tech companies. They can do it very quickly, too.

If you have high-speed Internet access, you're in the minority. Fewer than 3 million homes in America have 'Net connections fast enough for fast-motion video,

and only a fourth of the country is even wired to access speeds that fast.

Keystrokes don't count as electronic messages! That's the basis of a relatively new weapon being used by the FBI in its battle against underground communications over the Internet. Called a keystroke recorder, it is particularly useful when the culprit uses encryption such as the publicly-available PGP program.

Agents simply implant the device (software, firmware or hardware) somewhere in or between the keyboard and the computer. No electronic communications are captured so the federal wiretapping laws which limit what can be tapped do not apply. A federal warrant to implant the device in a private PC must first be obtained. Keystroke recorders used in the workplace, however, do not require a warrant since employers have the right to monitor worker activity.

Keystroke recorders come in three varieties: Software (with names like "Keylogger," "GetIt" and "Spyware") a microchip placed on the keyboard port, or a small battery-powered gizmo installed within the keyboard or in the cable linking the keyboard to the PC. Good keystroke recorders can store up to 32 million keystrokes. It is not clear how the FBI retrieves the stored information or if the device can transmit stored information on its own.

The FCC is planning a February 2nd meeting at its Washington, DC headquarters of its Commercial Operator License Examination Managers (COLEM). These are the ten organizations that coordinate commercial radio operator license examinations for the FCC. During 1999, about 5,000 General Radiotelephone Operator licenses (GROL) were issued by the FCC. And nearly 9,000 applicants passed Element 1, the requirement for the Marine Radio Operator Permit (MROP.) The third most popular commercial license is the GMDSS operator. There is practically no interest in the Commercial Radiotelegraph operator licenses since CW is being phased out on the high seas.

AMATEUR RADIO

Convicted (now a celebrity) computer hacker, Kevin Mitnick N6NHG gained more notoriety after having his ham radio - an Alinco DR610TQ posted to the eBay online auction site then removed. Item No. 507580398 had a starting bid of $100. Also offered for sale was his prison ID card. But eBay, Amazon and Yahoo also banned them after they were posted.

eBay said the auction was canceled based on their policy prohibiting the sale of government-issued identification cards. Subsequently, the card was auctioned on Yahoo Auctions!

Within twenty-four hours, Yahoo canceled the auction stating, "this kind of activity is not permitted" without any further clarification. Finally, the card was moved to Amazon. Once again, Amazon canceled the auction saying it violates their "community standards" without any specificity.

The Prison ID Card was then moved to, DutchBid.com, a Biloxi, Mississippi auction site. "Here is your chance to own this one-of-a-kind piece of history," it said. The ID card finally sold for $3,700 on December 9th. Also, available were 25 "...personally autographed Kevin Mitnick Bumper Stickers"

"It baffles me that these sites can censor Kevin Mitnick memorabilia, and then allows Nazi memorabilia to be sold," Kevin said. "Apparently, promoting hate group material is within the bounds of good community standards...."

Terms of his prison release prohibit Mitnick from having any contact with computers. The seller is listed as Alan Mitnick, Kevin's father.

Mitnick's General Class amateur radio license expired a year ago, but is still within the two year grace period for renewal. If it is not renewed, Mitnck's N6NHG ham call sign becomes available under the Vanity call sign program on December 12, 2001 ...undoubtedly another "collector's item."

Amateur radio enforcement.

Elaine Kam KH7YQ (Honolulu, Hawaii) has had her Extra Class license and **AH6QQ** call sign set aside while the FCC gathers more information about the multiple-choice Morse code examination she was administered in October.

Robert Lang, of the Friendly Tree Service (East Orange, NJ) was warned about operating on amateur radio frequencies without a license. Continued operation will result in a fine (normally between $7,500 and $10,000) and radio equipment seizure.

Nicanor DeRoda N2JTI, Haverstraw, NY must respond to an FCC inquiry into the status of his alleged uncoordinated repeater operating on 147.05 MHz. It is causing interference to K2UQ, a coordinated repeater located in Lawrenceville, NJ. The FCC said it had information that he was "...aware of the problem, but have declined to take any steps to correct or resolve the conflict." The Commission reminded DeRoda that "...the licensee of the uncoordinated repeater has primary responsibility to resolve the interference.

William F. Crowell N6AYJ (Diamond Springs, CA) has again been warned about deliberate interference to ongoing communications on 75 meters. Calling his previous response "...irrelevant to the issue concerning interference [and] frivolous...." the FCC cautioned Crowell "...that imaginary, make-believe or fictitious conversation ...constitutes interference and degrades the service...."

In response to an FCC inquiry, **Alan J. Koepke K1JCL (Coventry, CT)** has notified the FCC that he has removed his two and six meter repeaters from service until he is able to obtain frequency coordination.

Wendell Peterson K6POU (Walnut Creek, CA) has been cited for operating a repeater system with abnormally wide bandwidth and signal spurs with no apparent control operator. The FCC has requested information about his system, control operators and coordination information.

Otto Supliski WB2SLQ (Yonkers, NY) has been asked by the FCC to forward information about his WR2MSN repeater including the coordination document. The Commission also wants to know if he has received interference complaints about his system and any action taken to resolve them. Supliski's repeater is reportedly causing harmful interference to W2OQK, an Elmhurst, NY coordinated repeater operating on 145.27/144.67 MHz.

LOCAL GOVERNMENTS TO ACT ON CB VIOLATIONS

Local officials can now crack down on unauthorized citizens band radio operations under legislation signed into law November 22nd by President Clinton. Public Law 106-521 allows local and state governments to voluntarily enact laws and take enforcement action against CB operators that illegally interfere with consumer electronic equipment including TV sets, stereos and telephones.

The new law amends Section 302 of the Communications Act of 1934 by creating a new subsection (f). The original bill (H.R. 2346) was introduced by Rep. Vernon Ehlers on June 24, 1999. The Senate version of the bill was S.2767. Fortunately for Amateur Radio operators, radio services which require individual licenses are exempt from the new regulation.

Previously, action against illegal citizens band operation had to be handled by the FCC. The problem was, that CB enforcement was not a high priority item at the Commission and complaints frequently were not investigated due to lack of financial resources or field agents.

Such locally enacted regulations can address such problem areas as operating outside of the 40 CB channels, the use of power amplifiers, obscene or indecent speech, CB antennas mounted higher than 20 feet above a building; remotely controlled CB radio stations and illegal connection to a telephone.

The bill also requires the FCC to provide technical assistance to state and local governments on how to detect unauthorized CB use. The new subsection reads:

SEC. 302 -- DEVICES WHICH INTERFERE WITH RADIO RECEPTION

(f)(1) Except as provided in paragraph (2), a State or local government may enact a statute or ordinance that prohibits a violation of the following regulations of the Commission under this section:

   (A)   A regulation that prohibits a use of citizens band radio equipment not authorized by the Commission.

   (B)   A regulation that prohibits the unauthorized operation of citizens band radio equipment on a frequency between 24 MHZ and 35 MHz.

(2)   A station that is licensed by the Commission pursuant to section 301 in any radio service for the operation at issue shall not be subject to action by a State or local government under this subsection. A State or local government statute or ordinance enacted for purposes of this subsection shall identify the exemption available under this paragraph.

(3)   The Commission shall provide technical guidance to State and local governments regarding the detection and determination of violations of the regulations specified in paragraph (1).

EXTENDING FEDERAL PREEMPTION TO CC&Rs DENIED

The FCC has denied a *Petition for Reconsideration* filed by the American Radio Relay seeking review of the 1999 denial of its February 1996 petition which requested limited preemption be extended to "covenants, conditions and restrictions." CC&Rs are the fine print limitations contained in homeowner deeds and in condominium by-laws.

In its 1985 PRB-1 decision, the Commission established a policy of limited preemption of state and local regulations governing amateur station facilities, including antennas and their support structures. The FCC expressly decided not to extend this preemption to CC&Rs. The Commission concluded that specific rules bringing private restrictive covenants within the scope of PRB-1 "...were neither necessary or appropriate."

In PRB-1, the FCC stated that CC&Rs restricting amateur operations were not a Commission matter since these agreements are voluntarily entered into by the home buyer or tenant at closing and purchasers or lessees are free to choose whether they wish to reside where such restrictions on amateur antennas are in effect.

Noting that the FCC preempted local zoning regulations which banned over-the-air broadcast satellite TV devices, the ARRL argued that the Commission had the authority to preempt CC&Rs that restrict amateur operations. The FCC said that even if it had the authority to address CC&Rs in the context of amateur radio facilities, this alone does not necessarily warrant revisiting the issue.

"Unlike over-the-air reception devices (OTARDs), which are very limited in size in residential areas, amateur station antennas may vary widely in size and shape. Amateur station antenna configurations depend on a variety of parameters, including the types of communications that the amateur operator desires to engage in, the intended distance of the communications, and the frequency band."

"Amateur station antennas, in order to achieve the particular objectives of the amateur radio operator, can be a whip attached to an automobile, mounted on a structure hundreds of feet in height, or a wire hundreds (or even more than a thousand) of feet in length. They can be constructed of various materials occupying completely an area the size of a typical backyard. In addition, there can be an array of different types of antennas."

"We are not persuaded by ARRL's arguments that it is appropriate at this time to consider exercising such discretion with respect to amateur station antenna preemption," FCC said. "Moreover, we do not believe that ARRL has demonstrated that there has been a significant change in the underlying rationale of the PRB-1 decision, or that the facts and circumstances in support thereof, that would necessitate revisiting the issue. In the absence of such showing, we believe that the PRB-1 ruling correctly reflects the Commission's preemption policy in the amateur radio context."