

THE MAGAZINE FOR PROFESSIONAL ELECTRONIC AND COMPUTER SERVICERS

# ELECTRONIC™

Servicing & Technology

December 2002

**ACCESSING THE INTERNET**

**HIGH DEFINITION TELEVISION**



**DISTRIBUTED AUDIO/SOUND  
INSTALLATION & MAINTENANCE**

**NEW TECHNOLOGY UPDATE**

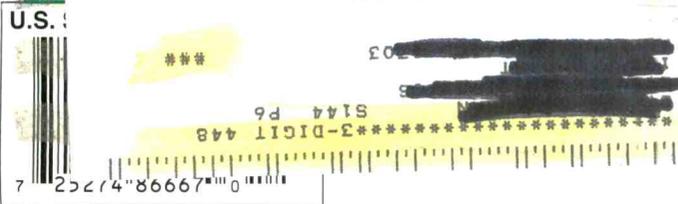
**PART 2: WIRELESS &**

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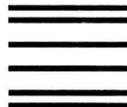
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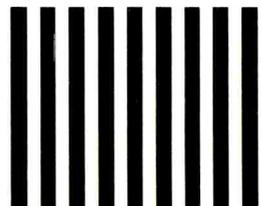
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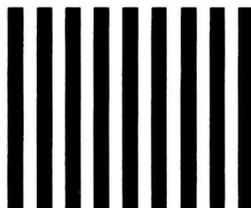
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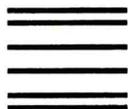
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# ELECTRONIC

Servicing & Technology

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**Electronic Servicing & Technology** is edited for servicing professionals and managers who service consumer electronics equipment. This includes owners, managers, service technicians, field service personnel and avid servicing enthusiasts who repair and maintain audio, video, computer and the new digital consumer electronics equipment.

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## FEATURES

### DISTRIBUTED AUDIO/SOUND INSTALLATION AND MAINTENANCE \_\_\_\_\_ 7

Today, people do not want to be tied to a single room to listen to their favorite music on a quality system. Unless one invests in a separate system for each room of the home, the best solution to meeting this consumer demand is to install a sound distribution system. Here is a planning guide and check list for installing such a system.

### ACCESSING THE INTERNET \_\_\_\_\_ 12

By John A. Ross

Almost everyone uses the Internet in some fashion. John Ross provides an overview of the full spectrum of opportunities afforded by the Internet system.

### HIGH DEFINITION TELEVISION \_\_\_\_\_ 15

By Alvie Rodgers, CET Hitachi

HDTV has definitely arrived. While it still has a way to go, manufacturers are churning out HDTV sets and TV broadcasters, cable and satellite programmers are now providing some HDTV content.

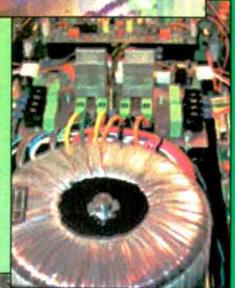
Based on a training document prepared by Alvie Rodgers, this article is designed to help servicers be more comfortable about the ongoing HDTV evolution.

### HOME THEATER SHOWCASE AN ADVERTISING SECTION \_\_\_\_\_ 30

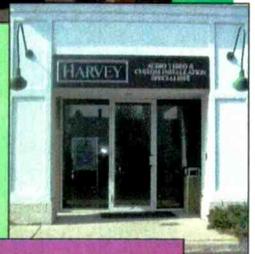
A special advertising section where key vendors provide the professional servicer with the tools required to take advantage of the new opportunities afforded by the burgeoning Home Theater business.

### NEW TECHNOLOGY UPDATE PART 2: WIRELESS AND CONSUMER ELECTRONIC FASHION \_\_\_\_\_ 33

High-speed broadband wireless voice and data connectivity is at the heart of the wireless world, bringing a complete wired-like experience to wireless users. Consumer Electronics Fashion is more than wearing a Dick Tracy wrist radio. Before long, tens of millions of people could be wearing computer and other connectivity and entertainment products combining the both the consumer electronics and fashion worlds of hyperactivity.



Cover Photos:  
Harvey Electronics  
Showplace at  
Greenvale, NY



**HOME THEATER  
PRODUCTS  
SHOWCASE  
AN ADVERTISING  
SECTION**

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# Editorial

by Nils Conrad Persson

## CONSUMER ELECTRONICS TECHNOLOGY VS ECONOMICS

HDTV is here. More or less. You can go to a consumer electronics store and buy an HDTV monitor with a set top box tuner for over-the-air broadcast, or you can buy a complete HDTV including tuner. Either product will have inputs for cable or satellite. Programs produced in the ATSC (Advanced Television System Committee) HDTV format will look great on either of those sets, whether it comes over the airwaves, from a satellite, or through a cable from the local cable company.

Problem is, there really isn't much HDTV programming being delivered to consumers via any of those media. Not yet anyway. And there still seems to be something of a chicken and egg problem working here. Until there are significant numbers of people watching television on their TVs at home, programmers are reluctant to put a whole lot of effort into producing high definition programs. And until there's a significant amount of high definition programming available, consumers are reluctant to spend large amounts of money to buy high-definition television sets.

In an effort to speed up the transition to digital television, in a Proposal for Voluntary Industry Actions to Speed the Digital Television Transition the chairman of the FCC has offered a number of proposals for all organizations involved in HDTV. Following is the essence of the proposal: It Asked That:

1. The top four broadcast networks (i.e., ABC, CBS, Fox and NBC), HBO, and Showtime provide high-definition or other "value-added DTV programming" during at least 50% of their prime-time schedule, beginning with the 2002-03 season. Value-added DTV programming could be high-definition, innovative multicasting, interactive, etc. - so long as it gives consumers something significantly different than what they currently receive in analog. This would include something more than a single stream of standard-definition digital programming.
2. By January 1, 2003, or as soon thereafter as they commence broadcasting, DTV affiliates of the top four networks in the top 100 TV markets will obtain and install the equipment necessary to pass through network DTV without degradation of signal quality (e.g., pass through HD programming, if that is what its network provides). Stations broadcasting DTV programming would inform viewers of their digital content through on-air promotional announcements over their analog broadcast facilities.
3. By January 1, 2003, cable systems with 750 MHz or higher channel capacity will: Offer to carry, at no cost, the signals of up to five broadcast or other digital programming services that are providing value-added digital programming during at least 50% of their prime-time schedule.  
Provide cable subscribers the option of leasing or purchasing a single set-top box that allows for the display of high definition programming. These devices will include digital connectors (e.g., 1394/5C and/or DWHDCP) at the request of the consumer. Market the digital television products the operator provides, including on their systems and in monthly bills, so that consumers know what programming is available and how they can receive it over the cable plant.
4. By January 1, 2003, satellite TV providers carry the signals of up to five digital programming services that are providing value-added digital programming during at least 50% of their prime-time schedule.
5. Equipment manufacturers and retailers commit to meeting the demand for cable set-top boxes that allow for the display of high definition programming.

Market broadcast, cable and satellite DTV options at point-of-sale. Include over-the-air DTV tuners in new broadcast television receivers according to the following schedule:

Sets 36 inches and above - 50% of units to have DTV tuners by

January 1, 2004; 100% by January 1, 2005;

Sets 25 inches to 35 inches - 50% of units to have DTV tuners by January 1, 2005; 100% by January 1, 2006;

Sets 23 inches to 24 inches - 100% of units to have DTV tuners by December 31, 2006. Include digital input(s) (e.g., 1394/5C and/or DWHDCP) on all new HD-capable television receivers and display devices by January 1, 2004.

As with any charge, there seems to be some controversy about this proposal. According to a more recent missive from the chairman of the FCC, the cable industry, the satellite industry, the networks and their affiliates have embraced the proposal. The lone dissenter is the Consumer Electronics Association (CEA), which is against the idea of pressuring manufacturers to include DTV tuners in all television sets according to the FCC's proposed schedule. Their contention is that to attempt to add such tuners to all sets would price some sets out of the market, and would be an unfair cost to consumers: something in the vicinity of \$200 price increase to include a DTV tuner. They suggest that manufacturers be allowed to make these decisions individually as dictated by their own market experience.

Another consideration mentioned by CEA is that most consumers receive their TV signals via cable and to put an ATSC tuner in sets that they buy would be an unnecessary expense. Those people are better served by cable-ready sets, they contend.

Further, the CEA contends, people who wish to tune in over-the-air digital signals will be able to do so by buying a set-top tuner/decoder and attach it to any set or monitor that they currently own, or will own in the future.

The National Association of Broadcasters (NAB) has weighed in on the side of the FCC (not surprisingly) with a rebuttal to the CEA's position. According to information that NAB has either developed or discovered, by the time 100 percent of smaller-screen TVs would incorporate DTV tuners, the actual increase in the retail price to incorporate a DTV tuner would be around \$16.00 as a result of the efficiencies of mass production.

One of the more compelling arguments that the NAB puts forth is this, quoted here verbatim:

"Relying solely on cable, as we move into the digital television world runs contrary to the U.S. system of free over-the-air broadcasting. One of the unique aspects of America's system of local broadcasting is that it is free to consumers. Anyone with a set and an antenna can receive the benefits of local news, weather and other programming over-the-air. In the analog world, manufacturers do not build television sets without analog tuners. Similarly, in the digital world, we should not be building sets that are incapable of receiving a digital signal off-air. The U.S. system of free, over-the air broadcasting is the envy of the world and protecting it should be an integral priority to any DTV transition policy".

They also opine that because over-the-air HDTV signals will provide a perfect picture without snow, jitters, ghosts or other distractions (or no signal at all) that more consumers might be interested in receiving their TV signals via an antenna.

What do I think? I'm not sure. I think that there are good arguments on both sides. Difficulties such as this are inevitable when a new, pervasive, technology is introduced. But the plan, as I understand it, is that by 2006 all TV broadcasts in this country will be digital, and I think all concerned should make every effort to meet this goal.

What do you think?

*Conrad Persson*

*An Open Letter to ES&T Subscribers,  
Advertisers and Other Friends*

## Thanks For Your Patience

During the past year or so, we have had real experience learning first hand about many of the difficulties the service industry has been experiencing for the past dozen years.

When we purchased Electronic Servicing & Technology Magazine we expected to subsidize it for a while with our other marketing operations.

Obviously the downturn in the overall market, the aftermath of 9/11 and a few personal difficulties conspired to make life difficult for us and for our subscribers.

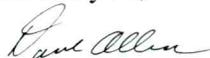
We are now back on track and committed to improve the magazine to meet the needs of today's servicers and be the independent voice of the industry.

We thank the thousands of subscribers who have expressed concern and continue to support the Magazine. And, for those who gave up on us, we look forward to regaining your confidence.

No, it isn't going to be easy, but business isn't easy for the servicers, parts suppliers, warranty firms, distributors or consumer electronics manufacturers either.

However, if we all communicate and work together, we believe we can all thrive.

Thank you,



Dave Allen, Marie Marcellino

Dallen@mainlymarketing.com

MMarcellino@mainlymarketing.com

## **Escient® Convergence Announces FireBall™ and TuneBase® 200 Compatibility**

INDIANAPOLIS, IN — Escient Convergence Corp., a developer of products that combine consumer electronics with the Internet to enhance the home entertainment experience, introduced new software that provides direct compatibility between the company's FireBall and TuneBase 200 music management products, and ELAN Home Systems 6.4 VIA! touchpanels. The software is now shipping on all new FireBall and TuneBase 200 units. Existing installed systems will receive the new upgrade automatically and free of charge, when the Escient product performs its weekly software update.

According to the company, this new integration with ELAN VIA! control systems is the result of an ongoing cooperative agreement between the two companies to develop software components

needed for seamless compatibility. Escient Convergence has consequently created an onscreen selection within its FireBall and TuneBase 200 setup menus, so that these Escient products can be optimally controlled from the smaller, 6.4-inch LCD color touchpanel from ELAN.

The beauty of the combined solution is that literally all it requires to incorporate the Escient interface onto the VIA! panel is one simple selection within the Escient interface, and one click within the ELAN VIA-TOOLS software. Dealers and Customers now have an even more powerful way to control the music they want, from any room in the house, regardless of whether the music is in MP3 or CD format, or coming from an Internet Radio station.

Bob Pankratz, President of Escient Convergence said, "We

are pleased to offer this latest plug and play option for controlling our products using VIA! panels, as it opens up additional integration possibilities for our Dealers and a very compelling music experience for their Clients."

Cat Fowler, Senior Vice President of Marketing for Escient Convergence stated, "FireBall represents a complete music solution for a wide variety of Customers who want fast, easy access to their music, regardless of the format it's in. This latest compatibility with ELAN's panels serves to further underscore the product's inherent ability to evolve to meet this ever-changing home electronics landscape."

Every authorized ELAN Dealer will have access to the VIA-TOOLS from their site, and subsequent versions of VIA-TOOLS will contain the Escient Fireball

and TuneBase 200 interface.

FireBall is a complete music management product that provides powerful, yet simple-to-use, ways to find and play CDs, MP3 collections, and pre-set, style-based Internet radio stations (such as jazz, blues, rock, and more), now also including the Sirius satellite stations. FireBall allows direct access to music stored on the hard drive, CDs, connected, supported mega-disc CD changers, music-recognition services from Gracenote's CDDb™ database, Internet radio stations, and on-going, enhanced entertainment services from sister company OpenGlobe(tm), Inc. FireBall is currently available at a suggested retail price of \$1,999, which includes the new Pipeline software.

Escient Convergence, an Escient Technologies' company, is based in Indianapolis.

## **PCs, Peripherals and Consumer Electronics Getting on the Universal Serial Bus**

SCOTTSDALE, AZ - With Universal Serial Bus (USB) 2.0 succeeding the first generation USB standard, USB saw continued success in 2002, according to In-Stat/MDR. The high-tech market research firm reports that in 2002, PC manufacturers adopted the new standard very quickly; to the extent that all desktop PCs shipped by the end of 2003 will be USB 2.0-enabled. As the standard is adopted by notebook PCs and, eventually, PC peripherals and consumer electronics devices, the total number of USB-enabled devices will increase from approximately 375 million in 2002 to 863 million in 2007, a CAGR of 18.2%.

"With the ability to offer 40 times the speed of USB 1.x, USB 2.0 significantly raises the total amount of bandwidth available in a single host design," says Brian O'Rourke, a Senior Analyst with In-Stat/MDR. "This had been a limiting factor in USB 1.1, and should help to expand the penetration of USB in high bandwidth applications such as external storage."

In-Stat/MDR has also found that:

- PC peripherals that require higher speeds have begun to adopt USB 2.0, including hard disk drives, optical drives, and scanners. Other PC peripheral devices, including printers, hubs, and PC cameras, will also adopt USB 2.0 in time, but do not have the same speed requirements.

- Consumer electronics devices will adopt higher speed USB 2.0 at a slower rate than PC peripherals, but most will eventually adopt the new standard. Many of the devices in this category are not as closely tied to the PC as the peripheral market, and often do not have the same speed requirements. The emergence of less expensive embedded USB 2.0 solutions, as opposed to discrete solutions, will help to drive its adoption in these types of markets.

- Another new USB standard, USB On-The-Go (OTG), made an initial appearance in the market in 2002. Intended to connect portable devices without the need for a PC host, silicon makers are targeting applications such as PDAs and mobile phones.

Contact: Erin McKeighan: 480.609.4551

## **Hitachi Announces Changes to the Servicer Web Site** [www.hitachiserviceusa.com](http://www.hitachiserviceusa.com)

The field service and warranty areas have been completely redone with a new format and layout expected to be easier to use.

One major addition is the ability to apply to become an authorized warranty servicer on line. After entering the Servicer's section, select "Warranty" and on the Warranty and Field Service Welcome page select "Warranty Authorization Application" at the bottom. This will take you to an opening page that will tell you what information you will need to complete the application. From there, follow the instructions.

Since this is still in Beta testing, please send Bill Warren (Hitachi) an email <bill.warren@hhea.hitachi.com> after you have submitted an application for follow up to make sure that it was properly processed so it can be reviewed.

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Circle (2) on Reply Card

## **SageGroup Strategies Opens a Beijing Office to Help China-Related American and Chinese Companies**

Beijing, China and Alameda, CA, USA- SageGroup Strategies announced concurrently in China and the USA that it has opened a SGS Beijing Office to serve troubled and untroubled China-related American and Chinese companies throughout both countries.

SageGroup accepted the invitation of the Beijing International Business Consultant & Service Center to base the SGS Beijing Office at the BIBCS offices in Beijing. (American entities in China typically have more distant, separated, and formal involvements in China.)

This SGS Beijing Office is another result of the agreement previously signed on January 31, 2003 by BIBCS and SageGroup to help American and Chinese companies.

SageGroup Strategies is the largest

Professional Troubled-Company Specialist firm in the United States and the world, with over forty offices nationally plus many international affiliations. Its Beijing Office is the first of several other foreign Offices expected to be opened soon, with special focus on other key cities in China and elsewhere in Asia.

BIBCS is an important, well-established, well-connected China entity. Under the Chinese governmental structure, BIBCS is an important part of a system that reaches into every part of China and is very important and influential throughout the country. BIBCS itself is directly part of the Beijing Science & Technology Committee, which in turn is directly part of the Science & Technology Committee of China. The Chinese Ministry of Science & Technology is very, very important in China.

## **Rex Stores Corporation Signs Marketing Agreement With Warrantech**

EULESS, Texas - Warrantech Corporation, administrator of service contracts and extended warranties for automobiles, recreational vehicles, home appliances, consumer electronics, televisions, computers, home office equipment and other consumer products, has announced that a marketing agreement has been reached with specialty electronics and appliance retailer REX Stores Corporation of Dayton, Ohio.

Rex currently has a network of 255 stores in 37 states.

The eighteen-month agreement calls for Warrantech to assume control of REX's after market program targeting direct sales to consumers and customer renewals. Beginning last November, Warrantech Direct will use direct mail and telemarketing campaigns to contact REX customers to offer service contract, product replacement and renewal coverage on consumer electronics and appliance purchases.

"Warrantech is proud of our ability to help clients identify and maximize their revenue sources. As a recognized leader in consumer warranty merchandizing, we are proud of our ability to close and renew service contracts and replacement warranties following the purchase," said Joel San Antonio, chairman and chief executive officer of Warrantech. "In many cases, warranty and service contract sales are lost once the customer leaves the store. However, Warrantech's marketing expertise gives clients like REX Stores the ability to take advantage of new marketing opportunities that provide a new and reliable revenue stream, while providing a higher level of customer service."

## **Pinnacle Systems Acquires Steinberg Media**

PCLE has entered into a definitive agreement to acquire all of the stock of Steinberg Media Technologies AG based in Hamburg, Germany. Steinberg specializes in digital audio software solutions for consumers and professionals. Pinnacle Systems will acquire all products, software, and intellectual property rights, along with all other assets and liabilities of the company.

J. Kim Fennell, President and CEO at Pinnacle Systems said, "We are delighted to welcome Steinberg's customers and employees into the Pinnacle family. Steinberg is a recognized industry leader in digital audio and this transaction significantly broadens Pinnacle's digital media offerings. By adding the talent and technology of Steinberg to our company, we believe we can bring our customers an even stronger solutions portfolio."

"Steinberg is pleased to be joining forces with Pinnacle Systems. Our customers and products will benefit greatly from the combined resources of the two companies and we look forward to bringing audio production expertise to the award-winning Pinnacle Systems' prod-

uct lines," said Manfred Rürup, President of Steinberg Media Technologies AG.

Steinberg Media Technologies AG is known for its professional audio software. The company has been developing, manufacturing and selling software products for professional musicians and producers in the music, video and film industry since 1984. Steinberg products are also in the fast-growing consumer market with music creation and other multimedia applications. Steinberg is one of the world's largest audio software houses.

Pinnacle Systems provides broadcasters and consumers with digital media creation, storage, and play-back solutions for use at Home, in the Studio and on the Air. Pinnacle Systems' digital media solutions are in use around the world for broadcast, cable and satellite television, video editing, DVD and CDR authoring, and the Internet. The company has received eight Emmy Awards for its technical innovations and carries this commitment throughout all of its product lines. Pinnacle Systems may be reached at (650) 526-1600 or at [www.pinnaclesys.com](http://www.pinnaclesys.com).

## **OBITUARY**

Gene Femiano General Manager from Panasonic "One of Our Own" passed away on Thursday, October 19, 2002

Gene was a kind person who supported the efforts of the ETF committee and the needs of the Industry. He will be missed.

The funeral service was held in NY.

## New Developments Increase Need For Servicers at Warrantech

Recently a major buying group contracted with Warrantech to provide Extended Warranty Plans to their retailers. Under terms of the agreement, MARTA Cooperative of America (MARTA) has designated Warrantech as the only "endorsed" provider of extended service contracts for its more than 100 active owner-members.

Marta represents more than 100 retailers with more than 450 storefronts across the U.S., and total annual sales of more than \$2 Billion.

According to a Jim Rolinson, Senior VP-Service, "Improvements made over the past 14 months played an important role in our ability to add MARTA to our growing roster of Warrantech partners, among them;

\* Improved Claims processing resulting in fewer rejections and faster payments. In

most cases, payments are processed in less than 21 days.

\* WCPS Online. Now you can submit claims on line one at a time or by the batch, resulting in even speedier processing. You can also generate claims reports and make corrections online.

\* Parts invoices are no longer required  
\* Increased pre-authorizations for our Contracted Servicers

\* Added a provision for Diagnostic Fee and Trip Charge

\* Established a priority phone extension directly to the Service department

\* Established a priority phone extension for your In Home Techs to get quick authorizations.

\* Estimates are handled in less than 24 hours. Estimates can be submitted by Email, Fax or Phone."

Warrantech is seeking new servicers to support the increased repair demand expected to be generated by current and future retailers.

If you are an authorized repair facility for any Appliance or Consumer Electronics manufacturer, please respond. If you are not authorized for a manufacturer, but are a member of NESDA, USA or PSA, please respond. Request a Warrantech Info Pack to <<http://www.wcpsonline.com>>. Click on the "Service Centers" box in the upper right corner, and then click on "To request more information, click here". If you prefer, you can email a request to [servicenet@warrantech.com](mailto:servicenet@warrantech.com) <<mailto:servicenet@warrantech.com>>, or fax the request to 817-785-6713.

## New Day Has Dawned For DTV Sets

SCOTTSDALE, Ariz.- In 2002, several factors gave new impetus to the digital TV (DTV) set market, according to In-Stat/MDR. The high-tech market research firm reports that with the FCC mandating that DTV tuners be integrated into all TV sets larger than 13-inches by mid 2007, in the U.S., the market will see explosive growth. While the DTV set market in the U.S. has historically experienced triple digit growth, the market heretofore, has been composed primarily of DTV monitors, which did not have integrated DTV tuners.

"Though digital TV sets began shipping in 1998 in the U.S., 2002 events will cause significant shifts in the future of the market," says Michelle Abraham, a Senior Analyst with In-Stat/MDR. "The FCC mandate in the U.S. will result in more shipments of DTV sets with integrated tuners and end the life of the DTV monitor category. In addition, the launch of Freeview in the UK (quintupling the number of terrestrial TV channels available free to air)

breathes new life into DTT." Other European countries are expected to go live with digital terrestrial TV in 2003, joining the UK, Finland, Germany, Spain, and Sweden. Digital terrestrial broadcasting will begin in Japan by the end of 2003, joining the current digital broadcast satellite transmissions, encouraging more Japanese consumers to buy digital rather than analog sets. DTV sets have also proven to be a popular item in South Korea and are growing in China.

The report, "Digital TV Sets: A New Day Has Dawned" (#IN030571ME), offers forecasts for DTV set unit shipments, ASPs and revenues for North America, Europe, Japan, and Asia. It also includes a discussion of display technologies, DTV tuner technologies, DTV set connections to other devices, and a DTV tuner bill of materials. For more information, please contact Erin McKeighan; [emckeighan@reedbusiness.com](mailto:emckeighan@reedbusiness.com) at 480.609.4551. The report price is \$2,495 U.S. Dollars.

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# DISTRIBUTED AUDIO/SOUND INSTALLATION AND MAINTENANCE

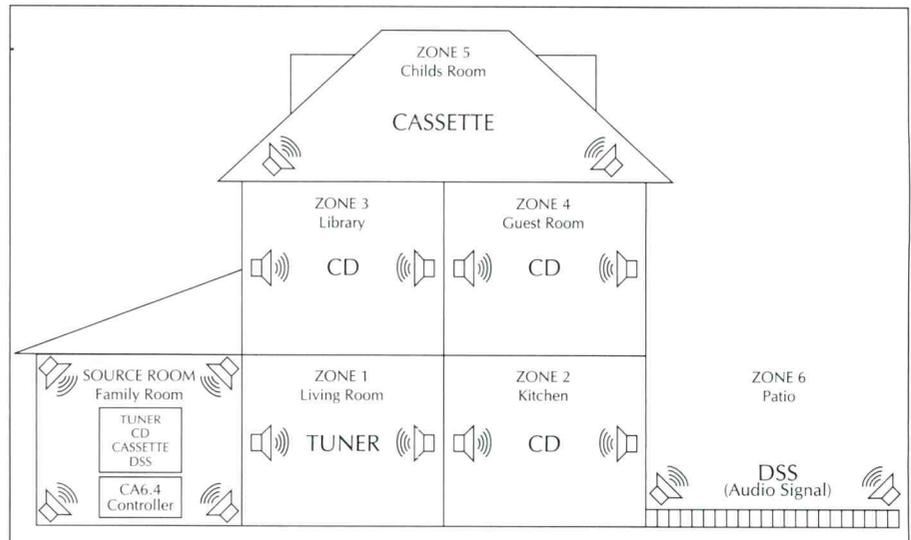
People have grown accustomed to taking their entertainment wherever they go. Today we have car stereo systems (not to mention DVD and VCRs in cars), walkman audiotape and CD systems, MP3 players and more. People don't want to be tied to the living room or the family room to listen to high-fidelity stereo music: they want to be able to listen while preparing meals, eating meals, working in the laundry or workshop, or lounging in the bedroom.

One way to achieve this goal of music anywhere is to have a sound system in every room, or a portable sound system that can be moved from room to room. The problem with the former is that if the homeowner wishes to listen to music from, say, a CD while moving from room to room that really isn't practical. And a sound system that is truly portable isn't likely to have the desired fidelity.

The key to fulfilling this desire is to install a sound distribution system in the home. With such a system every room that is connected to the central entertainment system can access whatever is playing on the radio broadcast receiver, the audiotape player or the CD player. Or, if none of those units is in use, but has program material in it, the occupant of any connected room can turn the unit on and adjust the volume in that room. Moreover, if someone else in another connected room is listening to program material from one of those sources, the occupant of any other connected room can access that program material, or any of the other, currently idle, signal sources.

## Planning a distributed audio system

As with any other product or system, a whole-house audio system represents a number of tradeoffs. In most cases such as this, the tradeoffs are performance and flexibility for money. It is important at the outset for the company that will be installing a whole-house audio system to determine what the homeowner wants the



## POSSIBLE SYSTEM CONFIGURATIONS

system to do, and how much he is willing to pay to have that system installed, and to get all understandings in writing. Few things are worse than for the installing company to demonstrate the new system to the homeowner and to have him ask why it won't perform a function he thought it would be able to do.

Let's look at the most basic of whole-house audio systems (and please keep in mind that we're not recommending this approach). Let's say that the homeowner already has a good single-room audio system. If the amplifier has sufficient output current, it would be possible to turn it into a simple whole-house system by running some speaker wire (if it's going through the walls make sure that the wire you use meets whatever building codes are in existence in that state and municipality) to the rooms where it's desired to have sound. By carefully calculating impedances, it's possible to set up a series/parallel combination of speakers so that the impedance of the combination matches the impedance of the amplifier's outputs.

Then in each room you set up the speakers on a volume control pad so that the volume can be controlled from that location.

This is not the most flexible system in

the world, but it is relatively inexpensive. Among other things, of course, the audio system can't be controlled from any of the remote areas, so in order to select a radio signal, or a CD or audiotape the person operating the system has to go to the entertainment room to turn on the system, choose a source, select or insert program material and turn it on. When he or she no longer wishes to listen to the program, he/she must go back to the entertainment room and turn everything off.

Moreover, none of the occupants of the other rooms have any control of the program material. Thus if dad is listening to some Beethoven, little Janie and young Biff have to listen to that too, or simply turn down the control on their volume pads. If this is the type of system your client suggests he wants, you might want to point out the advantages of some of the more flexible systems.

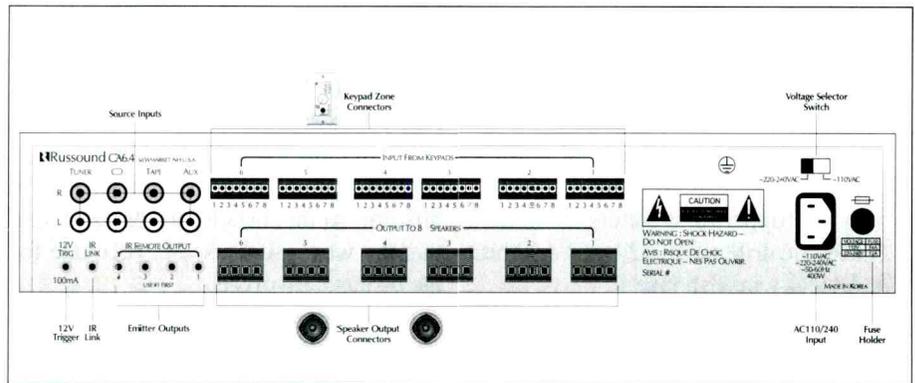
## An example of a more flexible system

Today, a number of manufacturers offer systems that offer people who want flexibility and convenience in a whole-house audio system, and don't mind paying for it: systems that allow them, their family

members and guests a way to select a signal source, turn it on and off, adjust volume (and in some systems even bass and treble) from any room that is part of the system. The systems we'll be talking about in this article consist of some products that are available from Russound. That company was kind enough to give us permission to publish portions of some of their installation and operation manuals as examples of high-quality, flexible, sophisticated whole-house audio (and video) systems.

Obviously, different manufacturers will have different types of products, and different sets of instructions. This particular information is presented here simply as an example of the type of effort that might be involved in installing a whole house distributed sound system, so service centers that might be thinking about getting into this type of work can get a better idea of whether or not they want to tackle it.

Take a look at Figure 1. This home boasts an audio distribution system that has six separate zones in which the source of audio, and the audio volume can be selected and controlled individually. In the "source room," the family room, up to four sources can be connected to the system: a radio tuner, a CD player, a cassette player and a digital satellite system (DSS). The heart of the system in this case is a CA6.4 Controller made by Russound.



**Figure 1** Your source inputs are located at the top left corner of the back panel. Connect each source output, left and right, using quality signal cables/patch cables. Label each cable the name of your source and the input number of the CA6.4 you have selected. Repeat until all sources are connected. List them down below.

In this home, several different people are listening to different program sources at whatever sound level they prefer. For example, Dad is in the living room listening to classical music from the local classical music FM station. Mom is in the kitchen getting dinner ready and listening to some easy listening from the CD player. The guests are listening to their preferred programs: Aunt Betty is in the guest room getting ready for dinner, and Uncle Harry is in the library reading a magazine. They're both listening to the same easy listening CD that Mom is listening to. Sally, the young daughter, is listening to a cassette of Britny Spears. Their son Biff is out on the patio enjoying the fresh air and listening to the audio of the baseball game. All those signals are orig-

inating in the family room and being distributed to the speakers installed in the walls of various rooms via wiring in the walls.

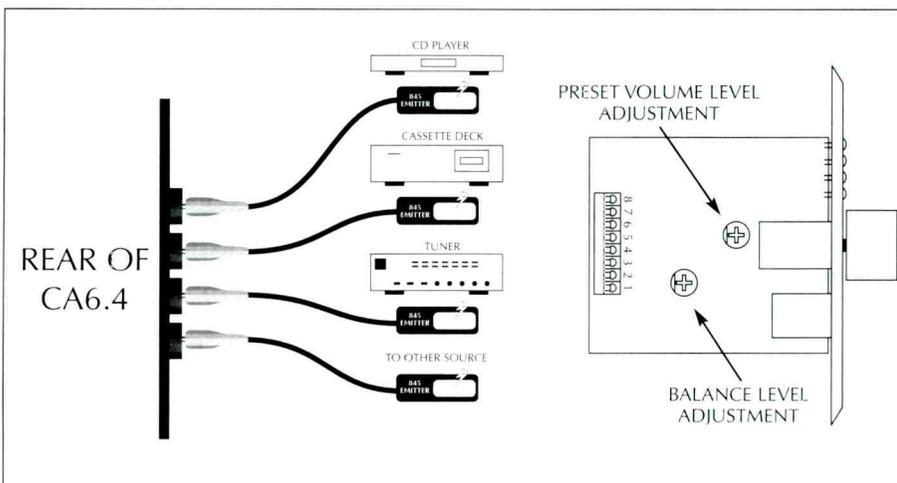
This system is based on the Russound CA6.4 multi-room controller. This six-zone, four source, multi-room controller is an integrated amplifier. The controller in the unit is the heart of the system. Six stereo power amplifiers are built into it allowing simple connections to each speaker in the system. Each zone is operated by an intuitive easy-to-use keypad. The keypad controls all the functions of the controller. Keypads have a built-in infra-red receiver used to repeat the source equipment remote functions back through the controller.

## Getting Started

The manufacturer of these audio distribution products recommends the following tools and materials as necessary for a complete installation of the system:

- 4 twisted pair communication wire (commonly referred to as CAT 5). This wire will be used to connect the keypads in each zone to the controller. Use 16 gauge, minimum, 2 conductor CL3 rated wire. This wire is used for direct connection between the controller and the speakers.

NOTE: CAT5 should not be run more than 100 feet. CAT5 should also not be used if the keypads to be installed in the room are the learning keypads offered by the manufacturer: CA6.4.LRN. For runs more than 100 feet or when using



**Figure 2** Connecting the IR Link- When two CA6.4 Controllers are to be used in an installation, the IR Link connection is used to pass IR signal between the two units. Use a 1/8", mono, phone plug, male to male cable connected from the IR Link on the first CA6.4 Controller to the IR Link on the second CA6.4. When connected, you may connect your IR emitters to either unit's IR Remote Output jacks.

optional CA6.4 LRN use 8-conductor 20AWG wire, shielded.

- A small jewelers flat-head screw-driver.
- A medium sized flat-head screw-driver.
- Wire strippers and cutters.
- Electric drill and a 1/2" x 6 "drill bit.
- A steel-wire fish tape.

Additional tools required to complete installation:

- A keyhole saw.
- Electrical junction boxes (6).
- A stud finder.
- A screwdriver (cordless recommended)
- Miscellaneous hand tools, nails and screws.
- Cable staples.

### Basic planning and layout considerations

Before drilling or cutting any holes, or pulling any wire, a number of basic questions need to be answered, and preferably, a set of layout drawings be prepared, so that the homeowner can provide formal approval of the location of all elements of the system. The following facts need to be determined in advance:

- Where will the speakers be located ?
- How will the wiring be routed to each location ?
- Where will the keypads be located ?
- Where is the signal source equipment located ?
- Where is the controller/amplifier going to be located ?

### Connection tips

- Disconnect all power cords before connecting to the controller/amplifier.
- Verify that all connections and polarity are correct.
- Keep all power cords away from all signal cables to prevent noise or hum.
- Choose reliable signal cables / patch cords.
- Label all wires with room location at both ends of the wire.
- Take your time. Don't panic about the number of wires; simply connect one at a time.

### Speaker wire length/gauge

For the average single room stereo

installation, standard lamp cord wire works pretty well for getting the audio signal from the amplifier to the speakers. However, when the speakers may be 50ft, 100ft, or more from the amplifier, the signal loss over small gauge wire will be significant, so the installer needs to be sure that the wire gauge used is adequate for the distance involved.

Moreover, we've mentioned this earlier, but it bears repeating, standard lamp cord is not appropriate for running in the walls of the home. National, state and local wiring and building codes apply. Make sure that you're familiar with the requirements of those codes before pulling any wires through the walls of the building.

Russound recommends the following gauges of wire for the respective distances between the amplifier and the speakers:

10 to 50 feet .....	18 AWG
50 to 100 feet .....	16 AWG
100 to 150 feet .....	14 AWG
Over 150 feet.....	12 AWG

### Back panel connections

The back panel of the controller/amplifier, Figure 2, provides connection points for each of the signal sources, for each of the speaker outputs, for inputs from each of the keypads, and for infrared control of the system. Source inputs are located at the top left corner of the back panel. Connect the audio outputs of each source output, left and right, using quality signal cables / patch cables. Label each cable with the name of the source and the input number of the controller amplifier. Repeat until all sources are connected. It's a good idea to list them for easy future reference. In fact, the manufacturer provides spaces to list the units for each input in the installation manual.

### Speaker connections

Each set of speaker outputs has a corresponding keypad input on the back of the controller/amplifier. Keeping in mind the location of the corresponding keypad, connect speakers by first removing the connector.

Using wire strippers, strip back 1/8" of

the end of the wire. Insert the proper polarity, left + to left +, left- to left- etc., until all wires are connected in each zone output. Label each wire with the room name and zone number. Write

down the room name to the zone number. Note: With this particular system, connect 8 ohm minimum speakers only.

### Trigger output

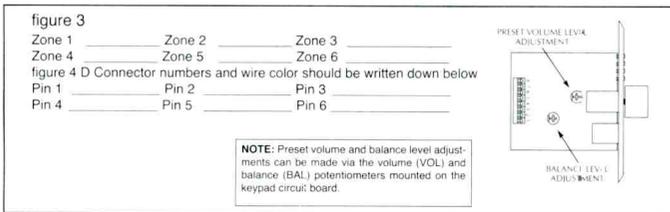
The 12V trigger is engaged when any of the zones are on. The trigger can be used to engage any 12V triggered accessory, such as a triggered ac outlet or audio amplifier. The connection for the trigger is made by an 1/8" phono jack. The tip is (+) and sleeve is (-).

### Connecting the infrared components

- In order for the system to transmit the IR signal from the keypads to a source, an emitter must be connected from the IR outputs marked 1-4. These outputs are wired in series and must be connected in consecutive order. For example, the #1 emitter output must be connected in order for the #2 emitter output to transmit the IR command.
- Connect each mini-emitter to the source IR output. Refer to the source number you had written down.
- Remove the adhesive back and locate the IR receiver on the product you wish to control. Stick the 845 emitter directly over the source component's IR window (Figure 3). The controller/amplifier will direct the IR command to the source component you wish to control.
- Repeat connections until all emitters match the selected sources.

### Connecting the IR Link

It's possible to use two of these controller/amplifiers in an installation. In such a system, the IR Link connection is used to pass IR signal between the two units. Use a 1/8", mono, phone plug, male to male cable connected from the IR Link on the first unit to the IR Link on the second unit. When connected, you may connect the IR emitters to either unit's IR



**Figure 3:** Each keypad connection on the back panel corresponds to the room/zone number chosen for your speakers. Each zone operates independently, so it is very important to connect the keypad to the correct zone keypad input. Remove the connector and strip 1/8" off each end of the wire insulation. Connect each wire 1 thru 8 using a small jewelers screwdriver. At this point it is not important what color wires connect where, however, take note of the color of each wire and number indicated on the connector when connected to the back panel. Write down the room name to the zone number on the next page. Note: the keypad and the speakers in each room must be hooked to the same zone number. See figures 2 and 3

Remote Output jacks.

### Keypad connections

- Each keypad connection on the back panel corresponds to the room/zone number chosen for the speakers. Each zone operates independently, so it is very important to connect the keypad to the correct zone keypad input. Remove the connector and strip 1/8" off each end of the wire insulation. Connect each wire 1 through 8 using a small jeweler's screwdriver. At this point it is not important what color wires connect where, however, take note of the color of each wire and number indicated on the connector when connected to the back panel.

- Write down the room name to the zone number. Note: the keypad and the speakers in each room must be hooked to the same zone number.

NOTE: Preset volume and balance level adjustments can be made via the volume (VOL) and balance (BAL) potentiometers mounted on the keypad's circuit board (Figure 4).

### Installing the KP Keypads

- The best performance is achieved with the keypad away from any direct sunlight. Also consider convenience when choosing a location.
- Choose a place that is easily seen from the position where a person is most likely to be located.
- Check whether or not you can route the wire to the location you have chosen.
- Purchase retro-fit plastic junction boxes (min. 20 cubic inches) and cut in the boxes using a key-hole saw or sheetrock knife/hand saw.
- Route the wire to the junction box from the controller/amplifier location.
- Strip the insulation back 1/8" from each twisted wire. Connect each wire to the correct position 1 thru 8.
- Mount the keypad in the junction box and attach the Decora plate.
- The keypad has source labels for your convenience. Place the label on the keypad keeping the input number in sequence with the source selected.

- Repeat the above steps until all keypads are installed.

### Speaker installation

- If you are installing in-wall speakers, follow the instructions provided with your speakers for mounting.
- Connect each speaker wire to the correct polarity (+,-).
- Power up by plugging in all power cords and turning the controller/amplifier and sources on.

### Operation

- Power switch - When the power switch is engaged, the CA6.4 power indicator will be lit an amber color. The CA6.4 should be left on at all times. The unit will consume very little power unless the zones are on and active. The unit has a standby mode when the zones are inactive.
- The zone indicator will light either red for off or green for on. The zones can only be turned on from the keypads. All functions are accessed through the keypad only.

### Operating the keypad

- Power ON / OFF - This knob on the CA6.4 keypad controls all functions except for the IR management. To turn the unit on, simply turn the control knob clockwise. You will feel and hear a click verifying that the unit has been activated. The lights on the keypad will also illuminate to verify the zone is now on. Note - The CA6.4 front panel zone-management lights also informs you which zone is On or Off.
- Volume UP / DOWN - Once the unit is on, the knob can be used to adjust the volume. To adjust the volume up, turn the knob clockwise, and to turn the volume down, turn counter-clockwise.
- Source Selection - By pressing the knob, the zone will scroll through the four sources connected to the CA6.4. The keypad has four lights (LED's) that indicate the source selected.
- IR Source Control - The IR window repeats all source commands from the source component's remote through the CA6.4 and 845 emitters. Most IR receivers have a range of 20' at an angle of 60 to 65 degrees.

### Making the decision

Expanding from servicing TVs, VCRs, etc. into installing something like a distributed audio system is a big leap. Pulling wires and cutting into sheetrock present a whole different set of problems than taking off the back off of set and tracking down a malfunction. However, there are some serious profits to be made in this type of work.

Some service centers have already made the leap and couldn't be happier, while others are doing quite well sticking with service, and wouldn't even consider installation work such as this. It's definitely an individual decision to be made on the basis of the service center's current condition and future plans.

We hope that this article will help any service centers that might be currently sitting on the fence.

# ACCESSING THE INTERNET

By John A. Ross

Thousands of computer networks located across the world make up the Internet. Although no single entity governs the Internet, organizations exist for setting Internet standards. In addition, manufacturers work together to develop the technologies for improved Internet access. Beneath the networks, access protocols establish the parameters needed for the search and retrieval of information by users. As a result, an Internet user has access to a wide variety of services such as electronic mail, file transfer, information resources, group memberships, interactive collaboration, multimedia displays, real-time broadcasting, shopping opportunities, and news.

## Internet protocols

While all computers on the Internet communicate through the use of the Transmission Control Protocol/Internet Protocol suite (TCP/IP) other protocols also allow communication between computers for the completion of different tasks. The protocols include the:

- **Simple Mail Transport Protocol (SMTP)** used for distributing electronic messages and files to one or more electronic mailboxes,
- **Telnet** used for allowing the logging in to a computer host and the execution of commands,
- **File Transfer Protocol (FTP)** used for transfers text or binary files between an FTP server and client,
- **Network News Transfer Protocol (NNTP)** used for distributing Usenet news articles derived from topical discussions on newsgroups,
- **HyperText Transfer Protocol (HTTP)** used for the transmission of hypertext over networks. HTTP provides the basis for the World Wide-Web.
- **Voice over Internet Protocol**, or VoIP, allows users to place a telephone call over the Web.

## World wide-web

The World Wide Web consists of a system of Internet servers that utilize hypertext to establish a single interface for accessing protocols on a single interface. From the user perspective, the use of hypertext creates a convenient and easily accessible environment. In contrast to the earliest Internet access, users have no need for command-level instructions.

HyperText documents contain user-selected words, or links, that connect to other documents and allow the retrieval of information. A single hypertext document can contain links to many documents. Within the World Wide-Web, words or graphics may serve as links to other documents, images, video, and sound. However, the links may or may not follow a logical path because each connection relies on the programming techniques used by the creator of the source document. Overall, the World Wide-Web contains a complex virtual network of connections between an increasing number of documents, graphics, videos, and sounds.

The World Wide Web consists of files called pages that con-

tain information and links to resources throughout the Internet. In some instances, user activity will create a Web page. For example, the entering of words for a topic search at a search engine will cause the creation of a page that lists the results of the search. The Web pages occur because of the capability of database servers to create temporary Web pages (on the fly) as a response to a user query.

Users may access Web pages by:

- Entering an Internet address and retrieving a page directly
- Browsing through pages and selecting links to move from one page to another
- Searching through subject directories linked to organized collections of Web pages
- Entering a search statement at a search engine to retrieve pages on the topic of choice

## Retrieving documents on the web

A Uniform Resource Locator, or URL, specifies the Internet address of a file stored on a host computer that connects to the Internet. Regardless of the access protocol used by the network server, every file on the Internet has a unique Uniform Resource Locator that points to the host computer and folder. As the search process takes place, the textual URL translates back to a numeric address that utilizes the Internet Domain Name System. Software programs process the request for a specific file or page and use the URL to retrieve the file. From there, the file displays at the requesting computer.

## Anatomy of a URL

A Uniform Resource Locator has a standard format: protocol://host/path/filename.

For example, a URL pointing to the home page of the House Committee on Agriculture of the U.S. House of Representatives appears as: <http://www.house.gov/agriculture/schedule.htm>. This Uniform Resource Locator breaks down into the structure shown in Figure 1.

Table 1 lists top-level domain names that have become common in the United States. Table 2 lists new top-level domain names approved in November 2000 by the Internet Corporation for Assigned Names and Numbers.

In addition, the Internet Corporation for Assigned Names and Numbers has assigned dozens of domain names to identify and locate files stored on host computers in countries around the world. In turn the International Standards Organization as standardized the two-letter Internet country codes as ISO 3166. Table 3 provides a listing of several of the two-letter Internet country codes.

## Web browsers

The use of a software program called a Web browser allows users to access services provided through the World Wide-Web and to navigate through those services. Users may gain this access through either graphical or textual software programs called browsers. A graphical browser, such as Netscape Navigator or Internet Explorer, supports the retrieval and display of text, image, audio, and video

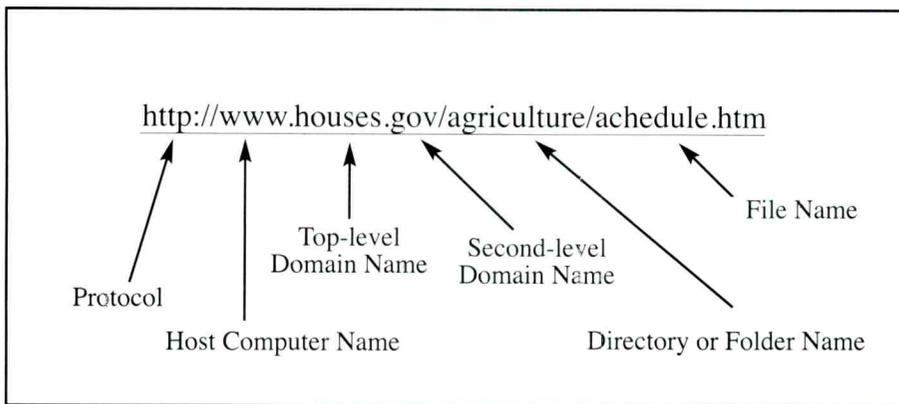


Figure 1

files. With navigation accomplished through the pointing and clicking of a mouse, the browsers operate on both Windows-based and Macintosh computers. A textual browser—such as Lynx— provides access to the Web in text-only mode. Navigation occurs through the highlighting of emphasized words on the screen with the arrow up and down keys. Use of the forward arrow or Enter key allows the system to follow the link.

### Extending the Browser: Plug-Ins

Users can configure additional software programs, called plug-ins, to enhance the capabilities of a Web browser. When the browser encounters a sound, image or video file, it hands off the data to the plug-ins to run or display the file. Working in conjunction with plug-ins, browsers can offer a seamless multimedia experience.

File formats requiring plug-ins use the Multimedia Internet Mail Extension, (MIME). Originally developed to help e-mail software handle a variety of binary file attachments, the use of MIME has expanded to the Web. A browser handles the basic text/html MIME type and associates the MIME with the .html file extension.

Web browsers include a small suite of plug-ins especially tailored for playing multimedia content. Users may acquire additional plug-ins through the Web site indicated at the browser; at special download sites on the Web; or from the Web sites of the companies that created the programs. Once a plug-in configures to your browser, it will automatically launch when a request occurs for a specific file type.

Adobe Acrobat Reader is an example of a common plug-in utilized on the Web. Acrobat Reader allows the viewing of documents created in Adobe's Portable Document Format. The documents use the MIME type application/pdf and associate with the file extension .pdf. When the Acrobat Reader configures to the browser, the program will open and display the file requested with the click of the mouse key on a hyperlinked file name with the suffix .pdf. The latest versions of the Acrobat Reader allow for the viewing of documents within the browser window.

### Active X

Developed by Microsoft, ActiveX may make plug-ins less necessary. ActiveX embeds animated objects, data, and computer code within Web pages. As an example of the ActiveX operation, users of this software are able to view three-dimensional VRML worlds in a Web browser without the use of a VRML plug-in. In addition, ActiveX allows the viewing and editing of PowerPoint presentations directly within the Web browser. ActiveX works best with Microsoft's Internet Explorer browser.

### Multimedia and the web

The World Wide-Web has become a broadcast medium. As events unfold, an individual can access pre-recorded and live audio and video broadcasts from sources such as CNN, Reuters, and the BBC. Several plug-ins, such as QuickTime Player, allow the viewing of these broadcasts.

### Streaming media

The use of streaming media answers the problem of slow download times. With streaming media, audio or video files play during the downloading, or streaming, into the computer. Only the buffering of the files may cause a slight delay. As an example, the use of the RealPlayer or the Windows Media Player plug-ins allow the viewing of larger files such as interviews, speeches and hearings or the viewing of real-time events such as press conferences, concerts, or breaking news. Many sites offer the option to use one player or the other.

Another multimedia experience becomes available through the application of Shockwave. In brief, Shockwave allows for the creation and implementation of an entire multimedia display that combines graphics, animation and sound. As with QuickTime, RealPlayer, and Windows Media Player, the user has the option to download the appropriate Shockwave plug-in for the viewing of Shockwave-enabled Web pages.

### Languages of the web

Programming languages such as Java, JavaScript and Visual Basic continue to extend the capabilities of the Web. In addition, database servers can provide information dynamically through the Internet.

- **HyperText Markup Language**

The production of hypertext for the Web occurs through the creation of documents with the HyperText Markup Language. HTML places tags within the text for the purpose of formatting in terms of visual features such as fonts, the integration of graphics, and the creation of hypertext links. As HTML changes, the addition of new types of tags continues to upgrade the language.

- **Common Gateway Interface**

Common Gateway Interface, or CGI, refers to a specification by which programs can communicate with a Web server. A CGI program, or script, accepts and returns data that conforms to the CGI specification. Programmers can use any programming language—including C, Perl, and Visual Basic Script—to write a CGI script. A common application for a CGI script

processes an interactive form on a Web page. The script processes the information and sends it to a designated e-mail address.

• **Active Server**

Developed by Microsoft, Active Server Pages utilize HTML and include scripting and create interactive Web server applications. The scripts run on the server, rather than on the Web browser, to generate the HTML pages sent to Web browsers. Active Server Page files end with the file extension .asp.

• **Java/Java Applets**

Seen as one of the most common Web programming languages, Java relies on object-oriented programming language and offers platform-independent usage. Web-based Java applications usually take the form of Java applets and operate as small Java programs called from an HTML page. The applets can download from a Web server and run on a Java-compatible Web browser. Java applets include live newsfeeds, moving images with sound, calculators, charts and spreadsheets, and interactive visual displays.

• **JavaScript**

JavaScript programs embed within an HTML page or can be called externally from the page to enhance the functionality of the page. Examples of JavaScript applications include moving tickers, drop-down menus, real-time calendars and clocks, and mouse-over interactions. Similar to JavaScript and developed by Microsoft, JScript operates with the Internet Explorer browser.

• **Virtual Reality Modeling Language**

Virtual Reality Modeling Language, or VRML, allows the creation of three-dimensional worlds that can link to Web pages and display through a VRML viewer. VRML provides the option to "enter" the world and control movements within the world.

• **XML**

The eXtensible Markup Language, or XML, offers a Web page creation language that allows designers to create their own customized tags. As a result, XML provides functionality not available through HTML. Because XML relies on

Table 1

<u>Top-level Domain Name</u>	<u>Entity Represented by the Top-level Domain Name</u>
com	commercial enterprises
edu	educational institution
gov	U.S. government entity
mil	U.S. military entity
net	network access provider
org	usually nonprofit organizations

data structure and exchange, it allows developers to separate form from content.

**Real-time communication**

Text, audio and video communication can occur in real time on the Web. With this capability, individuals or groups can conference and collaborate in real time. In its most basic form, real-time communication occurs through chat programs that allow

images on a shared window or board

- document/application sharing: view and use a program on a different machine
- collaborative Web browsing: visit Web pages as a team.

**Push technology**

In contrast to Pull technology, Push refers to a technology that sends data to a

Table 2

<u>Top-level Domain Name</u>	<u>Entity Represented by the Top-level Domain Name</u>
biz	business
info	museum
pro	professionals
name	individuals
aero	aerospace industry
coop	cooperatives

multiple users to type to each other in real time. Internet Relay Chat and the America Online Instant Messenger serve as prime examples of this type of program. With the development of messaging protocols, the capabilities of real-time chat will expand.

Enhanced real-time communication also offers an audio and/or video component. Software programs such as CU-See Me, Microsoft NetMeeting, and Netscape Conference allow true real-time collaboration that may include:

- audio: conduct a telephone conversation on the Web
- video: view an audience
- file transfer: send files back and forth among participants
- chat: type in real time
- whiteboard: draw, mark up, and save

program without a request from the program. The typical Pull technology occurs when a user clicks on a link to request a file from a server. With push, a server automatically sends the data content through a "channel." As an example, Push technology can deliver software upgrades to a desktop machine.

Table 3

Two-letter	Country
ch	Switzerland
de	Germany
jp	Japan
uk	United Kingdom

# HIGH DEFINITION TELEVISION

*This article is based, with permission, on the 1999 Hitachi HDTV Training document for the 61HDX98B and 60SDX88B, prepared by Alvie Rodgers, CET.*

High definition television has definitely arrived. Oh, there's no question it has a long way to go before it's universally available and the sets are priced reasonably enough so it's available for most people, but manufacturers are churning out sets, and the TV broadcast industry and cable and satellite programming are offering some HDTV content. If you're a service center and you haven't seen an HDTV for service yet, you probably will in the next few years. This article, based on the above mentioned two Hitachi sets, is not intended to be a comprehensive or exhaustive treatise on HDTV, but merely an introduction to help servicers be more comfortable about the ongoing HDTV evolution.

## The ATSC signal

Actually, that's probably a misleading heading, since we're actually not going to go into an explanation of the ATSC (Advanced Television System Committee) signal, but talk about why servicer's really don't have to be terribly concerned about that signal. And it's a good thing that servicers don't have to be concerned with it, since it's an incredibly complicated concept.

As most of you have no doubt read, the digital (ATSC) television signal is sent in a series of packets, not unlike data transmission via the internet. The scheme for keeping track of those packets so that the audio and video information as sent by the transmitter and received by the receiving TV set are synchronized, is complex and not easy to understand. Moreover, the data compression scheme for picture and voice is best left to the data communications experts.

However, the good news is that servicing technicians don't really need to have a detailed understanding of digital TV transmission. Oh, it wouldn't hurt to have a smattering of knowledge of the system, however a technician will be able to service HDTV sets with no knowledge of that end of things.

The "front end" (in this set the DM-1 module) receives the incoming HDTV signal (it also receives the NTSC signal, cable signal, and satellite signal, but we'll confine our

remarks to the HDTV signal) and does its magic on it. The output of the front end is analog audio and video that is processed by relatively ordinary TV circuits. At this point, and probably forever, these front end units are considered not field serviceable, so technicians will only have to concern themselves with signals, circuits and components with which they are, for the most part, familiar: CRTs and other display devices; power supply circuits, deflection circuits, video processing circuits, audio processing circuits, and so forth.

## The power supply

Figure 1 is a block diagram of the power supplies for these sets. The 61HDX98B utilizes two switching power supplies. Normally Power Supply switching is operated as following.

T901: 25- 56 kHz (Normal)

100-200 kHz (Stand by)

TP91 30- 53 kHz (normal)

Power supply for the digital and signal circuits: (Sub Power Supply PWB) This supplies power primarily to the digital circuits, i.e. DM-1 module. This supply runs anytime the set is plugged into an ac outlet.

The voltages produced are:

- +33V,
- Power for the Satellite dish which is switched between 13V and 19V depending on the channel being received.
- Stand By 12V also called A12V
- TV9V
- TV5V
- 3.3V
- -5V

Power supply for the deflection, audio and digital convergence circuits: (deflection PWB)

This supply only operates when the set is turned ON. When the ON command is received from the DM-1 module, relay S-901 energizes and delivers ac to the main bridge rectifier D903 located on the Sub Power Supply PWB. This supplies power primarily to the Deflection circuit for the collector of the High Voltage generation circuit and the collector of the Deflection Output transistor. Also, the Convergence output amps and the Audio output amps derive their voltages from here as well.

The voltages produced are:

- +130V used for Deflection and High Voltage circuits.

• 220V used for the collectors of the R, G, B drivers on the CRT PWB and the Velocity Modulation circuits.

- 6.3V to drive the CRT Heaters.
- +28V for the Convergence, Velocity modulation and Audio Out circuit.
- +13V for Vertical.
- -13V for Vertical and also converted down to the -5V for the Digital Convergence Unit.

The TV9V supply generated from the Power Supply for Digital listed above, is regulated down to +5V for the Digital Convergence Unit and the A12V for the Power Supply for Digital is used as a switched On/Off for the Deflection Vcc by the Rainforest IC.

## The "front end"

The 61HDX98B utilizes a non-repairable Front End Assembly called the DM-1 Module. This module contains the main System control center, NTSC Front End, Direct TV Receiver and ATSC Tuner. The block diagram (Figure 2) indicates the internal blocks contained within the Front End Assembly, hereafter called the DM-1. Starting counterclockwise from the upper left.

**SATELLITE:** This represents the Direct TV satellite dish connection to the back of the set.

**SATELLITE TUNER/IF:** This is the internal IRD, (Integrated Receiver and Decoder). This receives the satellite signal from the LNB (Low Noise Block) located on the Dish. This block converts the signal to a usable signal for decoding.

**SATELLITE CARD and SATELLITE LINK BLOCK:** To receive Direct TV signals, the customer is required to insert an active Security Card into the back of the set. This card contains a programmable chip that contains the consumer's information and the channels that the consumer is allowed to receive. Also, this card is used when billing information is retrieved by Direct TV.

**LINK/MIX:** This block passes the particular signal that the customer has decided to view on screen. Either the Direct TV signal or the ATSC tuner.

**TERRESTRIAL:** This indicates the outside antenna the consumer has elected to receive NTSC signals as well as ATSC signals.

**CABLE:** This is the input from the con-

sumer's cable signal.

**HD/NTSC TUNER/IF SPLITTER:** This block receives the Terrestrial signal and depending on which source the consumer has decided to view, processes the signal through the appropriate tuner.

- **HD:** Receives the Terrestrial Signal and routes it to the ATSC tuner. This tuner is capable of receiving all 18 ATSC formats. NTSC: Receives the Terrestrial Signal and routes it to the NTSC Tuner.

- The NTSC signal is routed out of this block on the line labeled Composite Video to the Signal Selector IC, which selects the appropriate signal according to the consumer's choice: wither tuner, AVX1, 2 or 3 and/or S-In 1,2 or 3.

- The NTSC audio IF signal is routed to the MTS STEREO DECODER.

- **SPLITTER:** The splitter routes the NTSC signal out to the RF Out PinP Tuner path to the PinP Tuner.

**MTS STEREO DECODER:** Decodes the NTSC Audio IF signal and decodes it into Left Total and Right Total. This signal

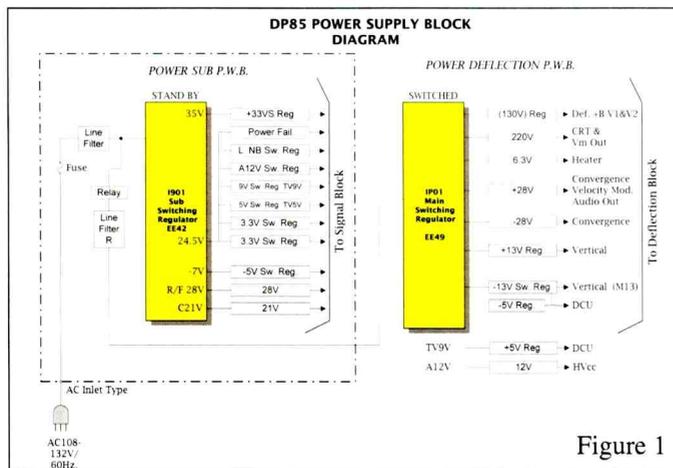


Figure 1

is routed to the Dolby Pro-Logic decoder.

**HDTV LINK:** This block routes the ATSC signal received by the ATSC tuner to the Link Mix.

**NTSC YUV A/D:** This block receives the NTSC luminance and chroma signals and converts them to a digital signal to be utilized by the MPEG VIDEO decoder.

**FROM MAIN MICRO:** This is communication in and out for the Sub- Microprocessor. Information such as the Selector IC selection, power on/off commands, etc., are routed from the ARM/Transport or Main Microprocessor section.

**SD-A/V:** This is the output of the AC-3 digital audio to be used by an off board AC-3 decoder.

**MODEM:** Direct TV polls the Direct TV receiver section through the customer's phone lines and determines such things as Pay for View authorization, customer's information, Card authorization and billing information.

**ARM/TRANSPORT:** The Arm/Transport block receives all signals from Direct TV, ATSC. It also receives the Infrared remote control. This is the output of the AC-3 digital audio to be used by an off board AC-3 decoder.

**MODEM:** Direct TV polls the Direct TV receiver section through the customer's phone lines and determines such things as Pay for View authorization, customer's information, Card

authorization and billing information.

**ARM/TRANSPORT:** The Arm/Transport block receives all signals from Direct TV, ATSC. It also receives the Infrared remote control signals, Front panel Key data, and Slave Microprocessor information. This is the Main Microprocessor section of the DM-1 module. Dynamic RAM and ROM information is processed from software loaded into ROM and determines the state of the Television. Information from ATSC and/or Direct TV is routed to the MPEG VIDEO DECODER.

**MPEG VIDEO DECODER, NTSC UPCONVERSION, OSD:**

Whatever signal is requested by the consumer as the source for viewing is processed through this block and is output to the YUV D/As.

**YUV/DAs:** This block takes the digital signals provided to it and converts them to an analog signal which is usable by the signal processing circuits.

All signals are routed out through the line labeled 2.14 YUV/YIQ, (NTSC Signal up converted to 480P or 2.14 HYPBPR which is the HDTV output as 1080I. MPEG/AC-3 AUDIO DECODER: This block processes the audio component from the ARM/TRANSPORT or the block A/Ds AUDIO, which is the NTSC audio processed by the Pro Logic decoding circuit, labeled as 5.1, (Front Left, Front Right, Center, Rear Left and Rear Right as well as Sub Woofer audio also called LFE (low-frequency enhancement). Then this block processes the signal and outputs all audio to the Audio D/As. AUDIO D/As: This block is the Digital to Analog converter which converts the digital audio signal sent to it by the ARM/ TRANSPORT block and converts it to a usable analog signal to be processed by the audio output section.

The audio labeling is composed of the following:

- L/R = Audio Front Left and Right
- LS/RS = Rear or Surround audio Left and Right
- C/LFE = C for Center and LFE for Sub Woofer, also called Low Frequency Effects.

- **VIDEO (MAIN) and R/L (AUDIO MAIN):** NTSC Video and NTSC Audio is routed from the DM-1 Block diagram. They are shown in the Block Diagram as one line, but they are separate signals. Anytime a signal is routed from the DM-1 or going to the DM-1 module, they must be sent through a DM-1 I/F block. This block reduces the noise by a noise cancellation process. This process uses the output of a comparator and routes the output back to the negative input to subtract the noise. It also level shifts the signal to make it useable by the circuit to which it is routed.

**DM-1 I/F BA4558:** This is the noise cancellation and level shift block.

**Audio/video selector**

**AUDIO/VIDEO SELECTOR TA8851BN:** This is the selector IC (Figure 3). Depending on the customer's viewing preference, the DM-1 will communicate via I2C bus communications and select the NTSC signal which is sent to the demodulator. The demodulator prepares the NTSC signal for the DM-1 module. This IC selects the following inputs;

- Main tuner
- Video One, Two or Three
- S-In One, Two or Three
- PinP Video and Audio outputs. This can be any of the inputs

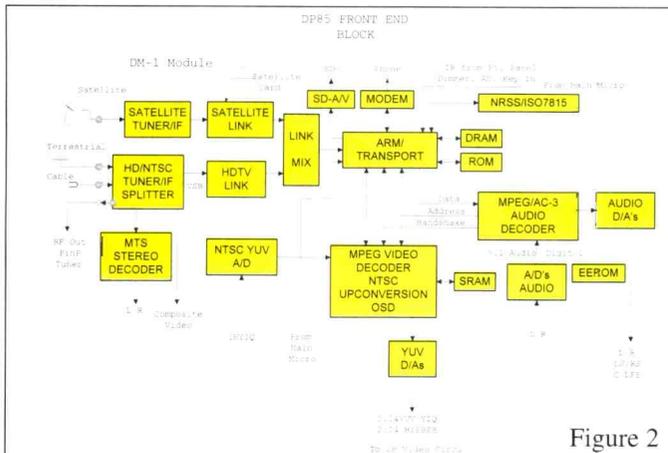


Figure 2

provided above except the PinP has it's own tuner.

Note: PinP isn't available when the customer has selected Direct TV or ATSC as its source. This is because, as will be shown later, the PinP Video is superimposed upon the NTSC video only.

Any video source selected for the Main picture will be routed to the 3D Y/C module.

Note: There are NO Component inputs on this set.

### System control and signal processing

Figure 4 is the block diagram of the system control and signal processing circuits. The following text describes the functions of these functional blocks.

**MAIN VIDEO FROM SELECTOR IC:** At the bottom left hand side is shown the Main Video from Selector label. This is the NTSC video from the selector IC. This is routed to two blocks.

**3D Y/C:** The 3D Y/C separates luminance from the chroma. It also adds the 3D effect, (if the 3D Y/C is turned on within the menu). Noise is canceled and the two separate components are output to the Video/Chroma Demodulator.

**VIDEO/CHROMA DEMODULATOR:** This IC decodes the signal down to its Luminance and Chroma components and outputs it as 1HYIQ.

**DM-1 I/F:** Noise cancellation and level shifting preparing the signal for the DM-1 module.

**1HYIQ:** 1HY = Standard NTSC format luminance. (Also known as 480I). I and Q = Standard NTSC format, demodulated chroma components.

**SYNC DET.:** Separates the Sync signal from the composite video signal.

**SYNC DET.:** This block outputs composite sync to the PinP unit which is used for timing for display. This is specifically related to the Demodulator, D/A's and Read/Write clock. The

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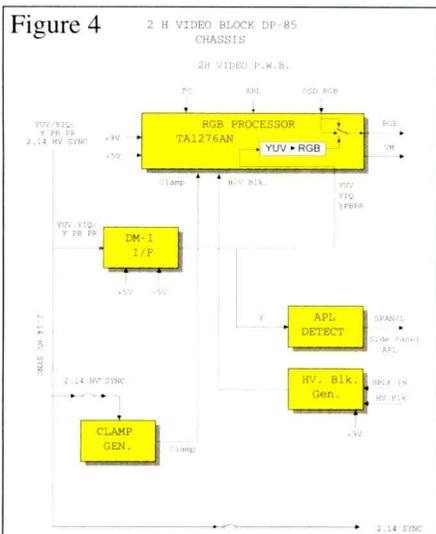
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Circle (4) on Reply Card





usage such as the Channel numbers, clock, Main Menu, etc. is generated by the DM-1 Module. Also, ABL controls the brightness and Contrast; as well as the color level at this chip. The Velocity modulation control signal is produced from the Rainforest IC. This signal is a representative of the Peak White components of luminance and drives the Velocity Modulation coils on each CRT.

## Deflection

Figure 6 is the block diagram of the deflection block. The following text explains the blocks within the deflection circuits.

The 61HDX98B deflection circuit differs from conventional Hitachi product. It utilizes in a sense, two horizontal output circuits. One for Deflection and one for High Voltage. The notations around the Block diagram will be described in a counter clock wise fashion as best as possible.

**CUT OFF:** Cut off collapses the Vertical circuit during I2C Bus alignments, during CRT Set Up.

**I2C:** Communication from the Sub Microprocessor I001 during sweep variations due to Standard/NTSC 480P mode and 1080I High Definition mode.

**ABL:** ABL voltage is generated by monitoring the current through the flyback transformer. This voltage will fluctuate down when the scene is bright and up when the scene is dark. The ABL voltage will manipulate the screen brightness and contrast to prevent blooming under these conditions.

**HV SYNC:** The composite sync is routed into the Sync processor which determines the sweep condition for the

signal being provided.

**Hand V BLK:** Horizontal and Vertical Blanking is developed within the Deflection circuit. The Horizontal Blanking pulse operates around 13V P/P and is produced by taking a sample pulse from the Deflection transformer T752. The Vertical Blanking pulse is generated from the Vertical output IC, I601 pin 7. This pulse normally operates at 23V P/P.

**IR:** The Infrared Pulses coming from the remote control are routed through the Deflection PWB to the Digital Convergence Unit. During DCAM (Digital Convergence Adjustment Mode), the Remote Control provides manipulation pulses for the DCU.

**DIG RGB BUSY:** This indicates Digital RGB and BUSY. Digital RGB represents the on screen characters produced by the DCU for generating the Digital Convergence adjustment grid and text produced during certain conditions such as Magic Focus, Sensor Initialization, Data Storage, etc.

Busy notifies the sub Microprocessor I901 which in turn notifies the DM-1 module that the DCU has entered the DCAM. During this time, the DM-1 module ignores the remote control commands.

**MAGIC SW:** When the customer presses the Magic Focus button on the front of the set, it produces a command for the DCU to begin the Magic Focus process.

**D SIZE:** Digital Size is a control signal for raster enlargement when MAGIC

FOCUS is operated. Raster enlargement is required for the MAGIC FOCUS PAT-TERN to hit the photo sensors. This signal is output from DCU and input to the Sub Microprocessor I901. The Sub Microprocessor controls the I702 on the DEF.SUB PWB) for enlarging raster size. In case of AP-85, this control signal is called "A. SIZE". It's the same function between DIG.SIZE and A.SIZE.

**S WIDE:** Smooth Wide is an option entered through the Menu by the customer while watching an NTSC 4X3 aspect video source. This causes the entire screen to be filled.

**TO CONVERGENCE YOKES:** The DCU provides compensation signal for deflection abnormalities to the convergence output IC. The Convergence output IC in turn, amplify the signals and route them to the convergence yokes.

**+26V, 26VP and RETRACE PULSE:** The positive 26V and the negative 26V is routed to the Deflection transformer I752. They enter the transformer as a pure dc voltage. A 15V P/P horizontal pulse is added to the dc voltage and leaves as +26VP and -26VP. From here these voltages are routed to the Convergence output section and they are rectified. They become +33V and -33V respectively. This process eliminates the need for another power supply.

**+B 130V:** The Deflection transformer receives the 130V V1 DC source.

**DF OUT:** Generated from the I702 on

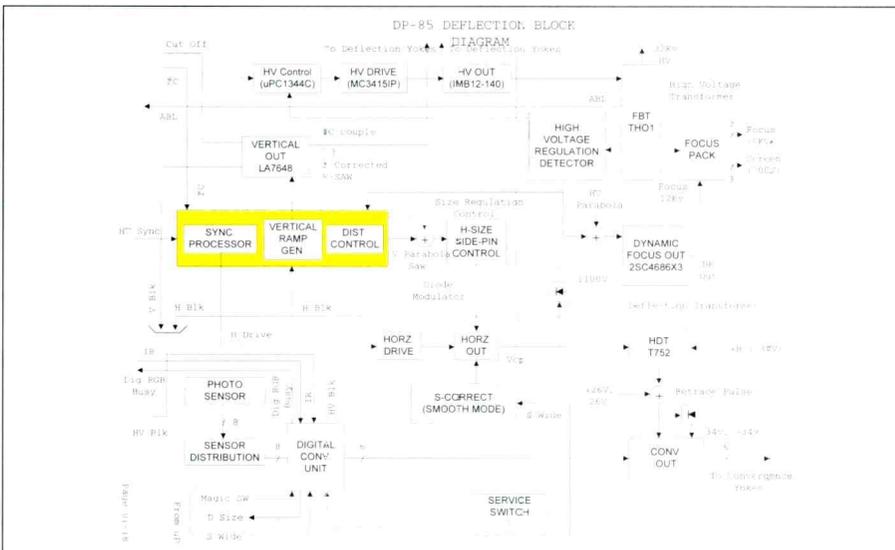


Figure 5. A high-voltage probe for an oscilloscope is really a relatively uncomplicated device: a properly insulated body containing a probe, a voltage divider, and an oscilloscope probe lead.

the Sub Deflection PWB and the Horizontal Blanking pulses, a Dynamic Focus waveform is created. This is a parabolic waveform that is superimposed upon the static focus voltage to compensate for beam shape abnormalities which occur on the outside edges of the screen because the beam has to travel farther to those locations.

**HV PARABOLA:** Described above.

**SCREEN 700V:** 700V Supplied to the screen grids on the CRT's.

**FOCUS 9KV:** Focus voltage supplied to the CRT's. 32KV HV: 32,000 volts DC supplied to the CRT's anodes.

**TO DEFLECTION YOKES:** Horizontal and Vertical deflection wave forms driving the deflection yokes.

**Internal blocks description**

**HV CONTROL:** The uPc1344C IC generates the horizontal drive signal utilized by the High Voltage circuit. The HV control IC receives it's locking pulse from the Deflection circuit. A feedback voltage is sampled from the High Voltage Regulation Detector circuit and compared with a reference voltage to maintain an accurate 32kV on the CRT's.

**VERTICAL OUTPUT:** The vertical output in the 61HDX98B operates differently from previous chassis. This circuit utilizes a +13V and a -13V to generate the waveform to drive the vertical deflection yokes. A pump up circuit is utilized to produce the retrace pulse for the vertical deflection yoke. It's at this time when a higher pulse is needed because the beam has to travel from the bottom of the screen to the top very rapidly. The vertical output IC receives its trigger pulse from the ramp generator.

**SYNC PROCESSOR:** The Sync Processor located in I702 on the Sub Deflection PWB, detects the horizontal sync rate for the displayed signal, either 480P or 1080I.

**VERTICAL RAMP GENERATOR:** I702 on the Sub Deflection PWB generates the Vertical Saw signal. This signal is controlled by several factors. The Sync Processor detection and I2C data communication.

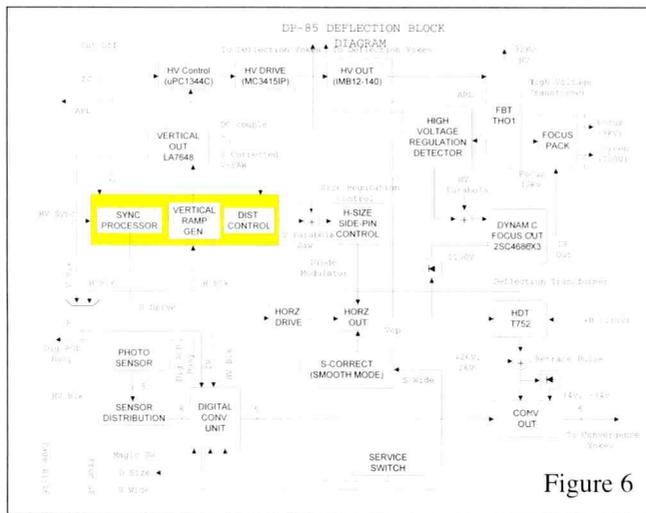


Figure 6

**DIST CONTROL:** Distortion control is another signal produced by I702 and sent to the Side Pin cushion circuit. These compensation parabolic waveforms are combined with the horizontal circuit to compensate for Side pincushion errors.

**H-SIZE SIDE-PIN CONTROL:** This circuit generates the Side Pincushion Distortion compensation pulse which is impressed onto a coil located in the output side of the Deflection Output section and compensates for Pin Cushion distortion.

**HORZ. DRIVE and HORZ. OUT:** This circuit comprises the Drive and Output for the Deflection output circuit.

**S-CORRECT (SMOOTH MODE):** During Smooth mode, the deflection circuit is manipulated so that the outside 1/3 of the picture is stretched to fill the screen. The center 2/3 of the picture is left undistorted. When an S Wide signal is received, a capacitor is switched off on the output side of the Deflection output circuit.

**PHOTO SENSOR:** There are 8 sensors located on the internal outside edges of the cabinet. These Photo Cells receive the light patterns being generated during MAGIC FOCUS or SENSOR INITIALIZATION and deliver this voltage to the Sensor Distribution circuit.

**SENSOR DISTRIBUTION:** This represents the amplifiers that receive the Photo receivers (Photo Cells) inputs during Magic Focus operation.

**DIGITAL CONV. UNIT:** This is the Digital Convergence Unit. This is a nonrepairable unit. It contains the distortion compensation wave form generation circuits, RAM, ROM and D/A's

for the convergence circuit.

**SERVICE SWITCH:** When the set needs a convergence alignment, the Service Switch is pressed. This switch is located on the deflection PWB. By removing the front speaker grill, the service technician has access to this switch.

**CONV. OUT:** The Convergence output block represents the two (2) Convergence output IC's. These two IC's contain the amplifiers for the Red, Green and Blue convergence outputs.

**HDT T752:** Represents the Deflection output transformer. By separating the Deflection circuit from the High Voltage, any distortions that would be generated by fluctuations within the High Voltage won't be visible within deflection.

**DYNAMIC FOCUS OUT:** This circuit amplifies the parabolic signals provided by the Deflection circuit and I702 on the Sub Deflection PWB and impresses these wave forms onto the static DC voltage use for focus. This keeps the beam as sharp or focused as possible in the corners of the screen.

**HIGH VOLTAGE REGULATION DETECTOR:** This circuit monitors a feedback voltage produced from the High Voltage Flyback transformer and routes an output signal to two circuits. 1.) A sample voltage is sent to the Horizontal Driver IC for regulation of the High Voltage and; 2.) If the High Voltage climbs too high, a shut down signal is produced to shut down the power supply until a repair can be made.

**FOCUS PACK:** The focus pack receives the Focus voltage and the High Voltage and distributes them to the CRT's.

**FBT TH01:** Is the main Flyback Transformer producing High Voltage.

Whew. Even though we don't have to be concerned with the ATSC signal, and even though HDTV sets contain more that is familiar to service technicians than is unfamiliar, HDTV sets still present a learning and familiarization challenge. There is a lot of digital circuitry in there in addition to the more familiar analog circuitry. A good approach to gaining expertise on these units is to take it a step at a time and take advantage of every learning opportunity.

December 2002

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 Television AVM-1309G/AVM-1309S .....4225

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Television Schematic (4 of 4)

Product safety should be considered when component replacement is made in any area of an electronics product. A star next to a component symbol number designates components in which safety is of special significance. It is recommended that only exact cataloged parts be used for replacement of these components.

Use of substitute replacement parts that do not have the same safety characteristics as recommended in factory service information may create shock, fire, excessive x-radiation of other hazards.

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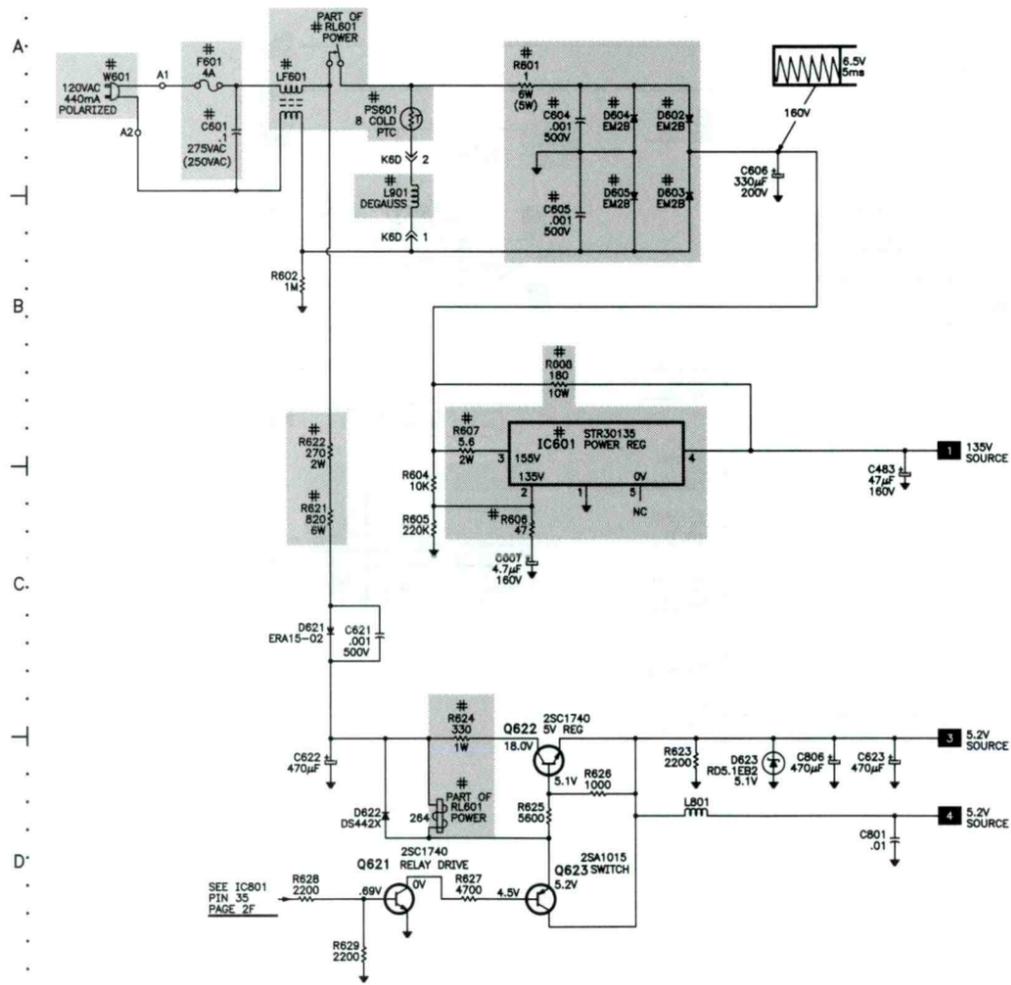
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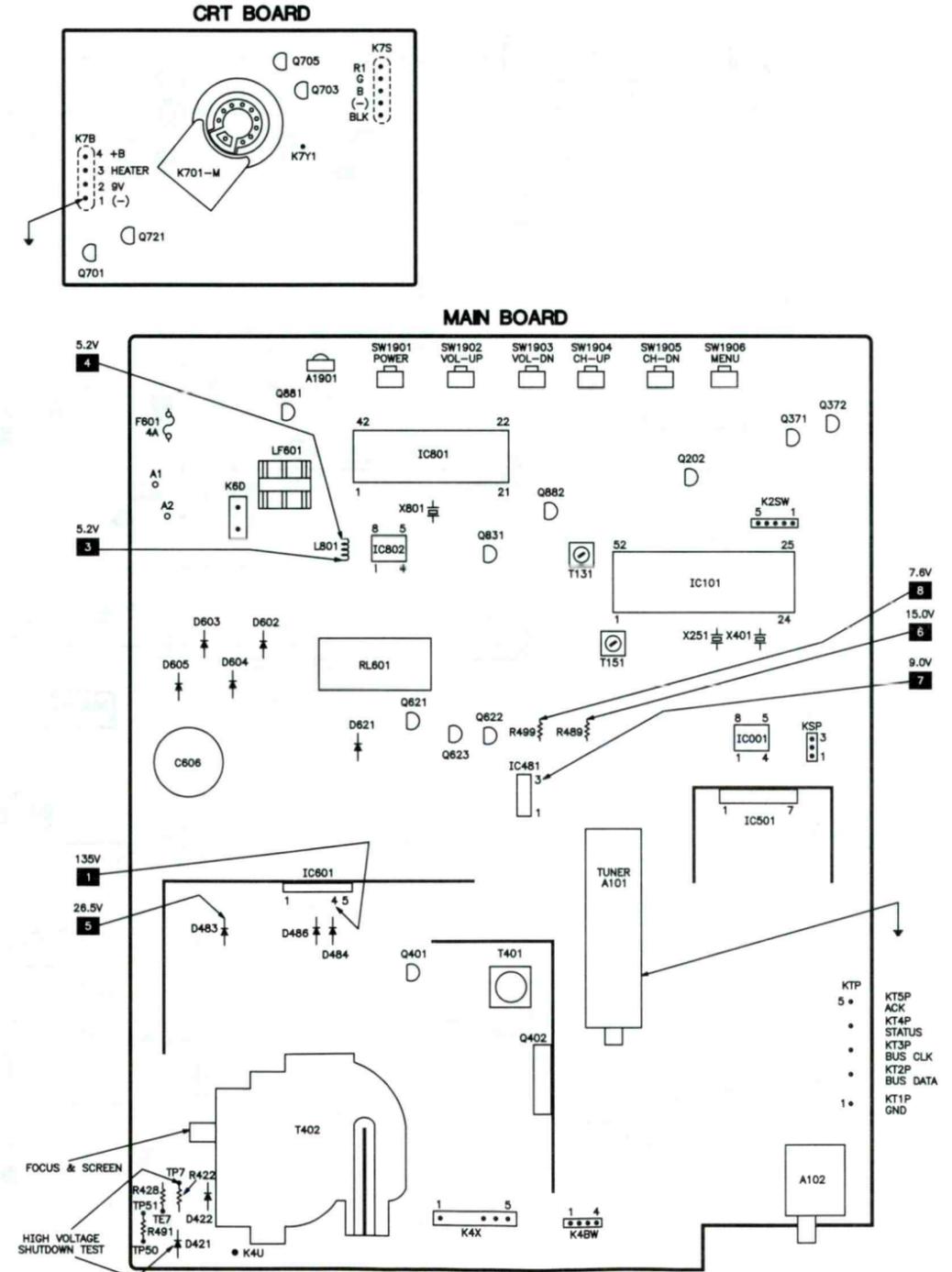
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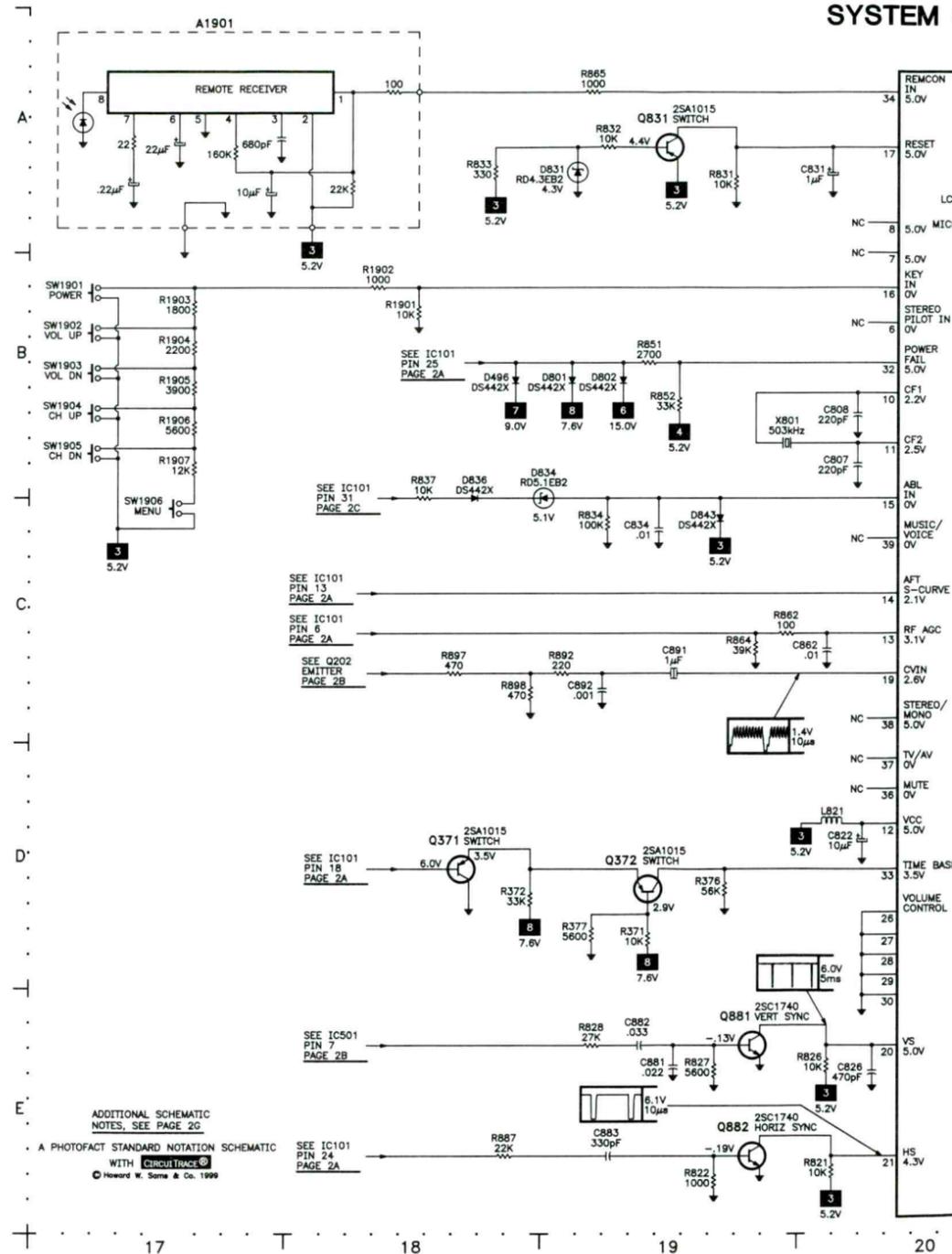
Use of substitute replacement parts that do not have the same safety characteristics as recommended in factory service information may create shock, fire, excessive x-radiation or

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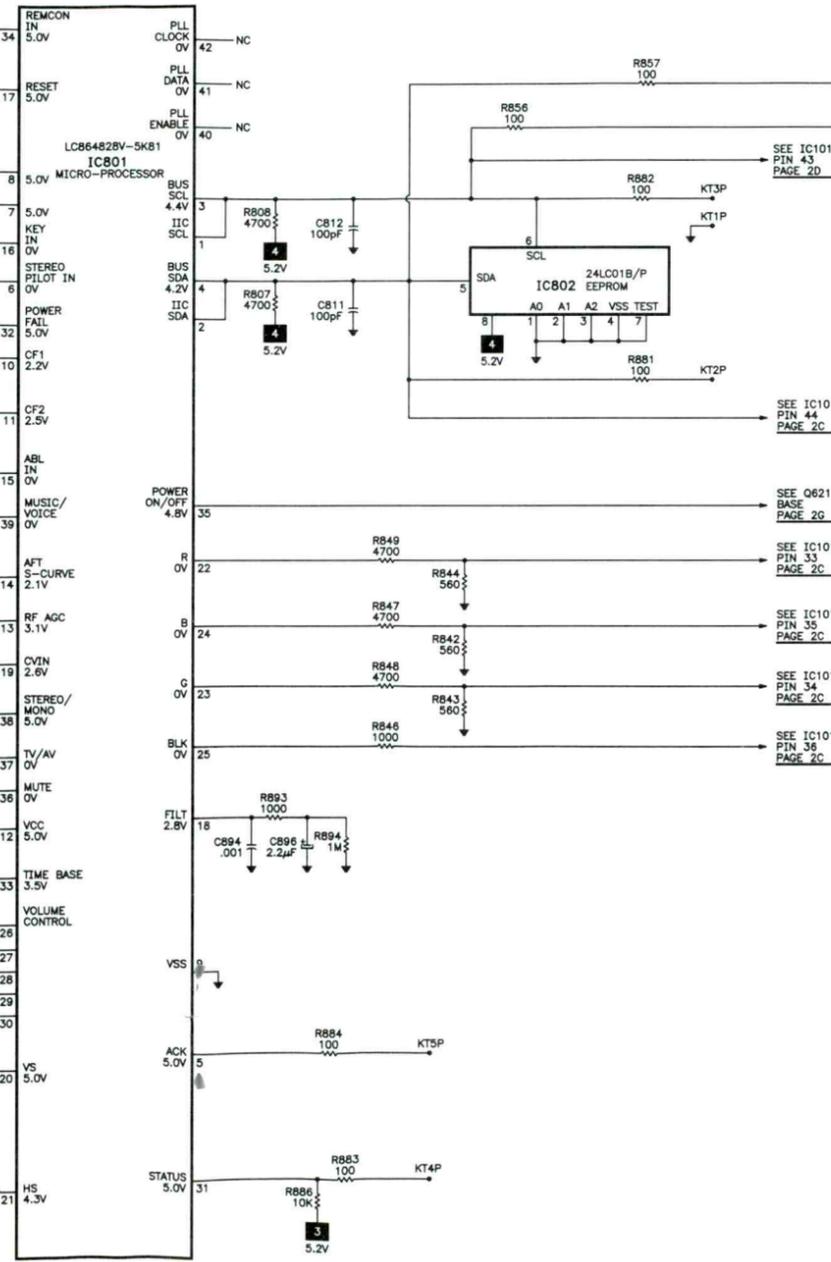
E



ADDITIONAL SCHEMATIC NOTES, SEE PAGE 2G

A PHOTODUPLICATION STANDARD NOTATION SCHEMATIC WITH CIRCULATED © Howard W. Sams & Co. 1999

SYSTEM CONTROL SCHEMATIC



F

Television Schematic (3 of 4)

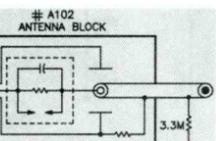
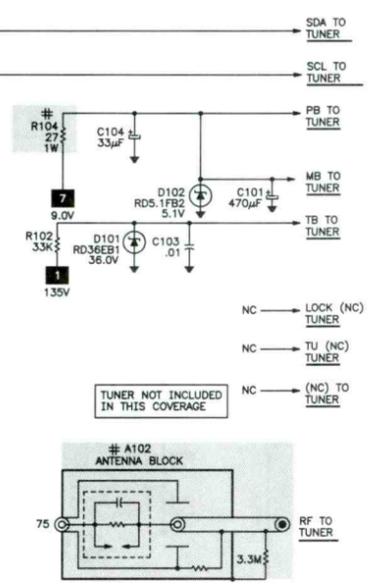
Product safety should be considered when component replacement is made in any area of an electronics product. A star next to a component symbol number designates components in which safety is of special significance. It is recommended that only exact cataloged parts be used for replacement of these components.

Use of substitute replacement parts that do not have the same safety characteristics as recommended in factory service information may create

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All integrated circuits and many other semiconductors are electrostatically sensitive and require special handling techniques.



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Television Schematic (2 of 4)

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C

TELEVISION SCHEMATIC continued

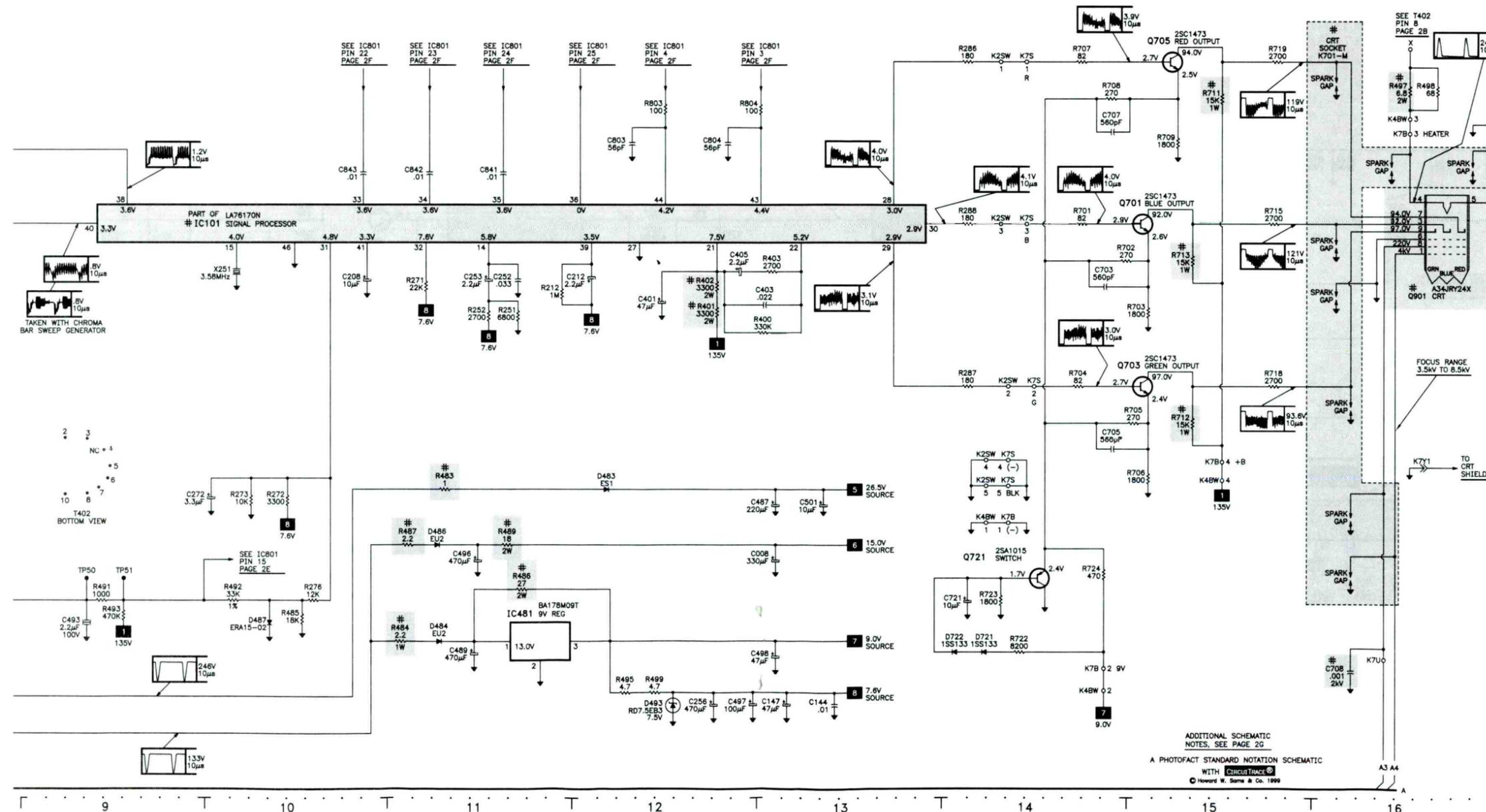
D

Television Schematic (2 of 4)

shock, fire, excessive x-radiation or other hazards. This schematic is for the use of qualified technicians only. This instrument contains no user-serviceable parts.

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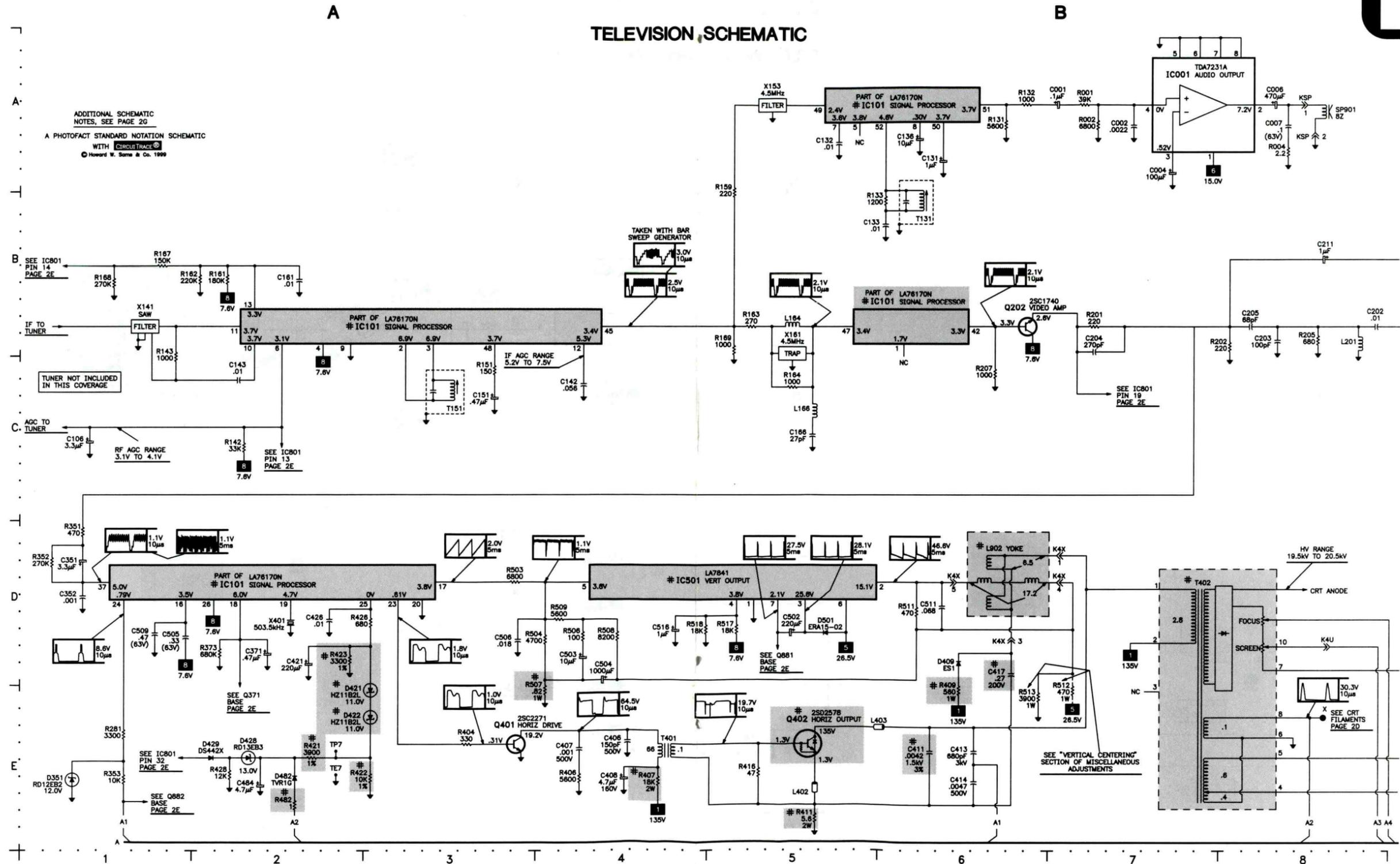
Product safety should be considered when component replacement is made in any area of an electronics product. A star next to a component symbol number designates components in which safety is of special significance. It is recommended that only exact cataloged parts be used for replacement of these components.

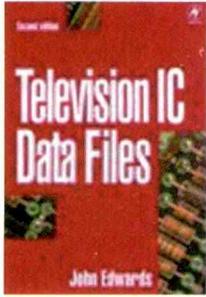
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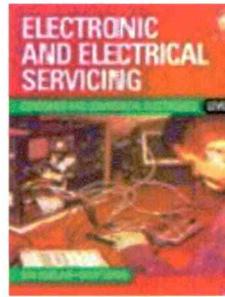


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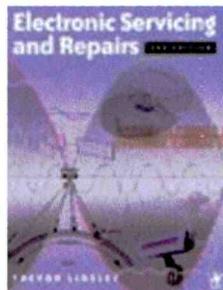


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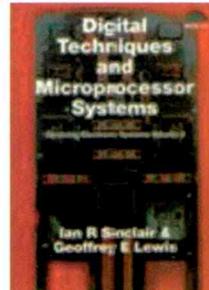


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Wherever you look in the Consumer Electronics industry, and everywhere two or more members of the industry get together, the conversation migrates towards the opportunities, pitfalls, and questions about the rapidly emerging Home Theater market.

Some view these products as simply big screen sets too heavy to be carried in, others look at the Home Theater installations complete with 'better than movie house' seating, and spectacular sound systems. Then there is the Smart Home group that sees the entire home as a single entertainment, security, computer and control compound.

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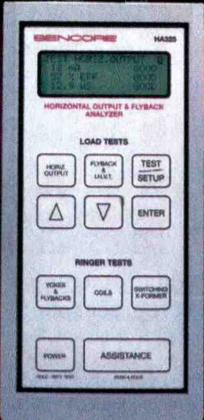
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Sencore was started in 1951, in downtown Chicago, Illinois, by R.H. (Herb) Bowden. As the business grew, Sencore moved west to Sioux Falls, South Dakota, in 1971, attracted by the area’s superb quality of life. The now second generation business remains in Sioux Falls where Sencore is actively involved in community events and charities. Sencore’s second generation, represented by co-owners Al and brother Doug Bowden, is committed to adapting to the technical challenges necessary to take Sencore into the 21st century.

Sencore’s highly trained employees continually design new equipment based on advances in the electronics industry. With each new product, the company deals with complex issues of marketability, design feasibility, and manufacturability, and brings these together in the shortest time possible. Sencore designs and manufactures test instruments that provide the highest quality and reliability in the entire service industry.

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The future looks exciting at Sencore. As

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The CP291 “ColorPro” is a Pocket PC-based color analyzer that helps you align color tracking and luminance levels on video displays to give you the confidence that the display is aligned to perform its best and to industry specifications. The CP291’s easy-to-use graphical interface greatly decreases calibration time with easy to follow measurement screens. The CIE and RGB screens make calibrations simple by illustrating exactly which colors need adjusting. CP291 readings are displayed in xyY, RGB, and color temperature is displayed in degrees Kelvin.

For TV/hdtv service, we just released the HA325 Portable Horizontal Output & Flyback Analyzer. The HA325 is designed to greatly slash servicing time on all types of CRT-based video displays. According to industry estimates, over 250 million CRT-based video displays are currently in use, with sales of another 22 million units this year including 1 million projection systems. Technicians servicing these video displays indicate that over 50% of the failures involve the horizontal output stage. These problems are especially difficult to troubleshoot because of their confusing interaction with other circuits and their potential for dangerous currents and voltages that quickly damage other circuitry and expensive components. Servicing is further complicated by the need to service projection and large screen displays on location.

Who knows where the future will take us next. We do know one thing. Sencore will be at the forefront of new technology with new products and alliances to insure we remain on top of our industry.

*See you in the future!*

## Electronic Design Specialists

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Electronic Design Specialists makes test equipment designed to help servicing electronic technicians troubleshoot problems as quickly and accurately as possible. All test equipment is designed by David T. Miga, CET, who is an electronic engineer and a certified electronic technician.

The EDS corporation was started in 1986 when Dave designed a digital capacitor meter and a semiconductor analyzer to increase his own productivity as a contract technician. When other technicians saw what the EDS-52 capacitor meter and the EDS-59 semiconductor analyzer could do, Dave found himself being asked to build more of these prototypes for them. The production version of the semiconductor analyzer, the SemiAnalyzer 59C, was very successful and was sold from 1987 until 1997. Other unique test equipment followed, such as the Bus Line Tracer, the Micro-Analyzer, the Leak Seeker, and the very popular CapAnalyzer. Although designed for independent service technicians, regular users are the US military, most of the fortune 500 companies,

NASA, the TV networks and cable companies, Panasonic, Pioneer and many trade schools and colleges.

Dave designs his test equipment with an entirely different perspective than most test equipment companies. All ideas start with interviewing thousands of independent service technicians for their opinions and special needs. This approach is different from conventional test equipment manufacturers, where equipment is designed by engineers that may have never picked up a soldering iron, who wouldn't be able to repair their own television, even with their own test instruments. Their idea of test equipment is to bombard the technician with numbers, to be expensive and to be difficult to use. This is overkill for a servicing technician; check out the "used test equipment" section in the classifieds of this magazine for these products.

For this reason, all EDS equipment is designed to give the technician the tools to tell whether a component is good, poor, or bad, in a circuit, as accurately as possible. A technician doesn't need to know what a capacitor's dissipation factor or dielectric constant is; just is it bad, can I move on? EDS test equipment is designed by technicians, is guaranteed accurate for in circuit tests, and is designed for easy use. Determining the quality of a component in questions done by the test instrument, not the technician.

To design a test instrument to decide whether a component is good or bad, EDS analyzes actual defective

components sent in by technicians. Calibrating the test equipment is done by comparing new, old but still working, and known defective components, then programming the test equipment to make the decision, with Dave's 30-year experience as helpful input. Every CapAnalyzer 88A is still tested with the same actual good, poor, and bad electrolytics and tantalums used to design the original prototype, before releasing it to the customer.

EDS was the first on the World Wide Web with animated demonstrations of test equipment products, and has one of the best technical assistance programs on the internet. You can even download replacement owner's manuals and review tech tips, and get self-maintenance help for each product.

As the electronic repair industry moves into the twenty first century, more and more technicians will discover that to be productive, less time must be spent looking at schematics of increasingly complicated circuits. Simply checking components in the circuit with the problem, with the right instruments, is how profitable repairs will be done by surviving technicians in the next millennium.

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# New Technology Update

## Part 2: WIRELESS AND CONSUMER ELECTRONICS FASHION

*This technology update is adapted with permission from the Consumer Electronics Association (CEA) website publication "Five Technologies to Watch." More information about these subjects, and a great deal more is available at the CEA website at [www.ce.org](http://www.ce.org).*

### WIRELESS

Family strife. New relationships. Interfering relations. Financial problems and delays. Sounds like a soap opera. Surprise! It is actually the "big picture" in the emerging wireless universe. It sounds more like "As the Wireless World Churns" rather than the simplicity of anytime, anywhere communications.

High-speed broadband wireless voice and data connectivity is at the heart of this soap opera. It's about the promise of bringing a complete wired-like experience to wireless users, including the delivery of broadband services and support for multimedia applications like streaming, image capture, JAVA and the wireless Internet. It's about mobile computing and wireless connectivity with devices and networks at home and eliminating the unsightly mess of cables snaking through the halls to the home office or home entertainment room. It's about remote access to the office or enterprise from the airport, from a hotel room or nearly any remote location.

However, there are some challenges with wireless. First, U.S. wireless pricing hasn't changed much in the last three to four years. The last major rate change was from 20 cents per minute to 25 cents per minute plus roaming charges to an all-inclusive flat rate "bucket price."

Average revenue per subscriber is flat at about \$45 per month at a rate of around 10 cents per minute to 15 cents per minute (in each direction, with large penalties for exceeding your bucket limit). Deregulation of the phone carrier companies was supposed to create competition. Instead, we've seen consolidation into six national footprint players with Nextel, AT&T Wireless,

Sprint PCS, Verizon, VoiceStream Wireless and Cingular Wireless. Increasingly, they all seem to be offering the same services. The point of differentiation has been nights and weekend pricing. That's nice for night shift cab drivers. But just extrapolate from 10 cents per minute for narrowband voice to what the industry would have to charge to support broadband wireless. That would be a significant hike in rates.

A second problem has been the inability to adopt next-generation technology. During the past 18 to 24 months, everyone

***"High-speed broadband wireless voice and data connectivity is at the heart of this soap opera."***

has been talking about third-generation networks (3G), which would provide high-speed transmission with a rich, colorful video streaming experience. Service providers paid tens of billions of dollars in Europe for 3G licenses and mortgaged their companies in the process. Well, this single wireless standard remains elusive, and some are wondering if it will ever occur. In the meantime, even simple low-speed wireless Internet providers such as Metricom are going bankrupt. The 3G build-out is turning out to be more complicated and expensive than anyone projected and delays are becoming a constant occurrence.

### Trends

Is this going to change? Well, yes and no. What is interesting is that we may indeed see technology change, but not in the way that 3G spectrum bidders anticipated, due to the advent of unforeseen new

technologies.

The first unexpected new technology is that some players with 2G digital technology are choosing instead to upgrade these systems at much lower cost into so-called 2.5G systems, adapting and enhancing the network capabilities. In some parts of the world, the terminology for this is called wideband-code division multiple access (W-CDMA), 1XRTT/CDMA2000 and its evolution variants of 1xEV-DO and 1xEV-DV, and variants on the global system for mobile communications (GSM) are general packet radio service (GPRS) and enhanced data rates for global evolution (EDGE). With 2.5G technologies, service providers will be able to provide data transmission services, albeit at lower speeds than with 3G.

A second unforeseen new wireless technology is Wi-Fi. Wi-Fi refers to the use of wireless Ethernet or wireless local area networks (LANs) using 802.11 technology. The Wireless Ethernet Compatibility Alliance (WECA) is the voice for Wi-Fi, positioning it as an open standard for ubiquitous connectivity. If you use wireless at home, you should be able to use it in the office and on the road. Apple was one of the first major companies to build in wireless computing capabilities with its Airport System.

There are two basic advantages for Wi-Fi. The first is that the 802.11 spectrum is unlicensed, so it is free to people setting up these LANs. Therefore, these systems are relatively inexpensive and can be set up anywhere. Secondly, Wi-Fi LANs run at very high speeds of 10Mbps, compared to only 2 mbps maximum for 3G. Since Wi-Fi LANs can be installed fairly easily on college campuses, offices, airports, hotels and cafes, mobile users will find that they can

transport their laptops and other mobile devices to remote Wi-Fi locations and “log on” to these systems at high speeds and at much lower cost per unit than with mobile 3G.

Combining 2.5G with Wi-Fi, results in a system that is far lower cost than 3G but with much higher data bandwidth in selected geographies. No wonder 3G players are worried, irrespective of current Wi-Fi security issues.

And then there’s Bluetooth, a short-range wireless technology. It is made for different applications, and a slew of Bluetooth products are coming to market this year. Imagine sitting with your laptop and being able to print out your text on the new H-P Bluetooth-enabled printer, sans cables. WECA supports Bluetooth, and Wi-Fi products are expected to coexist with Bluetooth products. Intel is hedging its bets, supporting both Bluetooth and Wi-Fi. But Microsoft XP has announced it will support Wi-Fi and not Bluetooth.

With these pieces in place, 2G and Wi-Fi seem to be gaining support since they are readily available. If the WECA Wi-Fi spec becomes the accepted public wireless LAN (PWLAN) standard, then why are high-speed bandwidth connections at a tremendous build-out cost necessary? If this PWLAN can serve the most demanding mobile user in the most demanding locations, from a hotel room or airport to a large office, isn’t this sufficient?

The wireless LAN segment is expected to become a very big business. Manufacturers’ revenue in the wireless LAN industry is expected to approach \$884 million by 2002. That’s a 113 percent total revenue growth over 1999 revenues, according to Frost and Sullivan.

Enhanced 2G variants are expected to roll out later this year. AT&T is moving from time division multiple access (TDMA) toward a 3G variant based on GSM. Some are saying that NTT DoCoMo’s investment is facilitating this transition. In the spring of 2001, it invested \$10 billion for a 16-percent stake. Cingular is moving toward dual-standard products. Because AT&T, Cingular and Verizon have a significant chunk of analog users, Sprint PCS and VoiceStream may be better positioned to offer a range of new

services since they have a limited number of legacy users and due to their technology choice. Sprint will use a CDMA variant and VoiceStream a GSM variant. The downside is that because carriers are making different technology choices, it’s likely that while subscribers will have basic phone service across the country, some features such as e-mail or Web access won’t be universally available.

### Challenges in geography, spectrum and the FCC

As a result of heightened prospects for 2.5G/Wi-Fi, expectations for 3G have been readjusted. Analysts now are predicting that it won’t become a major force until at least 2004. There still are too many obstacles.

One particular impediment in the U.S. is the lack of allocated spectrum. The standards issue and the lack of spectrum continue to occupy center stage as the U.S. scrambles to catch up with the rest of the world. The new administration in

*“The standards issue and the lack of spectrum continue to occupy center stage as the U.S. scrambles to catch up with the rest of the world.”*

Washington is attempting to figure out whom to dislocate. The Federal Communications Commission (FCC) proposed clearing out four tracts of wireless airwaves currently occupied by amateur radio enthusiasts and unlicensed personal communications services (PCS) users.

The FCC proposed freeing 110MHz in four blocks of spectrum for possible 3G uses. The 1,910MHz to 1,930MHz block is unlicensed PCS spectrum; the 2,390MHz to 2,400MHz span accommodates both unlicensed PCS services and amateur radio enthusiasts. Commissioners reportedly are concerned about the possible impact on the amateur radio community. The FCC has not considered another controversial issue: using MDS spectrum

for 3G, perhaps because of heavy lobbying efforts on the Hill by multipoint distribution service (MDS) proponents.

### Even more applications

Two other particularly interesting areas in the wireless universe are advances in video and voice technologies.

#### Video

Packet Video has raised more than \$100 million to date to pursue one of the most daring wireless applications: video and instant wireless visual messaging. LightSurf focuses on delivering a wireless digital imaging backbone for visual applications and services. Its customers and partners are wireless operators, imaging and digital media companies, network infrastructure providers and handheld manufacturers. LightSurf powers Kodak’s online Picture Center. Its wireless visual solutions support Qualcomm’s BREW platform, and Motorola will incorporate LightSurf digital photography architecture in its wireless personal networking products.

#### Voice applications over the web

Increasingly voice portals and the technology that enables it has become a popular application, and the technology is only getting better, cheaper and faster. Being able to input data into a Palm verbally is certainly easier than manual inputting on those small screens or learning graffiti. And then there’s the safety factor. In the summer of 2001, New York legally banned holding a cell phone while driving a car.

#### It’s about lifestyle and workstyle

Wireless is clearly advancing; with or without 2.5G or 3G. The big question is what will be the killer app? Which applications will prevail? It all depends on whom you ask. The chart below illustrates an interesting mix of workstyle and lifestyle activities.

#### WAP and SMS

In the short term, the wireless application protocol (WAP) and short messaging service (SMS) text messaging are components of “what can I do with my mobile device?” The WAP standard transformed

the handset. And during the past three years, SMS increasingly has become successful as the next-generation of handsets is coming to market and consumer and business users start to become comfortable with this feature. The surprising success of DoCoMo's iMode in Japan, with more than 2 million mobile internet users, showed that wireless instant messaging is hot with commuters and teenagers who have become addicted to iMode

### Mobile gaming and entertainment

Entertainment is destined to be the second most popular mobile application after messaging. Just look at the tremendous success of Nintendo's GameBoy. Major players like Vodafone and Sony also are attacking this space, as are a plethora of startups. Mobile gaming services are expected to skyrocket within the next five years with user numbers predicted to soar to 850 million by 2006 from a modest 43 million at present, according to British-based research firm ARC Group. This will translate into an increase in subscriber numbers from 12 million in 2001 to 508 million in 2006.

This growth in wireless gaming is attributed largely to the implementation of WAP, Bluetooth, GPRS, and other new high-speed technologies, which will enable content-rich multiplayer online games and highly interactive network games to be played on a variety of form factors. Soon you will be able to play interactive WAP games with your friends, listen to MP3 downloads from your phone over your Bluetooth headset or watch football highlights on your 3G videophone.

Along with high-speed wireless access and online and downloadable game applications, it is unclear what new revenue models will provide a continuous revenue stream to access and content providers and others along the way. Some believe location-based services may provide new revenue opportunities.

### Location-based services

Chances are, the cell phone on your belt allows your location to be pinpointed within a few blocks. Scary or empowering? It depends on your perspective. As a safety

***“Mobile gaming services are expected to skyrocket within the next five years with user numbers predicted to soar to 850 million by 2006”***

or directional tool it's great. But do you want to be found every time you may be in proximity to the enabled store?

### Business, sales-force automation and more

There are analysts who predict that business will kick-start the wireless revolution. Wireless technologies will become increasingly essential, with corporate wireless spending exceeding 20 percent to 30 percent of telecom budgets by the end of 2001, and wireless voice usage surpassing that of wireline during 2003 and 2004. The extension of enterprise applications to untethered users will take center stage as a new point of interaction into the enterprise, enabling immediate response to business partners, employers and customers.

Sales-force automation is a key proving ground for wireless business applications because it combines three key factors: numbers, needs and near-term vendor opportunity. Salespeople are increasingly mobile and dependent on timely business data. Wireless applications can address these needs effectively and affordably, given recent trends in the price/performance profile of both devices and applications. In response to this opportunity, vendors are offering three main types of wireless sales force automation solutions: hosted, packaged and custom. With enterprise applications for Palm O/S, Windows CE and other handheld devices entering the marketplace during the past 12 to 18 months this has become a profitable area. Because of this, numerous developers are concentrating their efforts on the enterprise.

### Telemetry

Traffic telematics, ITS (Intelligent Transportation Systems) and machine-to-machine communications are being

watched closely by industry analysts. Some of the suppliers lining up to grab a piece of this market are: AAA, Clarion, Intel, Microsoft, Sun, Motorola, OnStar, DaimlerChrysler and General Motors.

### Education

Educational institutions increasingly are using mobile multimedia applications for accessing online libraries and field research, as well as interactive education. Students at the Forsyth Country Day School outside Winston-Salem, N.C. won't just take out their books for school this year. They'll also have Palm IIIc PDAs. Forsyth is the first school in the nation to give high school students handhelds and to require their use. The devices are provided at a discount by Palm as part of a nationwide program for college and schools. Forsyth students will use the PDAs to access e-mail,



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have shown that there is a market for CE devices that allow consumers to express their individuality.

The results of the "Accessory Fashion, Ownership and More" survey conducted by CEA this summer identify four distinct categories of consumer electronics shoppers, but also find that, regardless of category, quality and cost still reign supreme. The four categories of shoppers were identified as: Fashion Bugs (11 percent of shoppers), Fashion Conscious (16 percent), Fashion Neutral (39 percent), and Fashion Oblivious (33 percent).

With the trend toward fashion in consumer electronics accessories, the potential market for manufacturers is tremendous. Within the last two years, 83 percent of consumers bought a CE product, and 40 percent of all CE purchases result in at least one accessory purchase within two years. If each consumer were to purchase just one consumer electronics accessory, this would imply a minimum potential market of \$340 million.

### Trends

Cellular phone attire is nearly ready for the mass market if a recent design contest is any indication. When Pelephone and Samsung got together to encourage fashion design students to combine cellular phones and other digital devices into their designs, they sponsored a special project for students at Shenkar College.

The winners unveiled at Shenkar's annual fashion show included such innovations as a wearable digital phone set with screen and keyboard belts plus wearable antenna; cellular phone sets with push buttons incorporated into t-shirts; and modular fashions with cellular phones as part of the detachable clothing details. Other entries included a cellular phone for the deaf with a sign language screen and platform-soled shoes, with a telephone dialing system.

Established cell phone makers are combining cutting-edge style with digital handsets as well. Ericsson is developing sophisticated green and metallic wristband smart phones, which will use Bluetooth technology. Nokia has long

been a trendsetter and the first to discover the secret that good design really matters when coupled with functionality. And finally, Candie's Inc. and Motorola Inc. have partnered to co-create accessories for Motorola mobile phones targeted at the Gen Y consumer. The Candie's/Motorola signature mobile phone accessories line will allow each user to personalize their phones. Hollywood, CA - based Orang-Otang Computers recently won a patent on a mobile phone that you load up your sleeve and pop into your hand with an instant snap of the wrist. The company also has secured patents on devices that do the same with a digital audio recorder, a camera and a universal remote control.

### Basic brand clothes

Fashion apparel lines are being re-examined with technology in mind. Because pockets were becoming too bulky with wallets, keys, handheld

*"Many clothing brands are creating pants with numerous pockets with hidden spaces for computerized date books, cell phones and pagers."*

organizers and phones all vying for the same space, many clothing brands are creating pants with numerous pockets with hidden spaces for computerized date books, cell phones and pagers. Dockers' newest Mobile Pant is called a "communication storage device" with three concealed pockets to hide gadgets. Dockers says that the lower pockets can be unzipped in 0.15 seconds for quick access to important cell phone calls. "You'll be surprised how much RAM you'll have in your pants," touts the company fliers with a price tag of \$52. Other companies are developing their own lines of pants, jewelry and wearable computers to tap into the trend. Lee jeans has its own mobile clothing line. Swiss Army Brands is rolling out urban technical wear that has

room for both a pocketknife and cell phone. And Jansport's school backpacks have added pockets for cell phones and other gadgets. Not to be left out, Palm Inc. teamed with Sanyo Fashion House to create Palm-ready raincoats, with a special pocket big enough to hold a personal digital assistant (PDA). Prices range from \$185 to \$695. The fall 2001 collection for men and women features a Palm logo button securing the pocket.

### Wearables: form and function

Most wearable computing still is industrial: laptops and PDA-like devices used by mechanics and technicians who need compact, mobile information technology. Xybernaut Corp., a well-known provider of wearables, says it holds the largest number of patents for these devices. Its products include the Mobile Assistant, which boasts a head-mounted color display, a touchscreen flat-panel color display and a voice-recognition interface. Xybernaut's computers include a headset that projects what looks like a 15-inch screen, a wrist-bound keyboard and a hard drive strapped around the waist.

Internet-enabled wristwatches also are big fashion news: Timex, for instance, has rolled out its Internet Messenger watch series, which uses Motorola technology. The Swatch Group and AOL said they would promote one another's brands, including an Internet Swatch watch carrying AOL entertainment content. And in March, IBM demonstrated its second-generation Linux watch, which isn't for sale yet since its battery currently only lasts for two hours. With its wrist technology watches, Casio has gone one step better on the wristwatch phone of the Dick Tracy comic strips. Different Casio models include MP3 players, digital cameras, global positioning system (GPS) receivers, voice recorders and organizers.

But watches are just the beginning. IBM's research team is beta testing the Vision Pad, a portable computer with a head-mounted display. The Vision Pad

might be useful to workers who need to keep their hands free such as engineers working on jet engines. IBM also is researching fashion accessories, such as digital sunglasses that have a built-in camera. The sunglasses could translate foreign-language signs into a native language for tourists as they toured a foreign country. And for the future, IBM is developing digital jewelry, as part of its "pervasive computing" project that's based on the idea that soon people will be connected everywhere. Among its prototypes is a necklace with a microphone, earrings with speakers to take your calls, and a watch and bracelet with screens to view text and images. Also in the pipeline are rings that glow different colors when particular user-selected events occur, such as a stock hitting a certain price. IBM also is working on a prototype in which a small eyepiece on a headband is the monitor and the central processing unit, that weighs less than a pound, clips to a belt.

For sports enthusiasts, FitSense Technology makes the FS-1, a sensor that clips to a runner's shoelace and monitors such data as speed and calories burned. The device uses a wireless platform that connects the device to a wristwatch. FitSense already has sold several thousand units. In fact, Olympic track and field gold medalist Michael Johnson used the FS-1 at the U.S. Olympic trials last summer.

### Interactive smart clothing

Although many wearable fashions sound futuristic, some are available today, and more are on the way. The crossroads between CE and high fashion is being called wearable electronics, or "e-wear." As technology allows devices to shrink ever smaller and design aesthetics and style take on a more prominent role, cutting-edge gadgets and fashion are converging into one. New hybrids of electronically embedded clothing are becoming available to consumers. With the advancement of such wireless technologies as infrared and Bluetooth, and the miniaturization of GPS devices, consumer

tech and fashion are evolving to the next level: interactive smart clothing.

Although this new wave of fashion technology has yet to reach its potential, the possibilities for future interactive designs are impressive. For starters, Levi's Industrial Clothing Division has teamed with Philips to create an ICD+ Jacket line, which holds a personal area network (PAN).

The jacket, complete with a built-in phone (Philips Xenium 989 mobile phone), MP3 (Philips Rush! MP3 player), MiniDisc player, microphone and head-phones, even has speakers built into the hood, enabling the wearer to be constantly "plugged in and on." Using an embedded single unified remote-controlled unit, the jacket allows the wearer to switch between devices, activate voice dialing and adjust networked gadgets. This "smart coat" even allows the muting of a built-in digital audio player when the user's wireless phone rings. It costs from \$600 to \$900 and currently only is available in Europe.

There is an abundance of fashion/lifestyle companies designing for the wearable tech market. Among them, Italian fashion designer Corpo Nove has a cooling system jacket that serves as a built-in air conditioner unit using Freon tubes. The jacket's rechargeable batteries last eight hours.

Reima has a smart clothing prototype line that offers life-monitoring wear for extreme temperatures. With a built-in 16MHz computer complete with 8MB of flash memory and 16MB of RAM, these survival snowsuits offer everything from GPS navigation to weather information to auto-SOS facilities. The embedded sensors monitor vital bodily functions such as heart rate and temperature and automatically notify the wearer and/or outside help if necessary.

Charmed Technology, which has roots in the Massachusetts Institute of Technology's (MIT) Media Lab, offers such products as the Charmed Badge, which stores electronic business cards and personal information for conference attendees. Charmed has a proprietary operating system called Nanix,

which allows the wearer to access the Web via wireless glasses, bracelets, necklaces or brooches. One of their more cutting-edge prototypes is the Osmo, a wristband that can be worn by surfers to monitor their body temperature and send that information to solar panels in an accompanying wet suit, which will heat up accordingly.

Samsonite's Black Label line offers such travel staples as a compass cardigan to a reading jacket, complete with built-in light and world atlas. Future designs include radio and climate control jackets.

Italian clothing line Paul & Shark has a solar-paneled jacket that will recharge the wearer's cell phone and plans to integrate microcomputers and mobile phones in future lines. They also are working with Sunshield to produce a fabric that will absorb and reflect UV rays to heat and cool the wearer.

The CP Co.'s survival jackets have removable anti-smog masks, compartments for laptops, documents and other gadgets, and are wind/water/oil/rip/abrasion proof. CP also is developing a jacket that will utilize GPS and is working with Sony to develop jackets with built-in Dictaphones and Discmans. In addition, Sony is working with such premier designers as Burberry and Griffin to develop other prototype intelligent wear.

The latest in vests creates an interface with digital gadgets. Scott Jordan developed the 15-pocket zippered e-Vest designed not only to carry digital devices but also to keep them connected to one another. The vest includes a PAN - a series of Velcro-sealed conduits that run inside the vest, connecting pockets. The conduits could hide the wires for earbuds or keep an organizer connected to a cell phone that is serving as a wireless modem. The vest costs \$159.99 and can even hold a bottle of beer.

### Looking in the crystal ball

Philips Electronics is at the vanguard of research for future applications between clothing and technology. Philips Design's New Nomads high-tech clothing line is strikingly futuris-

tic, although still in the development stages, it is paving the way in interactive clothing apparel.

Some of Philips' prototypes include: "No Kidding," an interactive clothing line for children that uses fabric antennas, remote cameras, mobile phones and radio tagging. This enables parents to track their kids' activities, and also allows for interactive entertainment for children. Hide-and-seek will be more like a live video game, where kids can use imbedded identity chips and built-in screens to track other players.

"In the Mix" is a DJ suit that is designed to allow a DJ to become more interactive with the dance floor, controlling the music via wireless connections. The crowd will be able to communicate with the DJ via short message service (SMS) or pager messages. This suit uses an integrated body area network (BAN) that acts as a central network in which gadgets such as PDAs, cell phones and pagers can be attached.

Another design in development dubbed "Feels Good," is a cream-colored kimono jacket with woven conductive fibers along the back, which will relax the wearer via an "electrostatic charge." These sensory stimulations can be adjusted by an attached biometric sensed remote control unit, which monitors pulse rate and blood pressure.

Other future concepts include flight attendant uniforms that can communicate with ground personnel, a smart jacket with an embedded eye-cam in front that records and recognizes everything from the people you meet to the calories you consume, and electronic coat hangers that recharge tech threads.

Some of these prototypes may appear farfetched, but the team of fashion/textile designers, electrical/computer engineers, and psychologists making up the wearable tech line of Philips Research Laboratories are paving the path toward the inevitable trend in high-tech fashion with the New Nomads concept.

### Power dressing

But how do high-tech wearable fashions work? Solar fashion is set to make

waves. Fibers developed by German scientists that can be woven into clothes soon may provide all the power you need for your portable electronic equipment, from cellular phones to MP3 players.

The solar fiber developed by scientists at the University of Stuttgart works like the photovoltaic cells found on pocket calculators. Three layers of non-crystalline "morphous" silicon are sandwiched between two conducting electrodes. The top layer is doped with electron-rich impurities while the bottom layer contains fewer electrons. When photons (light particles) hit the top layer, they displace electrons that then flow through the middle layer and to the electron-poor layer. This current can be used to power devices or charge batteries. The electricity generated can be used to charge handheld devices. Fabric can then be used to power wearable computers and other devices.

Charmed Technologies features the enchanting concept of "e-broidery" or "electronic needlework". This involves the use of conductive silicon thread, making it possible for a keyboard to be embroidered in any fabric, and for data to be "keyed in" from your own clothing.

Charmed says that whatever you can do on a desktop PC, you also can do while wearing it. And so full PC connectivity is available in brooches, tie clips and belts. A computer screen display can be projected, in miniature, through one lens of your specs. Charm's vision of "wireless everywear" is based on the integration between technology and fashion, including those silicon threads. Charmed even has a bra-based heart sensor.

### The role of chips

A large market for mobile computers already exists, including notebook PCs and Palm-style personal organizers. What drives the next step into wearables is the need to use mobile computers without losing the use of your hands. The first step could be to put computing capabilities into a wristwatch, like

Seiko's Ruputer, launched in Japan in 1998 or it could be as simple as fastening a Palm to your arm.

But more sophisticated applications may require wearable computers that are as powerful as desktop and notebook PCs, or even more powerful. Divers may want to use such computers on the ocean floor, like the WetPC, while construction workers may use them atop skyscrapers. The problems come from trying to replace the keyboard, screen and mouse with more portable and more flexible input/output devices.

Which wearable products become popular will depend as much on fashion trends and on the marketing skills of their proponents as it will on their technical ability. Underlying all digital technology is Moore's Law: microchip density is doubling every 18 months or so, enabling more memory and processing capabilities in ever-smaller devices to go with the bandwidth, plus ever-smaller sensors and cameras. Add intelligence from software and a soaring increase in data storage capabilities, and it is clear that some interesting personal helpers, health monitors and other devices should lie around the corner. Add Bluetooth or the IEEE 802.11 networking protocol, and you extend this further.

A fascinating range of new wireless gadgets is expected as a result of chipmaker Intel's recent announcement of new wireless "Internet-on-a-chip" technology that it says eventually will make wearable computing almost as ubiquitous as clothing. Intel claims it will be able to make these chips much smaller and more powerful than today's mobile phone processors. During a recent European forum on chip technology, Intel executive Ron Smith announced that within five to 10 years, "we should not be surprised to see devices such as wearable computers or even video watch phones become widely available."

According to the Wearable Computing website: "Large-scale acceptance of wearables in the general consumer market will surge by about 2005. By 2015, wearables will have virtually eliminated desktop, laptop and

handheld solutions altogether, leaving only installed computers; i.e. computers and monitors built into the walls of your home, and wearables.”

### Unveiling the borg

The “next wave” of computing can be found at the Borg Lab at MIT in Cambridge, MA where Rich DeVaul is helping to pioneer wearable computers on MIT’s MIThril project. He is following in the footsteps of Steve Mann, the pioneer of wearable computing, who received his PhD from MIT in 1997. Mann built a head-mounted computer device as a high school student in the 1970s and was known as the Cyborg. But as wearable computers and head-mounted displays become smaller and sleeker, there is less need to look like a geek.

DeVaul’s computer hardware is distributed around a mesh waistcoat then hidden under a jacket. However, the spectacle-mounted screen display, and the handheld controller, a Twiddler, which includes a number of small keys, are the obvious clues that some serious computing is taking place.

Looking into the screen, the image is sharp, but very small. According to DeVaul the wearable computer should act like a personal assistant, providing information about the places you go and the people in your life. In addition, the interface should be simple and do a few key things efficiently to maximize the value of the information. Voice recognition is an alternative to keying in information. The system is even more valuable if you add location data picked up from the GPS network, and from wireless “tags” added to the environment.

Also, instead of just monitoring your position and movement, a wearable computer also could monitor your heart and other bodily functions. And a sufficiently powerful system could provide access to visual, spatial and other data about the outside world. It becomes a sort of “virtual reality” display overlaid on the real world. The result is “augmented reality”, and one

example is the Mobile Augmented Reality Systems (MARS) research project at Columbia University.

Such “context-aware” systems could be of tremendous benefit to the disabled. But they are more likely to find military applications such as BARS,” a fully-functional prototype of a multi-user, distributed, wearable computer infrastructure for warfighters operating in the urban environment.”

Unfortunately, the market for wearable computers is being delayed by the high price of spectacle-mounted displays at around \$5,000 for a VGA (640 by 480 pixel) screen. When the cost comes down, the market is expected to pick up considerably.

Hitachi and Xybernaut have developed the first Wearable Internet Appliance (WIA) for the consumer market, and expect to have it on store shelves before Christmas for less than \$2,000. It weighs 10.9 ounces and, like many PDAs, runs Microsoft’s Windows CE.

### Fashion embraces technology

Meanwhile, fashion and technology are being celebrated in other design arenas. Fitch, a brand design firm, participated in the Fashion Institute of Technology’s three-day symposium on universal design held October 18 through 20 in New York City. Spencer Murrell, Fitch Partner and National Practice Director for Product Design and Development, present “Urban Tribalware as Universal Design: Fashion-Informed Electronics Can Broaden the Acceptance of Mobile Computing.”

Murrell discussed several conceptual designs and how they promote universal acceptance of the unwired future through an aesthetic harmonization of technology and fashion. According to Murrell, fashionable electronics broaden the acceptance of mobile computing. He will address how product designers can enhance freedom from the constraints imposed by offices through wearable wireless devices.

Technologized fashion, according to

Murrell is an emergent area of interest for product designers worldwide and looks at the intersection of the body, consumer electronics and their enabling technologies. He uses the term “urban tribalware” to describe the “wearer of the bohemian electronics pouch” as the embodiment of a self-directed, empowered movement.

According to Dr. Joyce F. Brown, president of FIT, “Designers, industry professionals, educators and students interested in universal design will find this conference an informative and invaluable experience.”

### Will high-tech fashion fly?

However, design issues aside, the unanswered question is will consumers adopt these products, regardless of how cool they are, in the near future? Many problems exist, not the least of which is the tiny form factor of these devices, which have limited power resources. Beyond that, wearables will be more practical when text-to-speech and speech-to-text are integrated into the gadgets and they don’t rely on input devices. To date, there are not any compelling applications for consumers. And without applications, there are not any customers.

According to Dr. Thad Starnier, a computer science professor at Georgia Tech and a founder of Charmed Technology, the four main difficulties with wearables are battery life, interface issues, privacy and networking challenges.

In addition, the market for what’s hot in fashion can be nearly impossible to forecast. Such factors as acceptance of current products and the ability to successfully market and predict new products due to rapidly changing fashion trends will impact who succeeds in this potentially profitable market.

*“The unanswered question is — Will consumers adopt these products, regardless of how cool they are, in the near future?”*

# New Products

## Smooth Radius Needle Nose Pliers

Manda needle nose pliers are ergonomically designed with rubber grips to provide user comfort. Smooth radiused edges protect component leads and wire when forming and bending. The pliers operate smoothly, thus reducing operator shock, stress, and fatigue and improving productivity. The precision screw joint reduces internal friction and the low profile design provides superior access. Non-protruding return springs eliminate the possibility of pinching.

**Menda**

Circle (10) on Reply Card

## Static Shielding Bag

Austin, Texas—The 3M brand 1960 static shielding bag with static protective properties that exceed industry standards. Sensitive parts are protected from the static discharge, triboelectric charging and electric fields. Product failures and waste resulting from static discharge during transportation and storage are reduced.

The multi layer, laminated construction of the 1960 static shielding bag uses a 48 gauge polyester film and meets required physical and electrical requirements while providing a significant reduction in packaging weight. This reduces shipping and handling costs. The bag is flexible and conforms to its contents, reducing the probability of bag damage from sharp edges.

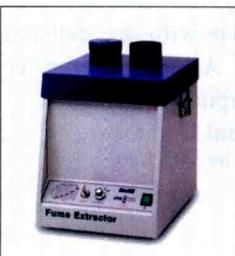
The bag is transparent and the 3M logo, product number and lot code are embossed on the side seam. A variety of bag sizes are available.

**3M**

Circle (11) on Reply Card

## Microprocessor-Based Fume Extraction

The Arm-Evac 250 from PACE, Inc. is specifically designed for soldering fume removal.



A simple-to-read graphical LED filter condition monitor changes from green to yellow to red as a filter becomes

clogged and an audible single alerts the user that filter change out is required. Additionally, the intelligent motor pump senses clogging and compensates by increasing air flow. The filter condition system self calibrates through a keyed switch, which can be removed for tamper-proof operation. The Arm-Evac 250 can effectively serve one or two workstations with a combination of Arm-Evac accessories.

**PACE**

Circle (12) on Reply Card

## Pace Announces The New VF 90 Desoldering System

Laurel, Maryland—PACE, Incorporated



introduces the new VF90 desoldering system. Combining conductive and convective methods for solder reflow and specifically designed for surface mount

printed circuit boards, the VF 90 offers a safe and effective solution for solder removal. This unit features a unique hot gas system with a long lasting stainless steel tip to remove solder from surface mount lands for component rework on printed circuit boards. The VF 90 has a variety of stainless steel tips available to meet multiple application needs.

**PACE**

Circle (13) on Reply Card

## Safety Checker Assists Service Engineers

Clare Instruments US Inc. has devel-



oped a handheld safety-checking instrument for electrical contractors and appliance engineers.

The PAC 500 is manual 'go-no-go' tester designed for simple and effective in-service checking of Class I and II electrical equipment and portable domestic appliances.

The unit performs insulation and earth continuity tests at the touch of a button, comparing test results to preset pass levels, and displaying and immediate pass/fail on the neon display panel.

The lightweight PAC 500 is supplied with all necessary test leads and a leather carrying case. Also available is a range of test accessories including pass labels, results recording cards and an extension lead adapter unit, for checking the safety of mains extension leads.

**Clare Instruments US Inc.**

Circle (14) on Reply Card

## RF Nuelink Announces Its' New SS-900 MHz Radio

RF Nuelink introduces the SS-900, a 900



MHz frequency hopping radio for the ISSM band. This unique package comes in a DIN rail mount with a RS-232 serial data port. No license required, full 1-watt RF output. Designed for industrial and SCADA operations this unit will pass data transparently as well as MODBUS and Allen-Bradley protocols. This radio complements RF Nuelink's long line of wireless data solutions. Each unit is capable of being programmed as Host, Remote, or Repeater/Remote. With wide input voltage from 9-28 VDC, it fits almost anywhere and any application. Easily connects to many off the shelf PLC's and other devices.

**RF Nuelink**

Circle (15) on Reply Card

# New Products

## Miniature Soldering Iron Tips Fit Directly Over Heating Element

A precision miniature soldering iron that features tips that fit directly over the heating element and a handle that stays cool and comfortable is available from M.M. Newman Corporation.

The Antex G/3U Miniature Soldering



Iron is designed for optimum thermal efficiency. The heating element is directly under that tip, not in the handle. Comfortable to hold for several hours

at a time the plastic handle stays cool while the tip reaches 750°F in only 45 seconds and recovers instantly after soldering each joint.

The industrial-duty Anex G/3U Miniature Soldering Iron is 6 1/2" long with the tip attached and weighs under 3/4 oz. Featuring over 40 different tip styles including spades, cones, chisels, needle points and prymaids, it is suitable for a wide variety of specialized soldering applications.

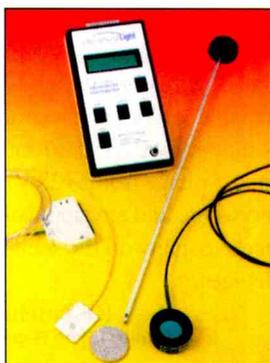
The Antex G/3U Miniature Soldering Iron is priced at \$24.75 and the tips are \$3.60 each.

**M.M. Newman Corporation**  
Circle (16) on Reply Card

## Telecom Wire Wrap Tool Kits

Telecom wire tool kits KTW224 and KTW2426 are designed to provide field service with a

complete line of tools to perform regular wraps, unwrap and strip wire gauge sets – 22&24 or 22&26, or try our new tri-wire gauge –



22, 24, & 26 or 26, 28 and 30.

The tool kit includes:

- Holster P/N TH250
- Manual wire wrap gun P/N WG200-R3279
- Wire Stripper
- Hand wrap tool P/N HWR224 or P/N HWR2426
- Bit and sleeve set P/N BR224 & S171 or P/N BR2426 & S171

**JDV Products Inc.**  
Circle (17) on Reply Card

## "SC" RF Coaxial Connectors Threaded For A Vibration-Resistant Coupling

A line of high-power RF coaxial connectors that replace "C" series bayonet types with secure threaded coupling in applications subject to vibrations is available from Tru-Connector Corporation of Peabody, Massachusetts.



Tru-Connector SC Coaxial Connectors are similar to "C" series bayonet types but are threaded to provide a secure coupling that cannot vibrate loose. Featuring a 5 KV version with overlapping Teflon® dielectrics for a longer electrical leakage path, these connectors can also be supplied in a 1 KV version with high temperature (+165C°) Fluoroloy® H dielectrics.

Designed for cables from .141" up to 5/8", Tru-connectors SC Coaxial Connectors meet MIL-C-39012 and MIL-STD-348 specs and are fabricated from brass or stainless steel and can be nickel or silver plated, with BeCu center conductors which can be gold or silver plated. They are ideal for radar and antennas systems in airborne, shipboard, and ground installations.

Tru-Connector SC Coaxial Connectors are priced from \$24.00

each, depending upon configuration and quantity. Literature and price quotations are available upon request.

**Tru-Connectors Corporation**  
Circle (18) on reply Card

## Portable Radiometer Monitors UV Lamp Performance

A portable radiometer for monitoring the real-time output of UV lamps used in applications for curing adhesives, coatings, and photoresist is available from International Light, Inc. of Newburyport, Massachusetts.

The IL1400A Radiometer for UV Lamp monitoring is a hand-held instrument that can be equipped with three separate detector probes for performing specific types of UV measurements. Featuring simple push button operation with direct readouts on LCD display, this portable unit provides NIST traceable accuracy for testing the real-time intensity of UV lamps.

Capable of in-situ measurements from mW/cm<sup>2</sup> to 20W/cm<sup>2</sup> depending upon the application, the IL1400A Radiometer for UV Lamp monitoring is



available with the RAMP "dip stick" probe for use in confined areas; the 2mm thick SuperSlim flat probe for applications where there is minimal access; and the wavelength-specific XRL probe for UV and visible spot curing systems.

The IL 1400A Radiometer for UV Lamp monitoring is priced from \$1,310.00, complete with one detector and carrying case. A catalog and price list are available upon request.

**International Light, Inc.**  
Circle (19) on reply Card

# Books

## Newnes Data Communications Pocket Book, Third Edition

ISBN: 0-7506-4991-7

Pages: 640

In Hardback: \$32.95

Woburn MA- Newnes announces the spring publication of Newnes Engineering Science Pocket Book, Third Edition by John Bird.

- Comprehensive and convenient for frequent reference in offices, workshops and studies
- Answers all those awkward questions, and includes all those half-remembered formulae
- Content matched to the demands of the latest FE syllabuses
- A compendium of key methods, formulae, diagrams and data

Newnes Engineering Science Pocket Book is a uniquely versatile and practical tool for a wide range of engineers and students. All fundamentals of electrical and mechanical engineering science and physics are covered, with an emphasis on concise descriptions, key methods, clear diagrams, formulae and how to use them. John Bird's presentation of this core puts all the answers at your fingertips.

This book and its companion title, Newnes Engineering Mathematics Pocket Book, provided the underpinning knowledge for the whole range of engineering communities catered for by the Newnes Pocket Book series.

Previous editions of Newnes Engineering Science Pocket Book were published under the title Newnes Engineering and Physical Science Pocketbook.

CONTENTS: Preface; part one- General engineering science; Part two- Mechanical engineering and physical science; Part three- Electrical engineering science; Index

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## Understanding Telephone Electronics

ISBN: 0-7506-7175-0

Pages: 416

Price: US \$29.95

Binding: Paperback  
Fourth Edition

Woburn MA- Newnes announces the spring publication of

Understanding Telephone Edition by Joseph J. Carr, Steve Winder, and Stephen J. Bigelow

- Provides comprehensive coverage of telephone system functions and the role of the Internet in telephony
- Updates encompass the trends and advances of the booming telecommunication field, with new chapters on fiber optic technology and the Internet
- Expanded coverage of new technologies in the areas of voicemail, phone networking, ISDN lines, satellite communications, wireless and paging systems, and much more.

Throughout its history, Understanding Telephone Electronics has been, by far, one of the most popular books on telecommunication electronics in the trade, electronic distribution, and educational markets because of its very simple, direct approach to technology. In keeping with the distinguished tradition of its predecessors, Understanding Telephone Electronics, Fourth Edition covers conventional telephone fundamentals, including both analog and modern digital communication techniques, and provides basic information on the functions of each telephone system component, how electronic circuits generate dial tones, and how the latest digital transmission techniques work.

The new edition of Stephen Bigelow's well-known, widely used text on telephone electronics offers comprehensive coverage of the latest developments in fiber optic technology, the convergence of telecommunications, cable-TV and Internet services, and CTI (computer telephony integration). The authors have made extensive revisions in these and other essential areas, such as business systems, voicemail, phone networking, enhanced services, satellite communications, wireless paging systems, digital communications, and much more to ensure that topics covered are current with most recent advances in technology.

The original Understanding Telephone Electronics has been a "gold standard" reference and training staple for years. Likewise, Understanding Telephone Electronics, Fourth Edition will serve as an essential and invaluable resource for technicians, engineers, stu-

dents at major universities and corporations, and anyone with an enthusiasm for telecommunication electronics.

The late Joseph J. Carr was an Electronics Engineer in avionics with US Defense Department.

Steve Winder is a BT Lab Engineer at the British Telecom Labs.

Stephen J. Bigelow is a Process Control Engineer in Bedford, MA

ABBR. CONTENTS: Ch.1 The Telephone System; Ch.2 The Conventional Telephone Set; Ch.3 Electronic Speech Circuits; Ch.4 Electronic Dialing and Ringing Circuits; Ch.5 Integrated Telephone Circuits; Ch.6 Digital Transmission Techniques; Ch.7 Electronics in the Central Office; Ch.8 Network Transmission; Ch.9 Modems and Fax Machine- Other Telephone Services; Ch.10 Fiber Optic Technology; Ch.11 Wireless Telephones; Ch.12 The Convergence of Technologies.

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## Newton Braga

ISBN: 0-7906-1234-8

Pages: 416

Price: US\$29.95

Binding: Paperback

Price: \$39.99 US/\$63.95 CAN

CMOS (Complementary Metal Oxide Semiconductors) are an essential part of almost every electronics component and are not typically understood. Braga takes the concepts from the legendary CMOS Cookbook from Don Lancaster (originally published by Sams/Macmillan) and brings them into the 21st Century with this new and different look at CMOS IC technology.

**Prompt® Pointers:** An updated look at an essential technology, CMOS, which is not often covered. Covers CMOS from theory to design applications. Perfect for students as well as experienced designers.

**Related Titles:** Electronic Cookbook Series: DSP Filters, ISBN 0790612046. Sourcebook for Electronics Calculations, Formulas, and Tables, ISBN 0790611937.

**Author Information:** The creator of the Brazilian edition of Popular Electronics magazine, Newton Braga is currently the technical director of two Latin American electronic magazines. Revista Saber Electronica and Electronica Total. Braga has authored over 50 books in the US and South America.

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# Association News

## **ELECTRONICS TECHNICIANS ASSOCIATION-INTERNATIONAL REACHES MILESTONE**

ETA-I has reached a landmark milestone in its history by successfully administering its 10,000th Certified Fiber Optics Installer Certification (CFOI).

The honor of being the historic technician has fallen to James A. Dillinger, CFOI, of New London, Connecticut. James is in the United States Navy, and has been for the last 12 years. He took his required Fiber Optics course with KITCO Fiberoptics of Virginia Beach, Virginia, an approved ETA-I Fiber Optics Training Facility. James commented that the subjects and topics covered comprised "some of the best courses I've ever taken". Although he could not comment specifically as to how he uses the knowledge from his course in the armed services, he says he has no doubt it will be useful for the duration of his time in the Navy, as well as after retirement.

The beginnings of ETA-I's CFOI courses and certification can be traced to 1996, when ETA-I got together with industry leaders and educational instructors and realized fiber optics was going to hold an important and growing position in the future of communications. The first CFOI certification was given to Tom Marler, CETsr/CFOI of Oxnard, California. Tom is also an ETA-I Certification Administrator.

The CFOI continues as one of ETA-I's most popular certifications.

Many schools, businesses and educational institutions have contributed to the success of the CFOI program. 18 of these firms have been approved as Fiber Optics Trainers by ETA-I including ECPI College

of Technology (Virginia Beach, Virginia), The Light Brigade (Kent, Washington), Texas A&M (Riverside, Texas), The Institute of Robotics (Houston, Texas), Guam Community College

(Barrigada, Guam), Honeywell Technology Solutions (Columbia, Maryland), IES Training (Glen Burnie, Maryland), Howard Community College (Columbia, Maryland), Casper College (Casper, Wyoming), Central Community College (Grand

Island, Nebraska), Texas State Technical College (Waco, Texas), Fiber Optics Services, Inc. (Suffolk, Virginia), Vector Fiber Optics (Elkridge, Maryland), Renton Technical College (Renton, Washington), Anixter (Troy, Michigan), Montgomery College (Conroe, Texas), Advanced Training Associates (El Cajon, California), Cable Links Consulting/West Hills College (Fresno, California), as well as the above-mentioned KITCO Fiberoptics (Virginia Beach, Virginia).

In addition, fiber optics courses may be taken around the country at military schools. Goodfellow AFB, Texas, the Fleet Training Centers of Norfolk, Virginia and San Diego, California, Sheppard Air Force Base in Wichita Falls, Texas, the Marine Corp Air Ground Combat Center in 29 Palms, California and the United States Coast Guard facility in Petaluma, California are all highly qualified as ETA-I Fiber Optics Trainers. To contact any of these institutions on how to become a CFOI, visit the ETA-I website at [www.eta-](http://www.eta-sda.com)

[sda.com](http://www.eta-sda.com).

A new certification for fiber optics are also being constructed at this time

by ETA-I is also creating a certification for a Fiber Optics Designer-Developer.

The CFOI examination is \$150, and includes a free re-test, if needed. This excludes the cost of the required course, which differs between the various ETA-I Approved Training Schools.

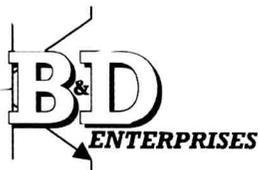
### ***NASTEC TO BE ADMINISTERED BY NESDA/ISCET***

All administrative functions for the National Appliance Service Technician Certification program (NASTeC) have been moved to the National Electronics Servicers Association (NESDA) and the International Society of Certified Electronics Technicians (ISCET).

ISCET has been the testing organization of NASTeC and will continue in that role.

The NASTeC PROGRAM HAD BEEN MANAGED BY THE Appliance Technician Certification Association (ATCA), an industry consortium including the North American Retail Dealers Association (NARDA), the National Association of Service Dealers (NASD), NESDA and the Independent Appliance Servicers (NIAS).

The ATCA had operated from the NARDA offices.



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## **National Electronics Industry Hall of Fame Accepting Nominees**

Mack Blakely, Executive Director of the National Electronics Service Dealers Association (NESDA), has announced that the National Electronics Industry Hall of Fame, a division of NESDA, is again accepting annual nominations in six categories for honorees who have made major contributions to the electronics industry.

The categories are as follows: 1) Scientists, Inventors and Engineers; 2) Business and Industry; 3) Communications; 4) Association Executives; 5) Industry Association Members; and 6) outstanding individuals who do not clearly fit any of the other groups. Only one honoree may be selected from each category per year.

One of the most important functions of the Hall of Fame is to select and honor new members through a nomination process that will be open to the entire electronics industry. A downloadable nomination form is available online at the Hall of Fame's new website, [www.eihof.org](http://www.eihof.org). Anyone knowing of a worthy nominee is encouraged to visit the website, download the form, and submit it for consideration. The form may be printed and returned with a \$150 application fee.

"The Electronics Industry Hall of Fame has had a rich history, beginning in 1969 under the auspices of NESDA and through the dedicated work of Larry

Steckler EHF," said Hall of Fame President and Chairman of the Board Dorothy Cicchetti EHF. "Its original purpose was to honor those individuals who have made outstanding contributions to the electronics industry or served as inspiring examples for others to follow. The website will offer an improved opportunity for nominations of worthy individuals and will help the Hall of Fame move into a new era."

The Hall of Fame is a not-for-profit corporation chartered in Texas, and accepts donations to assist in its operations. Contact: NESDA office at (817) 921-9061.

## **New Certified Service Centers**

Four service centers have recently completed the process of becoming Certified Service Centers through the new CSC Program.

**Delta Electronics**  
Dennis Mills  
NESDA Member  
San Angelo, TX

**Electronic Specialists**  
Daniel Champion  
CET/CSM/CA-  
NESDA Member  
Lansing, MI

**Glass Antenna Service**  
Greencastle, IN

**United Radio Service**  
Jim Fellows  
CET/CSM/CA-  
NESDA Member  
Syracuse, NY

For information on becoming a CSC, contact NESDA, ETA-I, CEA, NARDA, PSA OR United Servicers Association.

## **ES&T Calendar of Industry Events**

AFSMI NJ Metro  
Exelon Dinner Meeting  
April 3  
Headquarters Plaza Hotel  
Morristown, NJ  
[www.afsmi-nj.org](http://www.afsmi-nj.org)

NAB Multimedia World Conference  
April 5-10  
Las Vegas Convention Center  
Las Vegas NV  
[www.nab.org](http://www.nab.org)

Nesda/TEA  
School of Service Management  
April 24-26, Harvey Hotel  
Dallas TX  
[www.nesda.com](http://www.nesda.com)

EDS-  
Electronic Distribution Show and Conf.  
May 13-15  
Las Vegas, NV  
[www.edsc.org](http://www.edsc.org)

PS.C - Professional Servicers Org. of CA  
49th Annual Convention  
May 16-17  
Sacramento CA  
[www.professional-servicers.com](http://www.professional-servicers.com)

Connected Home  
May 21-23  
Baltimore Convention Center  
Baltimore, MD  
[www.connectedhomeevent.com](http://www.connectedhomeevent.com)

Home Entertainment Show  
June 5-8, Westin St. Francis  
San Francisco, CA  
[www.homeentertainment-expo.com](http://www.homeentertainment-expo.com)

CeBIT America  
Conference & Expo  
June 18-20  
Javits Center  
NY, NY  
[www.cebit-america.com](http://www.cebit-america.com)

VPEA  
Mid-Atlantic Electronics Conference  
June 20-22  
Dover, DE  
[Vpea.exis.net](http://Vpea.exis.net)

NPSC-National Professional Service  
Convention and Trade Show  
July 16-19  
Sparks, NV  
[www.nesda.com](http://www.nesda.com)

CEDIA- Custom Electronic Design &  
Installation Assoc.  
Sept. 3-7  
Indianapolis, IN  
[www.cedia.org](http://www.cedia.org)

Electronic House Expo Fall  
November 10-13  
Long Beach CC  
Long Beach CA  
[www.ehexpo.com](http://www.ehexpo.com)

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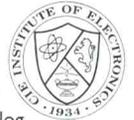
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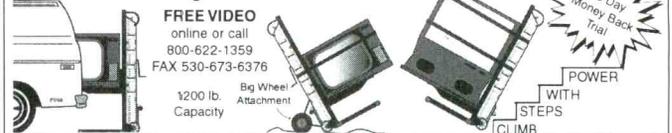


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**SENCORE** refurbished equipment for sale. (All Models) Like new and fully warrantied! Financing, Visa and M/C. 800-609-0677 ask for Lance Tople.

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**FURTHER PRICE REDUCTION!** New Diehl Mark III \$29, Diehl Mark V Horizontal circuit tester \$99. Conductive coating for remote control keypads \$9.99 ppd. WEEC, 2411 Nob Hill Road, Madison, WI 53713. 608-238-4629.

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Tektronix oscilloscope, model 453, 50 MHz, Dual trace, with manual and probe, \$300 plus shipping. Fordham sweep function generator with manual and probes. \$100 plus shipping. Heathkit AC operated digital multimeter with manual and leads, \$50 plus shipping. Popular and radio electronic magazines 1989 to 2000; all 71 magazines for \$30 plus shipping. Service manuals and Sams photo facts, and TV parts. Send SASE for list and prices. ES&T magazines 1976-2000, all 276 magazines for \$200. John Brouzakis, 247 Valley Circle, Charleroi, PA 15022, 724-483-3072.

Heath microcomputer trainer ET-3400 with manual asking \$70 or best offer. Call Sidney 510-357-3788.

Telematic Universal Test Rig, 19" pix tube, for tube and solid state servicing, with complete set of manuals, assortment of 30 adapters, convergence loads, pix tube adapters, etc., 1 Telematic transverter and 1 Zenith transverter, year 1977. \$100, can't ship too big, must be picked up. Have 18 Sams TSM manuals between 1 & 121, and 2 scanner book manuals, and 5 TR tape recorder book manuals. Wallace W. Huffman, 2579E 550N, Warsaw, IN., 46582-7183, skyhawk@maplenet.net, Phone: 574-453-4811.

Set of AR Auto radio repair manuals. AR-5 to AR-340, \$350 or offer plus shipping. BK 1077B TV analyst with manuals ect. \$100 plus shipping. Email wa7yzo@vcn.com.

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Altec 350A Power Amplifier, service manual containing schematic diagram and parts list for 3M model MP8660 LCD projector. Thomas Rocheleau, P.O. Box 132, Franklin, MA 02038, 508-528-3061, between 6-10pm ET.

A schematic and service manual for projection TV novabeam — Model 100 serial # C03330 — Manufactured in West Germany by ITT/SEL for Kloss Video Corp. — Cambridge, Massachusetts. Please write to — Mike Noto, 23 Thayer Place, S.I. NY 10306, or Call 718-667-4005, e-mail L1mag@tt.net.

Copies of Sylvania Chek-A-Color setup manuals 1982 or later editions. Sylvania adapters: B234, B237, B239, B244, B247, D482, D4124, D4153, D4160, YP2, YP2A, and YP4. Cross reference chart of Sylvania and RCA Telematic adapters. Also wanted adapters for RCA Telematic Test Jig 10J106. Robert J. Blackwell, Blackwell's TV, 2925 Riggs Ave, Baltimore MD, 21216, 410-362-6678, Fax: 410-362-6674, blackwellbob1@msn.com.

Service literature for Ballantine 6130A-101 Time Mark generator. Equal to AN/USM-441. Call Richard Gilman, P.O. Box 633, King City, CA 93930, 831-385-9248.

Wanted To Buy. B&K Model 1076 B&W and color television analyst with manual. Walter L. Hughes, P.O. Box 25, Berryville, VA. 22611. 540-955-2635.

Need Sony B+ Regulator module, (DM36), part# 123597111 or 123597112 for model-KV27HFR. Contact Mark at 864-560-6435 (work), 573-5506 (home).

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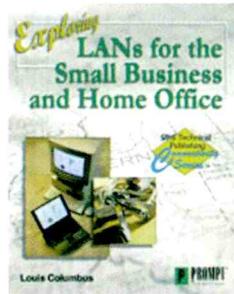
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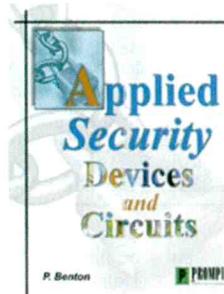


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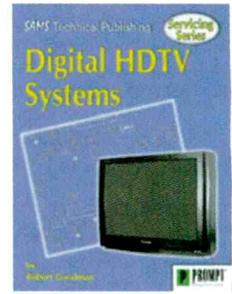
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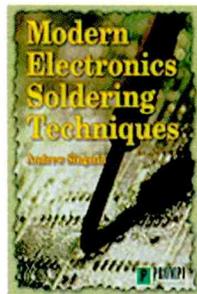


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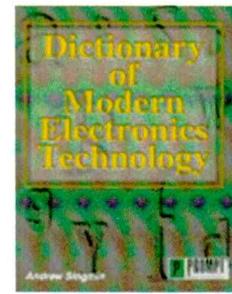


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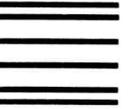
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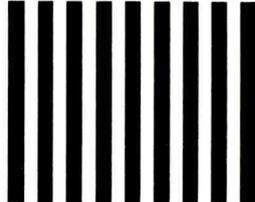


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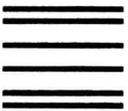
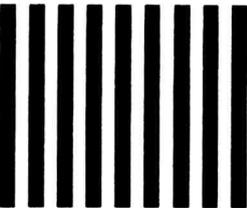
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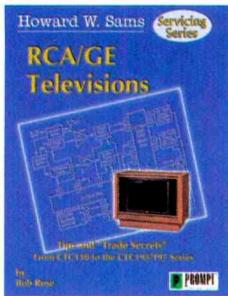
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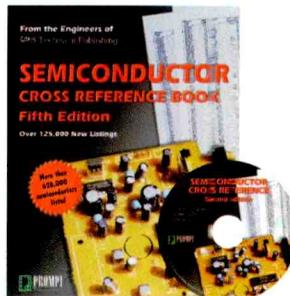
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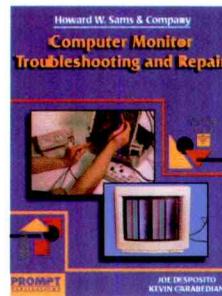
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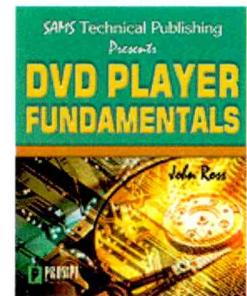
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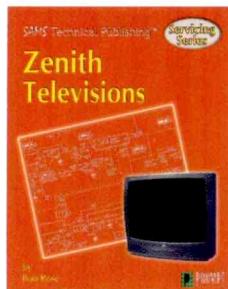
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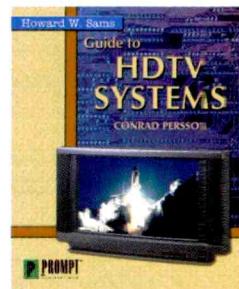
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