THE MAGAZINE FOR PROFESSIONAL ELECTRONIC AND COMPUTER SERVICERS

ELECTRONIC™

Servicing & Technology

April 2002

SERVICING THE DEAD TV/VCR CHASSIS

INTERMITTENT START-UP SYMPTOMS IN TVS

NEW TECHNOLOGY UPDATE — PART1:
- **THE INTERNET**
- **GAMES**
- **HOME THEATER**

TEST PROBES & ACCESSORIES

REMOVING & REPLACING SMDs

DISTRIBUTOR SHOWCASE
AN ADVERTISING SECTION

PROFAX
PANASONIC TELEVISION
4187

U.S. $3.95

ES&T WHOLE HOUSE ELECTRONICS VIDEO TRAINING

BEGIN TRAINING TODAY... Order Your Video Toll Free 800-462-4659

For professional servicers who are increasingly involved in home theater, Smart home and networking installations and maintenance, ES&T introduces this series of training videos from THE TRAINING DEPT. Each training course provides in-depth instruction on the fundamentals, planning and installation. Every training course is complete with a WORKBOOK, an EXAMINATION to test your comprehension, a BLANK ANSWER SHEET, and an ANSWER KEY. Skill Builders focus in-depth on a specific topic or skill.

Order TOLL FREE!
800-462-4659
VISA, MC, AMEX and DISCOVER

All items shipped FedEx Ground in U.S.
We will advise S&H for non U.S. shipments.

Outside U.S. Call: 516-883-2154

Order by Fax or Mail
VISA, MC, AMEX, DISCOVER
Include Credit Card# and expiration date.
Checks and Money Orders accepted
(U.S. funds only).
Make your selection and indicate your name. address and telephone number with order.

***ES&T* Customer Service**
P.O. Box 748
Port Washington, NY 11050
Fax: 516-883-2162

All videos come with a 100% GUARANTEE! If you are not satisfied you may return your purchase within 30 days to receive a full refund less S&H charges.

Residential Retrofit Wiring
Training Course

This 2-hour 30 minute course teaches everything you need to know to perform retrofit wiring installations. It includes basic principles of house construction, house framing types, retrofit tools, and retrofit installation techniques. It takes you through three complete residential retrofit wiring projects, each a different house construction type.

TC-03 $ 195.00

FedEx Ground S&H.....$12.50

Residential Infrastructure Wiring
Training Course

This 2-hour 45 minute course teaches everything you need to know to install structured wiring in new construction. It covers basic wire and cable principles for home networks and audio/video distribution, installation planning, and takes you through three complete residential installations from prewire to trim-out.

TC-01 $ 195.00

FedEx Ground S&H $12.50

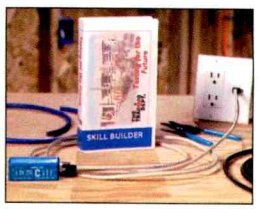
Residential Installation Basics
Training Course

This 2-hour course lays the foundation of technical knowledge needed for successful performance in residential installation. It also helps prepare for low voltage testing such as the CEDIA Installer Level 1 Exam. Topics covered include Safety and Codes, Wire and Cable Basics, Connector Types and Installation, Basic Installation Techniques, Equipment Installation Requirements, and Basic System Operation.

TC-04 $ 195.00

FedEx Ground S&H.....$12.50

Testing for the Future
Skill Builder

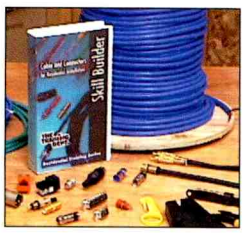


In 45 minutes learn the theory, equipment, and techniques to perform field testing of typical residential infrastructure cables. This video covers static and dynamic testing of TP, coax, and fiber optic cable. It also covers complete certification testing techniques and test equipment for CATEGORY 5 cable.

SB-01 $ 59.00

FedEx Ground S&H.....$12.50

Cable and Connectors
Skill Builder

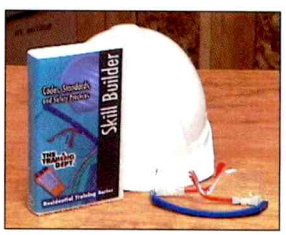


This 1 hour video is designed to teach the professional installer everything they need to know about the cable and connectors used for residential installation, including infrastructure wiring, security, audio, video, and home networks. The video covers cable characteristics and application areas, proper connector use and field and shop connector installation.

SB-05 $ 59.00

FedEx Ground S&H $12.50

Codes, Standards, and Safety Practices
Skill Builder



This 45+ minute video covers all codes and standards applicable to residential low-voltage system installation. It includes NEC requirements for grounding, electrical safety, cable listing, OSHA required site safety practices, UBC regulation, as well as TIA, EIA, and IEEE standards that affect residential installation.

SB-04 $ 59.00

FedEx Ground S&H. $12.50

Wiring Your Home for the Future
Consumer Education

This 23-minute video introduces the concept of state-of-the-art residential infrastructure wiring, or "structured wiring", and how it is installed and used in the home. It explains the coming wide bandwidth services and why "traditional wiring" is inadequate. It educates the viewer on the benefits and applications that structured wiring brings to the home.

CO-01 $ 29.00

FedEx Ground S&H.....$12.50

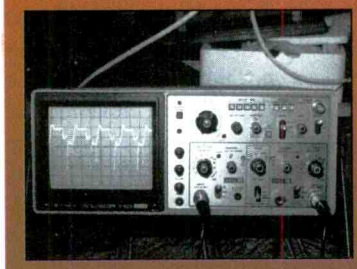
CALL TODAY 800-462-4659

THE MAGAZINE FOR PROFESSIONAL ELECTRONIC AND COMPUTER SERVICERS

ELECTRONIC Servicing & Technology

Volume 22, No. 4 April 2002

CONTENTS



FEATURES

SERVICING ITTERMITTENT AND START-UP SYMPTOMS IN TV'S ____ 7
By Homer L. Davidson
Intermittent problems are among the most difficult to solve, but when intermittent problems are combined with start-up problems the difficulty is compounded. Homer takes you through all the steps towards efficient solutions.

SERVICING THE DEAD TV/VCR CHASSIS ____ 13
By Homer L. Davidson
While the cause of a dead TV/VCR combo is most likely a defective power supply, there are a number of other suspects. Homer reviews the symptoms and clues to solving the problem.

TEST PROBES AND ACCESSORIES ____ 18
By ES&T Staff
Changes in the basic building blocks of electronics have forced changes in test equipment, test probes, and accessories used for troubleshooting. The ES&T staff reviews the changes and opportunities for the technician.

DISTRIBUTORS - THE SERVICERS PRIMARY SOURCE ____ 22
An Advertising Section
Distributors and product availability through distribution are critical for the professional servicer. This advertising section reviews a number of vendors, their operations and offerings.

REMOVING AND REPAIRING SURFACE MOUNT DEVICES (SMDS) ____ 34
Adapted from Toshiba America Consumer Products
With the demand for smaller and lighter products, consumer electronics manufacturers have increasingly used integrated circuits that incorporate large numbers of functions into a single IC package. These products often create difficulties for the professional servicer attempting to troubleshoot, remove and replace these packages.

CONSUMER ELECTRONICS PROFILE - SENCORE ELECTRONICS ____ 36
Our series on key manufacturers profiles of interest to the professional service community continues with this look at Sencore, Inc.

NEW TECHNOLOGY UPDATE, PART 1. ____ 38
The Internet, Games, Home Theater
This technology update from the Consumer Electronics Association provides the Professional Servicer with useful information on where the business is and where it is going.

DISTRIBUTOR SHOWCASE
AN ADVERTISING SECTION

DEPARTMENTS

Advertisers Index 56
Association News 53
Classified 55
Display Classified 55
Editorial 2
Literature 52
New Products 50
News 5
Photofact Index 52
Profax 25
Reader's Exchange 56

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.

Electronic Servicing & Technology Magazine
403 Main Street, 2nd Floor
Port Washington, NY 11050 USA
516-883-3382 Fax 516-883-2162
mmei@mainlymarketing.com

EDITORIAL
Editor: NILS CONRAD PERSSON
P.O. Box 12487, Overland Park, KS 66212
913-492-4857
cpersedit@aol.com

CONSULTING EDITORS
TV Servicing Consultant: BOB ROSE
TV Servicing Consultant: HOMER L. DAVIDSON
Components Consultant: VICTOR MEELDIJK
Audio Consultant: ALVIN G. SYDNOR

BUSINESS
Publisher: MARIE MARCELLINO
mmarcellino@mainlymarketing.com

President: DAVID L. ALLEN
dallen@mainlymarketing.com

CIRCULATION
Circulation Coordinator: GEORGINA MARTINES
Tel: 516-883-3382
admin@mainlymarketing.com

PRODUCTION
Production: JENNIFER COSTELLO
jcostello@mainlymarketing.com

SALES
Sales Director: DAVID L. ALLEN
Tel: 516-883-3382
dallen@mainlymarketing.com

Classified/Display Classified: LYNDIANE PAOLETTI
Tel: 516-883-3382
admin@mainlymarketing.com

Sales Coordinator: LYNDIANE PAOLETTI
admin@mainlymarketing.com

FOR SUBSCRIPTIONS *— new or renewal — use our subscription website:*
www.electronic-servicing.com

Electronic Servicing & Technology (ISSN 0278-9922) is published monthly by Mainly Marketing, 403 Main Street, Port Washington, NY, 11050. Telephone 516-883-3382. Periodical class postage paid at Port Washington, NY and additional offices. Canada: Postage agreement number 1885766. Subscription prices (payable in US dollars only): Domestic—one year $29.95, two years $55.95, three years $75.95. Canadian—one year $39.95, two years $75.95, three years $105.95. Foreign Air Post—one year $49.95, two years $95.95, three years $134.95. Allow six weeks for delivery of first issue and for change of address. Entire contents copyright 2002 by Mainly Marketing. Electronic Servicing & Technology or Mainly Marketing assumes no responsibility for unsolicited manuscripts.

Printed in the United States of America.

Postmaster: Please send change of address notice to Electronic Servicing & Technology, 403 Main Street, Port Washington, NY 11050.

ETA CEDIA NESDA Dealers Association, Inc. Member, Electronic Servicing Dealers Association

Editorial

by Nils Conrad Persson

AN END TO WIRE AND CABLE CLUTTER?

Imagine a home without wires (well, except for electrical power wires and cables). The DVD player is situated conveniently near the person who's controlling it. Across the room, the TV/monitor is faithfully reproducing the picture produced by the DVD player, and the home theater receiver is faithfully reproducing the full rich theater sound, but there are no wires between the DVD player and either of those units. No wires going under the floor or over the ceiling between the units. No wires snaking under the carpet or along the baseboard. No wires.

And take another look. The audio signal from the home theater receiver is arriving at the speakers, producing the full spectrum of the original theater sound, but there are no wires from the amplifier to the speakers either.

Now take a walk upstairs. Junior is in his bedroom watching the same video on the TV there. Again, there are no wires leading from the signal source in the home theater room to the bedroom.

How is this possible? The magic that makes all this possible (and don't go away, there's more) is a technology called ultrawideband. Oh, and I guess I should tell you before I go any further, all of what I've just described is somewhere in the future, but a number of companies are working hard now to make it happen.

According to an article in the September 2002 issue of "Technology Review," MIT's Magazine of Innovation, in the 1960's scientists in the military first started to experiment with ultrawideband. in trying to find some way to be able to detect objects with radar that might be on the other side of an obstacle, such as a stand of trees. According to theory, extremely short pulses of radio energy contain frequencies that represent a broad segment of the radio spectrum. The experimenters figured that some of those frequencies ought to be able to penetrate the obstacle. They were right.

A lot has happened since those early experiments, but one of the results is that some smart people figured that if this would work for radar, why wouldn't it work for other radio-frequency signals? Again, the answer is affirmative: it does work.

Ultrawideband radios emit radio waves in extremely short bursts: picoseconds, or even nanoseconds (billionths, or trillionths of seconds). The spectrum of each pulse involves many GHz of the radio spectrum. Information is transmitted by modulating those pulses in some way.

Interestingly, this technique results in radio devices that not only not more expensive than conventional radio devices, but in radio devices that are actually less expensive than their conventional counterparts. Ultrawideband devices don't require tuning circuits, which require quite a bit of costly hardware.

Ultrawideband could be available commercially by 2003, but experts say that it will probably be five to seven years before it is in widespread use. If, that is, it ever becomes commercially available.

Ultrawideband technology has its opponents. Even though ultrawideband operates at only 200mW (peak), airlines, GPS manufacturers, cell phone companies and a few others have voiced their concerns that wideband technology has the potential to interfere with the signals used by all of these technologies because of the wide bandwidth of the signals it generates.

If ultrawideband does become commercially viable, electronics in the home will certainly take on a different look. The tangle of wires behind the TV/VCR/DVD/home theater amplifier will disappear.

Oh, yes, earlier in this editorial we promised you more than the effect this would have just on the home's entertainment products. Ultrawideband is capable of data rates up to 100Mbytes per second. That means that computers and peripherals would be able to communicate without wires using this technology. I may be going out on a limb here, but if the technology becomes as inexpensive as I inferred from that article, it might be less expensive to connect computer devices with ultrawideband than with wires. Not only that, if the technology becomes as inexpensive as seems to be thought possible, ultrawideband might be built into all consumer electronics and computer devices.

There goes the clutter of wires and cables that has been the bane of computer users everywhere. Moreover, this same technology will make it possible for two or more computers to communicate at extremely high data rates. In other words, it's a nifty technology for networking computers.

As you may recall, in the past we have mentioned some other wireless schemes: Bluetooth, IEEE 802.11a and IEEE 802.11b. So how does ultrawideband compare to those other wireless systems? Ultrawideband has about the same range as Bluetooth (about 30 feet), but at 100Mbits per second compared to about 1Mbit per second, it's about 100 times as fast. It's also several times as fast as IEEE 802.11a (30Mbits per second) and IEEE802.11b (6Mbits per second). Both of those standards have greater range than does ultrawideband: 150 feet for 802.11a and 300 feet for 802.11b.

Oh, yeah, one more thing. Those other technologies are available now. Ultrawideband isn't expectected to be available until 2003.

So, what are the implications of ultrawideband for consumer electronics servicers. Well, for starters, if at some time in the future this becomes some kind of standard for interconnections between consumer products, it will add to the circuitry that servicers must be prepared to deal with. There will, therefore, be education considerations.

Another implication is the change in effort to install a home theater system or a distributed audio video system. A lot of servicers just don't want to become involved in punching holes in walls, fishing wires, and all the other activities surrounding installation/construction. If the wires go away, installation becomes strictly a matter of locating the components and making sure they work together properly. A lot more service centers might be interested in becoming involved in that end of the business.

Every time a new technology relating to consumer electronics comes down the pike it's a good idea for service centers to at least keep one eye on it until it either is integrated into the world of consumer electronics, or goes away. We'll be helping you keep an eye on this one and let you know whenever we hear news one way or the other.

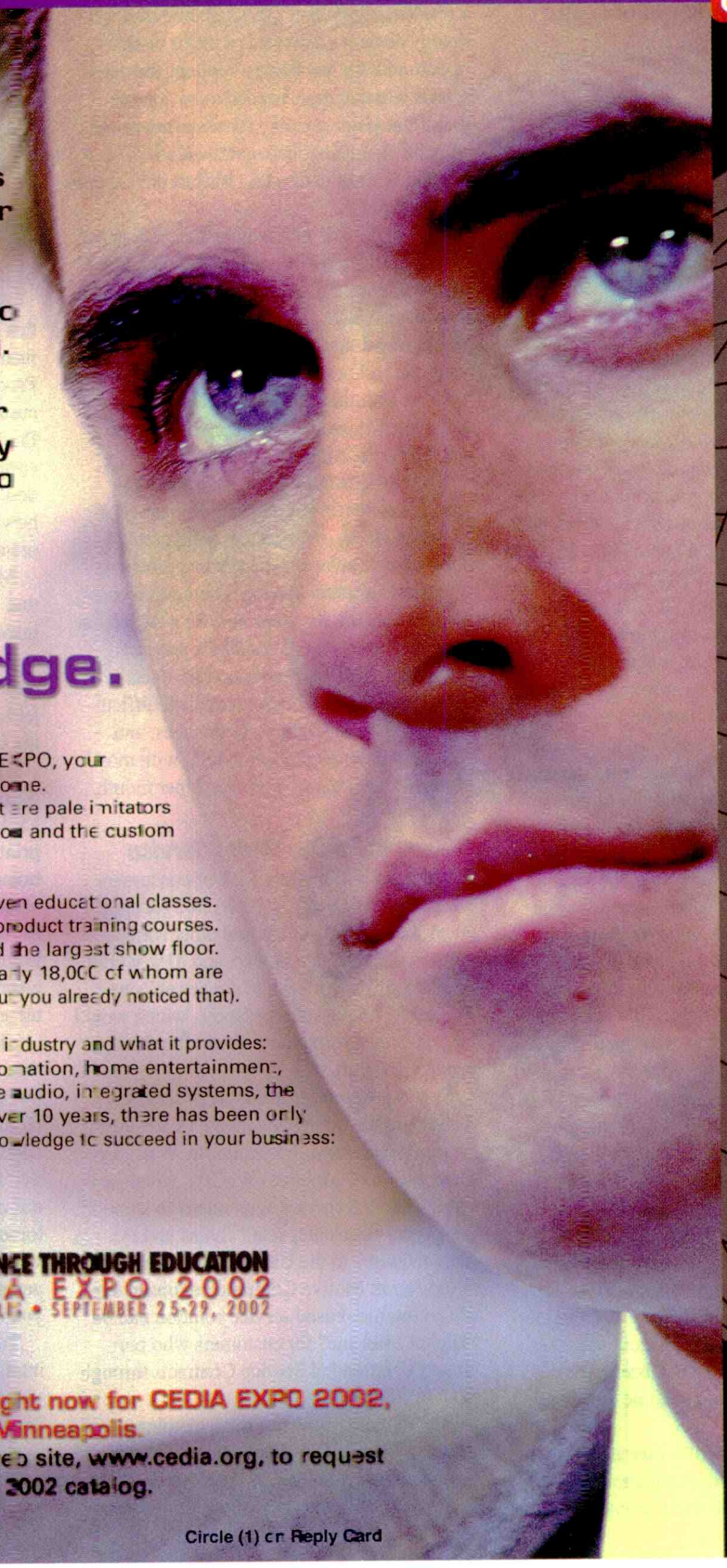
If you'd like to learn more about ultrawideband, we recommend that you find a copy of Technology Review at your library or bookstore and read the article. Or, several of the companies that are involved in this technology can be found on the internet. Here are a few of them: www.timedomain.com, www.multispectral.com, www.xtremespectrum.com, www.aetherwire.com.

Conrad Persson

It's the secret to your success.

CEDIA

CEDIA EXPO 2002



Your competitors tried to copy your marketing.

They even tried to copy your pricing.

But they've never been able to copy the real secret to your success:

your knowledge.

While you've gone to CEDIA EXPO, your competitors have stayed at home. Or they've gone to shows that are pale imitators of what CEDIA EXPO offers you and the custom electronic industry:

#1 – The most unbiased, proven educational classes.
#1 – The most manufacturer product training courses.
#1 – The most exhibitors and the largest show floor.
#1 – The most attendees (nearly 18,000 of whom are not your competitors ... but you already noticed that).

There are many names for our industry and what it provides: home networking, home automation, home entertainment, lighting control, whole-house audio, integrated systems, the connected home ... But for over 10 years, there has been only one name you trust for the knowledge to succeed in your business: **CEDIA EXPO.**

EXCELLENCE THROUGH EDUCATION
CEDIA EXPO 2002
MINNEAPOLIS • SEPTEMBER 25-29, 2002

Mark your calendar right now for CEDIA EXPO 2002, September 25-29 in Minneapolis.
Then go to the CEDIA web site, **www.cedia.org**, to request your FREE CEDIA EXPO 2002 catalog.

Circle (1) on Reply Card

Guest Editorial

SMART HOMES WILL EXPAND YOUR OPPORTUNITIES

**By Scott Harmon,
CEO and Co-Founder of
Motive Communications, Inc.**

The current trend toward "Smart Homes" will expand your business opportunities in the coming months and years. Smart Homes - that is, homes with such products as multimedia PCs, digital cameras, printers, mobile phones, personal digital assistants (PDAs), interactive TV, high-speed Internet access, and smart appliances - are going to need an unprecedented amount of service. The technology manufacturers and large service companies cannot possibly deliver it all, and that leaves plenty of work for reliable local service companies.

The Smart Homes trend is just beginning. For example, according to high-tech research firm Cahners In-Stat/MDR, the worldwide market for Internet access devices (personal computers, mobile telephones, Internet set top boxes, and Internet and smart appliances) will grow at an overall annual rate of 41.6% in unit terms between 2000 and 2005.

The ultimate promise of these products and services is convenience. However, most technology-based products are inherently complex devices that often send even tech-savvy customers running to the phone for support.

The result is today's perpetually overburdened, understaffed call center, where technology manufacturers spend millions of dollars each year trying to manage the flood of calls and emails from customers requesting service. These requests range from basic "how-to" questions to complex technical support problems. When customers can't get through or get an answer, they often simply give up.

For customers, it's an exercise in frustration. For technology vendors, it's a serious liability that hampers their introduction of new, revenue-generating products and services. For independent service companies, it's a rapidly expanding market - consisting of affluent customers who are quite willing to pay to save time.

Customers Are Intimidated

At a recent roundtable held in San Jose, California, top executives from world-class technology companies joined editors and journalists from leading business press outlets to consider a question many had been asking: "Whatever happened to the home technology revolution?"

Attendees included senior executives from 3COM, The Internet Home Alliance, Hewlett-Packard, LINKSYS, Motive Communications, and Odyssey. While the participants agreed that the "Smart, Connected Home" - defined as a residence with multiple, interconnected technology devices - represents a major market opportunity for technology vendors, the consensus was that more needed to be done to make that vision a reality for mainstream consumers. As one participant remarked, "The revolution's not in trouble - it's just not happening fast enough."

This opinion is mirrored by the findings of two recent Harris Poll surveys* sponsored by Motive Communications, Inc., the leading provider of intelligent service software. Harris found that 92% of Americans own at least one technology product at home, but 44% are intimidated by the idea of a Smart, Connected Home because they don't understand how the technologies work.

The intimidation is often based on real-world experience, not on irrational fear. For example, Harris revealed that a staggering 51% of broadband subscribers have had problems with their customer service. A common complaint was being forced to wait for a technician to come to the home to install the service.

Overall, 38% of consumers surveyed by Harris said they encounter technical difficulties with their electronics, appliances, and computer equipment each month, with most of those averaging two problems per month.

Willing to Pay for Better Service

Harris also found that 51% of consumers would be willing to pay 10% more for appliances that had self-repair and other conveniences built into the device, and 31% would be willing to pay for 24/7 "always on" customer service for a Smart Home, which would help ease the setup process and offer timely ongoing support.

So it's not surprising that large service companies are taking advantage of advanced service technology. For example, Warranty Corporation of America (WaCA), which provides extended service agreements to some of the largest electronics retail chains and PC manufacturers in the United States, uses technology from Motive Communications to supply an Internet-based service solution named "Digital LifeLine" for customers who purchase PC Extended Service Contracts through WaCA.

But no matter how fast the technology vendors and the large service companies deploy new service technology, the rapid proliferation of Smart Homes means millions of customers will want local, personal, on-site assistance. They will buy it instead of, or in addition to, assistance from manufacturers. They place a high premium on fast, easy service - and are willing and able to pay for it.

Smart Products on the Horizon

Another trend that promises to simplify the task of supporting the Smart Home is the emergence of "smart products." A few leading communications and technology providers are beginning to deliver these products now.

What are smart products? They are products that fix themselves, instead of flashing a confusing error message or requiring a truck roll. Products with built-in services that anticipate customer needs, and offer proactive solutions. Products that deliver value-added services that customers want, and screen out information they don't need. Smart products can even figure out how to work together, and help vendors collaborate to deliver seamless service to customers.

Many technology companies have realized that the road to long-term profitability lies not in the hardware they sell, but in the services they can offer for those products to improve the customer experience. In fact, Cahners In-Stat projects that by 2004, home networking services in the US will be a $3 billion/year business.

The larger technology companies are seizing the opportunity. For example, Hewlett-Packard has launched a new program for supplying PCs, printers, and other peripheral devices to the home user - all of them interconnected and serviced as a single solution. An HP service called Instant Support automates and speeds the resolution of customer problems and questions by electronically connecting customers to highly targeted answers or to human experts.

That's certainly a lot of change over a short time span. But don't be dazzled by the technology headlines. Recognize that Smart Homes, smart products, and affluent consumers add up to a major opportunity for your company. During the next few years, you may have not only more customers, but also better customers. They have plenty of hardware and they will need plenty of help. They appreciate competent, reliable local service - and will reward you if you can provide it.

To learn more about the Smart Home and intelligent service for smart digital products, visit Motive Communications at www.motive.com.

** The surveys were conducted May 2-5, 2002, and May 17-21, 2002.*

News

RF Connectors Adds Justyn Tyme Components, Inc. to Distributor Base

SAN DIEGO, CALIFORNIA RF INDUSTRIES, announces that its RF Connectors Division has signed a national distribution agreement, covering its full line of coaxial connector and cable products, with Irvine, CA-based Justyn Tyme Components,Inc.

"We believe that Justyn Tyme's distribution strength and expertise in the electronic component markets will help drive continuing growth in sales and market share for coaxial and cable products," said Les Perlam, Vice President, Sales & Marketing, RF Connector Division.

Dan Doss,Chief Operating Officer of JustynTyme, said "This agreement will significantly expand our line of RF coaxial and cable product offerings and increase our interconnect capabilities."

Justyn Tyme (www.Justyntyme.com) specializes in electronic components, production supplies and value added services for the telecom, industrial, electronic, electro-mechanical and fiber-telecom industries throughout the USA.

RF Industries' (www.RFIndustries.com) RF Connectors division designs, manufactures and distributes radio frequency (RF) coaxial connectors used in personal communication systems (PCS), radio communications, test instruments, PC LAN's and antenna devices. The RF Neulink division designs and manufactures wireless digital data transmission products for industrial monitoring, linking wide area networks, GPS tracking and locations systems.

Warrrantech Centralizes in Buford Texas

Warrantech Corporation announces the signing of a 10-year lease agreement in the city of Bedford, TX, where it will relocate its corporate headquarters and centralize other operations.

Warrantech said that by October 1, 2002, it expects to occupy a new 56,700 sq. ft. facility, which will house its corporate headquarters; sales, marketing and administrative personnel for its automotive, consumer products and international warranty businesses; and a direct marketing operation that eventually will house a 400-seat call center.

"We are most pleased to welcome Warrantech and its more than 400 employees to the City of Bedford," said John F. Murphy, mayor of Bedford. "The company's relocation reflects Bedford's growing reputation for our excellent quality of life, top notch city services, a safe living environment in which to raise a family, and a great place to conduct business."

Warrantech will be the anchor tenant at its new facility located at 121 Airport Center II, 2200 Highway 121 in Bedford.

Spectrascan acquired by Desco Industries

Desco Industries Inc. of Chino, California has acquired the assets of Spectrascan International Inc. Spectrascan manufactures test and monitoring equipment used in the manufacture of ESD sensitive components in electronic devices and assemblies.

Desco Industries, Inc started almost 50 years ago by John A. McDonald who developed a multiple-purpose continuity and voltage tester for electrical circuits. He and a partner formed the Delta Electrical Specialty Company (DESCO) to manufacture and sell the device. This first product was the Circuitracer.

In 1990, Desco acquired Charleswater Products.

In 1979 John McDonald sold the company. The product line expanded into ESD control, which is the primary focus today.

Plastic Systems in Marlboro, MA was acquired in 1994 as primarily a direct seller to the end user.

In 1996 Desco acquired Rochester USA manufacturer of foot grounders and in November 1999, Pilgrim ESD Technologies, a manufacturer of specialized testing devices, was acquired.

Sony's President and COO Kunitake Ando to Deliver Morning Keynote at 2003 International CES

The International Consumer Electronics Show (CES) announces that Kunitake ("Kuni") Ando, the president and COO of Sony Corp., will deliver the 2003 International CES Opening Keynote Address on Thursday, January 9 at 8:30 a.m. in the Las Vegas Hilton Theater.

We are particularly delighted to have Kuni Ando share his vision for an ubiquitous value network in the broadband era - along with the progress Sony is making in this regard - with the industry and our CES audience", said Gary Shapiro, CES President and CEO.

M-tron Appoints Glen White Associates as Manufacturer's Representative

M-tron Industries, Inc. has announced the appointment of a new manufacturer's representative. Glen White Associates (GWA) will handle M-tron's entire line of frequency control devices in Georgia, North Carolina, South Carolina and Tennessee. GWA has offices in Huntville, AL, Duluth, GA., Raleigh, N.C., and Huntersville, N.C.

Gary Miller, M-tron's National Sales Manager, stated that "GWA brings a wealth of knowledge and experience of the Southeast territory to the table." GWA's exposure to customers in Telecommunication, as well as Computer, Military, Medical, and Instrumentation fields will strengthen the Southeast markets for M-tron. A plus for M-tron is GWA's relationships with M-trons authorized distributors: Arrow, All American, Dove and Pioneer.

CEBIZ PARTNERS WITH INTELLINET CONTROLS

Newmarket, NH, 2002- IntelliNet Controls, a marketer of whole house audio distribution systems, has retained the services of CEBIZ LLC, a marketing consulting firm to research and identify market opportunities for IntelliNet Controls' key strengths, develop a creative marketing strategy and then help implement that strategy.

The company initially commissioned CEBIZ in spring of 2002, to conduct an in-depth audit of the brand that also included a comprehensive marketing plan.

According to Sergio Batista, Director of Market and Product Planning for IntelliNet Controls:

"We are delighted to have the resources of such a talented and experienced firm like CEBIZ on our team. I believe they possess unusually keen insight and understanding of technology, the specialty marketplace and its channels. Along with our dealers and representatives, we appreciate their professionalism as well as their commitment to make a real difference to the brand."

Mr. Batista went on to add: "The CEBIZ marketing audit is indeed powerful and will serve as a clear blueprint for IntelliNet Controls to develop a successful plan for the future."

John Caldwell, noted industry executive and one of the three principals at CEBIZ, commented: "CEBIZ is truly excited to be working with IntelliNet Controls. The technology and people behind the brand are second to none." Mr. Caldwell added:

"Our research audit was particularly effective because key reps and dealers were able to talk to us freely. That enabled us to go deeper in our research than ever before and ascertain what the market truly wants. Several distinct marketing and program recommendations have now been woven into IC's plan and we are eager to help implement them."

CEBIZ is a full-service marketing development and consulting firm run by CE—industry veterans John Caldwell, Chris Esse, and Kevin St. John Leja.

IntelliNet Controls is a Russound company, based in Newmarket, New Hampshire.

HomeRF Discloses Future Plans at CONNECTIONS 2002

The HomeRF Working Group disclosed its future plans and revised messaging during its open house that was held in conjunction with CONNECTIONS 2002: The International Home Networking and Gateways Showcase.

Work has already begun on the future HomeRF 2.1 specification, which will add features designed to reinforce HomeRF voice advantages Planned enhancements also allow HomeRF to complement other wireless standards, including 802.11.

Future HomeRF Plans using 2.4 GHz

More Active Handsets
More Range
Voice Roaming .
Increased Data Capacity .
Adaptive Frequency Hopping

Revised HomeRF Messaging

The group continues to stress HomeRF's ability to converge voice, data, and entertainment applications but is now placing much more emphasis on Voice.

Telamatics 2000 Inc

Telamatics 2000 Inc of Farmingdale NY has recently acquired all inventory and equipment from the former Telematic Company.

According to Pat Viscardi, Electronic Software Developers, "this acquisition enables us to expand our television and projection TV repair kits business and offer the service dealers a new source for purchasing adapters for the popular 10J-4000 series as well as replacement parts for their current test jigs."

Telamatics 2000 Inc will also be carrying the Polaris High Voltage Probes, CRT Adapters, Picture Tubes & Extension Cables for the test jigs, according to Viscardi.

Long range plans at the firm include working with the manufacturers to develop new adapters for 32" & up direct view sets, projection televisions and to develop adapters that will assist the technician with the sets of the future.

Correction!

In translating the Article on RCA's CTC 187 by Homer Davidson in the March issue we ran into one of those computer glitches that shouldn't happen and certainly should not have be missed by us. All of the "(c)" symbols should have been "?", and all of the "o"(degrees) should have been "µ". Our apologies to Homer and thanks to Mike Danish of Mikes Repair.

RUSSOUND EXPANDS DEPARTMENT OF EDUCATION

Russound, manufacturer of a/v products for the residential systems and connectivity markets, announces two new training appointments as part of the company's Department of Education. Philip Volk was tapped for the newly created position of Western Regional Training Specialist while Ron DeMille was promoted to Eastern Regional Training Specialist.

Servicing Intermittent and Start-Up Symptoms in TV's

by Homer L. Davidson

Intermittent problems in a TV set are among the most difficult problems to solve, but when intermittent problems are combined with start-up problems, the difficulty is compounded, and TV servicing becomes very difficult indeed, consuming a great deal more service time. Bad solder connections at the printed circuit board and component terminal can cause a dead-no power up symptom.

In the case where the TV chassis becomes intermittent, turning off and then back on several times, the problem may be caused by defective diodes. An increase in resistance of a resistor, or an invisible crack in a resistor, may cause an intermittent start-up. The symptom might be something like this: the set might go off and on for several minutes before start up and finally the chassis decides to operate.

Intermittent start-up problems might be caused by a defective regulator transistor within the low voltage power source. In this condition, the chassis might operate for 10 to 20 minutes and the next time will not start up at all. A bad relay driver transistor might produce a intermittent start-up symptom. Blobs of solder and improperly soldered jumper wires can cause a pulsating on and off symptom with intermittent start-up operation.

If you encounter a situation in which the high voltage crackles at first, then the chassis appears dead and will not power-up, you might find that the problem is caused by a bad EEPROM IC. The chassis that is slow to come on, intermittently dead and may come on in two or three hours may be caused by a bad soldered pin connections on the horizontal transformer or flyback. The list of symptoms goes on and on.

Dead-no power-up

In most cases, you'll find that failure to power-up, or intermittent start-up problems, are caused by defective components in the horizontal and low voltage power supply circuits. A quick look at the waveforms in the horizontal sweep circuits can confirm a defective horizontal circuit. Critical voltage tests in the low voltage power supply circuits can identify a defective component. When an RCA CTC187 chassis came in with no power-up symptom, a no waveform or voltage test could not possibly locate the defective no-power-up symptom (Figure 1).

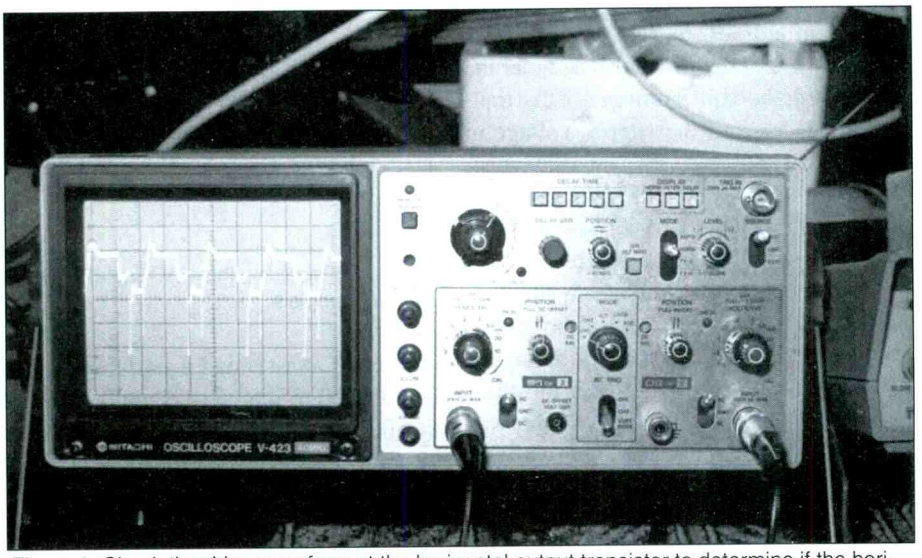


Figure 1. Check the drive waveform at the horizontal output transistor to determine if the horizontal circuits are functioning.

The 7.5V voltage source from the low-voltage power standby circuits must operate before the 7.5V is fed to pin 22 of the IC T-chip (U1001). A quick measurement of the voltage on pin 22 can indicate if a standby voltage is fed to the T-chip that controls the horizontal output circuits. A quick observation of the waveform present at pin 24 of the output terminal of U1001 indicates whether or not the IC is putting out a drive waveform. Presence of the horizontal drive waveform at the base terminal of the horizontal output transistor (Q4401) shows that the horizontal circuits are nor-

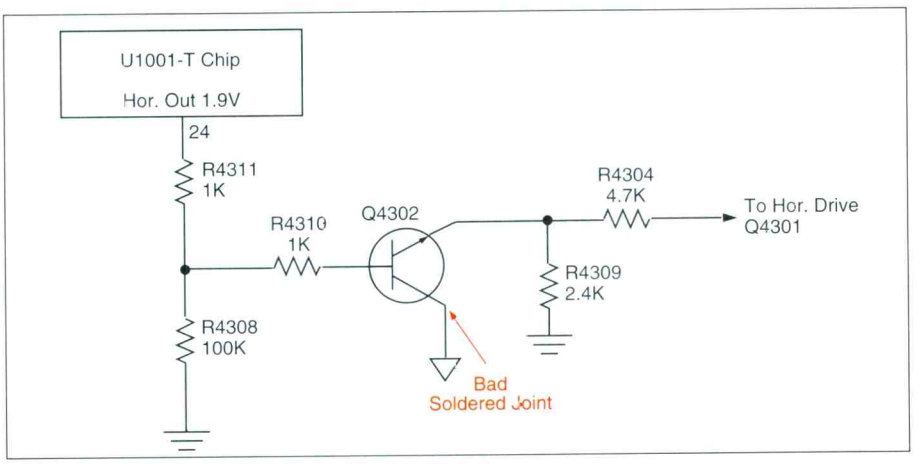


Figure 2. A poorly soldered connection on the collector terminal of Q4302 caused a dead-no-start-up symptom.

mal up to this point.

In this case, of course, there was no waveform on the base of Q4401. I traced back through the circuit to see where this square waveform first disappeared. The waveform was present at the base of horizontal buffer transistor (Q4302), but there was no trace of the waveform at either the collector or the emitter terminal of that transistor. I checked the supply voltage at Q4302. It was 0V instead of the value specified on the schematic diagram. In-circuit diode tests with the DMM suggested that Q4302 was functioning correctly.

The next time the chassis was fired up, the high voltage came on with a normal picture. When I again checked the voltage at the collector terminal of Q4302, the chassis went dead, as the DMM probe was applied. This suggested a problem with that connection. Further testing confirmed that a poor board connection at the collector terminal of Q4302 was the cause of the failure of this set to power-up (Figure 2).

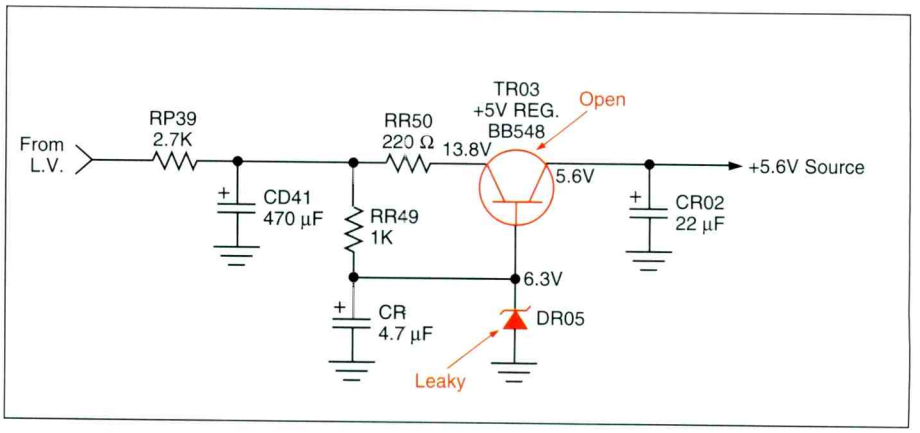


Figure 4. Replacing the +5V regulator transistor in a RCA TX82 chassis solved the intermittent start-up problem.

Dead-no start-up

Any of a number of different defective components in the horizontal and low voltage circuits can cause the set to be dead or to fail to start-up. In a Samsung CT5002DA model, the chassis was completely dead and would not start-up. A check of the schematic revealed that this particular chassis had a starter transistor circuit tied to the vertical and horizontal IC, IC301. A quick voltage measurement of the voltages on the leads of Q403 indicated no supply voltage.

A quick in-circuit test of transistor Q403 indicated the starter transistor was leaky. The 2SC222GY transistor was replaced and power was again applied to the chassis the set remained dead. This led me to believe that perhaps the leakage of Q403 had caused damage to other components in the starting circuits. Voltage measurements at the Q403 leads remained very low even though this was a brand new replacement transistor, and the collector terminal circuit was fed from a +125V source.

The supply voltage at the collector of Q403 was fed from the +125V source via resistor R428 (1K). The voltage on the resistor on the side where it was connected to the power supply was a normal +125V. Since normal voltage was found on one side of R428 (1K) and very low voltage on the other side of the resistor at the collector terminal, the assumption was that the resistor was faulty. The chassis was shut down and a resistance measurement was made from the +125V source to the collector terminal of Q403. This resistance was very high resistance, much higher than the 1K one would expect if the resistor was not faulty. Finally, R428 was removed and found to be open. All of the other resistors within the starter circuits were checked as well. Resistor R429 (39K) had also increased in resistance.

While making continuity and resistance measurements, D401 and D405 were checked with the DMM diode test and checked okay. Resistors R428 and R429 and transistor Q403 were replaced, which restored this product to normal operation (Figure 3).

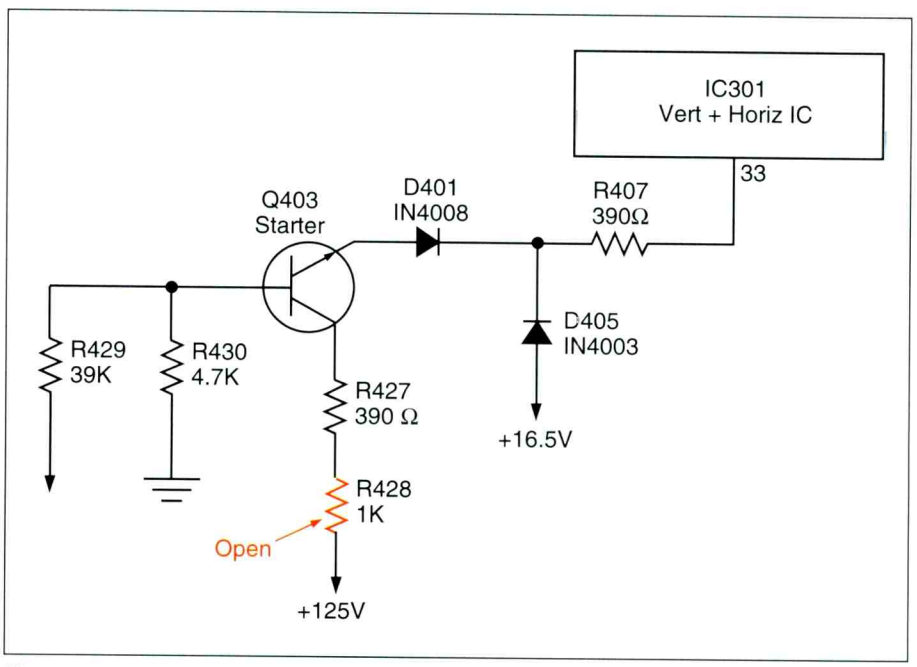


Figure 3. Replacing open R428 (1K) ohm resistor corrected a complaint of no start up in a Samsung CT5002DA TV.

Intermittent start-up

Symptoms such as intermittent start-up, pulsing off and on, and start-up followed immediately by shutdown can be caused by faulty components in the low voltage power sources. Intermittent transistor regulators, leaky or open diode rectifiers, and zener diodes are frequently the cause of such intermittent start-up condi-

tions. Faulty small isolation resistors and improperly soldered terminal connections can also cause intermittent service problems.

When the problem appears to be caused by possible failure of a supply voltage, go directly to the low voltage circuits that provide start-up voltages to the system control IC and horizontal microprocessors. In most chassis, the low voltage power supply circuits must operate before the horizontal and flyback derived secondary voltage sources are applied to other TV circuits. Check the voltage sources to the standby and system control start-up circuits.

When low or no voltage is measured within these circuits, trace the voltage sources back to the low voltage power supply. In one RCA TX82 chassis that exhibited intermittent start-up symptoms, the problem was determined to be that the source voltage that is nominally 5.6V was very low. After tracing this voltage back to its source, a very low output voltage was found at the emitter terminal of the +5 volt regulator transistor (TR03). A quick in-circuit test of TR03 indicated the transistor was open. You should be aware that in some cases these transistors will test good when you perform DMM diode tests with the power is off, but will become intermittent under load. TR03 was located towards the front end of the TV chassis.

Because it so often happens that malfunctions often involve more than the obviously faulty component, CR11, CR12, and CP41 electrolytic capacitor, and the zener diode (DR05) in the 5V regulator circuit were also checked. CP41 showed normal when tested with the ESR meter. Diode junction tests using the DMM showed that DR05 was leaky. To confirm this finding, one end of DR05 was disconnected from the PCB to isolate it from other circuit components and was checked once again. This diode did indeed have leakage. After DR05 and TR03 were replaced, power was applied and the 13 inch chassis began to operate (Figure 4).

Slow to come on

Defective components in the low voltage power supply sources are not the only possible causes of slow start-up or complete failure to start-up. These types of symptoms may be caused by a faulty micro control, main microprocessor or IC T-chip. Often when these control components become intermittent or began to fail, other circuits within the TV chassis quit functioning. Check for improperly soldered joints or pin connections at the many IC terminals, or absence of the supply voltage (VDD) feed to the control IC.

In the case of one RCA CTC177 set, the chassis was slow to come on and some-

Circle (2) on Reply Card

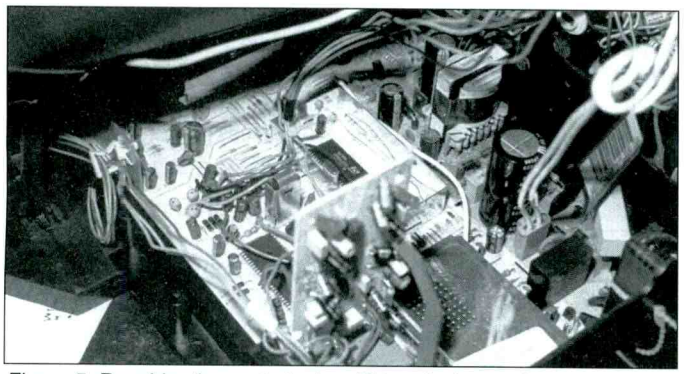


Figure 5. Resolder the control micro IC terminals to solve the slow turnon symptom in a RCA CTC177 chassis.

times the TV channels would change spontaneously. Since the TV channels were changing without anyone operating the controls, the schematic was studied in an attempt to determine which component might be the cause of both chassis symptoms. If a micro control IC is suspected of operating intermittently, gently tapping it, or pressing on it, or spraying it with coolant may make it act up and confirm the problem. In this set, the intermittent symptom seemed to act up when the control micro (U3101) was sprayed with coolant or pressed on top with the rubber eraser of a pencil.

In this set, control microprocessor U3101 operates the degaussing switch, reset circuits and controlled the +5V standby power supply. The 5V (VDD) source that exits pin 20 was monitored while UC3101 was prodded and sprayed with cooling spray, but that voltage showed no sign of changing. The degaussing relay seemed to operate when the TV was first turned on. Although these aspects of IC U3101 seemed to operate normally even while the device was being stressed, the fact that this control IC operates the remote control and clock circuits, caused it to remain a suspect of operating intermittently and causing the observed symptoms (Figure 5).

Desoldering any multi-leaded control IC or microprocessor and soldering in a replacement can be a great deal of work, and could possibly entail damage to the printed circuit board. Therefore, before going to that effort, the associated circuits and components should be checked as possible causes of the problem.

Improperly soldered connections between the micro chip pins and the PC board can also be the cause of intermittent control circuits. In this case, after re-soldering all pins of U3101 and applying power, the chassis came up at once and operated normally.

During servicing of other RCA television sets based on this same CTC177 chassis, and exhibiting the symptom of being slow to turn on or intermittent start-up, we have encountered bad solder joints at the pins of the T-chip (U1001). In these cases, simply resoldering all IC terminals has cured the problem.

In a number of other RCA CTC177 chassis that we have worked on that exhibited this same symptom, the problem was tracked to improperly soldered tuner ground points that failed intermittently. Yet another cause of the same problem has been bad solder joints at flyback terminals 1, 2, 3, and 10. If you suspect this as the cause of a symptom of slow start-up or intermittent start-up, resolder those terminals.

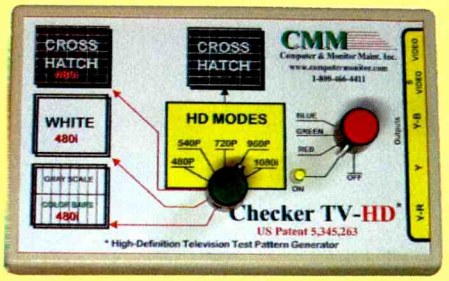
Intermittent start-up-RCA CTC169 chassis

The chassis tries to start up, has high voltage momentarily, cycles and repeats itself, then comes on for about 10 minutes. That was the symptom in an RCA CTC169 chassis. As in the RCA CTC187 chassis, the low voltage power supply in the CTC169 has a regulator control IC (U4101) that has been known to cause several different symptoms, such as a dead chassis even though the line fuse is intact, and no secondary voltage from the regulator transformer. In this particular unit, the secondary voltage to the horizontal output transistor measured 0V.

Since the regulator power supply has been known to cause intermittent start-up and cycling problems, the secondary voltage was monitored at the main +140V filter capacitor. The source of the raw +150V was located, and this voltage was applied to the U4101 regulator. The secondary output voltage with this arrangement was 0V. All measurements in this circuit must be measured with respect to the hot ground terminal of the filter capacitor for accurate voltage measurements.

Power to the set was disconnected and several diodes in the circuit were checked using the diode test of the DMM. All of these diodes appeared to be normal. Resistance measurements revealed that all resistance within the U4101 regulator circuits were quite close in value.

THE CHECKER TV-HD



The Checker TV-HD is a LOW COST, easy to use, High Definition Television pattern generator. It is small enough to slip in your toolbox (5.7" x 3.6" x 1.3"), yet capable of providing the video signals you need to test and evaluate an HD or standard TV. The TV-HD has base band RS170 video out, and S-Video out for the 480I mode and Component Video outputs for the HD modes. The TV-HD operates in 480i, 480p, 540P, 720P, 960P, and 1080i modes. On the road or on the bench, the Checker TV-HD is just what you need to test todays' multifunction Televisions, and at a price that allows every Technician to have one.

Price with Battery & AC Adapter $499.95
www.computermonitor.com 1-800-466-4411
All major credit cards accepted

Circle (3) on Reply Card

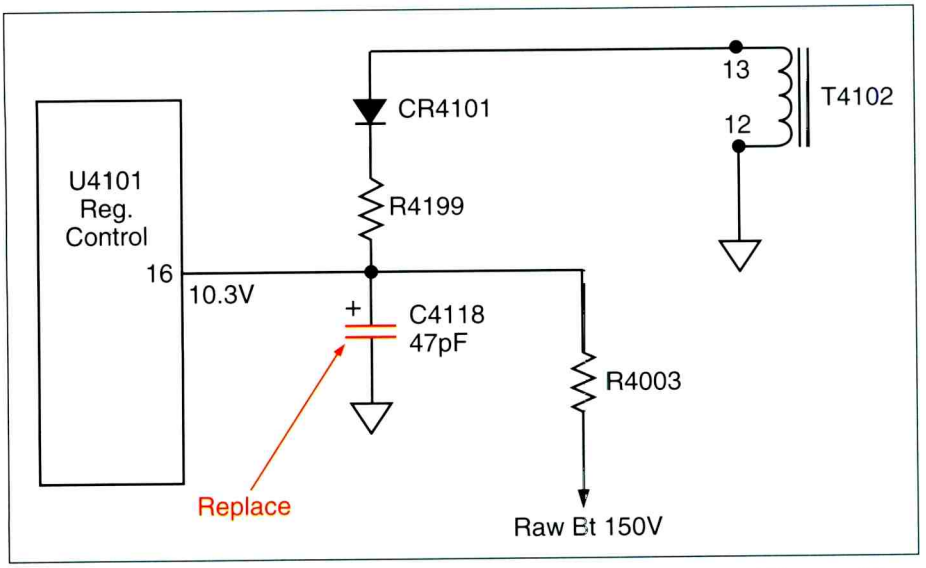


Figure 6. Electrolytic capacitor C4118 (47uF) connected to the regulator control IC caused the intermittent start-up problem in a RCA CTC169 chassis.

Next, all electrolytic capacitors in the regulator circuits were tested with the ESR meter. Initially, when electrolytic capacitor C4118 (47µF) was checked it appeared to be fairly normal. When measured a second time, this electrolytic capacitor produced a reading in the yellow scale of the ESR meter. No doubt C4118 was intermittently open. Power to the chassis was disconnected and a known-good 47µF electrolytic was clipped across C4118 (Figure 6).

When power was restored, the chassis became alive and the correct secondary B+ voltage was measured at the horizontal output transistor. C4118 was replaced with a new filter replacement and the CTC169 chassis was cured of the intermittent start-up and cycling symptom.

Intermittent start-up-shuts off and on

The RCA CTC130 chassis might go off and on after operating for several minutes and at other times might have an intermittent start-up symptom. The VIPUR switching power supply includes a switching supply regulator IC (U2), VIPUR output transistor (Q1), power transformer (T1), and silicon diode rectifier (CR10). The primary side of the switching transformer has a hot ground while the secondary voltages has a common ground terminal. A quick voltage test upon the diodes of the secondary windings of the VIPUR transformer (T1) can isolate a defective silicon diode.

At first the VIPUR output transistor was suspected of causing the problem of intermittent operation, so it was replaced. The problem remained. The TV was intermittent when the chassis was cold. A hand-written note on the schematic showed that C7 (68µF) and C11 (150µF) electrolytics had caused intermittent start-up within another CTC130 chassis. Both electrolytics were checked with the ESR meter and tested normal. Perhaps one or both capacitors were intermittent, causing the intermittent start-up and shutdown symptom. Both electrolytics were shunted with new capacitors and the chassis came to life. The defective capacitors were desoldered, and the replacement capacitors were soldered into the circuit.

After the chassis was shut down over night, the next morning the chassis acted up again. Several diodes within the output voltage circuits were checked, but they all appeared to be normal. Critical resistance measurements were made upon several low value resistors within the VIPUR output circuits revealed that the resistances or all of them were quite close to the specified values. Another check of those same resistances revealed that R16 had about doubled to 0.37ohms, a fact that hadn't been noted the first time it was measured (Figure 7). Was it possible that the doubled resistance of R16 could be causing the intermittent problem? R16 was replaced with part number 175331 (0.15ohms). When power was again applied to the set it operated perfectly.

Intermittent start-up-no tic tic noise

When the intermittent start-up symptom began in an RCA TX81 chassis, there was no vertical sweep nor any tic-tic noise from the speaker or flyback. At first the +22V source feeding the vertical IC output (IF01) was suspected. Further investigation revealed that a supply voltage was intermittently applied to the vertical circuits, even when no vertical sweep was seen on the screen (Figure 8).

Since CF09 (100µF) electrolytic capacitor and diode (DF04) had caused many vertical service problems in these sets in the

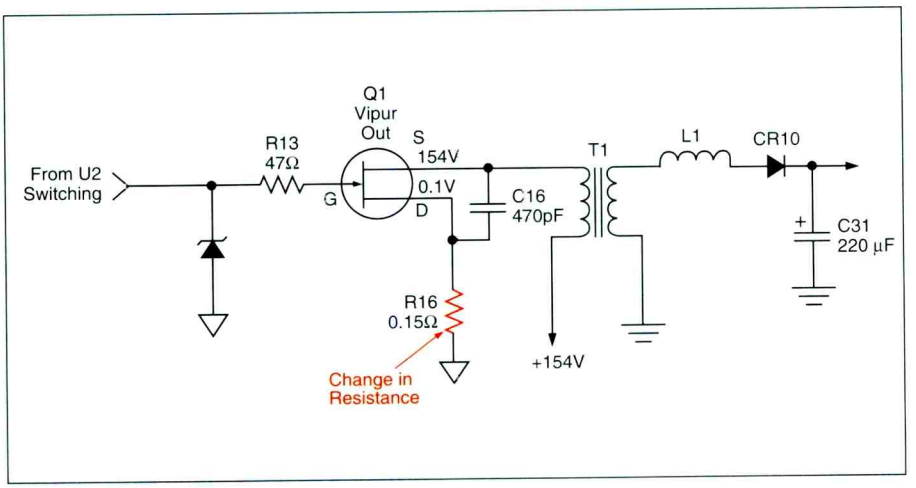


Figure 7. Resistor R16 (0.15ohm) in the drain terminal increased in resistance producing intermittent start-up.

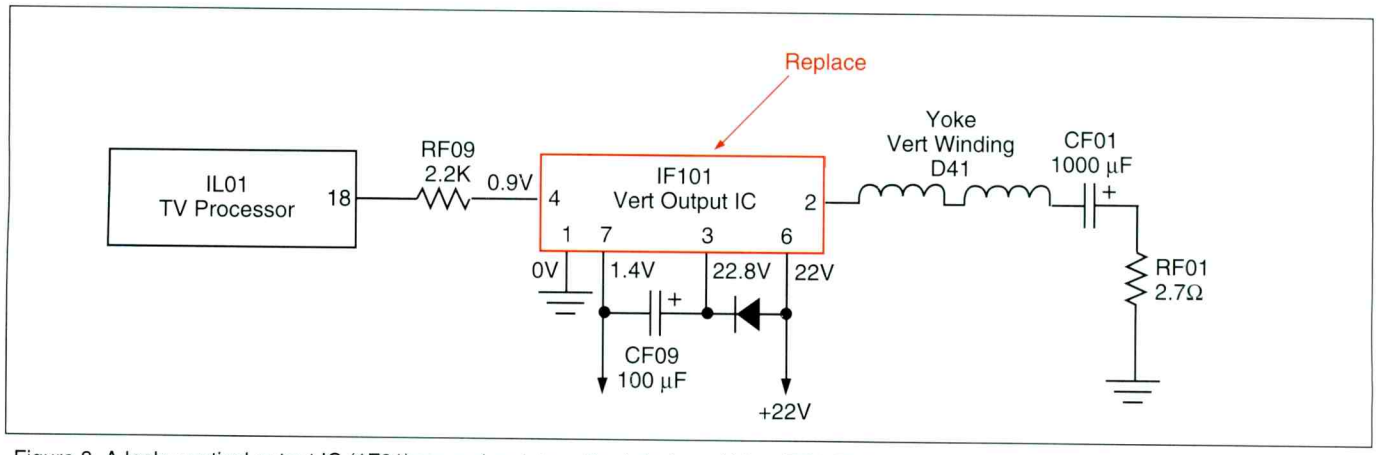


Figure 8. A leaky vertical output IC (1F01) caused an intermittent startup within a RCA TX81 chassis.

past, they were checked first. If you're working on one of thse sets, replace DF04 even if it tests okay as this diode has caused several TV chassis to operate for 10 to 20 minutes followed by loss of the raster accompanied by normal audio.

When a test waveform was applied to pin 4, all components tied to the vertical output IC tested normal. The vertical yoke return components CF01 (1000µF) and RF01 (2.7ohm) resistor tested normal. All the signs pointed to the vertical IC (LA7830) so it was replaced with a universal replacement. Now the chassis operated for a total of three hours then shut down.

When the chassis was turned back on, the start-up symptom acted up again. This time when the chassis was operating the vertical sweep appeared okay. All silicon diodes within the secondary flyback circuits were tested with the diode test of the DMM. When it was first checked, DP18 appeared open and then when tested gain appeared to be normal. Nevertheless, DP18 was replaced, which solved the second service problem within this 13 inch TV chassis.

It's wise to service test each TV chassis for several hours for a few days to determine if all service problems have been located. In another RCA TX81 chassis when the set was plugged in the high voltage came up with no raster or audio, that was caused by a leaky diode (DP18) and burned RP68 (0.68ohm) resistor.

TV came on by its self

Suspect a defective line switching relay, standby power supply or a defective EEPROM IC when the TV come on by itself. In many of the latest RCA TV chassis an EEPROM IC has caused many different service problems. The defective EEPROM IC can cause the high voltage to come up followed by a crackling sound, and then the TV goes dead and will not power up. A defective EEPROM can cause the TV chassis to cycle on and off or refuse to power up at all. If the EEPROM is defective, the symptom may be intermittent sweep or no vertical sweep.

If the on-screen display is dim or not sharp the reason may be a defective EEPROM. Suspect U3201 when the on-screen displays will not advance to the next frame and options could be selected in only the first frame. Replace EEPROM (U3201) if the set is dead but the line fuse is intact. Low or no audio can be caused by a bad EEPROM IC.

In the RCA CTC177 chassis, the EEPROM IC (U3201) is connected to the main control microprocessor (U3101). One of these sets that we were called on to service would come on and then turn off immediately (Figure 9). U3201 was replaced with a manufacturer's exact replacement. Check the part lists of each TV chassis for the correct EEPROM replacement, as they are not interchangeable or will not function without the correct replacement. Do not overlook poorly soldered ground terminal tuner connections within the RCA CTC177 chassis, causing the same symptoms.

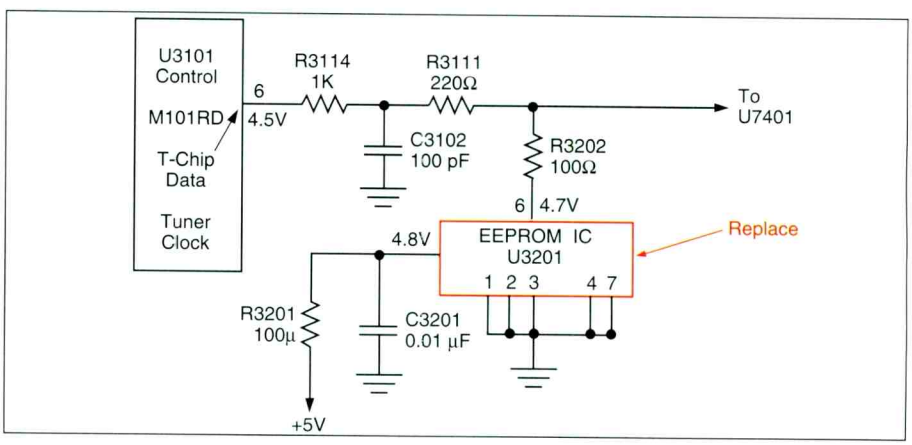


Figure 9. A defective EEPROM (U3201) in the RCA CTC177 chassis made the chassis cycle on and off.

Servicing The Dead TV/VCR Chassis

by Homer L. Davidson

If a TV/VCR combination is dead, or intermittently dead, the most likely causes are a defective power supply or defective horizontal output circuits. If the cause of the dead set is failure of the power supply circuits, the source of the problem might be:

- a bad relay,
- a bad relay driver transistor,
- or a shorted silicon diode across the relay solenoid.

If the set becomes dead intermittently, likely causes are:

- an intermittent relay transistor,
- bad relay points,
- or poor soldered connections of the relay.

If the set is dead and you don't hear a relay click when you attempt to turn it on, the problem may be caused by a defective component in the switching or switch mode power supply (SMPS) (Figure 1). The ac relay might be found in either the ac switching or degaussing TV circuits.

The best place to start with a TV/VCR combination that exhibits one of these symptoms is to determine if the cause of the problem is located in the TV, the VCR or both chassis.

Different makes and models of these products are designed and constructed differently. In some units, the TV circuits and the VCR circuits are completely independent. In other cases, the TV circuits and the VCR circuits each has its own power supply. You might find the main power supply provides a voltage source for both TV and VCR circuits.

The Dead Power Supply

If the unit you're working on is dead, and you discover that there is no output from the horizontal circuits, and no high voltage, the problem may be caused by a defective power supply, leaky or open voltage regulators or components in the horizontal circuits. Low voltage (or 0V output) from the power supply may be caused by an open line fuse or the input high voltage electrolytic capacitor in the bridge rectifier output circuits. If the chassis is dead and there is no relay click, look to see if there is a defective 120µF, 200V electrolytic in the bridge power supply circuits.

If the output voltage from the power supply is 0V and you hear a squealing noise, check to see if there is a defective low voltage electrolytic. A dead chassis may result if a 47µF, 16V, or a 220µF, 6.3V capacitor is defective. Also, use an ESR meter to check to see if the large, 100µF at 35V, electrolytic capacitor is defective.

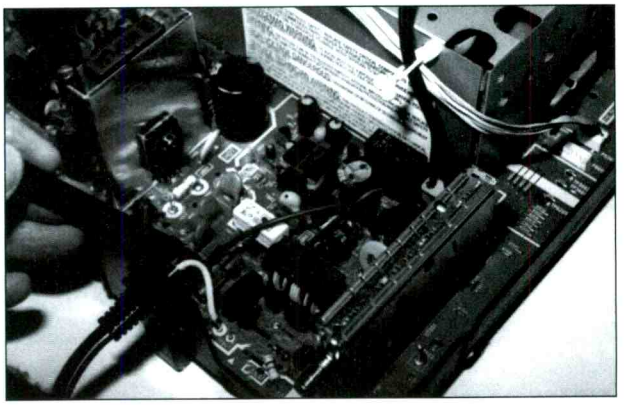


Figure 1. The low voltage power supply circuits are found at the rear of the TV/VCR receiver.

If the unit is dead, but the line fuse is intact, the cause of this situation may be a leaky 6.7V zener diode as found in a Symphonic TV/VCR 13E1 and 13F1 chassis. A leaky or open high voltage power line regulator can cause the dead-no output voltage symptom.

The intermittently-dead TV chassis can be caused by a intermittent relay transistor or a bad relay circuit. Check for a bad soldered joint on the relay when the set intermittently shuts off and will not come on. A bad solder joint on the primary side of the switch-mode power transformer can cause the intermittently-dead chassis. Bad solder joints on the regulator IC can produce an intermittently-dead symptom. Check for a defective regulator IC when the chassis squeals or squeaks when plugged in but doesn't come on.

The intermittently-dead chassis might start up sometimes when it's turned on, and other times it remains dead as was the case in a Samsung CXB1922 TV with a bad non-polarized 22µF, 16V, electrolytic (C09). Replace Q1012 (2SA950) transistor in a Funai F9TR21 TV/VCR for an intermittently-dead or dead symptom. Check for bad solder joints on electrolytic capacitors and transistors for the same symptoms in the power supply.

Intermittently Dead Emerson VT1920

A 19-inch Emerson TV/VCR combo was brought into the service center with the complaint that one some occasions it would operate intermittently and at other

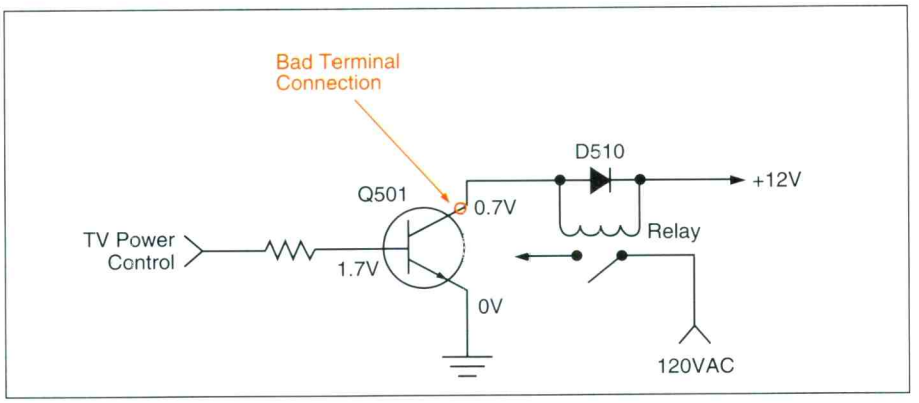


Figure 2. A bad soldered connection of relay driver transistor collector terminal caused an intermittent-dead Emerson VT1920 TV/VCR.

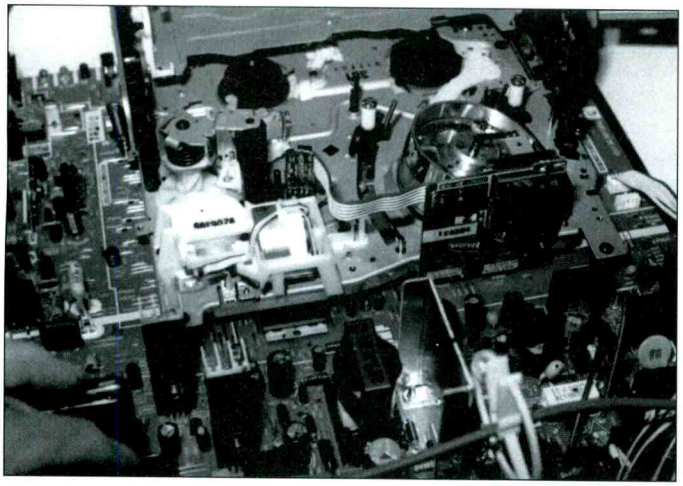


Figure 3. Use the negative terminal of the largest filter capacitor in the power supply as the " hot" ground terminal for voltage measurements.

times the TV would play all day long. We noticed the relay would not click on when in the intermittent state. Also when intermittent, no voltage was measured on the collector terminal of relay transistor (Q501) (Figure 2).

At first we suspected that the relay had an open winding; but the coil continuity appeared normal. The 12V source was present on both sides of the relay. After taking several voltage tests on the relay circuits, the chassis came on. Further checks revealed that a bad solenoid connection on the collector terminal of Q501 caused the intermittent-dead symptom. Its best to check transistor Q501 in the case of intermittent operation and possibly a shorted D510 in the same TV/VCR chassis operation is intermittent.

In another chassis with the same model number, the TV was intermittent, although the power light came on every time the set was turned on. This problem was caused by IC502. A dead-intermittent condition in the chassis of a Emerson VT3110 TV/VCR was caused by transistor Q406.

Dead-No Relay Click

One Panasonic PV-M1327 model remained inoperative when the power switch was turned on, and no click of the relay was heard. In this unit, the power relay (RL801) switches on the ac voltage applied to the silicon diodes D801, D802, D803, and D804. This B+ voltage source is applied to the power line IC regulator IC801 (STR30130) with an output voltage of 126V source to the horizontal circuits (Figure 3).

The relay turn-on circuit consisted of a relay driver transistor, relay (RL801), D806 and controlled from pin 28 of IC5001. A 12V dc source is provided by the switched mode power supply from the transformer's secondary winding. Relay driver transistor (Q801) turns on the relay (RL801) which in turn switches on the ac voltage to the bridge diodes in the low voltage power supply. The 12V source must also be applied to the transistor and relay circuits before the relay can energize.

In a situation such as the one described here, check the 12V source applied to the relay RL801. Test Q801 with an in circuit transistor tester or the diode-test of a DMM. Measure the resistance or continuity of the solenoid coil with the low resistance scale of the DMM. Remove one end of D806 across the relay to determine if the relay is leaky or shorted. In this case, these tests revealed that diode D806 was shorted, thus preventing relay RL08 from closing the ac contacts.

In an LX1 TV/VCR chassis, the TV was dead. The technician did not hear a click when he switched the on-off switch on. In this case, further tests revealed that this problem was caused by an open solenoid winding. It's also reasonable to suspect a bad solder joint on the relay when the chassis intermittently cuts off. Do not overlook the possibility that a dead chassis in which the relay is not heard to click on may be the result of a bad flyback.

Critical voltage tests

Any time you encounter a dead set, determine if the power supply is supplying the correct voltage to the horizontal and other circuits by taking critical voltage measurements. The defective component might be in the TV power supply or in the VCR power supply.

Some TV/VCR chassis have only one switched mode power supply providing all voltages to the different voltage sources, such as in the Daewoo CN-071 chassis. In contrast, in the Panasonic TV/VCR combo (PVM-1347), PVM-1357N, and PVM-3037 models, a single switch-mode power supply provides all voltages, except those for the horizontal circuits. Here, a 130V regulator source from another bridge rectifier circuit provides a 126V source to the horizontal driver and output transistors.

In a Sears TVSR090252 TV/VCR combo, there are two different switching type power supplies. The main switching power supply provides voltage to the entire TV and VCR circuits, while a 12Vdc switching power supply provides a switching voltage transformer circuit to both the TV and VCR circuits, when operated from a dc battery source.

Similarly, the early Sears nine inch TV/VCR combo model (934.4472790) provides the ac power circuit to a switching transis-

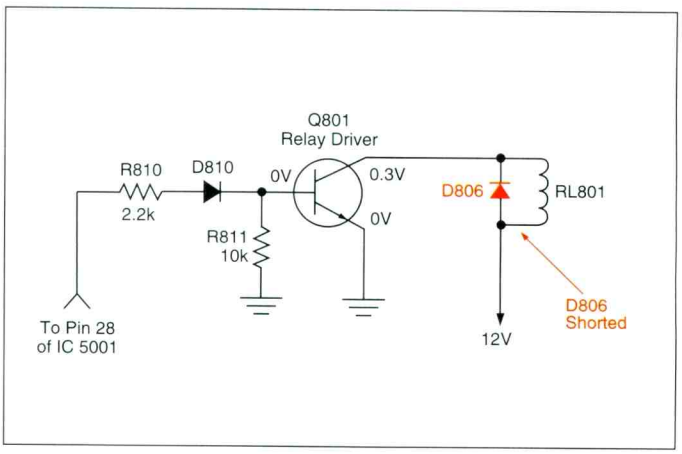


Figure 4. The shorted diode (D806) across the relay prevented a click or turn on of relay RL801 in a Panasonic TV/VCR.

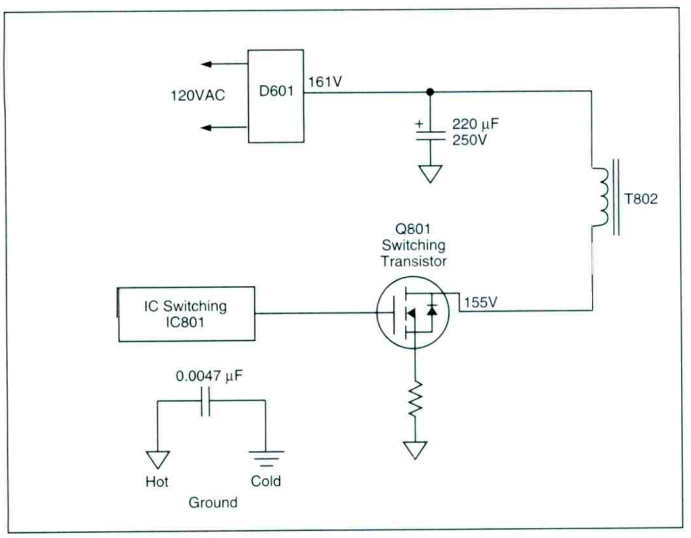


Figure 5

tor and transformer to the various voltage circuits. A switching IC and transformer in the 12V source provides voltages to the other circuits from a 12V dc source.

One power supply, or two?

Determine if the TV/VCR combo has a separate power supply for the TV and another power supply for the VCR circuits. It's likely that there's only one power supply when both the TV and VCR units are dead. If the VCR performs and the TV section is dead, you'll probably find two separate power supplies.

For instance, in an Emerson VT1921 TV/VCR combo, the TV was dead, yet the VCR operated okay. In this case, the problem was bad solder joints on D509, RY501, C532 and IC502. As with most TV/VCR combo chassis, you may have to remove several sub-chassis and boards to get at the defective component.

Check the "hot" side of the circuits

Check the ac power line voltage source from the bridge rectifiers at the large filter capacitor in the low voltage power supply (Figure 4). Measure the voltage across both capacitor terminals. Remember this electrolytic has a high line voltage source in most TV combos in the "hot" power line circuits. The negative terminal of this capacitor is above common ground.

All voltages in the primary side of a switching transformer are measured with reference to this electrolytic hot ground terminal. These same electrolytic capacitors are known to be the cause of dead units in which the line fuse is intact.

The horizontal circuits

Next check the voltages on the horizontal driver and output transistor to determine if proper voltage is applied. If everything is operating properly, a high voltage source (126V to 133V) is present on the secondary side of the switched mode power transformer. If the product is dead yet the supply voltage is normal, the problem might be caused by a defective component in the horizontal circuits rather than in the power supply.

If no high voltage is fed to the horizontal circuits, check for a dc voltage (145V to 155V) on the power switching transistor. A lower than normal applied voltage to the switching transistor might indicate a leaky or shorted transistor or switching input IC component. Shorted or leaky switching transistors have caused many problems in the switching power supply.

Don't overlook an open fusible resistor (0.22µ) to the hot chassis ground of the switching transistor. A shorted switching transistor can damage this low ohm resistor. Suspect an open switching transistor or fusible low ohm resistor when the voltage applied to the MOSFET transistor is higher than normal (Figure 5).

No SMPS voltage source or relay click

The relay did not click-on in a dead Daewoo 19H1FC combo. Relay (RLY01) provides a degaussing voltage to the degaussing circuits instead of switching ac to the low voltage power supply. Preliminary measurement revealed that fuse F801 was open, so it was replaced. Now when the voltage on the switching transistor Q801 was check, it was found to be very high at 161V.

The power switching transistor was replaced with an 2SK254 type, but when power was again applied, there was still no sec-

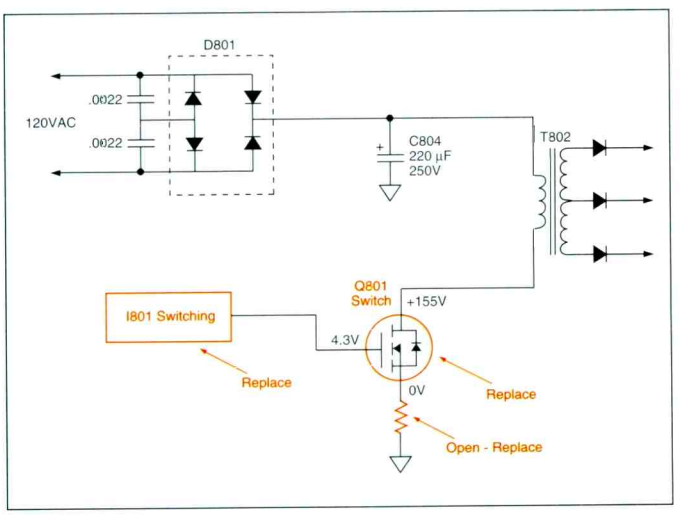


Figure 6

ondary voltage from the secondary winding of T802 (Figure 6).

After replacing open resistor R807 (0.22_), to the "hot" ground, normal voltage was found on Q801, but still there was no voltage from the switching power supply. Finally the switching IC801 was replaced with the original part number (4850M04310) and the chassis came alive. Notice that the raw dc voltage, switching transformer (T801) and switching transistor (Q801) operate in the "hot" ground circuits. All voltages measured in these circuit should use the large main filter capacitor "hot" ground as common ground for the negative meter terminal.

High and low voltage regulator problems

Most of the defective components found in the power supply circuits are transistors, diodes, electrolytic capacitors and voltage regulators. The voltage regulator might consist of a single trans-

former and IC component.

When doing your initial evaluation of intermittent start-up and shutdown problems, in addition to taking critical voltage measurements on the suspected IC regulator, resolder all of the terminals. Often the main power line fuse will not open with an open defective regulator IC. A shorted or leaky IC regulator might blow the main power line fuse. A dead chassis with a buzzing noise can be caused by a bad voltage regulator.

A bad solder joint on a 5V or 6V IC or transistor regulator can cause intermittent shutdown after the TV operates for a few minutes. The TV might come on with no customer controls being operated if a 6V transistor regulator is defective. A bad solder joint on a 5V IC regulator result in an intermittent-dead symptom. Another cause of a dead TV symptom may be a defective IC regulator that causes the power supply to keep oscillating.

Do not overlook a defective 5V regulator in the VCR section when a defective capstan motor pulls down the regulated voltage,

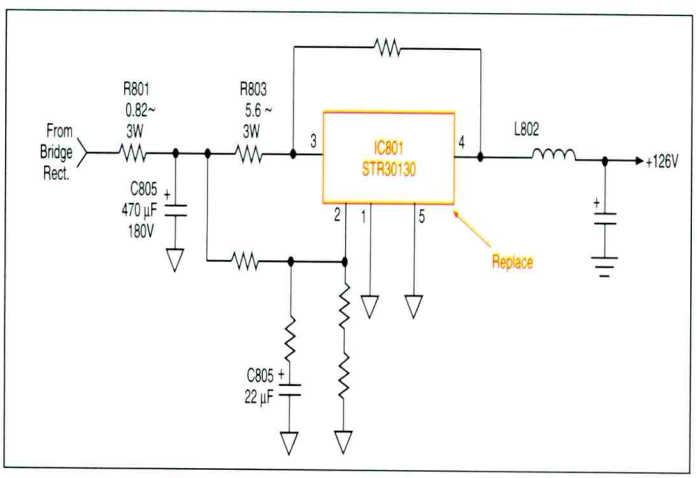


Figure 7

resulting in a dead TV chassis. Look in the VCR circuits when a defective component can cause a lower voltage with the same power supply that provides voltages for both the TV and VCR components.

A dead TV with no raster and some audio can result from poor soldered joints or connections on the IC regulator. If a TV/VCR has no high voltage yet the VCR operates okay, the cause may be a defective IC regulator. A bad high line voltage IC regulator can also cause an intermittently dead chassis, pulsating conditions, intermittent-shut down and no-relay click symptom.

The no-horizontal or no-high voltage symptom might be produced by a leaky or shorted high voltage IC regulator. These high line voltage IC regulators supply a regulated dc voltage source to the horizontal output circuits from the bridge rectifier circuits.

After replacing a dead-fuse okay symptom in a Panasonic CT-13R20 TV/VCR, with a defective Q551 and open R810 (5.6_), the picture had lines in it. The lines were not visible when the power line voltage was lowered by the variac at 100Vac, but the picture was quite wavy. Replacing the line voltage regulator IC801 cured the many lines in the picture.

Dead-no horizontal-no HV

The chassis was completely dead in a Panasonic PV-3037 TV/VCR combo with no horizontal sweep or high voltage. There are two different power supplies found in this particular chassis. A high voltage IC regulator provides voltage to the horizontal driver and output circuits, while a SMPS switching power supply feeds voltage to the rest of the chassis. Both the high voltage IC regulator and horizontal voltages should be measured from the "hot" ground side.

A quick voltage measurement on the horizontal amp (Q501) and horizontal output transistor (Q551) indicated very little dc supply voltage. The 130V IC regulator (IC801) circuit supplied the 126V applied to the horizontal circuits. A quick voltage test on IC801 indicated very little output voltage at pin 3. The B+ voltage at pin 4 was fairly high, indicating the low voltage power source was normal (Figure 7).

Always resolder all terminals on the IC voltage regulator then try operating the set to see if that did the trick before you replace the IC. Sometimes these terminal contacts and pc wiring are broken and this problem cannot be seen by the naked eye.

Notice that the IC regulator circuits operate in the "hot" ground circuits. The common "hot" ground at the large filter capacitor C805 (470µ, 180V) can be used for all voltage measurements on each IC terminal and in the horizontal circuits.

Fusible resistor R801 (0.82µ) and R803 (5.6µ) were found to be burned open. The body of IC801 showed signs of overheating. The fusible resistors and IC801 were replaced. Correct voltage was now restored to the horizontal circuits. IC801 was replaced with a ECG1777 universal replacement.

Dead-horizontal circuits

As mentioned earlier, the line fuse might be intact in a set with a dead TV/VCR chassis and a leaky output transistor. A defective horizontal output transistor can cause a dead chassis with a squealing noise. The shorted output transistor can cause the 1A fuse to blow in an Emerson VT1322 model. Bad soldered joints or connections on the voltage regulator IC, diodes and flyback connections can cause a dead or intermittent TV symptom.

Do not overlook bad soldered connections on the horizontal driver transformer when the symptom is intermittent operation or shutdown. The overheated or defective driver transformer (T571) has been known to cause a dead chassis with an intact fuse in a Zenith SRV-1300E TV/VCR combo. Check for a open emitter coil or resistor with a leaky or shorted output transistor.

In some models, the horizontal driver and output transistors are powered by the same voltage source, while in other TV/VCR chassis, the horizontal driver transistor might receive the voltage source (45V) from another secondary winding of the switching transformer. The horizontal output transistor operates with a high voltage source of (133V). You may find a separate power supply with a line voltage regulator supplying a voltage source to both the driver and output transistors in another chassis.

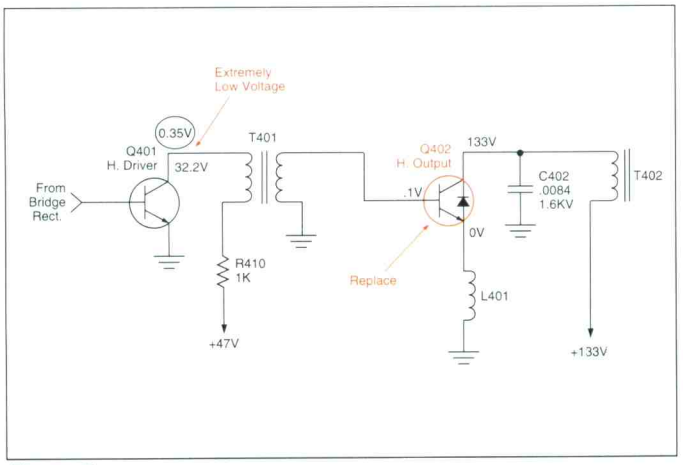


Figure 8

Dead-No HV-Daewoo CN-071 chassis

The Daewoo 19H1FC TV/VCR combo came in with a dead chassis and no high voltage. A quick voltage measurement on the horizontal output transistor (Q402) indicated lower than normal voltage. The +133V voltage source is fed from a high voltage winding of the switching transformer (T802) through the primary winding of T402 to the horizontal output transistor. Q402 (2SD2499) transistor was replaced with part number 2SD2499 (Figure 8). The chassis was still dead after replacing Q402. No drive pulse was found on the base of the output transistor.

A quick voltage test on the driver transistor, Q401, showed that it was zero . The source for this +45V is another tap off of the same switching transformer as the +133V source. Q401 tested normal with in circuit transistor tests.

Since the +45V source to the driver transistor was fed from a 45V transistor regulator (Q820), Q820 was tested in circuit and appeared open. Replacing the 45V regulator restored the voltage to the driver transistor (Q401). Now a drive waveform was found on the collector terminal of Q401 and the base of Q402. Before leaving the driver circuit, all terminals of T401 should be soldered to prevent further horizontal start up and shut down symptoms.

Conclusion

Many service problems in a TV/VCR combo have been caused by a defective filter capacitor. The TV chassis might intermittently start up and at other times appear normal with a defective 220-470 µ, 180-200V electrolytic filter capacitor. A defective filter capacitor can cause dark bars, like hum bars moving up the screen. The defective high voltage electrolytic can cause a dead chassis with no relay click and okay fuse symptom. Suspect a defective filter capacitor that might cause a squealing noise in the flyback. Check all electrolytics with the ESR meter.

ES&T IS AVAILABLE FROM THESE SPECIAL DEALERS AND NEWSTANDS...

AUDIO LAB
3611 Clearview Place
Doraville, GA 30340

CENTENNIAL ELECTRONICS
2324 East Bijoy
Colorado Springs, CO 80909

ELECTRONIC PARTS CO.
5744 Baum Boulevard
Pittsburgh, PA 15206

ELECTRONIC SPECIALIST
711 Kelso
Flint, MI 48506

NEWSBREAK INC.
Route 6, Stuart Plaza
Swansea, MA 02777

UBIQUITY DISTRIBUTION
607 Degraw Street
Brooklyn, NY 11217

UNICORN ELECTRONICS
Valley Plaza
Johnson City, NY 13790

Attention Distributors:
If you would like to be part of this network call ES&T Circulation 516-883-3382

THE MAGAZINE FOR PROFESSIONAL ELECTRONIC AND COMPUTER SERVICERS
ELECTRONIC
Servicing & Technology

Circle (32) on Reply Card

Test Probes and Accessories

Over the years, changes in the basic building blocks of electronics products have forced changes in the test equipment, test probes, and accessories used to evaluate and troubleshoot those products. As an obvious example, in the early days of consumer electronics service (TV service, really), the first piece of test equipment that the service technician brought to bear on any problem was the tube tester. Sometimes the technician would begin by doing a little preliminary troubleshooting; thinking about what the faulty product was or was not doing, and trying to determine which section of the TV set the problem might be in, and concentrating his tube-checking efforts to that section. On the other hand, vacuum tubes being what they were, the technician might just decide to check all the tubes because other tubes might be on the verge of failure. Might as well replace any questionable tubes in one visit and save the set's owner the cost of another house call.

A couple of interesting thoughts come up as a result of the foregoing discussion. One: was this type of scenario the point where "shotgunning" a problem got its start? And two: note that the service technician using a tube tester brought the components to the tube tester and plugged them into the appropriate sockets; he didn't need test probes to connect the tube tester to the set.

The need for test probes

The above discussion oversimplifies things a bit. When the problem was not "just a tube," the technician might have to bring the chassis into the "shop" and connect the Simpson meter, or the VTVM, or the oscilloscope, to the set to troubleshoot the problem, in which case, he did need some test probes. However, because the set was hand wired, and all the components were reasonably large, things were pretty simple: the test probes could be reasonably large, so a technician could get a good grip on them, and there was little difficulty getting the tip of the probe on the point of interest.

Figure 1. This assortment shows some of the many test probes and accessories that are available for connecting a multimeter to test points. Photo courtesy Fluke

Contrast that to the situation today in which the TV set (or the VCR, DVD player, home theater receiver, personal computer, or whatever) consists of printed circuit boards populated with large-scale integrated circuits, surface mounted components and other assorted tiny things with even tinier leads. Given this environment, the service technician needs a broad assortment of test probes, test probe tips, and accessories just to be able to connect the test equipment to the point of interest in the circuit. Moreover, the great variety of components and circuits and types of equipment that technicians find them in creates the need for yet more types of probes and accessories. This article will be an attempt to give a fairly comprehensive, if not exhaustive, view of the current state of test probes and accessories.

The arsenal of probes and accessories available today

For starters, probes available for consumer electronics service include the old standbys: standard test meter probes, standard oscilloscope probes, frequency compensated oscilloscope probes, alligator clips. Of course, when it comes to troubleshooting more recent products, those devices are of limited usefulness. In order to connect the DMM or oscilloscope to the point of interest in a tightly packed printed circuit, the technician might need something like a retractable hook tip, a miniature grabber clip or the like. With things as crowded as some circuits get these days, even that type of probe might not get the job done. Some ICs have leads that are so close together the danger of shorting out adjacent leads with a test probe or clip is quite high. In such a situation, a good solution is to obtain a spring-loaded test clip that clips over the IC. Conductors on the test clip engage each one of the leads on the IC individually and fan out from the point of attachment. The technician can then easily attach a probe to any of the conductors, thus gaining access to each of the tightly packed IC leads. That being said, let's take a look at some of the products that manufacturers offer to help busy technicians connect the signal from the point of interest in the circuit to their DMM, oscilloscope or other piece of test equipment.

Test leads/probes

Test leads come in an amazing assortment of choices. Even a simple multime-

Figure 2. This test probe adapter kit includes push-on adapters for test probes: IC test adapters for tight spaces, extended probe tips for hard to reach spots, medium alligator clips. Photo courtesy Fluke

ter accessory kit may come with a reasonably broad variety of attachments. For example, I'm looking at a catalog page from a test equipment/probe manufacturer. Their top-of-the-line DMM probe kit includes a set of straight to right angle silicone leads (the right angle is at the end where the probes plug into the meter), probe bodies with tip, pincer style clips, fully insulated alligator clips (good to 1,000V), alligator clips (good to 300V), spade lug adapters and banana plug adapters.

Insulation piercing probes

Sometimes you want to measure a voltage or some other parameter and a wire connected to the point from which you wish to take the measurement affords convenient access, but it's covered with insulation, and you can't even get to the point in the circuit to which it's connected. And you don't want to cut the wire. The solution to this dilemma is to use an insulation-piercing probe tip. An insulation-piercing tip has one, or a number of, very sharp, narrow, points. The sharp, narrow, point(s) pierce the insulation and make contact with the conductor within. Once the measurements have been made, the probe is removed and the insulation heals back over the tiny hole(s) made by the probe.

EEPROM reader/programmers

The introduction of microprocessor control to consumer electronics products also introduced those ancillary devices, EEPROMs. The EEPROMs contain the program that causes the microprocessor, and thus the product, to operate in the desired manner. When certain kinds of power anomaly occur, the program in the EEPROM may be corrupted. Fortunately, the program may be restored, frequently via access to a plug that allows the EEPROM chip to be accessed without opening up the set. The lead from the EEPROM device is connected to the correct plug on the set, or directly to the EEPROM itself and the data is read out. If you have the original manufacturer's data, the programmer can be set up to restore the proper info in the EEPROM.

Hand-held tone generator/cable tracer

A tone generator and cable tracer kit allows a technician to trace telephone lines. A tone generator is a hand-held, battery-powered instrument designed to quickly perform a variety of tests on unenergized telephone lines or LAN cables. The tone generator can be connected to stripped wires, terminal panels, wall plates or modular single line jacks using alligator clips and a standard RJ11 plug. Features include the ability to check line polarity and provide talk current on a dead line. The unit generates warbled tones with selectable test frequencies, and front panel LEDs indicate polarity when in the polarity mode and continuity when in the continuity mode.

The cable tracer is a hand-held inductive tracer that will help to identify wires without piercing the insulation. It features a high-gain, high-impedance amplifier and is capable of identifying tones from a distance of up to 12 inches. It can trace tone generator signals through dry wall, wood and many other non-metal surfaces (under ideal conditions).

Differential probes

It's not unusual for a service technician to have to make oscilloscope measurements in a circuit where neither point of the measurement is at ground. The "common" point to which the measured voltage will be referenced may be hundreds of volts above ground potential. Moreover, many of these measurements require that high common mode signals be rejected in order to be able to evaluate low level signals riding on them.

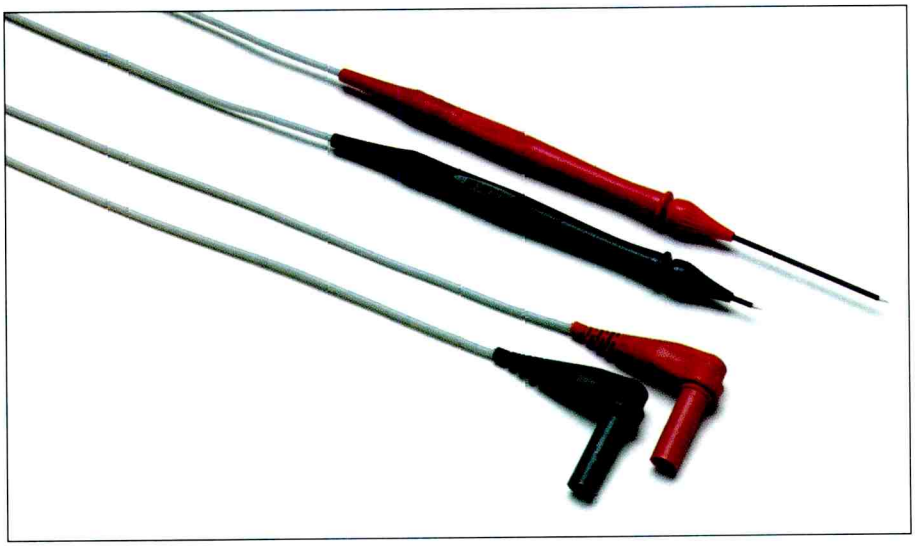


Figure 3. These retractable probes have extra hard tips for long life. Moreover, their sharp needle point tips adjust to the desired length, from 0 to three inches. The flexible leads are insulated with silicone. Photo courtesy Fluke.

Extraneous ground currents can also add hum to the display. Problems such as these prompt users to use dangerous measurement techniques. For safe and accurate operation, an oscilloscope must be referenced to ground. "Floating" a scope by defeating the scope's protective grounding system is dangerous to the operator because the entire scope poses a high voltage shock hazard. Not only is there a shock hazard under these conditions, but making such measurements cause stresses to the oscilloscope's power transformer insulation. In addition, in such a connection the capacitance of the scope chassis is connected to the circuit being measured, so measurement accurace is compromised.

There are several solutions available which are not only safe but much more accurate than the dangerous procedures: isolation amplifiers, differential measurement systems, and isolated input oscilloscopes.

Differential measurement systems, employing an active differential probe, compare the voltage levels at two different points in the circuit and provide the difference as an output.

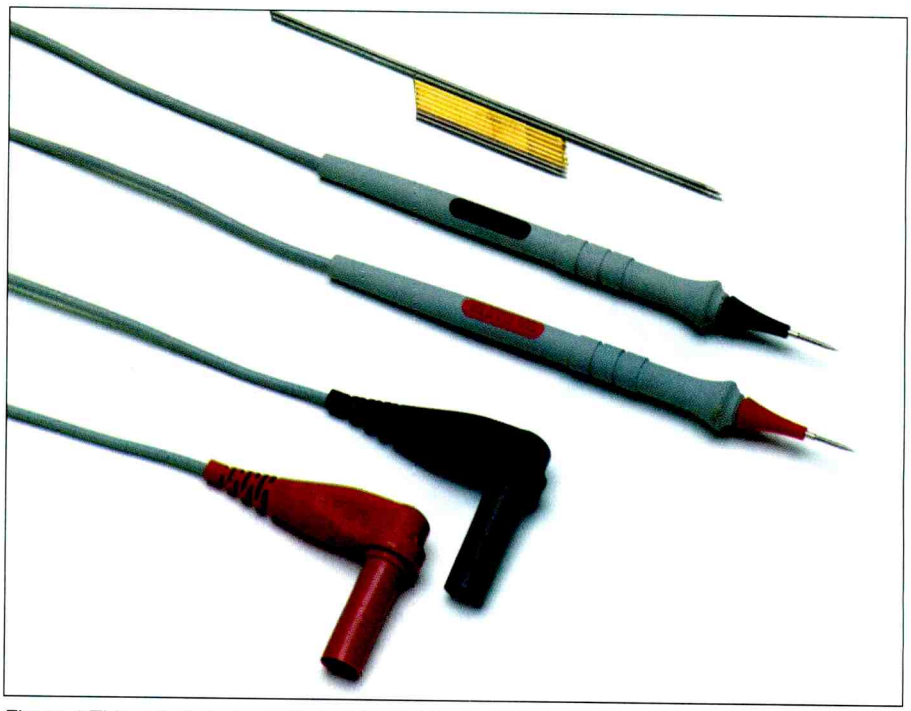


Figure 4.This set of electronic test probes with replacement tips includes five sets of replaceable tips. Its small profile design allows access to hard to reach test points. *Photo courtesy Fluke*

High-voltage probe

As many of you who have serviced a TV or other device that has extremely high voltages within it are aware, the average oscilloscope with its standard probes is not useful for such voltages. For one thing, 20,000V to 30,000V is well beyond the input voltage specification. Moreover, the insulation of the standard oscilloscope probe leads is not designed to withstand that magnitude of voltage, so that using an oscilloscope to measure such high voltages would be hazardous to the health of the user.

If it's important to be able to obtain an accurate reading of such high voltages, the technician can use a high-voltage probe (see drawing). It's really a relatively uncomplicated device: a properly insulated body containing a probe, a voltage divider, and an oscilloscope probe lead . The high voltage is confined to the probe tip and the highly insulated body. The much diminished voltage coming from the divider is conducted to the meter by the probe lead. As long as the technician exercises adequate care in applying the probe, measuring that high voltage is both safe and accurate.

Quality is important

When it comes to something as seemingly simple as a test lead: a piece of insulated wire with a plug at one end and a

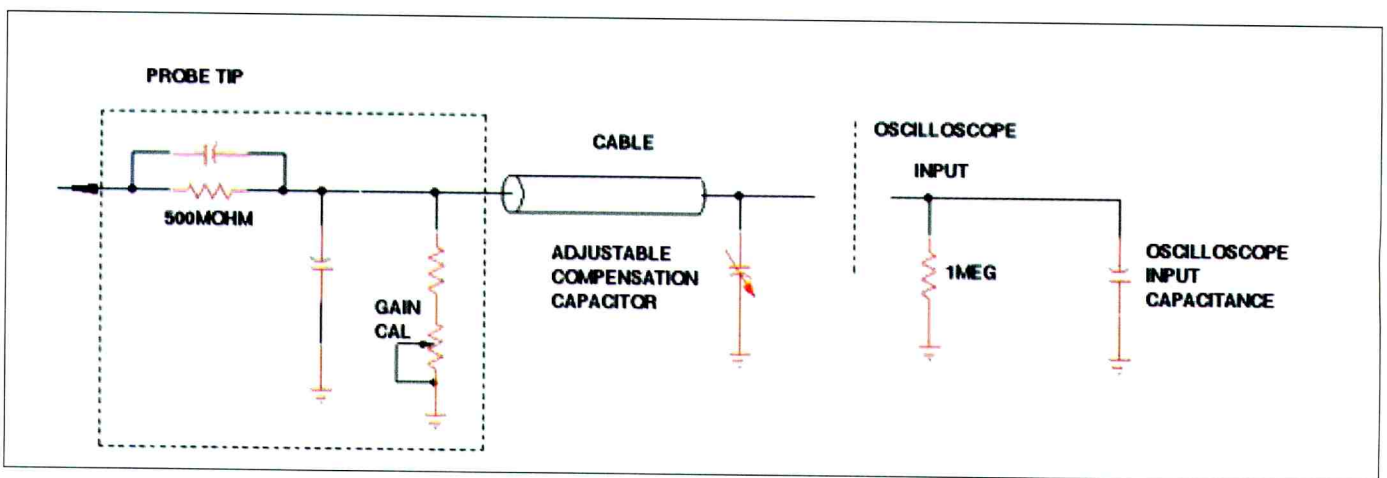


Figure 5. A high-voltage probe for an oscilloscope is really a relatively uncomplicated device: a properly insulated body containing a probe, a voltage divider \, and an oscilloscope probe lead.

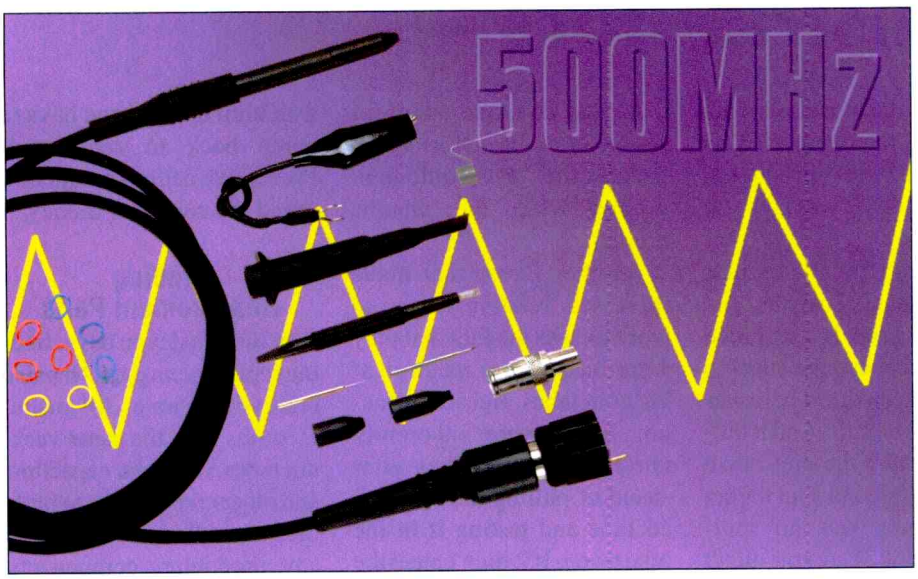


Figure 6. These "Microline" oscilloscope probes are designed to speed up and simplify testing of high-frequency, high-density circuits in limited space areas. Compatible with digital and analog oscilloscopes, the 500MHz bandwidth probes provide capability to test a broad range of high-frequency applications. *Photo courtesy Pomona Electronics.*

probe at the other, you wouldn't think that there was much of a quality issue. Don't be fooled: there is an important quality issue. You may have owned an inexpensive multimeter like the one I bought years ago (never again). If so you are aware of the need to be aware of quality. This meter came with a pair of test leads that was constantly coming apart. I didn't use it often, but it seemed that every time I went to use it, the leads had broken off of the probe or the plug and had to be resoldered. Apparently the wire was brittle. Of course, since the wire was brittle, the leads were not very flexible. Moreover, the insulation was made of some kind of plastic what was not heat resistant, so more than once I scorched it with the soldering iron. I wonder how accurate my readings were. Never mind.

Contrast that with quality probes: the probes are made to go together easily, the wire is of high quality and extremely flexible, and the insulation is a silicone product, and so impervious to any contact with a hot object such as a soldering iron.

In sum, a product is only as good, accurate and reliable as its weakest link.

SAMS Has The Service Manuals You Need

Sams Technical Publishing has a database of over 180,000 listings of manuals for electronics repair.

Coverage includes antique radios, CBs, and televisions spanning the past 50 years. Sams also covers Big Screen and Projection sets in **PHOTOFACT® GOLD**.

All manuals can be purchased from your local DISTRIBUTOR or directly from Sams Technical Publishing.

5436 W. 78th Street
Indianapolis, IN 46268-4149
800.428.SAMS Fax 800.552.3910
www.samswebsite.com

SAMS Technical Publishing

Circle (8) on Reply Card

Distributors —

As technology advances, everything about a class of product tends to change: the way it's engineered, the way it's manufactured, the components used in the product, the knowledge, test equipment and tools required to service it. This is certainly true in the case of consumer electronics products.

There was a time, when circuits were hand wired and vacuum tubes constituted the only active devices in the product, that technicians always performed troubleshooting to the component level. There was no choice. Those old sets were built on a metal chassis with everything interconnected by wires. There were no modules, no subcircuits. It was all a single unit.

Of course, those products were relatively simple, and straightforward. If a set failed it wasn't because the start-up circuit didn't work. There was no start-up circuit. And it didn't fail because the shut-down circuit operated to shut the set down. There was no shut-down circuit. And you didn't have to worry about hot chassis. The rectifier circuit consisted of a single rectifier element and its associated resistors and capacitors, so there was no requirement for an isolation transformer to isolate the test equipment ground from the chassis ground.

Another factor that made these sets relatively easy to work on was the fact that they were based on a handful of vacuum tubes. Because vacuum tubes were inherently unreliable, most fixes consisted of pulling the suspected tube and testing it in the tube tester. If it didn't meet the specs, it was replaced. Sometime is made sense to test all the tubes. If one was questionable, it might make sense to replace it, rather than wait until it failed and have to come back to replace it. Preventive actions frequently saved the customer money.

Finding Replacement Parts

In those halcyon days, finding replacement parts was also relatively simple. All manufacturers used the same vacuum tubes, resistors, capacitors and other components to build their sets. There were few, if any, proprietary components, so you could go to pretty much any distributor and get everything you needed.

Of course, we all know that things have changed dramat-

Circle (4) on Reply Card

T.A. EMERALD

PURETRONICS VALUE DRIVEN LINE HELPS MAINTAIN OPTIMUM SURFACE CLEANLINESS

T.A. Emerald Industries, a company that specializes in high quality cleaning products for advanced applications released the PURETRONICS(r) product line to the electronics industry late last year. PURETRONICS(r) is a new family of environmentally safe precision cleaning products developed specifically for electronic applications with one purpose in mind—-to effectively, safely and affordably clean electronic components and equipment to the point of optimum surface cleanliness.

With extensive research and development in the lab aided of process engineers and service technicians, T.A. Emerald Industries feels confident that they have created a quality line of cleaning products offered at outstanding value. Each individual PURETRONICS(r) product has been subjected to stringent quality and performance standards in order to qualify and be accepted into the line. These standards revolve around qualities they feel essential to an exceptional formulated product: excellent cleaning strength, material compatibility, quick evaporation rate, zero residue, low odor, low toxicity, environmentally safe and reasonable formulation material cost. These product objective qualities are the keys to an effective, safe and affordable cleaning product and are the foundation to the entire PURETRONICS(r) product line. The broad but initially general line consist of different strength contact cleaners, dusters, flux removers, contact cleaner and lubricate, circuit freeze and plastic and glass cleaner. For more information, contact: T.A. Emerald Industries, 1580 East Edinger Avenue Suite O, Santa Ana, CA 92705. 714.972.9200; fax: 714.972.9400. E-mail: info@puretronics.com Web: http://www.puretronics.com

The Servicers Primary Source

ically over the years. TV sets, and other consumer electronics products of today, contain large numbers of proprietary components. These have to be ordered from a distributor who carries that particular manufacturer's line of components. Even more recently, in many cases, such as is true with EEPROMS and EAROMS, once you've obtained the correct component, you're still not finished. You may have to program it so that the set works properly.

Because of the way things have evolved, a service center can spend an inordinate amount of time finding a replacement for a failed part. If the service center doesn't have the appropriate service literature, it may not even be possible to identify the part that has failed so that it may be ordered. If the part can't be identified and ordered, all of the preliminary work that the technician has performed to ascertain the cause of the problem is wasted, because the unit can't be fixed.

The Role of the Distributor

When the set is a less well-known product, and the service literature is not available, and the service procedure has come to a grinding halt, the service center may be able to get help from a distributor. Some distributors offer the service technician a variety of aids in finding the needed replacement. Others are less helpful. It's important that the technician have some way of knowing which is which.

The distributors who have advertised in this special advertising supplement have done so because they would like to tell you more about themselves than they can in an ad. They want service centers to know what kind of facilities they have, what kinds of people work for the company, the efforts they are making at customer satisfaction, and how to contact them when you need a replacement component.

Food for Thought

Keep some of these questions in mind when you're looking for a distributor. You want to find someone you can count on for reliability, convenience and service. Merely locating someone who stocks the part isn't the only consideration. For example, if the distributor requires a large minimum order, or if you have to wait weeks for the part to arrive, you'll have that defective product sitting around the service center for a long time without earning you any profit, a nd the customer will not be pleased with the wait.

Here are some of the questions you should ask distributors:

- How often are they able to fill orders from stock?
- What payment options do they offer: open order account, credit card?
- How soon after receipt of an order to they ship?
- Do they add a shipping surcharge?
- Do they have a toll free number?
- What ordering options do they offer?
- What is their return policy?
- Do they offer a warranty?
- Is there a minimum order amount?
- Do they have a minimum line charge?
- What shipping options do they offer?
- What special services do they offer?
- Do they have a research department to help technicians find a specific part?

If you require "same day" delivery it may be important to know their closest inventory location. For "next day" delivery you should know their base, or minimum rate.

It might be tempting to order from the first distributor that comes to mind, but if you will take the time to ask a few questions it might save time, money and aggravation. The following section will give you a head start in answering some of those questions.

FLUKE

Circle (5) on Reply Card

AN ADVERTISING SECTION
VANCE BALDWIN

JVC SERVICE & ENGINEERING COMPANY OF AMERICA has recently appointed VANCE BALDWIN ELECTRONICS as a New Full Line Authorized Parts Distributor.

Vance Baldwin Electronics is happy to announce that JVC has recently appointed Vance Baldwin Electronics as the first Full Line Authorized Parts Distributor to be added in over 5 years.

"We are very excited about this newly formed relationship with one of the best service organizations in the country. 2002 is shaping up to be a great year for Vance Baldwin customers as we were also recently named as a Master Distributor for Philips and Lexmark," said President Fred Baldwin.

With a new 35,000 square foot facility located in Fort Lauderdale, Florida, Vance Baldwin Electronics has implemented some of the latest technologies available to help improve our service levels and efficiencies. Our 28-person call center allows customer service personnel to have access to detailed customer information as they receive each call. In addition, an automated conveyer system and picking process allows packages to flow easily and accurately on a daily package count to over 2,000 per day.

Vance Baldwin Electronics carries a full line of consumer electronics parts, computer parts, and printer parts, and distributes for manufacturers such as our newly added **JVC as well as Denon, Sanyo Fisher, Hitachi (Elite), Panasonic, Technics, Quasar, Techwood, RCA (Premier), GE, Proscan, Toshiba, Philips (Master), Magnavox, Sylvania, Philco, and Zenith.**

We are also the only Distributor in the country to be authorized for **HP, Canon, Lexmark, Epson, Panasonic, Brother, and Okidata** printer parts. In addition, we also stock computer parts for **HP, Compaq, IBM, Toshiba, Dell and Apple.** This allows dealers around the world to experience lower prices, better service, and an overall parts savings with consolidated ordering and shipping from Vance Baldwin Electronics.

As Vance Baldwin Electronics continues to grow at record pace, we will continue to upgrade our systems in a sophisticated manner so that all new technology is evaluated to its fullest extent to maximize our customer's benefit. Future plans include moves toward fulfillment programs for other distributors, and web hosting partnerships.

If you have not tried Vance Baldwin Electronics in the past, please pick up the phone and ask one our our helpful parts professionals how Vance Baldwin Electronics can help your business grow. ***Vance Baldwin Electronics looks forward to serving you.***

For more information, please call (800) 432-8542 or visit us on the web at www.vancebaldwin.com.

VANCE BALDWIN ELECTRONICS

Your #1 Source For Original Replacement Parts:
The Parts Professionals!

Now Authorized! JVC

- Same Day Shipping on all in-stock orders!
- Auto Email Order Confirmations!
- Auto Fax Order Conformations!
- Auto Back Order & ETA Confirmations!
- Free & Discounted Freight Programs!
- No Minimum Order!
- Free Parts Research!

FedEx ESTES

Shop with us at:
www.vancebaldwin.com

Panasonic MAGNAVOX HITACHI
Technics TOSHIBA RCA
Quasar SYLVANIA PROSCAN
SANYO PHILCO PHILIPS
FISHER New JVC DENON
LEXMARK Z hp
COMPAQ Techwood Canon
IBM OKIDATA EPSON
Apple DELL brother

Vance Baldwin Baldwin Electronics
7060 State Road 84, Suite 12
Fort Lauderdale, Florida 33317

Toll Free: (800) 432-8542
Fax: (800) 552-1431

Circle (6) on Reply Card

andrews electronics

25158 Avenue Stanford
Santa Clarita, CA 91355
Phone: 800-289-0300
Fax: 800-289-0301
www.andrewselectronics.com

Andrews Electronics is housed in 50,000 square feet of warehousing and office space. Miles of shelving are arranged for immediate identification and easy accessibility for over 250,000 different parts that we carry.

Maintaining an inventory of this size has been the cornerstone of our success as the O.E.M. parts distribution industry leader. It provides us with an average first pass fill rate of above 90% and makes us the largest supplier in America for the manufacturers we represent. Our fill rate is calculated on not only everything that is ordered but also on every call or fax we receive for availability, even if it isn't ordered! Our dealer order desk has 32 available sales representatives to handle all of your ordering needs.

We've built our reputation on a very simple philosophy...service. Not very fancy, but very effective. Our constant growth attests to it. You see, all of our policies that have been developed over the years have been based on that one simple thought: "How may we better serve the industry?" How about:

- 14 major brands to save you time, frustration, and money with "one-stop shopping."
- Orders placed before 2:30 PST are routinely shipped the same day.
- A freight program that offers free and discounted shipping.
- No minimum orders or handling charges.
- Automatic backorder reports with ETA's mailed bi-weekly.
- A fast, highly-efficient research department, second to none.
- A program that converts make/model descriptions to part numbers instantly for the majority of research requests.
- 24-hour toll-free phone and fax order lines.
- Over 100 full-time employees waiting to serve your needs.

Our already outstanding freight program has been drastically improved! The minimum qualifying amount has been cut in half and the 2 day air discount has been almost doubled! With this type of shipping program, we're a lot closer than you might think.

In case you've heard this elsewhere before, now's the time to let us prove it to you. By investing a mere two minutes of your time, you can discover what thousands of others have: that there is a difference. When you place your next order with your local supplier, check the availability of all the items. Then call or fax Andrews and check out our stock levels. We believe you'll be pleasantly surprised! Wouldn't getting those extra units repaired a week or two sooner be good for reputation? Sure it would! And we can help! After all is said and done, it is performance that counts. We know that your ability to perform your job depends on how well we perform ours. Our regular office hours are from 8:15 to 4:45 PST and we're closed for lunch between 12:00 and 12:30.

When You Think of Electronic Parts...Think of Andrews.

andrews electronics

Stocking the Largest Inventory of O.E.M. Parts, Accessories, and Service Literature in the Country!

SONY PANASONIC AIWA
RCA/GE PROSCAN SHARP
TOSHIBA QUASAR ZENITH
TECHNICS PHILIPS HITACHI
MAGNAVOX JVC SYLVANIA

Over a 90% Fill Rate

- **FREE or Discounted Freight Program**
- **Backorder Reports with ETA's Mailed Biweekly**
- **Factory Authorized**
- **No Handling Charges**
- **No Minimum Orders**
- **Fast, Efficient Research**

Over 1/4 MILLION Different Parts in Stock
Shipped the Same Day*!

**We routinely ship over 90% of all orders the same day.*

Phone (800) 289-0300 Fax (800) 289-0301
25158 Avenue Stanford, Santa Clarita, CA 91355
orders@andrewselectronics.com

Circle (7) on Reply Card

Removing and Repairing Surface Mount Devices (SMDs)

As manufacturers of consumer electronics products have continued to make their products smaller, lighter, more energy efficient and more feature rich, they have increasingly employed surface mount devices. Moreover, in order to cram as many functions into the smallest possible space, manufacturers have increasingly used integrated circuits that incorporate large numbers of functions into a single IC package. The result has been small, lightweight, inexpensive, sophisticated products; a dream for consumers. However, these same products are a nightmare for service technicians who have to be able to troubleshoot, remove and replace these multileaded, surface mount, IC packages when they fail.

This article, adapted with permission of Toshiba America Consumer Products, Inc. from the service manual for the Toshiba Color TV 13A21 (File No. 050-200110), describes a method for removing and replacing these many-leaded devices without causing damage to the printed circuit board, the delicate foil lands and traces, or any of the surrounding devices on the board.

Removal

When removing a faulty surface mount IC, it's important not to apply much heat to surrounding components, their soldered leads, or the delicate foil traces on the printed circuit board. The following paragraphs describe how to heat the leads of the IC that is to be removed to the point that the solder flows enough so that it may be removed without damaging anything in the vicinity.

1. Put the masking tape (cotton tape) around the flat package IC to protect other parts from any damage (Figure 1). Note: masking is carried out on all the parts located within 10mm of the IC leads.

2. Heat the IC leads using a blower type IC desoldering machine (Figure 2). Note: do not use force to try to rotate the IC, or to move it back and forth until the IC can

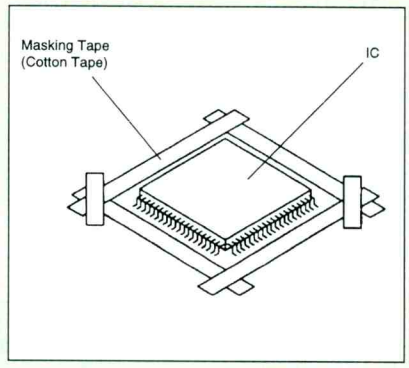


Figure 1.

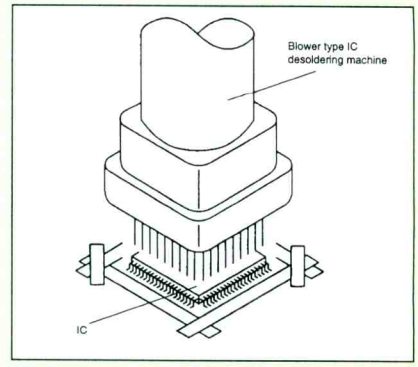


Figure 2.

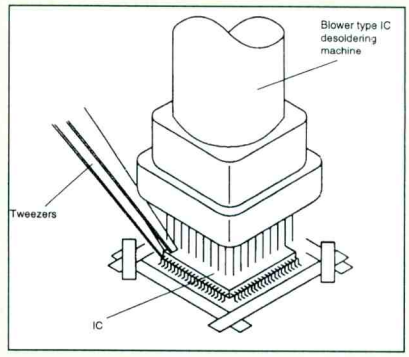


Figure 3.

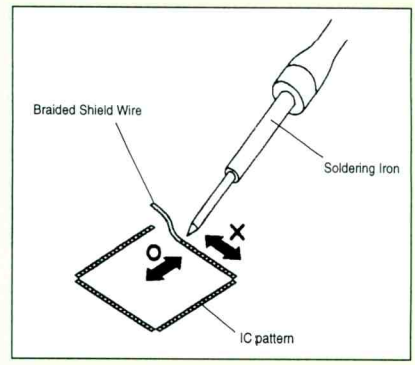


Figure 4.

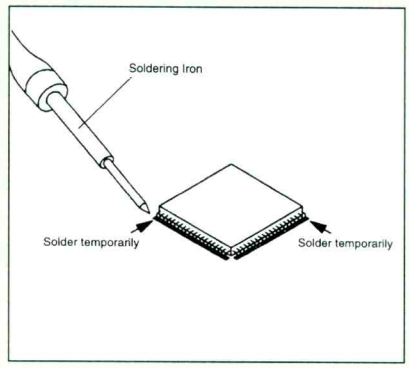


Figure 5.

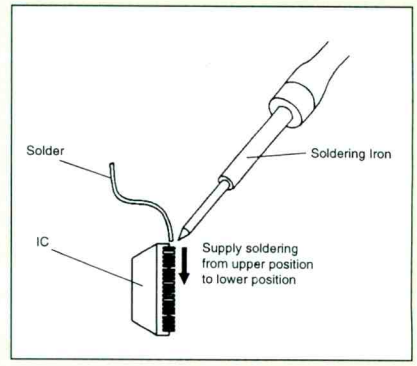


Figure 6.

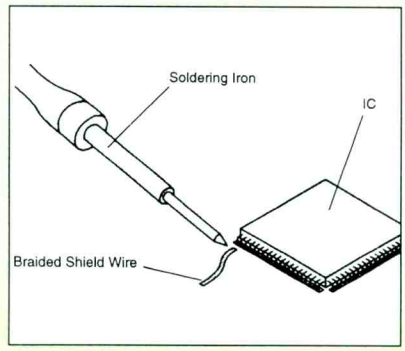


Figure 7.

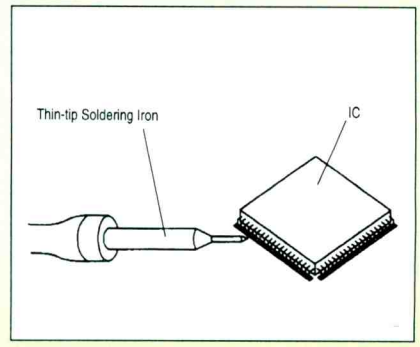


Figure 8.

move back and forth easily after the leads are completely desoldered.

3. When the IC starts moving back and forth easily after desoldering completely, pick up the corner of the IC using a tweezers and remove the IC by moving with the IC desoldering machine (Figure 3). Note: Some ICs on the PCB are affixed with glue that was used to hold them in place during mass soldering, so be careful not ot break or damage the foil of any of the IC leads or solder lands under the IC when removing it.

4. Peel off the masking tape.

5. Absorb the solder left on the pattern using the braided shield wire (Figure 4). Note: Do not move the solder braid in the vertical direction toward the IC pattern.

Installation

When you're installing the replacement IC, it's important to avoid overheating the new IC, or bending its leads out of position. It's also as important during installation to avoid damaging other devices or leads, just as it was during removal. To install the new IC without problems, follow these steps.

1. Make sure that leads of the new IC match up properly with the corresponding lands, and then install the new IC fitting on the printed circuit pattern. Then temporarily solder each lead on the diagonal opposite corners of the IC (Figure 5).

2. Supply the solder from the upper position of the IC leads sliding to the lower position of the IC leads (Figure 6).

3. Absorb the solder left on the lead using desoldering braid (Figure 7). Note: do not absorb the solder to excess.

4. If it appears that there is not enough solder on any of the lead/land solder connections, resolder using a thin tip soldering (Figure 8).

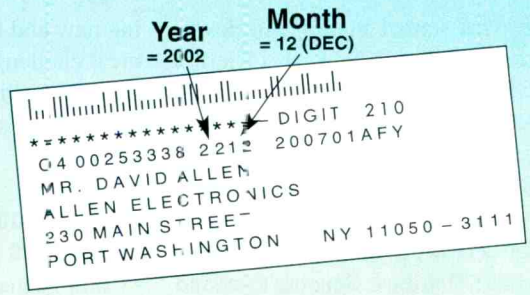
5. Finally, check on four sides of the IC using a magnifying glass to make sure that all solder joints were properly made. If some abnormality is found, correct by resoldering. Note: If the IC leads were bent during soldering and/or repairing, do not rebend any of the leads. If you try to rebend the leads, you might damage the pattern. In such a case, replace the IC and start again.

DON'T MISS A SINGLE ISSUE OF ELECTRONIC SERVICING & TECHNOLOGY

THE MAGAZINE FOR PROFESSIONAL ELECTRONIC AND COMPUTER SERVICERS

ELECTRONIC Servicing & Technology

Check your label for your expiration date!
Your expiration date is here:



As a subscriber to ES&T you don't want to miss a single issue of the trouble shooting, diagnostics or profax information in every issue...

Renew Your Subscription Now!

BY PHONE: (516) 883-3382 **BY FAX:** (516) 883-2162

BY MAIL: ES&T Circulation, 403 Main St., Floor 2, Port Washington, NY 11050
Please Include you name, address, check, or credit card information (including expiration date), and an address label if available.

BY WEB: www.electronic-servicing.com

DON'T MISS A SINGLE ISSUE OF ELECTRONIC SERVICING & TECHNOLOGY

Circle (9) on Reply Card

Consumer Electronics Profile

SENCORE, INC.

HOME ELECTRONICS DIVISION
3200 Sencore Drive
Sioux Falls, SD 57107
Tel: (800) 736-2673
Fax: (605) 339-0317

Founded in 1951,
by R.H. (Herb) Bowden

A series of vendor profiles designed to provide servicers with a word picture of the manufacturers service organization, policies and contacts. If you have a manufacturer you would like profiled, just let us know.

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 proud to be 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.

For over 50 years, Sencore has focused on one goal... Making our customers more successful in electronic servicing and helping them take advantage of new and profitable opportunities in our industry. Sencore is a leading manufacturer of innovative electronic test and measurement equipment that has provided thousands of technicians with solutions to help them succeed on the bench and in business. Our high quality test equipment, advanced electronic training courses, free technical support, and our commitment to developing new and innovative tools for the technical challenges of today.... Sencore continues to be the number one source for technical answers for the consumer electronics market.

Some of today's difficult servicing challenges include:

- Complicated surface mount circuits that require more technical training; Sencore provides innovative, easy to use test equipment combined with improved troubleshooting methods and training to get the job done right - the first time & every time.
- A distinct lack of current technical training courses; Sencore provides comprehensive hands-On training and self-study courses to meet both time and technical demands of technicians.
- A shortage of technical support and resources throughout the industry; Sencore is staffed with technical sales engineers and application engineers that are a toll free call (1-800-SENCORE) away from helping you streamline your operations and provide solutions to the technical support issues so you can get the job done. (Give us a try, were sure you will be impressed by the high level of support you receive)
- Part's and schematics are often hard to find; Even though Sencore is not a parts or schematic supplier, our technical staff works hard keeping our manufacturers and part supplier information up to date. (Call your sales engineer for an updated listing)

Service challenges slow down servicing operations. This causes profits to be lost. It is our main goal to help our customers succeed by eliminating obstacles by streamlining the service process.

The Home Electronics Division is also pursuing new opportunities. As we continue to design, manufacture, and market some of the best test instruments for the audio and video service industry we have expanded our reach to include training for audio/video manufacturing, marketing,

installation and service. Take a look at the CEDIA (Custom Electronics Design & Installation Association) Website - www.cedia.org and you will see some great opportunities for businesses in the consumer electronics service industry. Sencore supports this market and we think it makes sense for you to investigate the opportunities available.

CEDIA and collateral markets have experienced unprecedented growth in the last several years. This growth is creating not only opportunity for Sencore but also tremendous opportunity for technicians trained in the areas of A/V installation, calibration and service. The Commerce Department projects that there will be requirements for in excess of 80,000 Custom Electronics Installers or A/V Experts in the coming years. That's a big demand and a lot of jobs!

Sencore also works with technical schools, colleges, and training centers to meet the demands of our industry.

Sencore's Tech School Partnership Program provides equipment and access to training resources needed to assist in setting up top-notch programs at schools to get students trained and ready to take advantage of these new and exciting opportunities. Sencore's Tech School Partnership Program includes:

- Innovative Test Instruments For Simplified 'How To' Guides For A/V Installation And Calibration
- Access To Sencore's Sencore News With Articles And Tips On A/V Installation And Calibration
- On-Line Interactive Demonstrations For Classroom Training
- Interactive CD-ROMS For Classroom Training And Self-Study
- Hands-On Training Classes Administered Or Sponsored By Sencore.
- Consultation On Industry Skill Requirements and Needs For Curriculum Development
- Key Industry Contacts For Curriculum Develop and Student Job Placement

As a sponsor providing equipment and judges for the past several years to the annual VICA Skills USA competition in Kansas City we have seen a definite shift in skill sets required for employment in this new and fast paced consumer electronics economy. In 2001 we saw the first ever Custom Installation competition at VICA. We feel this is a direct result of new the jobs demanded in A/V Installation that the Commerce Department is projecting over the next several years.

Additionally we are seeing excellent opportunities in several other peripheral markets that require audio/video skills including Gaming & Entertainment, Hospitals, Government, and Manufacturing to list a few.

Now more than ever is an exciting time to be in our business! We encourage you to investigate and go after these new challenges and opportunities to see where they take you. Expand your horizons and as technology changes be ready and eager to change.

Most recently the Home Electronics Division here at Sencore acquired Bowden Automated Products (BAPCO). Sencore & Bowden Automated Products (BAPCO) manufacture and market Test and Measurement Instruments for the Medical, Safety & Compliance, and Advanced Medical Imaging markets. Our offering includes Safety Testers and Analyzers, including SPO2 and Patient Simulation; Compliance Testers that test to the following standards: IEC601, AAMI ESI, NFPA99, IEC1010, and IEC950. Our newest products include Medical Imaging test equipment for Color Analysis and Signal Generation to ensure compliance with DICOM standards.

We re-launched the *Sencore News* last year with rave reviews. It is available for free by visiting www.sencore.com providing your email address and subscribing. The "Online" News is filled with technical articles, new opportunities, special offers and up-to-date information. We have also started listing great-refurbished Sencore equipment on our Website so check that out also.

You can learn even more about the new market opportunities by visiting the following web sites:

www.cedia.org
Custom Electronics Design & Installation Association

www.cesweb.org Consumer
Electronics Association

www.icia.org
International Communications Industry Association

www.nsca.org
National Systems Contractors Association

www.skillsusa.org
USA Skills USA / VICA Web Site

You can contact Sencore as follows:

For Sales, Service, Parts, and Technical Support:
1-800-SENCORE (736-2673)

Email:
sales@sencore.com - Sales
service@sencore.com - Service
parts@sencore.com - Parts
ae@sencore.com - Tech Support

Web:
www.sencore.com

Fax:
605-339-0317

New Technology Update

Part 1: THE INTERNET, GAMES, HOME THEATER

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.

THE INTERNET

In the more than 30 years since the birth of the Internet, the world has changed dramatically.

The files are bigger, the user base is larger and the demand on pipe width has expanded enormously. The Web now is an integral part of society. We listen to the radio; play games against and with other players across the globe; communicate in real-time with someone in far-away places through instant messaging and net-enabled phones; watch video broadcasts and short films; transfer music, picture, and movie files; download the latest software; and even do some holiday shopping; all from the comfort of our browser.

The trouble is this activity is taking place on the equivalent of unpaved country roads. The average consumer connects at speeds up to 56 kilobits per second (Kbps), roughly a page of text every half-second, and often much slower. This is like serving a downtown area with single-track roads where speed limits are 25 mph.

The full potential of the Internet will not be realized until more consumers have bigger roads going into their homes. Some argue that the digital divide is widening due to limited distribution since some have access to the new three-lane highways, while others are confined to dirt tracks. Others say that progress has been slowed on delivering the amount of content possible because high-speed connections, or broadband, have not been adopted on a wide scale.

However, what are the benefits of wider roads to the Internet? Some set the threshold at 100 megabits per second (Mbps), or roughly 1,800 times the average connection speed now, as a key point, but what would be different if we got to the 100 Mbps threshold and beyond? Is it critical that all consumers make the switch? Does it enable new technologies or just enhance the current experience? And, what are the implications for consumer electronics (CE)?

TRENDS

Even at current usage levels the average connection speed is not enough to support a fluid and enjoyable online experience. Experts estimate that 128Kbps are required for fluid streaming media connections, twice the rate available with the common 56Kbps dial-up modem. Any less causes skips and breaks in the broadcasts. Broadcasting high-definition signals may require as much as 20Mbps. Online gaming alone requires about 50Kbps continual connection speed. Even at those speeds, lag and packet loss can be a problem as the actual connection speeds dip.

The Web now is an integral part of society.

Even simple Web surfing can result in frustration when websites and large files are agonizingly slow to load. As a result, experts set 100Mbps as the frontier beyond which the Web experience truly can demonstrate its potential - surfing to streaming of high-quality, skip-free digital audio and video, as well as faster upload of graphic images and larger files. Broadband has tremendous market implications for carrying the current technologies beyond their present limitations. The following is a sampling of the technologies that rely on broadband for their continued growth:

- **High-Definition Video.** The current video content available on the Internet is arguably of low quality due to the limitations on bandwidth, even if the lags are removed. Greater bandwidth would enable streaming of higher quality high-definition (HD) signals across the Web.
- **CD-Quality Internet Radio.** Most radio broadcasts over the Internet are subject to skips and pauses with questionable audio quality even in times of stable feed. Listening to online radio places heavy burdens on a network or direct connection, making any other concurrent tasks impossible. This goes against consumer's normal usage of radio as background noise.
- **File Sharing.** Napster at its peak usage showed the mass-market appeal of file-sharing technologies as well as the impact that massive sharing has on Internet loads. Apart from the legal questions of sharing copyrighted material, a host of less controversial uses for file-sharing technologies exists. Sharing of photos and home videos involve large files and require high-bandwidth to feasibly transfer across the Web.
- **Web-Based Delivery of Movies and Software.** With many movie files up in the gigabit plus range, loading movies is not feasible. Many software titles are too large to send across the Internet. With more bandwidth, sending larger files becomes more manageable and opens new avenues for e-commerce.
- **Online Game Play.** The graphic content of games is continuing to approach photorealism. More realism means more information contained in a single screen. Added to this is the complexity of several independently moving characters con-

trolled by the gamer and rapidly shifting views. This means an ever-increasing demand for high-bandwidth connections to achieve the full capability of online game-play. In fact, more bandwidth can take gaming to new levels by providing gamers with access to new online universes.

• **Home Networks.** The more data that flows into the home through an Internet connection, the more data there is to share among devices within the home. Streaming media and other Internet delivered content provides consumers with more compelling reasons to invest in home networks. High-bandwidth, always-on connections can be shared between multiple access points in the house.

INCREASING SPEED

The full potential of the Internet cannot be realized until broadband connections are a reality for Internet users.

At a minimum, high-bandwidth connections offer faster downloads, quick access to sites and information, high-quality and lag-free streaming media, smooth online game-play, and unbroken audio broadcasts. However, the larger benefits of high-speed Internet stretch beyond current usage into possibilities that economists estimate could be worth $400 billion in growth each year.

Broadband is pivotal force

A large portion of product evolution in the CE space is linked to broadband-home networking, home automation, gaming, audio, and video into the home, not to mention the further development of the Internet. Greater adoption of high-bandwidth connections opens new avenues of distribution for entertainment media. MP3 was the first of many media to have impact on CE feature sets with more on the way.

Internet backbone is not a barrier

Current transfer rates across the Internet backbone, the core of the Internet infrastructure connecting the hubs of the net together, are more than enough to support ultra-high transfer rates. Multiple pipes with as much as 10Gbps stretch across the country. The stewards of the backbone, the large telecommunications firms such as MCI and Sprint, are in a continual process of upgrade to ensure enough bandwidth for years to come.

The core problem area in the Internet infrastructure is the last mile-the connection between the Internet service provider (ISP) and the home. Most households connect at speeds of 56Kbps or lower, barely enabling them to perform basic tasks on the Internet.

Cable and DSL hold promise

The two most likely candidates for bringing broadband to the Internet last mile are cable Internet and digital subscriber line (DSL) providers. Though cable offers higher speeds at a given price, DSL offers greater security. Each offers an always-on connection with speeds of more than 1.0Mbps. For now cable is winning the installed base war, but DSL is gaining speed. Waiting in the wings as a final solution are the wireless options, able to reach the most remote users.

Broadband has tremendous market implications for carrying the current technologies beyond their present limitations.

Limited cable choices, DSL plagued with conflict

For those considering cable, the options are limited. There are two main cable ISPs to choose from, Road Runner and @Home, each offered by a local cable MSO. This is in contrast to the more than 20 different DSL providers that exist as a result of the Telecommunications Act of 1996. The heavy competition among DSL providers as well as lawsuits stemming from the alleged anticompetitive actions of incumbent local exchange carriers (ILEC) have left DSL providers struggling to keep up.

Consumers need a reason to buy

The largest roadblock for broadband has been a lack of consumer adoption. Consumers are daunted by the expensive price tag of broadband and don't have a compelling reason to upgrade. On the flipside, many consumers report not having experienced high-speed access and do not have enough information to make a decision.

Government wants to open the market

The primary concern for government is the digital divide issue. The government views unequal adoption of broadband as a result of the lack of availability of broadband in rural areas and high prices as a major roadblock. Also troubling to officials is a regulatory imbalance between cable and DSL. The ultimate goal is to open the market for broadband so that consumer adoption increases.

The opportunities are tremendous

CE users are downloading enormous amounts of music over the Web and creating vast libraries of compressed audio files. MP3 playback functionality in audio devices was an appropriate product response to this development. The expansion of broadband means even more usage of an Internet connection as a delivery mechanism for home entertainment media; be it music files, movies, TV broadcasts and games. Much of the future home entertainment experience will be centered on a connected device. Manufacturers are incorporating this mechanism into the feature set; the limitations are only bound by the creativity of the developers. The resulting products not only are a revenue generator, they are a part of the compelling reason for upgrading to broadband, thereby feeding the cycle.

One area where this is playing out is in the next-generation game consoles. The newer consoles are including a broadband connection among the feature set. Already a center for game-related entertainment, these devices are positioning themselves as the center of home entertainment by also including DVD playback functionality and a hard-drive for saving games and downloading music, videos or games. A consumer owning one of these devices will have a broadband-enabled device that can play back compressed audio files and be

used to watch movies. The next step is for these devices to act as tuners for cable or satellite TV.

Encouraging growth

Economists have gone so far as to quantify what the emergence of technologies fostered by broadband will mean to the U.S. in terms of economic benefits. New research prepared by Bob Crandall and Charles Jackson suggests that any delays in the adoption of high-speed networks could cost the U.S. $500 billion per year. The premise is that lack of capacity in the networks is holding back U.S. economic growth. Higher penetration of broadband will encourage new purchases of technology and development of new services. Under this framework, the advancements may eventually add a total of $400 billion to U.S. economic growth each year if broadband becomes as pervasive as the telephone. Delays push these benefits further out into the future, thereby decreasing the total benefit.

Streaming media and other Internet delivered content provides consumers with more compelling reasons to invest in home networks.

So where are we in the process of broadband adoption? Where is the high-speed bottleneck? Are the underlying Internet backbone speeds enough to handle high-band-width transmissions or is the problem with the home Internet connection speeds?

Several technologies impact the bandwidth flowing to consumers. These include:

- The transmission technology (from content originator out to an Internet node)
- The size of the information package being transmitted (compression)
- The Internet backbone (from node to node, and node to ISP)
- The local loop and connection to the home (from ISP to household)
- The speed of the processor (CPU speed)

It is important for each of these components to advance so that information can be sent more quickly over the Internet. Compression standards are evolving to pack more information into a smaller space. Current technologies have made home PC processor speeds a non-issue. Quickly approaching 2GHz, current PC processor speeds far outstrip the rate at which information is being sent across the Internet.

Bandwidth through the Internet backbone, the central arterial system of the Internet, is not a concern either. The Internet backbone is made up of redundant fiber optic networks linking hundreds of ISPs and the central Internet nodes. Large portions of the backbone incorporate OC192 (10Gbps) fiber optic cable. At that level, sufficient amounts of bandwidth are available to get connection speeds up to 100Mbps and beyond for the vast majority of consumers. Upgrades are on going as well.

The problem is the last mile

Experts largely agree that the problem is in the "last mile" of the Internet infrastructure, the link between the ISP and the home or mobile user. Today, the vast majority of consumers rely on dial-up connections to their ISP through POTS (plain old telephone service) lines and an analog modem. Depending on traffic across the phone lines and coming into the servers, connection speeds can reach a theoretical maximum of 56Kbps. Unfortunately, the technology is fairly limited and upgrades are not likely to yield any substantial increases in bandwidth capability.

High-speed options are available

A variety of broadband solutions are available for consumers to choose from including cable, DSL, wireless connections and fiber optics. Each offer different connection speeds and has benefits and weaknesses. So far, cable and DSL have made the greatest strides in the proliferation of broadband. However, each is faced with different issues.

Cable internet

Cable is the most widely adopted broadband technology by a margin of more than two to one over DSL. Cable Internet services have benefited from monopolistic control over the cable infrastructure, a captive audience in the large installed base of cable subscribers, the low cost of delivery as a result of low utility pole rental, and an earlier jump on the market facilitated by upheaval in the DSL market.

Consumer choice in the cable marketplace is limited to two key providers through the local MSOs. The Time Warner owned RoadRunner service and Excite@Home provide the main Internet backbones and proprietary content to any of the MSOs, including AT&T and Comcast, the two largest. Other smaller cable ISPs exist in specific markets in the U.S., such as ExpressNet and 21st Century in Chicago.

ISCET
CERTIFIED ELECTRONICS TECHNICIAN

Your Ticket to
SUCCESS

More than 50,000 technicians worldwide are Certified Electronics Technicians. ISCET offers Journeyman certification in Consumer Electronics, Industrial, Medical, Communications, Radar, Computer and Video. For more information, contact the International Society of Certified Electronics Technicians, 3608 Pershing Avenue, Fort Worth TX 76107; (817) 921-9101.

Name_____
Address_____
City_____
State_____ ZIP_____

__ Send material about ISCET and becoming certified.
__ Send one "Study Guide for the Associate Level CET Test." Enclosed is $16.95 (includes postage/handling). ***TX residents — include 8.25% sales tax.***

ES&T

Circle (10) on Reply Card

Concern over the monopolistic control of the cable industry is mounting. Already consumers face limited choice for cable TV and cable Internet services. Some argue that cable should be treated as a telecommunications service and subject to all the regulations that would apply. These critics argue that the 1984 Cable Act, which requires cable companies to lease channels to content providers, should also apply to data services. Cable operators point to the huge investments they have made in their infrastructure and say they should not be deprived of the benefit of the investment. They view any regulation on the infant broadband market as detrimental.

Current trends suggest that perhaps times are changing for the DSL providers.

The Federal Communications Commission (FCC) has attempted to steer clear of the third-party issue. However, a series of court decisions appear to be moving toward redefining cable Internet services as telecommunications services. This is forcing the FCC to take a stand on the issue. In informal communications, the FCC has endorsed the concept of openness, but has taken no actions to enforce the issue.

Digital subscriber line (DSL)

At the root of the current state of affairs in the DSL market is the Telecommunications Act of 1996 that opened the lines for competitive local exchange carriers (CLEC), to offer DSL options to consumers underserved by the incumbent local exchange carriers (ILEC). ILECs, wanting to offer their own DSL products through the local infrastructure they control, have engaged in some anti-competitive behaviors. The ensuing legal battles, as the DSL providers fought for access, have brought many providers to their knees and left many new subscribers in the dark.

A number of bills have been introduced before Congress to revert the local-exchange market back to its deregulated state. Ultimately the ILECs strongly object to being forced to lease lines to the CLECs, saying that it is bad for the overall health of the market and has contributed to the slow rollout of DSL.

However, a number of ILEC and CLEC providers are beginning to engage in cooperative acts. The courts have stepped in to ensure ILEC compliance with the Telecommunications Act. Overall, the market appears to be taking off, although no single provider has yet emerged as the market leader.

Consumers aren't signing up

Roughly nine million households in the U.S. are currently subscribing to a high-speed service. This represents only a third of the potential, since nearly 27 million households are in an area covered by either DSL or cable broadband. Consumers simply are not taking advantage of the opportunities that exist and seem to have no plans to do so. According to the latest study on broadband adoption by CEA, over half (54 percent) of those using a dial-up connection have no plans to upgrade to high-speed access. Why? Many cite cost and availability as a reason.

No reason to upgrade

A survey by CEA shows that users are generally satisfied with their current service and don't have a reason to look elsewhere. However, a large portion (41 percent) of dial-up subscribers are dissatisfied with the speed of their connection. They rate connection speed (91 percent) and stability (90 percent) as important decision factors. Regardless, consumers enjoy the Web community and services such as chat and Instant Messenger that come as part of a dial-up service. Many of them believe the tasks they perform online simply don't require more bandwidth. So being fairly satisfied and not pressed to get more speed in their connection, many consumers aren't searching for alternatives with any enthusiasm.

Price is perceived as too high

Lacking the impetus to consider options, price is the first thing considered when new alternatives present themselves. Whenever surveyed, non-users of broadband services point to the cost as their primary reason for not upgrading. This includes the perception that the cost of acquiring the necessary hardware is prohibitive, even though many companies now offer installation deals. However, prices are higher than what users are paying for dial-up services. Consumers are looking at paying double their current subscription rates. What is missing from the equation, in the minds of consumers is the perceived benefit received from the additional expense.

Not enough information about available options

Consumers admit to not having enough information about broadband in making purchase decisions, which translates to a lack of awareness of availability, pricing and benefits. Many consumers (67 percent) have never experienced a high-speed connection. Without having tried it, these users are unaware of what high-speed access can offer.

Consumers want choice

Current consumers of dial-up services are accustomed to being able to choose their provider. They expect the same level of choice when evaluating broadband options. This manifests as a desire for choice in the type of service (DSL or cable), service offerings, method of acquiring (bundled with PC or separate), and information sources (retailer recommendations). Furthermore, consumers don't want restrictions on choices such as higher fees for not subscribing to cable TV. Given levels of satisfaction with a current provider, consumers consider ability to get broadband options right from their current ISP as an important option, something that is not possible in most cases.

The digital divide cannot be overlooked in the broadband build-out. Lower income consumers and those in remote areas are underserved by the current offerings. Prices are too high for many of the poorer consumers to manage. And the coverage areas for DSL and cable are limited and wireless solutions have not filled in these

gaps. The net effect is the creation of disparities in access to information on the Web. Policy makers are seeking solutions to these issues.

How do we get there?

The broadband deployment issue is solvable by allowing the market to sort it out. Broadband technologies will be available as coverage areas expand and prices decline, more consumers will find a compelling reason to upgrade, and innovative uses for high-bandwidth will emerge. What is uncertain is how long this process will take. The pressing question is whether we can afford to let the market take its course. Regardless of the approach taken, either more Taoist or activist in nature, a wide variety of factors must come into alignment for broadband to become a reality.

Expand availability of affordable high-speed access

With broadband technologies unavailable in many areas, continued broadening of the coverage is critical. Cable and DSL are likely to be the flagships for the broadband rollout in the short-term. Fortunately, the incentive for each is an economic one that will allow the expansion to continue on its own-more coverage means more revenue for the providers.

In terms of coverage area potential, both cable and DSL are fairly equal. Cable is slightly more available due to the proliferation of service providers, but beyond normal cable TV coverage areas, lines must be installed. DSL's infrastructure is already in place for most of the country since phone lines are ubiquitous. Adding repeaters to deal with diminished signal strength is pivotal to expanding the coverage of DSL.

Viable high-speed wireless options, including satellite, are essential to reaching the remotest regions of the "last mile" left open by cable and DSL and for enabling portability of the Internet experience. Current options are limited by the slow emergence of 3G technologies. Additional high-wavelength spectrum would help to push the frontiers of speed in the wireless domain. Fortunately, these technologies are continuing to emerge, albeit at a pace slower than the market demand requires.

The benefits of the broadband experience must be communicated.

Public policy is gearing up to help the coverage issue. The federal government currently is seeking ways to reward companies who make broadband a ubiquitous reality. The Broadband Internet Access Act of 2001 is one such attempt. This bill proposes offering a tax incentive to companies that offer broadband connections to underserved areas. Rewards are based upon a two-tiered tax incentive based upon the bandwidth offered by the connection infrastructure. Bandwidths of 1.5Mbps download/200Kbps upload will be rewarded with a 10-percent tax credit. A couple of variations of this act exist, including the Rural Broadband Enhancement Act and the Broadband Deployment Act of 2001. The former seeks to extend financing in the form of grants and loans to companies offering broadband in remote areas. The latter seeks to offer a tax credit as well, but is based upon the amount spent on equipment used to deploy broadband service.

Ultimately, increased coverage means increased competition and lower prices in the local broadband markets. With little competition currently in any given market, prices tend to reflect a more monopolistic market structure. As coverage areas expand and begin to overlap and the markets open up to competitors (either on their own or through regulation) increased competition should lower prices. This will help to bring broadband more in range for all income groups, also helping to relieve some of the digital divide issues.

Provide a reason to upgrade

Consumers have given the answer to the question of incentive; the benefits of the broadband experience must be communicated. Part of this is relaying to dial-up users the current broadband users' evaluation of ownership. Dial-up users already have expressed the importance of speed and stability to their purchase decisions. Knowing how highly current users rate both broadband options on these two criteria may entice non-users toward broadband options. Specifically, two out of three cable owners (67 percent) are satisfied with the stability of cable access. A strong portion of DSL owners is satisfied as well at 59 percent. Finally, broadband owners rate their connections very highly in terms of speed. The majority of both cable and DSL owners, or 70 percent and 69 percent respectively, are somewhat satisfied with their connection speed.

Another piece of the puzzle is getting users to experience it. Putting demonstration models on the retail floor is a good start. Word of mouth and showcase demonstrations among friends are likely to increase as penetration increases. Simply letting consumers see (not read about) how their basic surfing can be improved is the key. Getting them to think outside the box of their current usage patterns is critical.

What cannot be overlooked is the need for a compelling application for a high-bandwidth connection to give broadband deployment the extra push it requires. Some would argue that the decline of Napster does not help the adoption of broadband. Aside from any legal implications, here was an application best served by a high-bandwidth connection that also had mass-appeal. Another such application is needed for consumers to grasp onto as a compelling reason to get a faster connection; something that pushes the current frontiers of their usage..

Part of the answer is separating the Internet experience from the PC and moving it into the center of home entertainment, the living room. One possibility for this comes from the evolution of the set-top box and game console products. For years, technologists have struggled with finding a way of bringing the Internet to the living room. So far, products incorporating TV and the Internet have had limited success in the marketplace. However, both set-top boxes and game consoles are moving quickly in this direction. In fact, the newer product lines set for release during the 4th quarter of 2001 squarely position these devices as the center of the home entertainment experience. A broadband con-

nection going into either box at first serves a specific purpose, such as a connection to online gaming in the case of a console and self-updating program guides in the case of a set-top box. Once the foothold is gained through these specific applications, it is only a matter of time before other uses develop. Game consoles come with a hard-drive that can be used to download music or movies. DVR type settop boxes also offer movie-downloading capabilities. Ultimately, the entertainment aspects of Internet usage can shift to the living room away from the home PC, creating even more compelling reasons for consumers to upgrade.

The time will come

The prognosis for broadband adoption is good. Ultimately all the factors will converge to supply consumers with sufficient incentive to upgrade, compelling content utilizing the power of broadband will emerge (the killer app), awareness will increase as penetration increases and users show non-users the benefits, and prices will come down under increased competition. Thus the installed base will continue to grow. According to CEA, the number of broadband households should double to roughly 18 million in 2002.

As broadband penetration expands, so too do the opportunities for manufacturers of consumer electronic products. Whole new market opportunities will reveal themselves in time. As with many new technologies, forward thinking will triumph.

ENTERTAINMENT/ GAMES

The electronic game industry is in a period of massive evolution and convergence. As a whole, the current wave of changes amount to 40 years of gathered momentum for the industry, propelled on the back of rapidly advancing technology. And now games are being propelled right out of the closet.

For years, games were the pastime of a few, but the force of the industry as an entertainment vehicle is gaining attention. For one, the user base is extremely impressive.

From humble beginnings, electronic games have become a part of the leisure activities for nearly 60 percent of Americans. Revenues further tell the story. In year 2000, the game industry commanded more revenue at $9 billion than the entire movie box office.

At these levels of usage and sell-through, it is no wonder that competition is beginning to soar and a variety of firms are paying attention. The fourth quarter of 2001 promises to offer unprecedented competition and advancement in the console space as three strong rival platforms prepare themselves for a battle in the living rooms of Americans. Strap yourselves in folks, the new era of gaming promises to be a fun-filled and exciting ride with wide reaching implications.

According to CEA, the number of broadband households should double to roughly 18 million in 2002.

Trends

An important aspect of the current evolution is that there truly is something for everyone. Whether game-play involves regularly firing up a game console to test one's fighting prowess in a round of Pokemon, spending countless hours exploring the darkest recesses of some unknown universe through the eyes of an avatar, using the full extent of tactical and strategic mental powers to conquer and control as some vast tyrant, or simply pulling out a deck of virtual cards to engage in a casual game of bridge, more people than care to admit participate in the ever-expanding electronic game phenomenon. Games are an activity many prefer not to be identified with and yet so many dabble from time-to-time including the occasional quick game of Solitaire or online game of Family Feud. All of it counts, and the desire for fun only has become more compelling.

Game types

- **First-Person Shooter**. Players look out from behind the eyes of the character. Objective: seek out and destroy. Examples: Quake, Doom and Unreal.
- **Third-Person Shooter.** Players view the game from the side or the rear of the character. Main objective also is to 'shoot-em-up'. Example: Max Payne.
- **Adventure.** These are games in which the player must complete a series of tasks while adventuring through a world. Played primarily from the rear third-person. Examples: Myst,Tomb Raider, Mario, Crash Bandicoot.
- **Role-playing.** Gamers play with a single or multiple characters to complete quests or missions. Objective is to advance the skills and levels of the character. Examples: Diablo II, Everquest and Asheron's Call.
- **Arcade.** Arcade games have a simple interface and objective. Generally they are two-dimensional. Include all the classic arcade games, such as Frogger, Asteroids, Pac Man and Final Fantasy.
- **Gambling.** Primarily an online category of game. Includes Slots, BlackJack or Poker.
- **Family. Games** with an educational and family oriented theme such as Monopoly, Rugrats and Who Wants To Be A Millionaire.
- **Fighting.** Gamers fight against others in boxing, martial arts or wrestling style. Examples: Tekken III, Mortal Kombat and WWF Smackdown.
- **Driving Simulation.** Player controls a vehicle usually from a behind-the-wheel perspective. Examples: Crazy Taxi and Gran Turismo.
- **Flight Simulation.** Player controls a plane or space-craft from behind the controls. Examples: Flight Simulator and Mig 29.
- **Sports.** Games centered on a sport, such as football or basketball. Examples: NFL 2K1 and NHL Face Off.
- **Strategy.** Games played from a god's perspective. Players control resources to build civilizations and/or troops to conquer

the world. Examples: Civilization, Age of Empires and The Sims.

In short, games are a quick escape from reality. They provide a moment of fun in an otherwise regimented and busy day. More involved game formats allow gamers to take the experience to even higher levels of escapism.

Whatever your pleasure, game makers have the answer. Ultimately, game developers are the new breed of story-teller-creating alternative worlds for us to escape into; weaving plotlines for us to become lost in; painting pictures to blur the lines of reality; and inventing characters to engage our social senses. Games represent the ultimate interactive movie, allowing the user to control the direction and flavor of the plotline.

And now, the newest technologies make gaming an access point medium. In the home, we have PC and/or video game consoles as the escape vehicle. At work, escape comes from a desktop or laptop computer, usually loaded with OS-bundled games or Web-based freebies. Even on the road, there are a plethora of devices to play from-laptop computers, portable game devices, wireless phones and PDAs. These technologies allow ultimate portability so that a game of choice can be played no matter where you are. We are only beginning to see the possibilities of the wireless game market as the industry tests the waters.

Games are evolving

Evolutions in gaming take the experience beyond the boxes to which they were once confined. Historically, games and gamers were broken into two camps: PC games and console games. Each commanded its own niche. PC games, born from the high-powered PC with mouse and keyboard driven controls, drew the older more sophisticated gamer looking for role-playing or strategy games. Console games, born from the animated TV realm, drew a younger crowd interested in sports, adventure and fighting games mirrored after TV programming. But now, games are pushing all the boundaries that once confined them: hardware, genre, realism, location and time. The sum total of these advances is helping to push games into the realm of virtual reality. The stuff of science fiction novels is emerging.

The first aspect of the evolution is happening in the graphic aspects of the game. In the beginning, electronic games involved simply moving blocks across a TV or computer screen (ala Pong). Aided by the vast increases in processing power, games quickly are approaching three-dimensional realism. This power allows a developer to create a realistic world where a gamer can look around in full 360-degree vision.

In year 2000, the game industry commanded more revenue at $9 billion than the entire movie box office.

Coupled with tremendous storage capacity, game universes can span the equivalent of a globe, going from one region to the next. The effect is to pull the gamer in so they are truly immersed in the gamemakers world. The advances are so compelling that it makes it hard to see beyond the increases in graphic quality to other, equally important changes in game technology. Console platforms are not far behind the PC, with the next-generation consoles offering tremendous graphic processing power. In fact, historically, advances in graphic capability have been the driving factor in adoption of the most current iterations of console game technology.

The Internet takes the experience worldwide

Equally, if not more important in the evolution of electronic games, is the shift from games as a solitary experience to a wide-scale social one. Originally the phenomenon started as simple two to four multi-player games on a game console. This expanded to four to eight gamers as newer network technology allowed multiple game consoles to be linked together. As the games and gamers became more advanced the possibilities for larger groups of players expanded.

Now multiplayer gaming has reached new heights with the advent of online gameplay and the inclusion of an Internet connection on a console. Rather than experiencing games alone in a dark room or with a limited group of friends in the living room, the Internet makes it possible to play hundreds of others at the same time across the globe. In the latest multi-player games, it even is possible to talk to a fellow gamer using a microphone and headset, bringing squad-based and team play to a whole new level. Originally, online game play was confined to the PC game space. With this functionality moving to the console, the lines between PC and consoles become grayer. It also provides PC gamers with some incentive to migrate to the console platform.

To put it in grander terms, the Internet brings the notion of a virtual reality to a whole new level. Specifically, the online realm allows developers to create whole alternate universes/societies that can be experienced by a multitude of gamers simultaneously. The impact of this cannot be overstated. Just imagine; this allows any gamer to join an online universe and act out the role of any type of person from any time, place, story or reality he or she wishes and to interact with others who have done the same. In these universes, players come together to work toward common goals, engage in commerce, clash in conflict, share information and generally just socially interact from the perspective of an alter ego. Some universes even will provide gamers the ability to create additional regions of the world; called map areas. In others, characters will continue to work on specific tasks or missions even when the gamer is not technically logged in and playing. In still others, a gamer can decide to assume control of the universe so as to shape an experience for another set of gamers. The boundaries of these worlds are only limited by the creator; whatever they want to be possible can be.

Game universes centered on a medieval setting already exist and more are on the horizon. Soon to be released are games based on the Star Wars universe, Star Trek universe and other science fiction themes. Perhaps closer to home is a universe based upon the popular The Sims title for the PC,

in which players can role-play as an average member of today's society with a normal career, family and social life. There are endless other possibilities that exist. Ultimately, as always, there will be a world for everyone's tastes, providing each gamer with the possibility of personally relevant, multiple lives.

Mobility further enhances gaming

Combine the online universe concept with the portability of game-play through mobile devices and you have a universe with multiple points of access. Thus a player can use an Internet connected PDA to check the status of a task that a character is working on. In a new and ground-breaking title, Majestic, the game utilizes mobile phones, home phones, e-mail, faxes and instant messaging to contact the player and provide clues for the ultimate solving of the puzzle. This represents the frontier of gaming.

Game developers are extremely excited about the revenue possibilities afforded by the combination of high-level graphics, broadband-enabled multiplayer online gaming and mobile gaming. These formats open up new models for distribution of games, including subscription- based or pay-as-you-play methods. Games now can move away from the static one-time, off-the- shelf purchases they are currently, to a more continually expanding and updated product. Ultima Online and Everquest, two of the first titles to be developed under the subscription-based model, have had tremendous success in this area. This has lead others to believe the idea is viable for other themes. It is hard to overlook recurring revenue of $10 to $20 per month from one to two million subscribers in addition to the off-the-shelf revenues from selling the base title. However, developers believe the key to more widespread adoption of the subscription and massively multiplayer concept is better adoption of broadband Internet technologies.

Consoles want control of the living room

Simultaneous to the online evolution, a battle for control of the living room is looming. The next-generation consoles, represented by the Xbox, Playstation 2 and GameCube, represent the early steps toward positioning themselves as a center point of the home entertainment experience. At the core of this, is a tremendous convergence of technologies. Essentially, new consoles offer extra features such as a DVD player, output jacks for high-definition TV sets, broadband connections and hard-drives for storing music and games. The next logical step is for game consoles to include tuner controls for cable or satellite TV and DVR technology. Both Sony and Microsoft already have game consoles and set-top boxes in their product lines, creating a possibility for product integration.

These technologies allow ultimate portability so that a game of choice can be played no matter where you are.

Ultimately these additional features move the game console more into the center of the living room. They also indicate that the upcoming fourth quarter battle is more than just gaining market share in the video game market, it represents a chance to gain a foothold in the home entertainment space.

The most important components of some game manufacturer's efforts are the inclusion of DVD playback and broadband connectivity right out of the box. These two features are sure to contribute to any given platform's success in the upcoming console battles. Consumers already are buying DVD players, and so the bundling of a new game console with a player will be very compelling in fourth quarter of this year. Consumers also are evaluating broadband options and are looking for a reason to upgrade. The possibility of high-speed Internet game play and access to other entertainment content provides that reason. Equally compelling is that the device already is in the liv-ing room where it is directly linked to the TV and home theater. The challenge is whether consumers are interested in an all-in-one device.

Broadband changes everything

The importance of the broadband feature alone is paramount. Aside from the benefits to the multiplayer genre of gaming, its inclusion has tremendous implications for broadband adoption and may be the key to bringing Internet connectivity into the living room. It also may help to shift reliance away from the PC as the primary Internet device. Internet appliances, such as WebTV, only have had limited success in this area. A game console, on the other hand, has compelling features of its own, and is more able to bridge the gap between the digital world of the Internet and the analog world of the TV. Consider the logical progression. Console games are played on the TV. An Internet connection in a console box allows the gamer to play against other gamers across the Web. It also allows them to download games to the hard-drive and communicate with other gamers through text messages or voice over IP. Games and music are closely linked, so music is the next likely digital medium to be downloaded to the box, making a console a key repository for a music collection. From there, other entertainment oriented e-commerce might take place, such as purchasing movies; not unlikely given the inclusion of DVD playing capabilities. It only is a matter of time before additional Web-oriented uses for the console evolve, making the console a critical access point for the household.

Console manufacturers are not the only ones with their eyes on the center-point prize. Some of the latest DVD players come equipped with the ability to play games through a DVD-based game operating system called Nuon. Set-top boxes with DVR and Internet connectivity also are likely candidates. Already controlling the TV viewing of the household, there is a strong likelihood they will move toward a central role in home entertainment. Set-top boxes benefit from the strong control of consumers' entertainment experience held by the cable industry.

Ultimately, there is room for both a console-based and a set-top-based, center-point technology. For now, consoles appeal more to households with children, whereas set-top boxes are for the rest of the TV viewing public. It is very likely that enter-

tainment devices with and without the ability to play a certain set of game titles will exist in the same product line. Branding and feature sets of each box will determine who buys which version of a console.

But don't forget; titles determine success

There is one important factor that cannot be overlooked when considering the ensuing platform battles and convergence of product. First and foremost, a game platform's success is based on the library of titles it has to offer. No matter what additional features a console has, if it does not offer compelling, relevant content and a wide variety of titles to choose from consumers will not buy it. Processing power, DVD players, hard-drives, HD outputs and even Internet connectivity to some extent, come second to the title library. This is a tried-and-true mantra that all game manufacturers must live by or fail in the game space.

Gaming in the future; consoles at the center

So what does all this evolution mean for the industry? Where is it all going? The changes in the gaming industry open up entirely new opportunities for consumer electronics manufacturers and game developers. Ultimately the game console is likely to emerge as the hub of consumer's gaming and general entertainment experiences. With the new generation of consoles with tremendous processing power, excellent graphics, a hard-drive and an Internet connection, some of the traditional PC gamer market is likely to shift over to the console in time. This becomes particularly true as relevant titles port over to the console. For the more mainstream user, connectivity allows Internet tasks to shift away from the PC. A hard-drive shifts other tasks to the console, such as down-loading music files. The other entertainment features of the new consoles, i.e. the DVD player, seal the deal.

In this framework, the portable game devices gain importance as well. These are the devices that bring games and electronic entertainment beyond the hardware into our everyday lives. The devices are merely access points to an entertainment experience. Mobile phones, PDAs and handheld game consoles can act as satellites to the main console hub. Even portable MP3 players have a role here. Ultimately these devices allow a user to take entertainment content with them, music, games and video, all downloaded from a central console hub.

More important in the evolution of electronic games, is the shift from games as a solitary experience to a wide-scale social one.

Without a doubt the home entertainment industry should pay very close attention to what is happening in the console game space as it has strong implications for how consumers will experience electronic entertainment in the future. This is not just limited to games, but includes music and video as well. A console as the center of the living room has implications for the development of a wide-range of consumer electronics. It also has implications for possible partnerships that could be formed. The opportunities and potential are lucrative. Even if one just chooses to view the evolution from the sidelines, the journey is sure to be entertaining to watch.

DIGITAL HOME THEATER

Not your ordinary Monday night football game! If you have a home theater in which to watch the big game, your house quickly becomes the most popular one in the neighborhood. Home theater draws family and friends to be part of an even livelier experience on your big-screen TV and surround sound audio system, down to every helmet thump and roar of the crowd.

According to CEA market research, nearly 25 million households, about 23 percent of all U.S. households, own home theater systems. "Even with the downturn in the economy, home theater sales keep going up," says CEA's Sean Wargo, "in part because mainstream America is beginning to adopt home theater. Home-theater-in-a-box (HTIB) also has helped to push sales because it makes it easy for people to shop and buy."

And with good reason. Entertainment content is multiplying, from the Internet, Hollywood and recording studios. With today's fast-paced lifestyles, it's more convenient to bring the content home than it is for consumers to leave home to get it. And today's digital technology, from broadband to home networking, makes it easier to bring the content in. As products converge, combining several functions in a single product, these digital packets of information, whether audio, video or even data, can be simply moved around a house, the "digital domain."

The looming question in home theater now, according to Wargo, is "What will that connection to broadband in the living room be? Many homes have their Internet connection in a home office or study. When we expand that to getting broadband to a big screen and the whole house, what set-top box or other device will be the 'gateway' that brings the content in?" While that question sorts itself out, several important trends are affecting how the elements in the digital home theater interact to enhance the entertainment experience.

Trends

TVs function as "gateways," while home networking's role increases. The audio/video receiver is the control center for all other equipment, and therefore is one of the most important components of a home theater system, accounting for almost 85 percent of total audio revenues in 2000. As the home theater market expands, the demand for receivers with flexible connectivity is expected to increase.

The TV remains the most important entertainment element in the home, the hub for networked audio, video and computer accessories in the home theater as well as throughout the house. By linking a high-

performance PC processor and broadband connectivity to their TV, families can connect to the Internet through dial-up, cable modem or DSL connection. Then they can enjoy being in the middle of the music or display Internet content from around the world without being tied to their computer. InStat predicts sales of these residential gateway products will rise from $100 million in 2000 to $5 billion in 2005.

Right now, most household devices and appliances have no way to connect to the Internet, and are designed generally for a slower, narrowband world. Broadband multiplies the possibilities enormously, with faster speeds and fatter pipes to carry more data and video. New broadband applications could spark new services for consumers, from wireless touchscreens to virtual high school class reunions to videophones.

Many families now own more than one television, VCR or DVD (digital video disc) player and sound system, so audio and video manufacturers increasingly are combining multiple functions into one box. Some systems work equally well with PCs equipped with DVD-ROM drives or DVD players that connect to the TV.

Exactly what kind of console or set-top box will be most successful remains to be seen. "Many products are trying to make their way into the living room," notes Wargo, from game consoles to TVs and PC manufacturers.

Surround sound choices expand

Home theater continues to offer a superlative audio experience, placing listeners in the middle of the action of a concert, film, TV show or sports event. Perhaps the most important aspect of home theater is the surround sound technology that makes such an experience possible. The popularity of DVD players and high-definition television (HDTV) also has added to the demand for advanced audio equipment that provides surround sound.

Consumers can take advantage of two 5.1- channel digital surround formats, Dolby Digital and Digital Theater Systems (DTS) Digital Surround. For people who like to wander around the audio/video listening room, Sony has come out with the first wireless surround headphone system to simulate the 5.1 channel sound field.

According to Dolby Laboratories, there are more than 16 million 5.1 surround-sound systems in the United States. About 20 percent of U.S. households have a multi-channel sound system connected to a TV, and anyone who has ever seen a DVD movie in surround understands why. With the 5.1-channel surround sound formats, audio technology completely encircles listeners, imparting the thrilling sense of "being there" to movies and concerts.

Now surround-sound soundtracks are increasing on videotapes, DVD discs and TV programs. During the 2000-2001 TV season, for instance, more than 200 TV series, specials and regular events were scheduled for broadcast in Dolby Surround. Several cable broadcasters, from HBO to BET, have announced support for 5.1 surround sound, and more 5.1 content is coming out, stimulating sales of home theater products.

Audio engineers also have been creating even more options: two 6.1 channel systems, Dolby's Surround EX and Digital Theater Systems' DTS-ES Matrix. The new formats help to create a home soundstage (left front, center, right front, left surround, center surround, right surround and subwoofer) where music or theatrical sound effects can be placed directly behind the listener, enhancing the home theater experience.

What set-top box or other device will be the 'gateway' that brings the content in?

DVDS continue rocket climb

DVDs have emerged as a major force in the home entertainment economy. Watching a DVD movie, viewers in millions of U.S. homes enjoy better quality pictures and sound made possible by higher-resolution digital video and audio.

DVD is the fastest rollout of a new consumer electronics product ever. According to CEA research, 15 million homes have players; that could reach 25 million by the end of 2001. That doesn't count computer DVD drives or consoles such as Sony's PlayStation 2. Nintendo is partnering with Panasonic to offer a DVD player/Game Cube combo, while Xbox also can play DVDs if you add a $30 accessory.

Consumers are crowding stores to buy or rent DVD discs. DVD rentals are up, growing 223 percent to $300 million in the first quarter of 2001 vs. the same period in 2000. About 25 percent of Blockbuster's shelf space now goes to DVDs. DVDs bring in about a quarter of most studios' home video revenue.

DTV grows steadily

Manufacturer-to-dealer sales of DTV monitors and sets (monitors with integrated tuners) totaled 137,854 units with more than $243 million in revenue during August, according to CEA. The dollar sales represent a 65 percent increase over the same period in 2000 and a 95 percent unit sales increase over the same period in 2000. Consumer dollar investment in DTV is projected to reach nearly $5 billion by the end of this year. CEA projects sales of DTV sets and monitors to continue their rapid growth in the coming years, with unit sales of 1.1 million this year, 2.1 million in 2002, 4 million in 2003, 5.4 million in 2004, 8 million in 2005 and 10.5 million in 2006.

Consumers overwhelmingly have embraced the digital experience, which brings spectacular high-quality video and audio as well as enhanced services. New CEA research in mid-2001 found that 95 percent of digital television owners would purchase a DTV set again.

Television manufacturers have produced more than 250 models of DTV products. Among those who are targeting the home theater market, Motorola says that in the first quarter of 2002, it will begin selling a home theater unit with a digital cable receiver, the ability to decode Dolby digital sound, and DVD and CD players. Princeton Graphic Systems offers two sets with HDTV capability along with Internet access. The 36" HDTV-ready set, the basis for a home theater, is ready for both dial-upand broadband Internet connections.

Flat TVS may become more affordable

As picture quality improves and costs come down, consumers will become more interested in flat, tube-free, TVs. These thin television displays-about the thickness of a big-city phone book-hang easily on a wall. The majority of flat-screen sales right now are to businesses, who use them as a "wow" marketing device. But as prices come down, individuals are getting in the game as well.

• Plasma. Plasma is becoming the new status symbol. Some consumer electronics experts say that flat plasma displays will have replaced the traditional cathode ray tube TVs within about 10 years. As HDTV television accelerates, so will demand for these high-resolution displays in 16x9 aspect ratio. In a plasma screen, two panes of glass are separated by just a few millimeters, filled with hundreds of thousands of tiny neon and xenon gas cells. That's what produces the crisp digital image. Plasma prices are beginning to come down, but are still out of reach for most consumers. In the 50" range, prices go from $18,000 to $25,000. The 42" size (measured diagonally) is cheaper.

Sony, Fujitsu and Sharp tout models that are 3 inches to 4 inches thick and weigh less than 100 pounds. Pioneer, Marantz, Panasonic, Philips and NEC also have gotten into the plasma business.

• LCD screens. Liquid crystal display flat screens, the same technology used in some computer screens, are a slightly cheaper way to go in flat screens. There are several types of LCDs, some of which have less costly manufacturing requirements.

DVR offers expanded storage options

Digital video recorders (DVRs) are loaded with software that allows consumers to digitally record and store TV programs. They also enable viewers to pause live TV and skip past commercials. Since "distributed" audio and video rely on storage and memory devices, the market will grow for more and better storage capacity. People may digitally store video collections on a DVR, for instance, so they can call it back whenever they want it, through a server. "DVRs will be important as a function of the set-top box," says CEA's Wargo. The amount of memory on a DVR is limited, so long-term storage is not really feasible. It is useful for "time-shifting," though, which means the ability to record something and then watch it later. Any programs that a viewer wants to "save" must be moved over to a VCR, at least until recordable DVD becomes more affordable.

CEA projects sales of DTV sets and monitors to continue their rapid growth in the coming years

Dozens of technologies are vying for that place in consumers' living rooms. Philips Electronics and Sony Electronics-branded recorders work with TiVo's Personal TV Service. Microsoft has been working on interactive TV and broadband content delivery, expecting that people will use the Internet less than they will use interactive TV and digital video recording. Microsoft's MSTV platform links those elements in an integrated fashion.

Also driving the growth in home theater on the audio front, two high-resolution audio formats, multi-channel DVD-Audio and Super Audio CD (SACD), have emerged. Both offer higher resolution than CD, multi-channel playback and extras like liner notes, lyrics and photos.

SACD (super audio CD)

Sony and Philips created the SACD, which offers higher resolution than regular CDs, but is compatible with existing CD players and both stereo and multichannel playback. SACD is being positioned to compete directly against DVD-Audio. A new version from Sony offers surround sound playback and a five-disc carousel changer. It plays SACDs and CDs. Since they launched SACD, Sony and Philips have courted the high-end users. Then Sony announced some inexpensive multichannel players as part of its home-theater-in-a-box, Dream System. It plans to have more than a dozen SACD products out by the end of 2001.

DVD-audio

DVD-Audio is a viable option to SACD. A few studio facilities with DVD authoring capability have begun working on titles, but except for Warner Music Group, the major companies have not supplied many titles. As more production tools become available, making a DVD-Audio disc should become easier, which should help to make more DVD-Audio titles available. The recent introduction of Universal players for DVD-Audio and DVD-Video may bring in customers who do not own a DVD player, as well as those who plan on upgrading their DVD player within their current home theater system. Working in DVD-A's favor is the wide adoption of DVD players that is happening now. DVD-A could work its way into homes by riding in on the DVD

Given the huge installed base of CD players, a consumer's impetus to move to a different format has to be very strong. DVD-Audio and SACD both promise better sound quality than CD, and CEA is conducting research focus groups to determine consumer reaction to these formats.

Meanwhile, music download from the Internet continues, although in new forms post-Napster. "MP3 was only the beginning," says CEA's Wargo, "and the compression formats will improve." According to Wargo, the installed base of MP3 players was four million as of September, 2001. CEA estimated that 1.8 million MP3 units would be sold in 2001, which would create a 4 percent household penetration rate in the United States.

Recordable DVD

Various standards are vying for consumer attention: DVD-R, DVD-RW, DVD+RW and DVD-RAM. As they continue to battle it out, the DVD Forum of manufacturers has discussed the adoption of the DVD-Multi standard, which many hope will solve the incompatibilities among formats. Both Panasonic and Pioneer have introduced combination DVD-RAM/DVD-R and CD-RW recording solutions. Apple announced that the Mac would support both DVD and digital audio recording.

Moving the market forward

For digital home theater to reach its full potential, several challenges must be resolved and several important indicators must be watched.

• The delivery model must get worked out. What sort of connection to broadband will emerge as the winner for the TV/set-top box in the living room? That answer will continue to evolve, as competition among manufacturers intensifies.

• Policy hurdles will need to be overcome. CEA continues to work hard to give consumers fair rights to digital content. The analog to digital television transition has brought many technological advances and enhanced features. The digital, home-networked environment enjoys expanded access to high-value content, and at the same time, must be afforded robust content-protection.

• The CE industry takes the concerns of the content industry quite seriously, but as studios use copy protection standards, CEA has urged them to ensure that Americans' normal and customary fair use rights are preserved.

• With differing formats and technologies competing for customers, the need for standards and compatibility grows. Recordable DVD, for instance, offers DVD-R, DVD-RW, DVD+RW And DVD-RAM.

• Home networking will be one important driver. The more CE products a home contains, the more pressing the need to link them together easily. Both wired and wireless applications will see a surge as the number of home theaters continues to increase, and people want to be able to view and listen to that content in other places in the home.

Market potential for home theater

Factory sales of home theater products are rising, from $6.99 billion in 2000 to an estimated $7.5 billion in 2001, a 7 percent increase. Within the category, HTIB saw a 116 percent jump comparing second quarter sales in 2001 to 2000.

Sales are increasing at the same time that much of the equipment required for a home theater is dropping in price. A basic system costs between $3,000 and $15,000 but can range higher or lower, especially for the popular HTIB.

The basic building blocks of home theater include a large-screen TV (25 inches or larger); a hi-fi VCR, either a VCR or DVD player; an audio/video receiver or integrated amplifier to drive the speakers; and four or five speakers. Consumers like HTIB because it's simpler to buy their preselected speakers, receiver and other components together.

The growing interest in home theater is driven in large part by an interest in audio. A November 1999 CEA study, for instance, found that 70 percent of consumers are either "very interested" or "somewhat interested" in multi-channel audio. This interest is particularly strong among younger buyers: 79 percent of 18 to 34 year-olds reported they were "very or somewhat interested."

Another CEA survey, College Students: Audio Market Overview, confirmed that the six-million college student market is full of surround sound enthusiasts. Conducted in June 2000, the study reported that 95 percent of students for whom music is "extremely or very important" had interest in surround sound. In all, 54 percent of college students indicated they already owned surround sound equipment.

To help consumers understand the home networking possibilities, CEA has created the Guide to Home Networks (www.ce.org/networkguide), an online resource that talks users through the nuts-and-bolts of what to look for in entertainment and home theater set-ups through home networking. A consumer oriented web-site, www.ce.org/techhome, offers resources for installation and a glossary. CEA also has launched the TechHome rating system, which allows consumers to assess the technological infrastructure of a home at the time of purchase or sale.

Overall, the best indicator of whether the digital home theater market is doing well is to look at sales of home theater technologies; and there the news is encouraging indeed. DVD players are becoming more commonplace, home-theater-in-a-box sales are spurting ahead, DTV interest continues to build and surround sound audio is attracting an even larger following. All that adds up to more memorable hours with family or friends, enjoying the music, big game or special show in front of that big-screen TV in the new digital domain.

Part 2 : Wireless and CE Fashion will appear in the next issue

ETA-I
Electronics Technicians Association, International
SDA

Want To Know More About Basic Electronics?
(The Associate C.E.T. Study Guide 1 & 2)

Want To Know All About Antennas & Televisions?
(The Antenna Book 1 & 2)

Want To Be Able To Communicate With Customers More Professionally?
(The CSS Study Guide - 2nd Edition)

Want To Add Membership In A Professional Technicians Trade Association To Your Resume?
(ETA Membership)

Call ETA @ 800-288-3824
Or E-Mail For More Information at eta@tds.net
Electronics Technicians Association, International
502 N. Jackson Street
Greencastle IN, 46136

Circle (29) on Reply Card

New Products

CP291 Color Analyzer

The CP291's portable, handheld operation and high-resolution, color display makes it easy to align displays on loca-

tion—the home theater, mall, convention center casino and more.

The CP291 ColorPro is a Pocket PC-based color analyzer from Sencore 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. Luminance units are selectable between foot-lamberts and cd/m2 (nits). Built in setups for D65, D75, D50, 9300K, 3200K, and E-5450K simplify adjusting a display to a particular color temperature. The CP291 operates up to four hours on one battery charge. The CP291's measurement specifications are similar to those found on lab-grade instrument and are NIST traceable. Additionally, the Imaging Science Foundation (ISF) approves the CP291 ColorPro for use by Home Theater dealers. The CP291 includes custom report software that lets you download calibration data to a PC for documentation, data storage and report generation. The Pocket PC contains software management tools and Windows-CE programs such as Task Manager, Contact List and Calendar that maximizes your efficiency at the job site. The CP291 ColorPro Color Analyzer includes: 1) Auto ColorPro II Measurement Probe, 2) HP Jornada Pocket PC™, 3) Windows-CE™ ColorPro Software (comes preloaded on the Jornada), 4) Serial Interface Connector and cable, and 4) ColorPro Report Generation Software.

SENCORE
Circle (11) on Reply Card

New Protometer Model 70 Series of Intelligent DMM's

Global Specialties has released three new PRO-70 series intelligent hand held digital meters.

All three meters in the series come standard with RS-232 computer interface, computer cabling and software starting at $59.95.

All models in the series also come complete with a 3999 count 33/4 digital display and 40 segment bar graph, Voltage measuring to 750 Volts AC, 1,000 Volts DC, current measuring to 10 AMPS AC & DC, as well as capacitor and transistor testing facilities, backlit display, auto/manual ranging, relative hold, continuity & diode testing features.

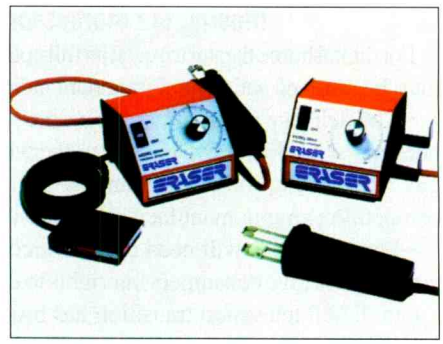
In Addition, the PRO-70T has an added temperature measuring to feature with a list price of $69.95. The PRO-70F has the added frequency measuring feature with a list price of $66.49.

Global Specialties
Circle (12) on Reply Card

Handheld Thermal Wire Strippers

The Eraser company offers the handheld MH10 Thermal Wire Stripper. The MH10 strips thermoplastic insulations from solid and stranded wires between 12-43 AWG (2.06 - .056mmØ) without damage to conductors. The heating elements are activated by depressing a foot pedal and can reach an operating temperature of 1400°F (760°C). The element depth and strips lengths are easily adjusted. The unit is easy to set up and operate.

The Eraser company is ISO 9001 certified. The company offers Free E.S.P.



(Eraser Sample Program). Send 10-20 feet for your material and Eraser will recommend the best solution for your wire and cable processing needs.

The Eraser Company, Inc.
Circle (13) on Reply Card

Klein Heavy-Duty Cable Shears

New heavy-duty cable shears (No. 63016) from Klein Tools. This comfortable, lightweight tool is designed for single-hand use, continuous cutting and the power to cut with minimum effort.

Designed with a unique triangular cutting jaw, the Klein cable shears cleanly cut a variety of cable types and most hardened wire without compressing of fraying ends. The tool's heavy-duty, tempered steel, precision cutting blades offer long service life.

Measuring 7-1/2" long, the heavy-duty cable shears feature comfortable, blue plastic-coated handles that provide a steady grip. A lock keeps the handles closed for storage.

The new heavy-duty cable shears feature the following cutting capacities: 1/4" for aluminum and copper conductor strands and mild steel strands; 3/16" for aircraft cable, wire rope strands (227,500 PSI) and aluminum and copper rods; 5/32" for steel and iron rods (85,300PSI); and 3/32" for tempered spring wire.

Klein Tools
Circle (14) on Reply Card

Reztore Surface & Mat Cleaner

Reztore Surface & Mat Cleaner is a static dissipative solution designed to clean and restore ESD mats. It is ideal for cleaning static dissipative and conductive mats, electronic instrumentation, medical equipment, computer monitors, and keyboards. Reztore does not contain silicone and will leave no insulative residue to degrade a surface's ability to drain

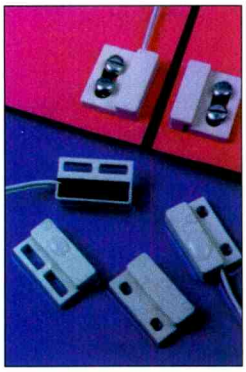
New Products

charges. Reztore does not contain alcohol and will not dry out mats. Its low volatility formula is compatible with most clean room specs. Reztore Surface & Mat Cleaner is available in 16oz and 32oz spray and in a 2.5 gallon refill box.

Desco
Circle (15) on Reply Card

Reed Sensors Replace Mechanical Switches

A new series of magnetically operated reed proximity switches that are waterproof, can be mounted almost anywhere, and are suitable replacements for mechanical switches, especially in wet and dirty applications, is being introduced by MEDER electronic Inc.



MEDER MK4/5/13 series Reed Sensors are magnetically operated reed proximity switches that feature fully potted, hermetically sealed construction and are totally waterproof. Available with matching actuating magnets, they open-and-close with the introduction and removal of a magnetic field and come in three screw mounting versions for a wide variety of applications.

Offered in five sensitivity classes from 5 to 30 AT, with switching voltages up to 400v and carry current up to 1.25A, MEDER MK4/5/13 Series Reed Sensors can be supplied in normally-open and normally closed single pole, double throw configurations with various wire and termination options. Different plastic cases can be molded and are available in custom colors.

MEDER MK4/5/13 series Reed Sensors are priced from $1.20 each, depending upon version, termination requirements, and quantity. Samples, literature, and price quotations are available upon request.

MEDER Electronic Inc.
Circle (16) on Reply Card

Statfree Type i Fused Conductive Rubber Floor Mat

Statfree Type i Fused Conductive Rubber Floor Mat is an ergonomic dome/support cell structure that improves worker comfort and productivity while meeting ESD protective flooring requirements of ANSI/ESD 20.20 and EIA-625 with an RTG of $<10^9$. RTT is 10^3–10^5. The homogeneous 100% premium nitrile butadiene rubber will never delaminate and the chemical fusion process allows for a wide variety of withs and lengths to suit any flooring application. Statfree® Type i offers superior heat, chemical, and wear resistance and is suitable for areas requiring these features combined with ESD protection (when properly grounded and ESD footwear is used) and anti-fatigue properties. Widths of 2', 3' and 4' up to 120' long and widths of 6' and 8' up to 60' long are available.

ESD Systems
Circle (17) on Reply Card

Ultraviolet Light Meter

A fully portable phototherapy radiometer for validating that the UVA and UVB lamps used in commercial sun tanning booths and skin treatment centers are operating properly is available from International Light, Inc.

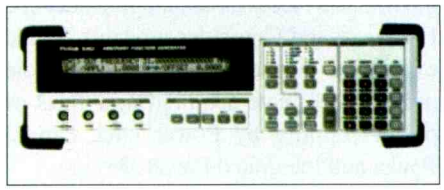
The IL1402 Phototherapy Radiometer is a portable instrument for measuring the output from UVA and UVB lamps to help assure that people will receive safe doses of UV radiation. Featuring a detector which simulates the response a person's skin will have to ultraviolet light, this instrument provides instant readings on an LCD display and can also monitor doses over time.

Important to use after changing lamps or cleaning detectors, to make sure that the tanning equipment is operating properly, the IL1402 Phototherapy Radiometer is easy to use by non-technical personal. Accurate to ±4% of a NIST transfer standard, with linearity and repeatability better than 1%, it displays results in direct unity from milljoules/cm^2. The IL1402 photography radiometer is priced from $1,310.00, equipped with either a UVA or UVB dector and includes a carrying case. Literature is available upon request.

International Light, Inc.
Circle (18) on Reply Card

Arbitrary Waveform Generator

A newly developed 0.1uHZ up to 31 MHz Digitally Synthesizes Function/Arbitrary Waveform Generator



which simulates many types of waveforms and stores, in memory, and arbitrary waveform of up to 16,00 points, is the latest entry from Protek.

The two channel Model 9302 generates sine, square, triangle, ramp and noise waveforms. Arbitrary waveform sampling rates are up to 40Ms/S with 12 bts resolution. All waveforms, except noise, may be swept over their entire frequency range with phase continuos, linear, log up, log down or up and down sweep. Sine wave accuracy is ± 0.2dB. Highly versatile, the generator also provides triggered internal or external AM, FM and phases modulation as well as burst operational modes.

The advanced integrated design enables waveforms to be created and edited from a PC and transferred to ARB over an RS-232 or optional GPIB interface with waveform composer software and supplied or via front panel control.

Principal uses are: Research and Development; Medical Waveform Simulation, Modulation Generation and anywhere are specialized waveform is needed for testing.

Protek
Circle (19) on Reply Card

Literature

New Components Catalog

Jameco electronics announces the release of catalog 222 "The best part is your bottom line". More than 300 new products have been added, including Integrated Circuits, Power Components, Test Equipment, Cat-5 Accessories, Interconnect and Hardware and Computer products. While expanding our selection of brand name products we have acquired new lines of power supplies by Power One, Digital Power and Integrated Power Designs.

The 188 page catalog features programmable devices, memory micro processors, breadboards, test equipment, TTL and Linear ICs power equipment, fans, capacitors, LEDs, and many more products ideal for OEM, maintenance, repair and operating applications

Jameco's Advanced Website

Find the newest products not found in the catalog at their website, www.Jameco.com.

Jameco Electronics
Circle (20) on Reply Card

Connector Cleaning and Enhancing Catalog

CAIG Laboratories presents their millennium catalog, "A Universe of Possibilities." The current catalogue introduces new products and packaging of enviornmently safer products which eliminates the need for repeated cleaning. Products can be used on all metal surfaces that conduct electricity such as edge connectors, integrated circuits, sockets, probes, contacts, relays, batteries, terminals, etc. These products do not rely on solvents to clean contacts and connectors, thus preventing damage during cleaning.

All aerosols have been formulated to contain no ozone-depleting chemicals. For aerosol-sensitive customers, a variety of non-aerosol applicators that can be shipped worldwide without HAZ-MAT restrictions to satisfy customers' and shippers' requirements.

In order to meet the requirements of specific applications, a line of alternative applicators are available. Products are sold in pump sprays, pens, wipes, liquid/brush and needle/syringe dispensers.

CAIG Laboratories INC.
Circle (21) on Reply Card

Data Logger Catalog

The newly released AEMC Data Logger Catalog includes comprehensive information on their single channel, low-cost data logger family. Over 20 models are available, including several new models.

This family of loggers requires no user set up and has the ability to automatically adjust its scale and sample rate to optimize itself to the recording. One button operation makes the data loggers extremely easy and quick to use. Data loggers are available for measuring Arms, VDC and Temperature.The software included is compatible with Windows 95, 98, 2000, ME, NT and follows plotting, statistical analysis, text annotation and zoom capability.

AEMC Instruments
Circle (22) on Reply Card

OnQ Professional Installer Program

The OnQ Professional Installer Program provides qualifies On Q system installers and their companies with a comprehensive set of sales and marketing tools designed to help them increase their revenues and profits with the On Q system, including: The brochure provides benefits and requirements for being an ONQ professional.

To qualify for the OnQ Professional Installer Program, applicants must have complete at least one advanced OnQ training course as well as agree to the program terms and conditions. Descriptions of the ONQ training courses and a list of upcoming sessions are posted on the OnQ web site under the "Become an OnQ Installer" button.

OnQ Technologies
Circle (23) on Reply Card

Photofact®

SAMS TECHNICAL PUBLISHING HAS JUST RELEASED THE FOLLOWING PHOTOFACT®

GE		**RCA** *(continued)*	
CTC203CA	4595	F31317YX51	4600
CTC203CA5	4595	F31317YX53	4600
CTC203CA9	4595	F31665YX3	4589
CTC203CA10	4595	F32665YX3	4589
31GT740YX51	4595	F32665YX5	4589
31GT740YX53	4595	F32665YX7	4589
32GT740YX1	4595	F35317YX1	4600
32GT740YX51	4595	F35317YX51	4600
32GT740YX59	4595	F35665YX1	4589
35GT740YX1	4595	G32665YX5	4589
35GT740YX51	4595	G32665YX7	4589
MAGNAVOX		**SHARP**	
MS2530C121	4591	V01A	4594
		25R-M100	4598
PANASONIC		27R-FS1	4594
AP368	4590		
CT-24SX11CE	4590	**SONY**	
CT-24SX11E	4590	KV-32XBR250	4597
CT-24SX11UE	4590	KV-36FV16	4592
CT-27G7DF	4599	KV-36FV26	4592
CT-27G7DUF	4599	KV-36XBR250	4597
CT-27G7SDF	4599	SCC-S32E-A	4597
CT-27G7SDUF	4599	SCC-S32F-A	4597
JP363	4599	SCC-S33E-A	4597
		SCC-S33F-A	4597
PHILIPS		SCC-S44C-A	4592
TS-2746C101	4596	SCC-S44D-A	4592
TS-2746C121	4596	SCC-S45C-A	4592
TS-2746C221	4596	SCC-S46C-A	4592
27F8	4596	SCC-S46D-A	4592
RCA		**TOSHIBA**	
CTC203CA	4600	TAC0109	4593
CTC203CA2	4600	TAC0111	4593
CTC203CA5	4600	TAC0171PF GOLD	12
CTC203CA6	4600	TAC0172PF GOLD	12
CTC203CA9	4600	TAC0173PF GOLD	12
CTC203CA10	4600	32A61	4593
CTC203CH	4589	36A11	4593
CTC203CH2	4589	50A61 PF GOLD	12
CTC203CX	4589	50A11 PF GOLD	12
F31317YX1	4600	61A61 PF GOLD	12
F31317YX3	4600		

Photofact® and Photofact® Gold are available from NESDA Corporate Members: B&D Enterprises, HBF Electronics, MCM Electronics and Pacific Coast Parts. Additionally, Photofact® and Photofact® Gold can be purchased from your local SAMS distributor or directly from Sams Technical Publishing

Association News

NASC dates set for 2003.

The dates and location of the National All Service Convention (NASC) -2003 have been announced.

NASC-2003 will be held at the Travel Lodge Hotel and Convention Center on McCoy Road in Orlando, Florida

The dates will be Wednesday, March 12 through Sunday March 16, 2003.

The room rate will be $65 and will include breakfast each day with your hotel registration.

NASC-2003 will feature Appliance training, Electronics training and a complete School of Service Management. There will be meetings with industry leaders to discuss industry problems, a trade show and time to relax and enjoy the Florida sun. Contact Professional Servicers Association, ETA - or Florida Electronic Servicers Association.

IN MEMORIAM

DENNY MCKOWEN

Denny was the Guild (WNYEG) membership paper chaser, check writer and all around good guy. He also took care of our NYSEDA membership paperwork for the Buffalo/ Binghamton area members, who belong to the Guild. Denny passed away on August 12, 2002.

Halla Joins Visionary Don Tapscott at CEA Industry Event

Brian Halla, chairman of the board, president and CEO of National Semiconductor, will address trends in the electronics industry at his keynote address during the CEA Fall Conference and Industry Forum on Tuesday, October 15 at 12:00 p.m. at the Fairmont Hotel in San Francisco, Calif. The CEA Fall Conference and Industry Forum is held October 14-16 at the same location.

"National Semiconductor is helping fuel the information age by designing innovative products and technologies to help connect people to information," said CEA President and CEO Gary Shapiro. "We are pleased to have Brian Halla address the industry's top executives, retailers and manufacturers at the premier networking and education event for the CE industry."

Halla joined National Semiconductor in 1996 from LSI Logic Corp., where he had served as executive vice president of the Products Group. Prior to LSI, Halla was director of marketing for the Microcomputer Group at Intel. Earlier, he held a variety of management positions at Intel and Control Data Corp.

In addition to Halla's address, Don Tapscott, author of Digital Capital, will keynote on Monday, October 14th. Tapscott will discuss the key challenges facing business in the country's new environment and the threat of cyber-terrorism and offer advice on how companies can achieve agility, cost control and competitiveness.

This year's CEA Fall Conference and Industry Forum is co-located with Parks Forum and Home Theater Specialists Association (HTSA). The three-day event will feature discussions on the impact of copy protection on consumers and businesses; new research on the product returns issue; the latest wireless communications technology; 2002 holiday sales forecasts; a DTV subdivision open forum; and audio, video, home networking and mobile electronics technology.

UPCOMING CEA EVENTS

- **CEA Fall Conference and Industry Forum**
  October 13-16, 2002, San Francisco, CA
- **Electronic House Expo - Fall**
  November 12-14, 2002, Long Beach, CA
- **Electronic House Expo - Spring**
  February 27-March 1, 2003, Orlando, FL
- **CEA Winter Summit**
  March 4-6, 2003, St. Regis Aspen, Aspen, CO
- **2003 International CES - Defining Technology's Future**
  January 9-12, 2003, Las Vegas, NV
- **7th Annual Consumer Electronics CEO Summit**
  June 18-20, 2003, Vail, CO

B&D ENTERPRISES

Your Number 1 Source for Semiconductors and Capacitors!!

SANYO Shindengen NEC SanKen

Call today for your FREE 2002 catalog, or visit our web page at

http://www.bdent.com

Online secure server ordering, specification database, manufacturer links and **MORE!**

1-800-458-6053 or fax at 814-757-5400

Main & Liberty Street, Russell, PA 16345

Circle (24) on Reply Card

ETA-I Announces new Exam Fees Effective July 1, 2002

The Electronic Technicians Association (ETA-I) has announced new fees for their extensive exam program. Following are the rates.

CET Associate -$60
(Take the Associate and the Journeyman at the same time total fee is $75)*
Journeyman -$75 (Each additional journeyman is $30*)
CNST - $100
CFOI - $150.
CFOT - $150
DCIC - $150
Senior - $100
*Master - $150
CSI - $60
(Each of the four endorsements if taken at separate times is $60 per endorsement; if the CSI and all four endorsements are taken at the same time it is $240, a $60 price break; if they already have their CSI and take the four endorsements at the same time they may subtract $60 for fee of $180 instead of $240)
CSS - $60
*CST/CNCT - $75
CWS/CWT - $100
PCS-C - $60
E-Commerce - $100
*Rollover - $30

An asterisk represents those certifications affected by a price increase

These exam fee increases were voted for at the Annual ETA-I Board Meeting, in March 2002 in Orlando, FL and became effective on July 1, 2002.

Electronic Technicians Association Moves

The Electronics Technicians Association has moved to their own building in Greencastle, Indiana. The new address is 5 Depot Street, Greencastle, IN 46135. Telephone, email, fax and web addresses remain unchanged.

Tel: 800-288-3824,
FAX: 765-653-4287,
Email: eta@tds.net,
Web: www.eta-sda.com.

CES Returns to Weekend Dates in 2003

The 2003 International CES, North America's largest technology tradeshow returns to Las Vegas January 9-12, 2003. The 2003 International CES will showcase the latest innovations from 2,000 international exhibitors in wireless communications, gaming, digital video, high-end or "extreme" audio, accessories, consumer technology networking, broadband, mobile electronics, content media, new business technology, delivery systems and the Internet.

CES Keynoters Represent Four of the Top 35 Electronics Companies in the World

- Pre-Show Keynote - Wednesday, January 8 at 6:00p.m.
  Bill Gates, chairman and chief software architect, Microsoft Corp.
- Opening Keynote - Thursday, January 9 at 8:30 a.m.
  Kunitake Ando, president and COO, Sony Corp.
- Thursday, January 9 at 4:30 p.m.
  Craig Barrett, CEO, Intel Corp.
- Friday, January 10 at 4:30 p.m.
  Tom Engibous, chairman, president, CEO, Texas Instruments
- All take place in the Las Vegas Hilton Theater and will offer simultaneous Japanese translation

CEA Publishes Digital America 2002

Arlington, Va.- Digital America 2002 - U.S. Consumer Elec-tronics Industry Today, published by the Consumer Electronics Association (CEA), showcases the growth and vitality of the consumer electronics market, from handheld computers and video games to wireless phones and satellite radio. Available online at http://www. ce.org/digitalamerica, Digital America 2002 offers trends analysis and data on sales volume, the market and consumer satisfaction for video, audio, wireless communications, mobile electronics, home networking and accessories.

Given the special challenges that 2001 brought, total sales of CE products held their ground, reaching $93.2 billion, just two percent behind Y2K's record tally. During the fourth quarter, the electronics industry led the economy with holiday sales that defied some of the bleak forecasts that followed the September terrorist attacks. The strong end-of-year sales laid the foundation for a strong rebound this year, and CEA is projecting an increase of three percent to $95.7 in factory sales for 2002.

Some highlights from Digital America 2002 include:

- Video Leads the Digital Transition
- Digital Imaging
- Digital Sound
- Information on Demand
- Accessories

Digital America 2002 is available free online, with print and CD-ROM versions priced at $49.99. To purchase, e-mail: cea@ce.org, tel: (703) 907-7600, fax: (703) 907-7675.

2003 Test, Measurement and Electronics Supply Conference

The 2003 Test, Measurement and Electronics Supply Conference will be held February 2-4 at the Loews Ventana Canyon Resort in Tuscon Arizona. The Conference provides members of the test, measurement and electronics supply sectors with an forum for their unique areas of the business. The Conference is sponsored by the National Electronic Distributors Association (NEDA).

DISPLAY CLASSIFIED MARKETPLACE

DISPLAY CLASSIFIED MARKETPLACE Display Classified Marketplace $260.00 per column inch per insertion. Frequency rates available. 2 columns per page, 3 1/2" column width. Minimum size accepted: 1 column inch. Additional sizes billed in 1/4" increments. Maximum height per ad is 4", maximum width per ad is 1 column (3 1/2"). Agency discounts paid to recognized agencies if finished materials are provided. We accept AMEX, MasterCard, VISA and Discover. Optional color (determined by ES&T) $150.00 per insertion. For more information, or to place your order, contact:

Lyndiane Paoletti
Electronic Servicing & Technology
403 Main Street, 2nd Floor, Port Washington, NY 11050
Tel: 516-883-3382 Fax: 516-883-2162

Do You Repair Electronics?

Repair databases for TV, VCR, Monitor, UL Audio, FCC, and more.

- Over 76,000 records
- Private user forums
- Live on-line chat rooms

RepairWorld.com
Electronix Corp., 1 Herald Square, Fairborn, OH 45324 (937) 878-9878

Circle (25) on Reply Card

STATIC SOLUTIONS

- Anti-Static Mats
- Anti-Fatigue Mats
- Wrist Straps
- Field Service Kits
- Conductive Floor Mats
- Anti-Static Wipes & Sprays

ViziflexStaticSolutions.com
Tel: 1-800-307-3357
Fax: 201-487-6637

VIZIFLEX SEELS, INC. • 16 E. Lafayette Street, Hackensack, NJ 07601

Circle (27) on Reply Card

www.stairclimber.com
Escalera Stair Climbing Forklifts & Handtrucks

Circle (26) on Reply Card

COMPLETE YOUR COLLECTION TODAY

Order Back Issues

ONLY $5.00 PER ISSUE

Check, Money Order, Mastercard, VISA, Discover and AMEX accepted
Electronic Servicing & Technology, Back Issues,
P.O. Box 748, Port Washington, NY 11050
CALL: 800-462-4659
For Fastest Service
FAX 516-883-2162

ELECTRONIC Servicing & Technology

Circle (31) on Reply Card

CLASSIFIED

CLASSIFIED ADVERTISING **By the word.** $1.65 per word, per insertion, pre-paid. Minimum charge is $35 per insertion. Initials and abbreviations count as full words. Indicate free category heading (For Sale, Business Opportunities, Miscellaneous, Wanted). Blind ads (replies sent to ES&T for forwarding) are $40 additional. No agency discounts are allowed for classified advertising. For further information, or to place your order, contact:

Lyndiane Paoletti, Electronic Servicing & Technology
403 Main Street, 2nd Floor, Port Washington, NY 11050
Tel: 516-883-3382 Fax: 516-883-2162

FOR SALE

For Sale — Sencore CM2000 Computer Monitor Analyzer & CR70 Bcam Builder. Manuals and cables included, $975. Please call 603-646-3374.

ANY Tuner we rebuild is $25, YES $25, YES $25, YES $25! Includes FREE Shipping and Handling. *BUY - SELL - TRADE* **Tip Top TV**, 18441 Sherman Way, Reseda, CA 91335. **818-345-1974.** www.tiptoptuner.com.

IN-CIRCUIT CAPACITOR TESTER - Find bad caps FAST and RELIABLY with the Capacitor Wizard in-circuit ESR Tester! Great for monitors, switching power supplies, TV, etc. Still only $179.95 MC/VISA. **Independence Electronics Inc. 800-833-1094. www.awiz.com.**

TV CASE HISTORIES: Volume 9 with 3,500+ histories. Satisfaction assured. Only $63.00 (plus $3.95 shipping). Over 13,800 books and supplements sold with only 1 returned for a refund! **Mike's Repair Service**, P.O. Box 217, Aberdeen Proving Ground, MD 21005. Same mailing address 38+ years. Send SASE for samples. 410-272-4984, 1-800-2-FIX-TVS 11a.m.-9 p.m. (http://mikesrs.no-frills.net).

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

CRT Adapter/Setup Book, hookup "ANY" CRT tester to "ALL CRT's" Projection, Monitor, color. $79.95 dandee@geotec.net. Free 1-877-280-3598-VISA/MC.

CALL FOR INFORMATION ON PLACING YOUR AD HERE...
(516) 883-3382

READERS' EXCHANGE

Readers' Exchange is a free service for ES&T paid subscribers only. Please include a copy of a recent address label with your Readers' Exchange Copy. The following restrictions apply to Readers' Exchange:

- Only individual readers may use Readers' Exchange, and items must be restricted to those that are ordinarily associated with consumer electronics as a business or hobby. If you're in business to sell the item(s) you want to offer for sale, the appropriate place for your message is in a paid advertisement, not Readers' Exchange.• Readers' Exchange items must be restricted to no more than three items each for wanted and for sale.
- All submissions must be typed or printed clearly!

Send your Readers' Exchange submissions to:
Readers' Exchange c/o Electronic Servicing & Technology
403 Main Street, 2nd Floor, Port Washington, NY 11050
Tel: 516-883-3382 Fax: 516-883-2162

FOR SALE

Picture Tube Rejuvenator and testers RCA WT-333A $20, Beltron 2972-E with many adapters $50, Sencore CR-70 $250, Simpson 15MHz dual trace oscilloscope $35, Fluke 8000A digital meter $25, Holiday HI-1500 microwave leakage meter $35, RCA flyback & yoke tester $20, Heathkit C-3 Capacitor tester $20, B&K model 501 curve tracer $20, Sencore Electrolytic Capacitor subber $10, Eico 1073 3amp Variac with current and volt meters $45. Jim Havlicek, 531 Wentworth Calumet City, Il. 60409. 708-891-5550. After 5pm cst. 708-730-1549.

Sencore VA62A Universal video analyzer with all manuals & Probes. Excellent condition. $500.00 plus shipping. Tektronix oscilloscope 50 mHz dual trace model #453 with probes and manuals. Excellent condition. $300.00 plus shipping. Contact John Brouzakis 247 Valley Circle Charleroi, PA 15022, 724-483-3072.

Sencore PR570 $400, hardly used, Sencore HP200 HV probe, $20.00, never used. Call Sam Stephens 916-655-3365.

Sencore Equipment, TVA92 Video Analyzer ($600), VGA91 Video Generator ($600), HA2500 Horizontal Analyzer ($750), CMA125 Computer Monitor Signal Generator ($750). All units with original boxes, manuals, schematics, and cables. Ken Meier, 2709 Maplewood, Champaign, Il 61821. PH# 217-352-3842 after 5:30 PM cdt. email kmeier1938@aol.com.

Hi-Lo systems Model # Sep-81 AE 8M Quick Eprom Programmer (new) $150.00. Sams Photo Fact #s 4337-4456 (New) $550.00. John A. Farnsworth Jr. 9027 Auditorium St. Lakeview, OH 43331 Ph# 937-935-2493.

EICO Tube Tester Plus RCA Tube Caddie with over 300. Tubes (TV). Some in original cartons. $250.00/Best Offer plus shipping. Picture Tube Sobber Sylvania Model # CK 3000 with Adapters $75/Best offer plus shipping. Contact Jim Annunziata 619-465-3788.

Sam's Photofacts 1-2000 virtually complete. Number above virtually complete. Number above 2000 have many missing. Cabinets included for many. TSM 24-151 complete, AR 8, 37, 51, 73, 90, 98, 138, 160, 175, 275, and 289. Dave Nelson 218-643-6904 423 N. 8th St. Breckenridge, MN 56520, email, djnels@702com.net.

Video Pattern generator Signal Source model 1219 $150.00, Biotek Electro surgical analyzer model RR 301 $75.00, New Static Mat $25.00, Zenith Transoceanic radio $350.00, Stromberg Carlson short-wave radio $325.00, Approx 350 Vacuum Tubes 1980's era $200.00, New Weller Pyropen Jr. not used $60.00, Anatex Model C Iron $10.00, Kenwood 2mtr handy talkie w/accessories $200.00. Will ship COD and add shipping to all prices. E. Leduc, 319 So. Hall St., Manchester, NH 03103 Phone: 603-669-1533, E-mail: edleduc@prodigy.net.

WANTED

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.

Service Literature for Ballantine Model 6130A-101 or AN/USM-441 Time Mark Generator. Richard Gilman P.O. Box 633, King City, CA 93930, 831-385-9248.

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

Wanted to buy. Diehl Mark 4 and Diehl Mark 7 Testers. Also parts for Don Bosco Stethatracer. Murray's Repair Service, 561-966-8862. Email-tmgold@bigplanet.com.

Schematic for Motorola model 76T2. (A vintage portable transistor radio.) Mackenzie TV, (480) 946-7270, marjmac@cox.net.

Impedance bridge zm-11/u, phillips scope pm3212, sharp camcorder vll-1250u.need it for parts. Sid 510-357-3788 or sgoldhor@msn.com.

Wanted to buy, Flyback Transformer Zenith projection TV Part #095-04134-13 or 95-4134-13. Also an IC for Emerson TV part #M52039SP. Call at 276-971-2395 or e-mail me at shelbyf@netscope.net.

ADVERTISERS INDEX

COMPANY	PAGE NUMBER	READER SERVICE	ADVERTISER HOTLINE
ANDREWS ELECTRONICS	33	7	800-289-0300
B&D	53	24	800-458-6053
CEDIA EXPO 2002	3	1	317-571-6602
COMPUTER & MONITOR MAINTENANCE	10	3	1-800-466-4411
ELECTRONIC SERVICING & TECHNOLOGY:			
BOOK SHOP	IBC		800-462-4659
BACK ISSUES	55	31	800-462-4659
SUBSCRIBE	35	9	800-462-4659
NEWSSTAND	17	32	800-462-4659
ELECTRONIC TECHNICIANS ASSOCIATION	49	29	800-288-3824
ELECTRONIX CORP.	55	25	937-878-9878
ESCALERA, STAIRCLIMBER	55	26	800- 622-1359
METERMAN	23	5	425-446-5866
ISCET	40	10	817-921-9101
SAMS TECHNICAL PUBLISHING	21	8	800-428-SAMS
SENCORE	9	2	800- SENCORE
T. A. EMERALD	22	4	800-280-0020
THOMSON MULTIMEDIA, INC.	BC	28	www.thomsonnetwork.com
VANCE BALDWIN ELECTRONICS	24	6	800-432-8542
VIZIFLEX SEELS, INC.	55	27	800- 307-3357

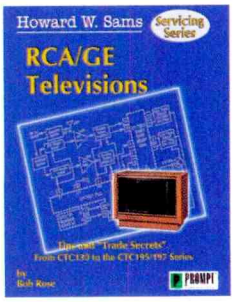
WE'D LIKE TO SEE YOUR COMPANY LISTED HERE TOO!

CALL: **Joni Jones, 516-944-8068, e-mail: jmjones@ix.netcom.com, or David Allen, *Sales Director*, 516-883-3382, e-mail: dallen@mainlymarketing.com**

TO WORK OUT AN ADVERTISING PROGRAM TAILORED TO SUIT YOUR NEEDS.

ES&T BOOK SHOP

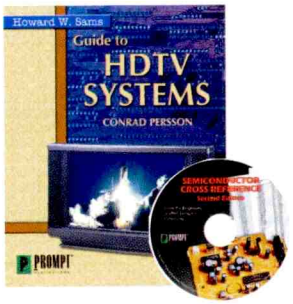
To Order Call Toll Free 800-462-4659



RCA/GE Televisions
(Howard W. Sams)

Expanding on the Sams Servicing Series, author Bob Rose takes an in-depth look at RCA/GE TVs, with coverage of manufacturer hr shop in Fort Dodge, IA for 38 years. He is the author of more than 43 books and more than 1,000 articles printed in 48 different magazines. He currently is the TV servicing consultant for *Electronic Servicing & Technology* magazine.

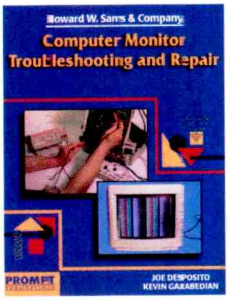
Paperback • 320 pages
ISBN 0790612240 • Sams # 61171
$34.95 US



Semiconductor Cross Reference Book
Paperback or CD-ROM
by Sams Technical Publishing

The perfect companion for anyone involved in electronics! Sams has compiled years of information to help you make the most of your stock of semiconductors. Both paper and CD-ROM versions of this tool contain an additional 128,000 parts listings over the previous editions.

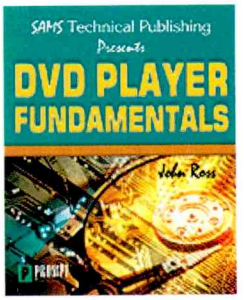
Paperback, 5/E • 876 pages
ISBN 0790611392 • Sams 61139
$39.95 US
CD-ROM, 2/E
ISBN 0790612313 • Sams # 61231
$39.95 US



Computer Monitor Troubleshooting and Repair
By Joe Desposito
Prompt Series from Sams

This can save time and money in monitor repair. Technicians will benefit from this book as it takes the reader through the basics and on to trouble shooting circuits.

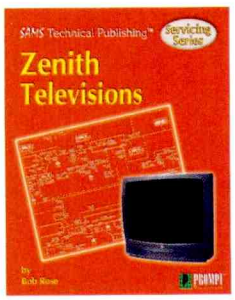
Paperback • 308 pages
ISBN 0790611007 • Sams # 61100
$34.95 US



DVD Player Fundamentals
by John Ross

DVD Player Fundamentals covers every aspect of the Digital Versatile Disc starting with features, specifications, hookup, operation, user error, and more. For the professional, specific technical information includes: DVD track structure and disc construction, optical head and lens features and specifications, video signal processing, MPEG-2 technology, audio signal processing, decoding, audio path and reference signals, switch-mode power supply, tracking servo, transverse servo, system control circuits, etc.

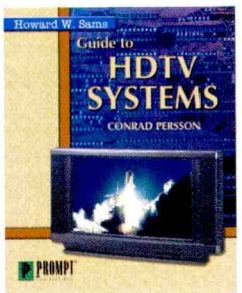
Paperback • 304 pages
ISBN 0790611945 • Sams# 61194
$29.95 US



Servicing Zenith Televisions
(Sams Servicing Series)
by Bob Rose

Expanding on the Sams Servicing Series, author Bob Rose takes an in-depth look at Zenith TVs, with coverage of manufacturer OEM parts versus generic parts.

Paperback • 352 pages
ISBN 0790611716 • Sams# 61216
$34.95 US



Guide to HDTV Systems
by Conrad Persson

As HDTV is developed, refined and becomes more available to the masses, technicians will be required to service them. Up until now, precious little information has been available on the subject. This book provides a detailed background on what HDTV is, the technical standards involved, how HDTV signals are generated and transmitted, and a generalized description of the circuitry an HDTV set consists of.

Paperback • 323 pages
ISBN 079061166X • Sams# 61166
$34.95 US

Servicing TV/VCR Combo Units
(Sams Servicing Series)
by Homer Davidson

Part of Sams Servicing Series, Servicing TV/VCR Combo Units covers the servicing issues surrounding this popular electronic device. TV/VCR combo units have become smaller, more affordable, and functional. They are now used in new ways, including applications in autos, campers, kitchens, and other non-traditional locations. Homer Davidson uses his vast knowledge to cover this subject in a way no one else can.

Paperback • 320 pages
ISBN 0790612240 • Sams # 61224
$34.95 US

ORDER TOLL FREE
1-800-462-4659

Make your selections and include your name, address and telephone with order.

Check, Money Order, MC, VISA, AMEX and Discover accepted. Include CC# and Expiration with order.
Make checks payable to: ***Electronic Servicing and Technology***.

Shipping: FREE on US orders over $50.
Smaller orders = $6.00.
Foreign shipping charged at actual cost (less $6.00 for orders over $50).

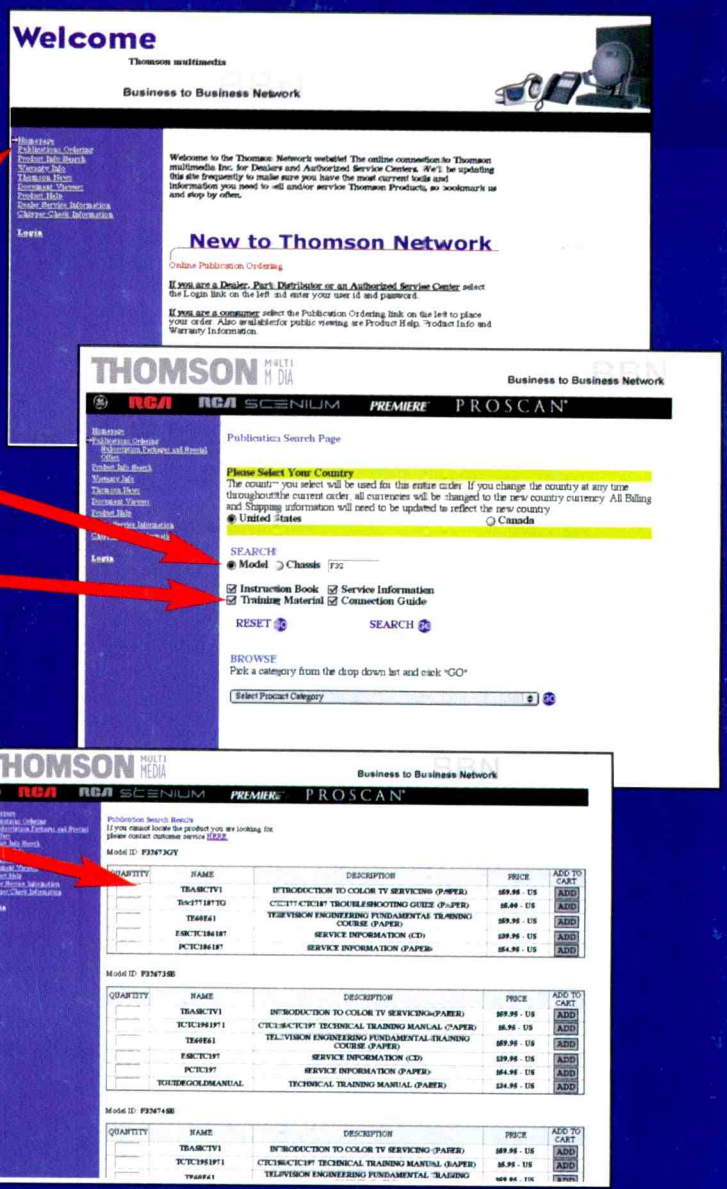
Call or mail order to:
Customer Service
ES&T
P.O. Box 748
Port Washington, NY 11050
Fax: 516-883-2162
Tel: 800-462-4659

Order Thomson Technical Information at www.thomsonservice.com

RCA SCENIUM RCA

Now you can order service information, training manuals, connection guides and instruction books quickly withthese easy steps!

1. ***Go to*** **www.thomsonservice.com**
2. ***Select*** **Publications Ordering**
3. ***Search by*** **model or chassis number**
4. ***Check*** **type of information required**
5. ***Select*** **appropriate manuals and follow the easy ordering instructions**



VISA and MasterCard Accepted

Fast Service: Choice of delivery service-overnight or standard

www.thomsonservice.com
Thomson multimedia Inc.

Circle (28) on Reply Card