

THE PROFESSIONAL MAGAZINE FOR ELECTRONICS AND COMPUTER SERVICING

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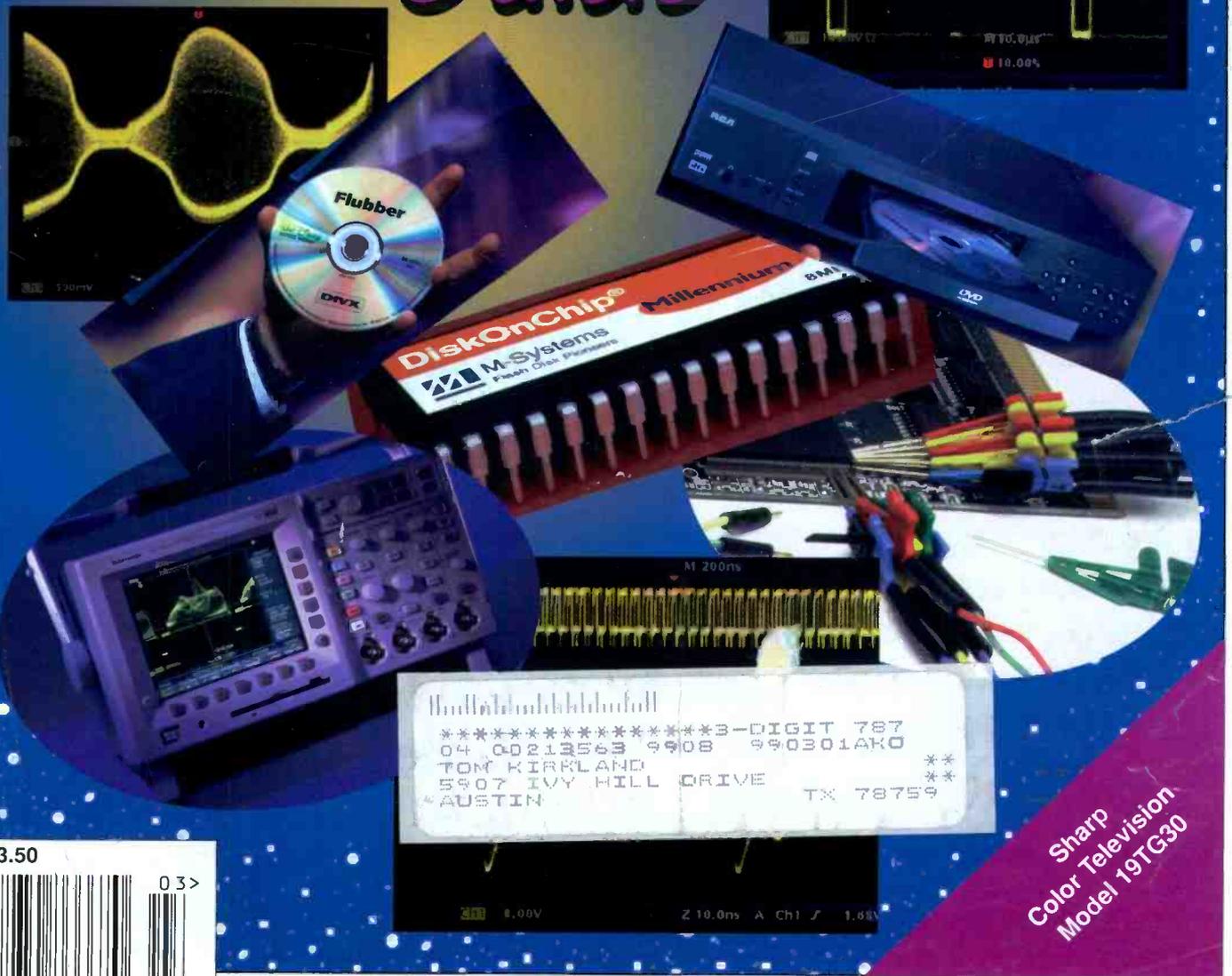
Servicing & Technology

March 1999

Using the World-Wide-Web as a service tool

Antenna types

Buyers' Guide



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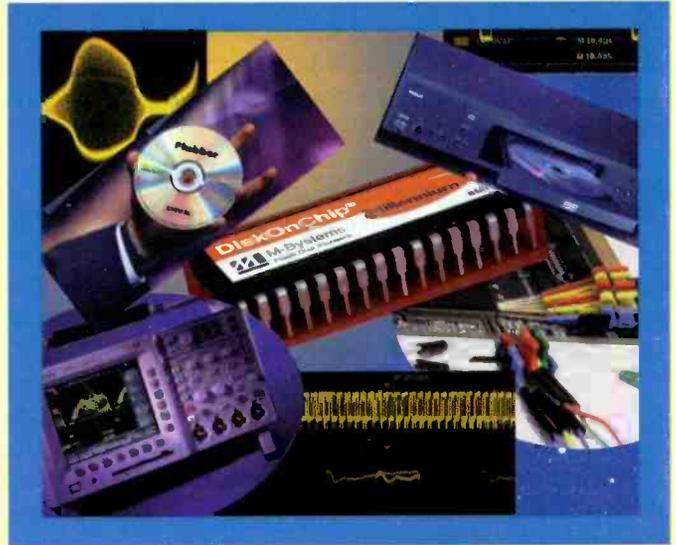
by John A. Ross

When an electronics servicing technician is up to his elbows in a TV, VCR, or other product and looking for some kind of useful information, it helps if the schematic diagram, service literature, or some kind of tip is on hand. When there's no information at all to be had, sometimes a technician will find a clue on the Internet. Ross describes some of the sites that are useful to technicians, and gives a rundown on what kind of information is to be found there.

10 Antenna types

by Dick Glass

With the introduction of HDTV, there's a renewed interest in antennas designed to receive terrestrial TV broadcasts. As an example, CEMA has announced the TV Antenna Selector Map Program, a new campaign that uses color-coded maps to help consumers select the appropriate type of antenna for their television reception location. In this article, Glass describes the different types of antennas and their applications.



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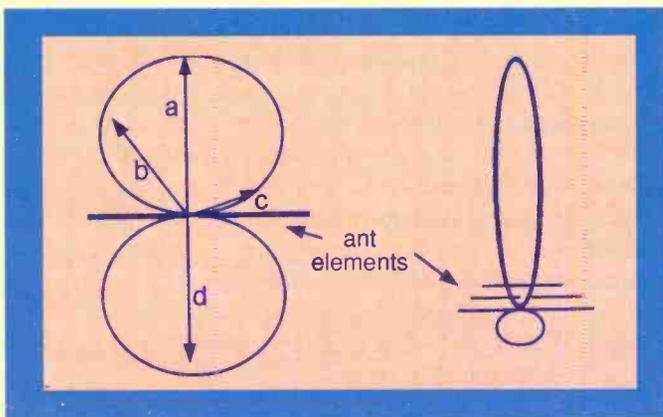
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1999 BUYERS' GUIDE

With so much new technology in consumer electronics these days, it is vitally important that a service center have a source where it can find a good company for replacement parts and product information. One source of that type of information is the annual **ES&T Buyers' Guide**. The guide includes information about manufacturers and distributors, what they supply, where they are located, and how to get in touch with them. We welcome you to this year's Buyers' Guide and we hope you find it useful in finding companies that provide just the product or service you need.

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ON THE COVER

It's easy to take for granted the various tools, equipment, information, supplies, fixtures, and more that are required to efficiently service a piece of consumer electronics equipment. Just think about what it takes to service one of these units. There's a lot to it. That's why we bring you this annual list of the companies that supply everything that service technicians need to do their job.

The making of the Annual Buyers' Guide

In order to try to help readers stay abreast of this constant change among companies that supply consumer electronic service, this magazine publishes this annual Buyers' Guide special issue every March. We thought that readers might be interested in a rundown of what goes into it.

The questionnaires

Last October, we contacted a printer/mailer to print around 1500 copies of the Buyers' Guide Questionnaire. The questionnaire is four pages long. The first two pages are a letter of invitation to the companies to fill out the questionnaire, and, of course, an invitation to advertise in the issue.

The second two pages are the questionnaire itself. At the top the first of these two pages there are spaces in which the company can enter the company name, address, phones and faxes and e-mail and website addresses. The remainder of that page, and the second page, of the questionnaire pages contains a listing of every product that we list in the buyer's guide, with a check box where the company can place a mark if they sell that product.

Initially we mailed a questionnaire to each of the companies on our list. Keep in mind that when we say "company," that actually includes manufacturers, distributors, depots, associations, consultants, publishers, schools, extended warranty companies and software companies. That was over 700 companies. Of those, 169 questionnaires were completed and returned. In December, we sent out a second mailing to the companies that had not returned completed questionnaires. In response to that mailing, we received another 46 questionnaires back, filled out. That's a total of 215 completed questionnaires that we received back. Another 50 or so were returned by the Post Office as having a bad address. Of those 50, we managed to find the correct address of some from the Internet or other sources. The rest, we removed from the list.

We assume that if a questionnaire was mailed out, and didn't come back with a notation by the post office that the address was incorrect, that at least the address information is correct, so we kept those companies in the listing.

The data

Once the completed questionnaires were in hand, we began to correct our database to reflect the correct information. In the company information, we confirmed or changed addresses, area codes, telephone numbers, e-mail addresses, Internet addresses.

In the product information database, for each company we confirmed our listing for products for which the respondent had checked off a product that we had in the database. We added to the product listing in the case where the respondent checked a

product that we didn't have listed, and deleted products that they indicated that they no longer sell.

Some interesting information

The company database as it's printed in this issue consists of some 674 companies. Of these companies, about 500 actually have corresponding products in the product listing. The other companies have apparently never returned a questionnaire, or never took the time to check off the products they sell. The product list consists of over 6,000 entries.

It's also interesting to look at the geographical distribution of these companies. And it's easy to do using a computer database program. Of the 674 companies listed here, 135 (about 20%) are located in California. Another 60 (just shy of 9%) are located in New York. Almost 30% of the companies listed in this Buyers' Guide are either in California or New York.

The ten states of the United States that contain the highest concentrations of companies in this Buyers' Guide are, as mentioned, California and New York, Illinois (53) Massachusetts (48), New Jersey (46), Texas (31), Ohio (30), Florida (29), Pennsylvania (21) and Connecticut (19). These ten states account for a total of 472 of the companies in this Buyers' Guide listing, or around 70%.

You can help us make the 2000 Buyers' Guide better

Over the course of the next year, the editors are planning to make a determined effort to improve the accuracy of the Buyers' Guide. We'll be contacting those companies that haven't responded to questionnaires recently, in an attempt to get up-to-date information. If we can't confirm their listings that way, or in some other fashion, we'll delete those entries.

It would be a great help in this effort if readers could let us know when they call a number in this listing and are told that it's a wrong number, or if they write to an address in this listing and get either a notation that the address is wrong, or no response, or if they contact a company to buy a product that our listing says they have, but the company says that they don't sell it.

And you can help us make the listing more complete. If you notice that there's a company that we don't have listed that you think should be here, please let us know.

The more accurate we can make the Buyers' Guide listing, the better for all concerned.

And finally, if you have any comments about the Buyers' Guide, we'd like to hear it.

Nile Conrad Pearson

ELECTRONIC

Servicing & Technology

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

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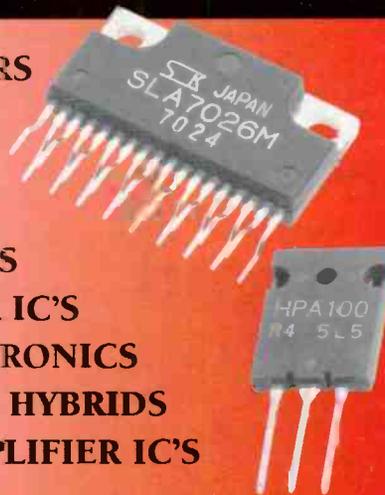
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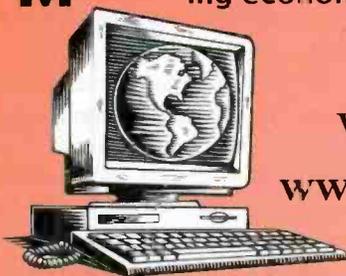
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NEWS

New choices for linking cable and TV sets

The Consumer Electronics Manufacturers Association (CEMA) is proceeding with four technical solutions to link cable and other set-top boxes to television receivers: a 1394 interface, the RF remodulator interface, a component video interface, and the National Renewable Security Standard (NRSS) interface. These efforts are designed to ensure that consumers who buy a digital television system (DTV) set in the future will be able to receive digital cable and use their DTV sets with other digital technologies like direct broadcast satellite (DBS), digital versatile disc (DVD) players, digital VCRs, and computers.

The four interfaces will provide consumers and manufacturers a myriad of choices for connecting their TV sets to cable systems. With four interfaces, consumers will be able to choose from simple, low-cost connections to high-end, feature-rich models.

How do the interfaces differ?

1394 Interface:

- The Institute of Electrical and Electronics Engineers (IEEE) and International Electrotechnical Commission (IEC) have created international 1394 standards: IEEE 1394-1995 and IEC 61883. Many other organizations are near completion on other related standards, and these standards are now far enough along that companies are creating "suites" of protocol to implement these standards and specifications. CEMA's R4.8 1394 Interface Subcommittee is working rapidly to meet the Federal Communications Commission (FCC) Chairman Kennard's goal of an industry specification by November 1, 1998 for implementation of 1394 to connect cable set-top boxes and DTV.

- The 1394 interface creates a two-way digital bus architecture.

- Digital devices can be daisy-chained together as opposed to using point-to-point connections. Unlike the other three interfaces, 1394 is not only a cable set-top box to receiver connection; it can connect several digital devices together such as digital versatile disc (DVD) players,

digital VHS players, Dolby Digital surround sound processors/receivers, digital converter boxes, and other digital consumer electronics products.

- CEMA is investigating copy protection methods and their impact on television receiver designs.

- Of the four interfaces being developed, 1394 is the most high-end, feature-rich interface.

RF Remodulator Interface (EIA-762):

- This standard has been published with the designation EIA-762.

- The RF remodulator interface links one digital device (such as a digital cable set-top box) to a digital TV receiver.

- Using a one-way, point-to-point digital connection, the interface can translate the cable industry's transmission language Quadrature Amplitude Modulation (QAM) into vestigial sideband (VSB), the transmission standard accepted by the Advanced Television Systems Center (ATSC) for use with DTV.

- The interface can support one-way digital copy protection schemes.

Component Video Interface (EIA-770):

- This standard has been published as a three-part document, EIA-770.

- The component video interface can link a cable set-top box to a television receiver.

- The interface uses a one-way, point-to-point analog connection.

- The interface can support analog copy protection technology.

National Renewable Security Standard (NRSS) Interface (EIA-679):

- This standard will be published with the designation EIA-679.

- The NRSS interface applies to digital cable-ready TV receivers

- In the NRSS interface model, a smart card or PCMCIA card provides access security to pay and subscription cable or satellite TV services, telephony, and all forms of electronic commerce.

- The interface can support two-way copy protection schemes.

Interested parties can order EIA/CEMA standards through Global Engineering Documents, 1-800-854-7179 or <http://global.ihs.com>. CEMA engineering information can be found on CEMA's Website, <http://www.CEMAcity.org>. ■

Tool catalog

Wiha Tools has published a new, four-color catalog featuring their New System 6 and System 4 interchangeable blades, bits, and handles programs. This 16-page catalog details each program completely, which includes over 200 items.

The System 6 Interchangeable program features six different, ergonomic handles and a selection of blades. The System 4 Interchangeable program features four Precision handles available in standard or ESD Safe material, along with an assortment of blades. Sets are available in standard and Anti-static pouches, and compact fold out or steel box packaging.

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Spring 1999 audio catalog

The new Spring 1999 edition of the Old Colony Sound Laboratory catalog is now available. The new catalog features books on all aspects of audio, software, PC boards, test CDs and LPs, and vendor sources for all areas of audio construction and modification.

Available for the first time in the Spring 1999 catalog is CLIOLite, the entry-level version of Audiomatica's CLIO electro acoustic measurement system for loudspeaker designers and builders.

Also highlighted in this spring's catalog, *Testing Loudspeakers* by Dr. Joseph D'Appolito, the comprehensive new volume by the world class authority on loudspeaker design and testing, is offered at a special pre-publication price. Due to be printed later this spring, *Testing Loudspeakers* is a thorough tutorial on the subject of loudspeaker testing including analog measurements through all facets of using a PC-based electrical and acoustical data-acquisition and analysis system.

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Product info on the Web

The Eraser Company announces that they are now serving their customers on the World-Wide-Web. Customers can find out what's new at the company, view information on many products and services, and even fill out a free laboratory

evaluation form or catalog request form on-line. Information is also provided to help customers reach their inside Technical Applications Representative, or local Distributor, by phone or E-mail.

The site will be updated every six weeks with new information on new products, trade shows the company will be attending, and other industry news. A separate section contains links to other industry Websites that may be of interest to the company's customers. The Website address will be <<http://www.eraser.com>>.

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On-line ordering

The new TechAmerica On-Line Catalog allows customers to view and order from more than 18,000 different electronic parts, components, and publications at <www.techam.com>. The company specializes in value-priced electronic parts and components, test and measurement products, electronic kits, technical books, wire, cable, connectors, and adapters.

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Using the World-Wide-Web as a service tool

by John A. Ross

In the February 1999 issue of **ES&T**, we took a brief look at general software strategies for improving the efficiency and effectiveness of an electronics service business. Those strategies involved the use of off-the-shelf software, including word processors, spreadsheets, and databases; custom-made software management solutions; and World-Wide-Websites that contained a wide variety of information. Each of those strategies provided a solution for typical problems ranging from the production of flyers or business letters to the tracking of service calls and on-line solution sets.

This article enlarges the amount of information given about several World-World-Web sites that provide information tailored for the electronics service industry. That information may vary from definitions of electronic components to listings of problems and solutions for products from many different corporations.

As each of the following sections demonstrate, information found on the Internet can assist technicians in a number of ways. Access to this information can occur through a personal computer in the home or at the business location. With a subscription to a local or national Internet service provider, an internal or external modem, and the use of a Web browser, technicians can supplement their hard copy service material with on-line information.

The Technician's Forum

Located at <http://www.anatekcorp.com>, *The Technician's Forum* contains electronic repair tips, schematics, manuals, and published articles about repair subjects. Along with including an *Electronic Repair Bookstore*, an Electronic Repair E-mail Discussion

Ross is a technical writer and microcomputer consultant for Ft. Hays State University, Hays, KS.

Group, and offers for CD-ROMs containing monitor schematics and manuals, the site also covers the following topics:

- Video Cassette Recorders
- Televisions
- Computer Monitors
- Audio
- Test Equipment

The article also has links to an Electronic Repair FAQ and a Component Cross Reference and Source FAQ, or frequency asked question list. No passwords or payments are required for access to the site.

The selection of any of the five product topics found on the Website takes the technician to a list of regularly-updated product repair answered questions. As an example, the Anatek site contains 30 pages of questions and answers posted about VCRs by service technicians. The Anatek Corporation owns the copyright for the questions and answers posted on the pages by service technicians. Each question and answer set has a unique number.

As an example of the type of information found within the question and answer sets, a sample set shows that a transistor and a fuse in a particular VCR have shorted and become unreadable. The solution to the question lists the symptom (no power) and the values or product names for the fuse and the transistor. In addition, the solution advises that three components should be changed as a set. Within the VCR category, the 39 pages of question and answer sets covered units produced by Fisher, Sony, Akai, RCA, Samsung, Daewoo, Goldstar, Zenith, Magnavox, GE, Mitsubishi, Toshiba, Sanyo, Realistic, Hitachi, Multitech, Technica, Emerson, Panasonic, Sharp, Lloyds, and Funai.

The *Electronic Repair Center FAQ for Electronic Repair Professionals* found on the Anatek site allows service professionals to post queries which become part of the individual question/answer databases. With its keyword search format,

Pin 21 of the IC is a input pin for pincushion para-compensation. The digital pulse is fed from Acer's very own PAL chip, the AP3105 (IC84) pin 13. This IC sends a digital pulse that converts to a dc voltage value through R858 (10K) and C84 (2.2uf). The dc voltage ranges from 0-5Vdc. IC853 and IC854 look identical but have different firmware.

Figure 1. An example of the type of problem solution you'll find at The Electronic Repair Tips Home Page.

PIX INOP POWER LIGHT ON ONLY
DRAWS 20W POWER

Figure 2. You might find a problem listing like this at Electronix Corporation's *Repair World*.

the FAQ page allows technicians to quickly identify possible solutions for known problems. Anyone wishing to post to the site should use their full name and a valid electronic mail address. Anatek posts the questions for a month at the FAQ center before moving the question and answer to the appropriate section.

The Electronic Repair Tips Home Page

Found at <http://www.elmswood.guernsey.net/>, the Electronic Repair Tips Home Page provides tips and hints for a wide range of consumer electronics equipment. The list includes:

- Computer Monitors
- Stereo Equipment
- Laser Printers
- Microwave Ovens
- Satellite Systems
- Telephones
- Televisions
- VCRs

In addition, the site also contains links to news and messages, a list of related sites, and advertisements.

As an example of the information found on the site, the computer monitors section covers 25 different brands along with a section about general faults. The section

**SOLDER BAD AT C330 ON 21.5V LINE,
105 DEGREE CAP**

Figure 3. This is the solution to the problem listed in Figure 2.

about monitors manufactured by Acer begins with a symptom where the sides of the raster bend inwards on an Acer model 7156 computer monitor. The solution for the problem points the technicians towards the pincushion section and lists components that may cause the problem symptom. As Figure 1 shows, the solution set recommends the replacement of a TDA4855 pincushion IC and discusses the differences between several integrated circuits used within the pincushion circuit.

The Electronic Repair Tips Home Page does not require a password or payment for access to the hints and tips pages. Information may vary in age and the amount of detail. However, each section covers a wide range of manufacturers. Again referring to the computer monitors section, the Website lists repair information for Acer, AOC, Compucon, CTX, Gateway, IBM, Mag, Philips, Samsung,

Sony, Tatung, Techmedia, TVM, ADI, Compaq, Compudyne, Digiview, Goldstar, Interquad, NEC, Proton, Samtron, Tandon, Taxan, and Trust. Similar coverage exists throughout the other sections of the site.

RepairWorld

Located at www.electronix.com, Electronix Corporation's *RepairWorld* site provides an on-line database of repair tips for televisions, computer monitors, VCRs, and other consumer electronic equipment. Although access to the site requires payment and a password, the site features the updating of the data each week. *RepairWorld* collects the data from manufacturer's service bulletins and service centers. Data is listed by model number, chassis number, suspected component and problem, and the solution.

As an example of the data found at this site, a technician can select a Gateway 2000 model CS1572FS monitor and find the problem listing shown in Figure 2.

Figure 3, shows the solution listed for this particular symptom. The monitor problem/solution database contains over 1,300 records.

Sci.Electronics FAQ

Found at <http://ftp.cised.unina.it/pub/electronics/REPAIR/>, the Sci.Electronics FAQ site contains a set of on-line mini-books that cover subjects such as computer and video monitors, televisions, microwave ovens, and switch-mode power supplies. Each mini-book begins with an introduction to the particular subject and discusses fundamentals, characteristics, and product types. From there, the mini-books show how the product separates into various subsystems. No password or payment is required to view the information in the mini-books.

Although the information contained in the early portions of each Sci.Electronics FAQ section may seem basic to some, it exists as a readily available information source. The latter part of each mini-book provides a listing of common problem symptoms and solutions. Using the "Troubleshooting and Repair of Computer and Video Monitors Index" as an example, the troubleshooting sections cover safety guidelines; low voltage power supply problems; deflection problems; high voltage power supply problems; raster, color, and video problems;

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Expanded Customer Service Hours

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and miscellaneous problems. In addition, each section also identifies areas of interest for each type of product.

Electronix Express

Presented at <http://www.elexp.com>, the Electronix Express Website by R.S.R. Electronics, Inc. provides a set of general interest hints and tips for electronic tech-

nicians, teachers, and students. Anyone wishing to post information to the site may send an electronic mail message to electron@elexp.com. The site includes information about topics such as:

- Inductors
- Electrical Measurements
- Amplifiers
- RS-232 Interfaces

TESTING LEDS

LEDs have a larger voltage-drop across them than regular diodes. Depending on the LED, the drop can be between 1.5 to 2.5 volts. If you have a DMM with a diode setting on the Ohms scale, then you may be able to test an LED as a standard diode. The difference will be that the meter will read 1600 or 50 when the diode conducts instead of the 600 you read on a silicon diode.

Figure 4. — "Making Electrical Measurements Part 3: Testing Diodes and Transistors" — Study Section.

- Oscilloscope probes
- Shunt Regulators
- Soldering
- Troubleshooting

Figure 4, the "Making Electrical Measurements Part 3: Testing Diodes and Transistors" section illustrates the type of information found at the site.

Along with that information, the site includes capacitor code and resistor color guides as well as film resistor charts. The site also contains experiments that cover topics such as audio amplifiers, dc-dc converters, and adjustable duty-cycle oscillators. Readers may access the information contained within the Electronix Express site without the use of a password and at no charge.

Summary

Along with the technical service information found at manufacturer's Websites, the information found at independent sites can assist for anyone involved in the service industry. Referring back to the examples listed in this article, the Internet provides information about a wide range of products at the click of a mouse button. Going beyond those examples, we can access many manufacturers sites and find detailed white papers that not only cover products but also components. Given the technology, a technician located in almost any part of the world can quickly and inexpensively access information once described as "hard-to-find."

Moreover, please note that the manufacturer listings in the Buyers' Guide published in this issue include Website information for all of the companies that provided this information to the editors. You never know what type of useful servicing information you might find by paying a visit to one of these sites. ■



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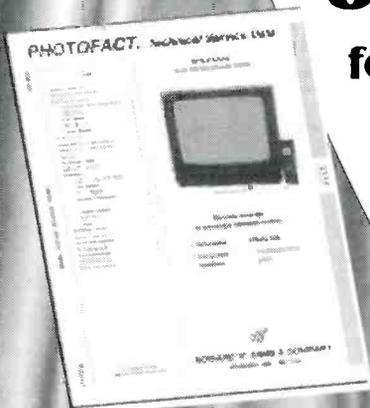
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TV antenna types — dipole; folded dipole; conical; rhombic; log periodic; yagi; all channel; cut channel

by Dick Glass, CETsr

The most basic antenna for television reception is a half-wavelength dipole. Since it is the basic antenna that other types of TV antennas are compared with, the dipole is considered to have a gain of 1. Whether the dipole is near a TV transmitting tower, or 30 or 40 miles away, the antenna has the same gain, which is 1. That doesn't mean it always receives the same amount of signal. It doesn't mean its output is always 50uV, or 500uV, or 5,000uV, or some

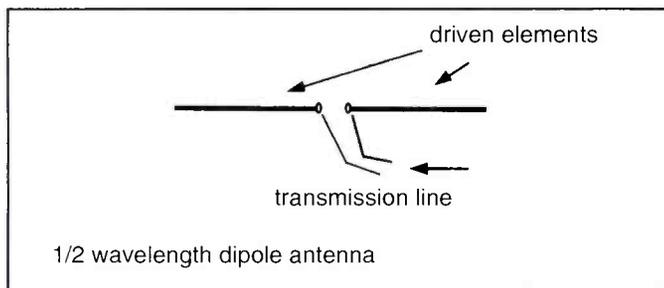
other amount. It means that it is the basic antenna against which others are compared. If your antenna picks up 100uV of signal on a certain channel or frequency, and a simple basic dipole picks up only 50uV (both being at the same location, height, aiming direction, etc.), then that antenna has double the reception capability, a 100% gain, or a 6dB gain over that of the basic dipole.

Double your pleasure

Suppose your antenna is an improvement over the basic dipole in Figure 1. For instance, you have added a reflector (Figure 2). Note that some of the transmitted energy is intercepted by the driven

element, which should give the same amount of signal as the Figure 1 dipole. But still more signal is added to the driven elements, as some of the electromagnetic beams hit the slightly longer reflector and bounce back to the driven element. Since the time-lag between the energy cycles hitting the driven element and those bouncing off the reflector reinforcing the initial ones picked directly up by the driven element is small, it is as if there is no time difference. The reflected signals add to the direct rays and thus the Figure 2 dipole (given the same exact conditions in the same exact location) will produce a higher voltage-level signal. It could be as much as 25% or 30% more!

Dick Glass is President of ETA and SDA. He has had a private business for many years: Glass Antenna Systems, Inc., which sells and services satellite systems and off-air antennas and operates two small cable systems and a master antenna system.



↑ Figure 1

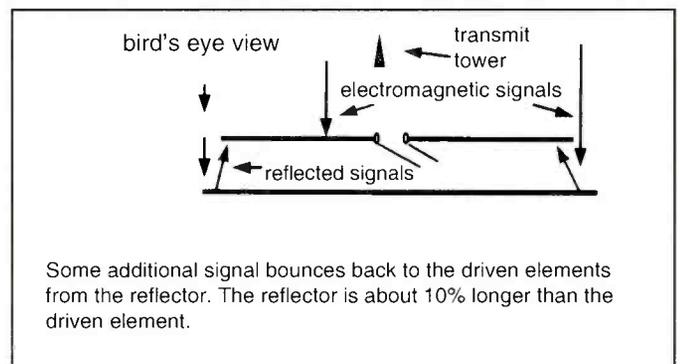


Figure 2 →

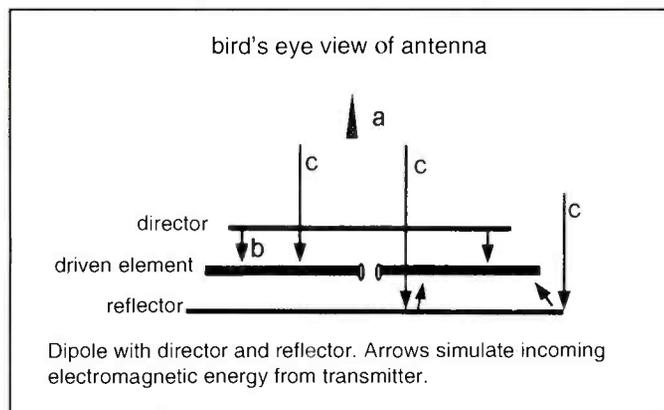


Figure 3

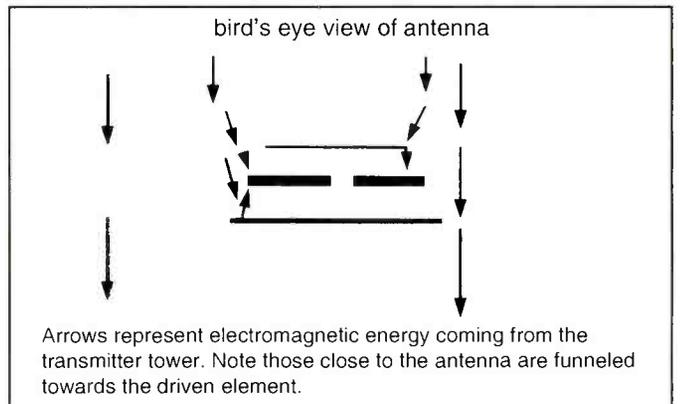


Figure 4

You might say, "Great! Why not always use a reflector and get more gain?" The answer is: In most cases we do use reflectors and we do get more gain because of that. In addition, the reflector blocks unwanted rearward signals. That can also be a big plus, as blocking signals coming from other than the direct path to the transmitter is usually desirable.

Back to the subject: now we have increased the gain of our dipole basic antenna by perhaps 2dB or 3dB by collecting additional electromagnetic impulses via the reflector, sort of like the satellite dish reflector focuses signals onto a pickup element inside the feedhorn waveguide opening.

Now let's add a director — another parasitic element (Figure 3). The director — slightly shorter than the driven element — picks up the transmitted electromagnetic impulses too. Both the director and the reflector are likely to be grounded to the boom of the antenna, thus any signal variations in them can't be picked up. The director, rather than reflecting the signals away from the driven element, focuses, or relays, additional energy onto the pickup or driven element (Figure 4). If it were longer than the driven element, it would truly shield the pickup element from the signal just as the reflector does to rearward incoming signals. Think of the director(s) as resonating and retransmitting a bit of signal to the pickup element. Also think of the director as funneling the electromagnetic waves to the driven element.

Whatever way you think of it happening, the director and reflector add to the energy received from the forward direc-

tion. In fact, a simple dipole with a director and reflector added, has over twice the gain of the dipole without both. Twice the gain is a 6dB voltage gain.

If your location can produce an amplitude of 300mV of signal from a simple dipole of the proper size for the frequency desired (such as TV Channel 6), then a dipole with a director and reflector will give perhaps 400mV or 500mV of signal at the very same location and height and aimed in the same direction.

With TV reception, those close to the broadcast towers don't really need the director and reflector. That is why "rabbit ear" antennas can be used fairly successfully by urban dwellers.

But even those in strong signal areas find directors and reflectors may be needed. Not for added signal strength, but for receiving signals from only the desired direction and not those signals bounced off metal structures at oblique angles. These secondary-path signals travel farther, and therefore take longer to arrive at the driven element (since they travel at the same speed as the direct signal: the speed of light). The same reflected signal, arriving a split second later, will appear a short distance to the right on a TV picture tube screen. It takes 62.5usec for the beam being traced on one line of a picture tube to travel from left to right. It then makes sense that if you receive a reflected signal that has taken 5.0usec longer than the direct-path signal to arrive at the antenna, this second image will be displaced to the right about 8%. (See Figures 5 and 6). You can actually determine about where an objectionable

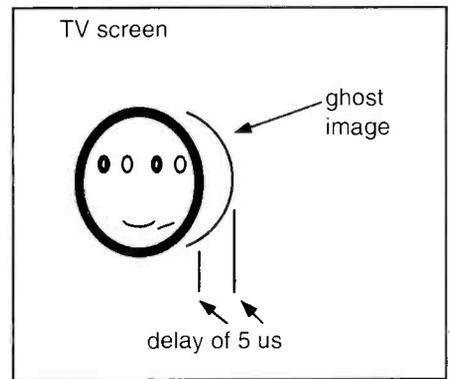
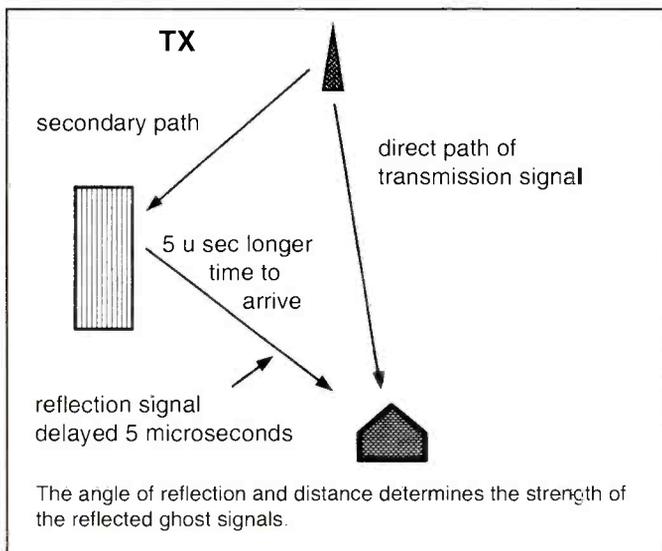


Figure 5

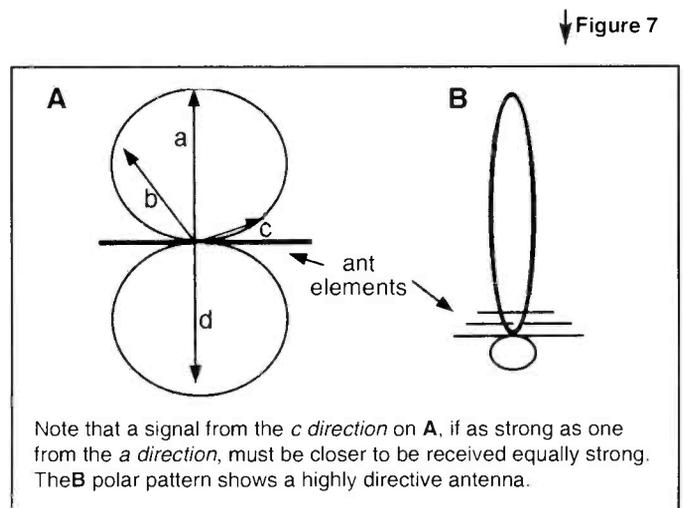
reflection is coming from by comparing the delay on the TV screen with the speed of light. You need to realize that a reflecting surface off to the right or left of your antenna direction, 90 degrees, is not likely to be picked up since antennas usually can't respond to signals which are in the direction of the antenna rods ends, rather than perpendicular to them. You also will find the science of determining the ghost producing object is less than perfect in that the path the signal takes to produce the ghost image may be any angle, even an obtuse angle arriving from the rear direction. A rearward reflection path not only has to travel to the reflecting object, but then has to return to the antenna and get past the reflector.

Polarity

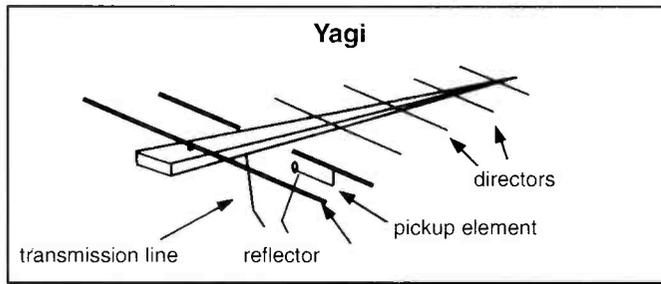
For starters, forget about the gain that directors and reflectors give you over the simple dipole. As you add more directors, you do increase gain but more important right now, you also change the shape of



← Figure 6



↓ Figure 7



↑ Figure 8

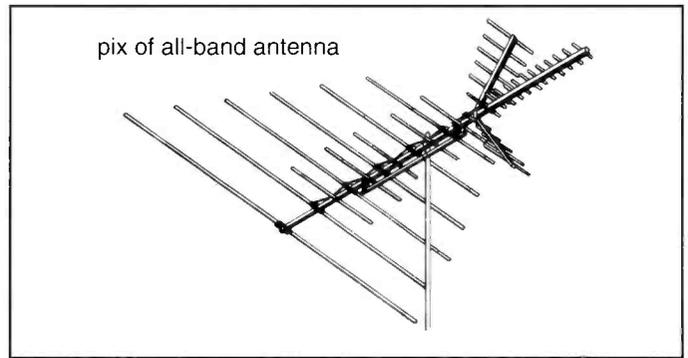


Figure 9 →

the graph that shows equal angles of reception ability. Think of a simple dipole as having a birdseye-view pattern that is shaped like a figure 8. Think of the same antenna, but with several directors and reflectors, as having a polar pattern shaped like an exclamation point (!).

Urban dwellers frequently have severe ghosting problems, thus an antenna with multiple elements may be required. If this causes the signal to be too strong because of the extra gain of an antenna with multiple directors and reflectors, then an attenuator can be used to reduce the amplitude to a desirable signal level.

You can see from the polar patterns in Figure 7 that a sharp polar pattern can eliminate or reduce the ghosting problems. On the other hand, your area may have antennas receiving signals from 2 transmitter sites that are miles apart. You may want to use a broadbeam antenna like the simple dipole in order to receive both signals without having to reorient the antenna on the mast. While a rotor is best, allowing you to aim the antenna exactly at the station you are viewing, a rotor may be impractical, for instance in the case of the antenna being used in an apartment building where all of the available channels may be viewed at the same time.

The outlines on the figure 8, or on the exclamation-point-shaped polar patterns in Figure 7 are points of equal reception ability. We can't know just how much signal is at the *a* point in Figure 7A's figure 8 pattern but we do know that if the antenna is aimed that direction (a), whatever signal it receives is as strong as the same signal received at the *c* angle from a point much closer.

Note that by adding directors and reflectors, we have taken the figure 8 pattern and "squeezed" it into the exclamation-point outline. The actual straight-ahead direc-

tion becomes greater and the rear lobe much smaller. Because of the reflector, there is virtually no rearward reception ability. Physical size generally dictates the number of directors and reflectors one can use. Each additional director adds a lesser amount of gain but does aid in narrowing the beamwidth or directivity.

Yagi antennas

The Yagi (Figure 8) was named after the man who invented this style of antenna. It is not as popular today as it was in the early days of TV ('40s and '50s), when many areas had only 1 or 2 TV stations within range. The Yagi more often was intended for one channel (although modified versions are used for the LO and the HI VHF bands). Most cable TV systems put up towers that are 100 feet tall or higher equipped with Yagi antennas intended for picking up clear signals from TV stations 50 or more miles away. The Yagis not only have high gain, (10dB to 13dB) but when "cut" for a single channel, receive unwanted channels poorly. They have a narrow bandwidth and a narrow beamwidth.

You may run into UHF Yagi antennas used for single channel reception in areas where there is only that one UHF station.

Adding the ability to receive this station, in addition to the several other stations broadcasting to that metro area, can add to the diversity of channels for the residence or MDU (multiple dwelling unit) being served by the antenna system.

Isotropic

Isotropic antennas are frequently mentioned in antenna engineering books. They are hypothetical antennas having equal radiation (or reception) in all directions. They have no unwanted lobes. While we have been embedding in your mind that the basic half-wave dipole is the antenna against which other TV antennas are compared, there are communications antennas other than dipoles. It is convenient and meaningful to compare an antenna with the theoretically perfect isotropic radiator or receptor.

All-band antennas

Most antennas installed today are all-band antennas. Why? The reason is that there are few areas that do not have several TV stations. The top 100 metro areas in population all have multiple TV stations — low VHF, high VHF, and UHF. Therefore one antenna that will receive

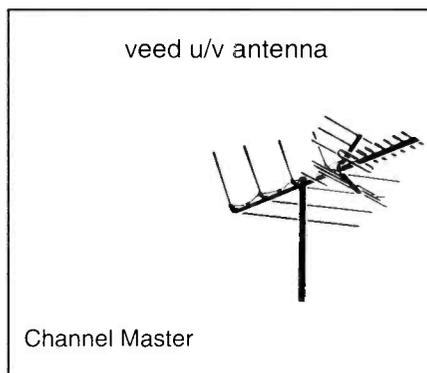


Figure 10

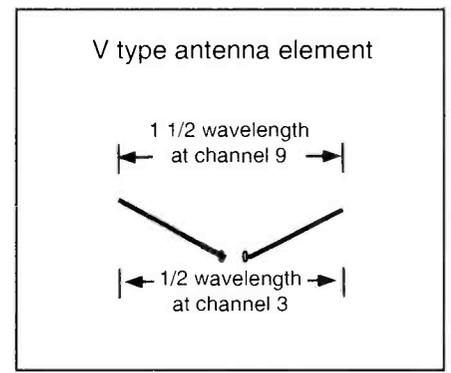


Figure 11

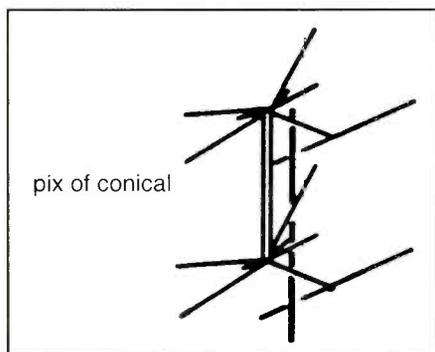


Figure 12

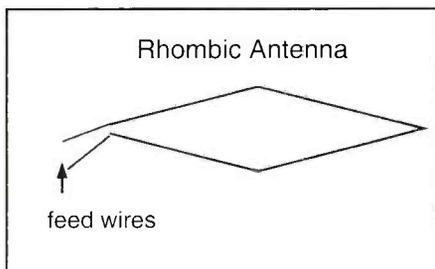


Figure 13

each of the three bands satisfactorily is not only practical but economical. The all-band antenna shown in Figure 9 is very popular. Note that the small or front end of the antenna has UHF reflectors mounted at 45 degrees. It also has the elements perpendicular to the boom upon which the elements are mounted. The pickup element is a dipole immediately ahead of the UHF reflectors. This antenna is 120 inches long.

Figure 10 is another version of the all-channel U/V antenna. This is called a "Veed" antenna since most of the elements are tilted towards the front by about 30 degrees (in the shape of the letter V).

Note that both antennas, (Figure 9 and Figure 10) connect the elements in a criss-cross manner. The right-side rear element is linked to the element in front of it on the opposite side. You will note that the Figure 9 antenna is 10 feet long. It is

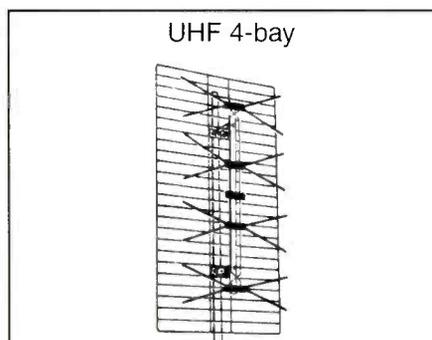


Figure 14

intended as a fringe area antenna. The Figure 10 V antenna is intended for suburban reception.

The Figure 10 V-shaped antenna has only 4 VHF elements. These 4 elements must share the reception duties with the rear element responding to channel 2 and 3, the next to channels 4-5-6, the next to 7-8-9, and the most forward (right behind the UHF reflectors) to 10-11-12 and 13. Actually, the dipole pickup element immediately ahead of the UHF reflectors is a little long for UHF and so it will respond to channel 13 fairly well also. The only portion of this antenna that will do anything at all for the UHF channels is the UHF 45-degree reflectors, the pickup element and the 8 directors. The 4 VHF elements also can act as reflectors for the UHF, but in a very minor way.

The Figure 9 antenna has more VHF elements, thus it will provide a more even level of reception over the channel 2 through 13 frequency range than the Figure 10 V antenna. The UHF corner reflector section in front on the antenna in Figure 10 is nearly the same as that on the front of the Figure 9 unit, thus each antenna should perform on UHF about equally well.

"Veeing" the antenna design is popular. By orienting the elements in a V, or swept-forward manner, a smaller antenna is possible. The side lobes, which are usually undesirable, are reduced. By Veeing, the lower channels usually suffer some reduction in gain because the elements appear shorter to the directly-ahead signals than parallel rods would appear. Veeing allows longer elements to not only resonate at their cut frequency but they also resonate at 3 times the frequency as well. Thus, a V antenna can respond to VHF Lo band and VHF Hi band

The smaller the antenna, the larger the undesirable side lobes. This can lead to excessive ghost reflection pickup. It could also allow you to use an economical antenna in some locations where you actually want to receive certain channels from slightly separate directions.

Using the same antenna element for both low VHF and hi VHF channels is called multimoding. Resonance occurs at each half wavelength, thus the "veed" elements, which are 1/2 wavelength for a low band VHF channel, are also resonant at 1 wavelength. However, the 1 wavelength

for the low channels is longer than the element. But for the high VHF channels, 1 and 1/2 wavelengths fit OK. That's why the V style antenna works as an all-band antenna (Figure 11).

Log periodic

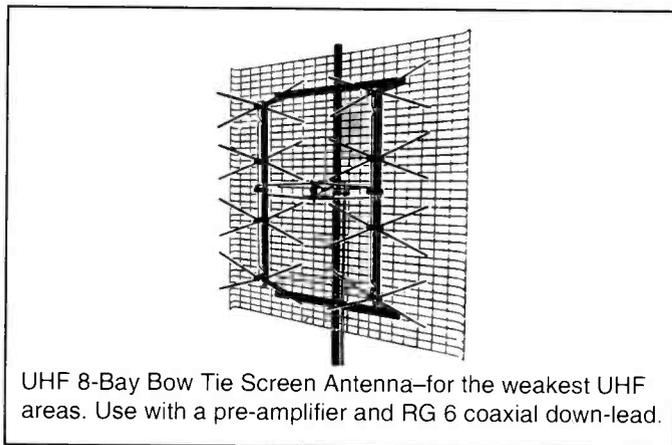
A log-periodic TV antenna can have straight elements as in Figure 9, or "veed" as in Figure 10. A true log-periodic has decreasing measurements. This applies to the rod lengths, spacing, diameter, and gap spacing between the 2 sections of an element. In practice, the lengths of the antenna rods increase from the front hi-VHFs to the back lo-VHF. All of the elements are active and are cross-coupled to the next forward and next rearward elements. The feed wing nuts for attaching the twin-lead transmission line are at the shortest elements.

The log-periodic is possibly the most popular TV antenna design. It allows slightly smaller elements (when "veed"). A 10-foot log-periodic antenna covers the VHF bands sufficiently. Adding a UHF front-end to it makes it an all-band log-periodic. Other all-channel antenna designs may have as many elements as the LP but perhaps only 2 or 4 are connected as active elements — the remainder being reflectors or directors.

The log-periodic TV antenna utilizes the smallest elements as directors for the elements behind it and the larger elements as reflectors for those ahead of it. Thus, while it may pick up channel 2 or 3 fairly well from behind, other channels are shielded by the progression of elements acting as reflectors.

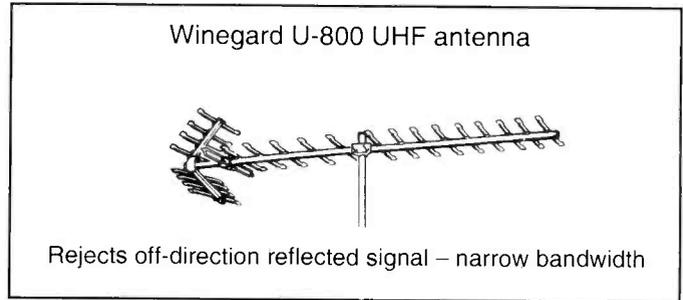
Return of the Yagi

Looking again at Figure 6, notice that the Yagi, unlike the V, or the log-periodic, has only one active element. Also notice that the pickup element on that Yagi is only about 1/2 the length of one side of the active element. There are several strange-looking ways to match the transmission line to the Yagi. One is called a T-Match. The T-Match has 1/2 sized stubs below the active elements on both sides. The gamma-match shown in Figure 6 is capacitively coupled to the right side of the active elements, as shown. It is connected directly to coaxial 72Ω cable. To broaden the bandpass, for instance to cover the 5 Lo-VHF channels, (rather than only a sin-



← Figure 15

Figure 16 ↓



gle channel), a folded dipole might be used for the active element. Some all-band antennas that look like log periodics from a distance, are really Yagis. For instance, the area “special” multiple-antenna arrays are usually Yagi antennas. These often are intended to cover more than one channel, thus the pickup element may be a folded dipole and each of the 3 or 4 sections, mounted at 2 or more feet apart vertically on the mast, will be connected together with 300Ω twinlead which must also be an exact length to reject unwanted channels from all but the intended section.

Recap

Now you are becoming familiar with how antennas work and the names of common types. Knowing what each section of an antenna does will help you choose the best antenna for the area and application you are working on.

Conical

Hanging on rooftops all over the country are the conical antennas. Figure 12 is an example of this antenna.

The conical is the ugliest of them all! It was used extensively in the early days of TV because it has the ability to cover the entire VHF band fairly well. Some have reflectors that match the driven element X shaped front end. Others have only a single reflector for each bay.

The conical is so named for two reasons:

1. Looking at the X elements from directly in front, the two sides form a laying-on-its-side V, or two cones. Thus, the designation conical.

2. But most conical antennas (usually installed as 2 bays mounted one above the

other and connected by two aluminum bars with the feed wing-nuts in the center), have the driven X-shaped elements veed at a little angle (10 degrees to 20 degrees) forward. Looking at it from a birdseye view or a side view, then, the front active elements aim forward in a cone shape. The cone shape is not much different than the V angles of the “veed” antenna elements and they also then can work for the high VHF channels by multimoding.

We have discussed the value of using a thick active element, such as the folded dipole. In the conical, we use the dual V, or X arrangement for the pickup element. The entire X is used as the active element with the right sides tied together at the insulated crossing point and the left sides tied together the same way. In fact, to help out the high VHF and perhaps UHF to a degree, an addition horizontal dipole element may be mounted at the conjunction points insulator of the X.

The conical is sometimes the preferred antenna when you are between two cities and able to pick up stations in opposite directions. Despite having a reflector, note that we said previously that some of the reflectors are a single horizontal element about 3 feet behind the X active end. It should be obvious that that single reflector can't do much, either to aid the forward signals, or to prevent rearward signals from being picked up. This is a plus when trying to receive signals from front and rear directions without using an antenna rotator. Because the conical presents an array of metal in only one X section, it is nearly like having 2 ordinary dipoles stacked. This means more signal captured. Add to that the ordinary usage

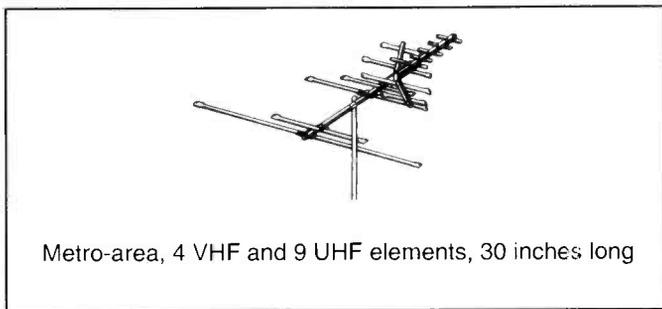
of 2 conicals, one above the other (really stacked) and you have VHF gains above 12dB, or 4 times what a simple basic dipole might see.

Because conicals are among the lowest priced antennas, there is still some reason to use them. You need to understand them, since some dish customers will ask you if they can just hook up to their existing antenna and get satisfactory local reception. By understanding all about antennas, you will be able to advise them and end up with a professional job.

Area-special antenna combos

In most metro areas, the broadcast towers are not located at one single “farm.” It is common to have TV transmitters at two or three locations. Because rabbit-ear antennas have no reflectors, they can often work somewhat by merely reorienting the two rods slightly to better face the station being watched. Because of the use of aluminum siding and aluminum covered wall insulation or the crowding of apartments between buildings, and because of hills or living in a ravine, rabbit ears usually leave viewers watching a ghostly, weak, fading picture, often with electrical interference adding to the woes. The area-special antennas have helped to provide better reception than rabbit ears or monopole portable TV antennas.

Area-specials are a practical answer to some metro-area homes and apartments. Improved reception can be gained by using the recreational vehicle style enclosed antennas, some of which have rotors to reorient them. The antenna expert needs to experiment with each type until he or she finds the most practical



↑ Figure 17

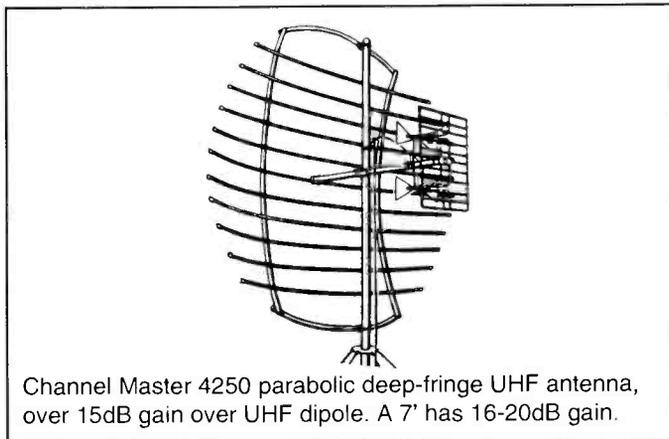


Figure 18 →

Channel Master 4250 parabolic deep-fringe UHF antenna, over 15dB gain over UHF dipole. A 7' has 16-20dB gain.

ones that work. The object is not to put up the cheapest model and convince the viewer that nothing more can be done. The object is to find the best antenna, to advise the customer on the options available, to provide the best value, and to make a profit on the hardware and installation. Closing a sale by "throwing in" the installation and hardware for a local antenna may appeal to a sales person but if the viewer cannot receive some available channels and must watch eye damaging inferior reception on the rest, a disservice has been done to the public and the profession.

These compact weather-proof antennas will work well in some areas. Rarely will they work in the class B contour locations. You can spend a lot of time convincing a viewer that an RV antenna will be sufficient for local channels, or that you can install a "small" antenna in the attic, only to find the customer is comparing the pictures with his dish channels. While you may be thinking the pictures are "watchable," the customer is expecting nothing less than a first-class signal, with no snow and no ghosts on *any* channel, even though he is trying to pick up multi-direction signals and didn't want to invest in a rotor.

Attic installations are rarely satisfactory. The shingles are made of petroleum and sand. In dry weather, they interfere with reception. In the rain, they are an effective shield. When your attic antenna is below the roof line, you have aluminum covered insulation blocking the signals. In most attics, you can't use a rotor and often find you have a difficult time aiming the antenna the direction you would like.

We are not suggesting that you never install an attic antenna. Only that you be

aware, that you plan to cover the extra costs in time, and that you prepare the customer in advance for its limitations.

Rhombic

Another basic antenna type that you will probably never encounter is the rhombic (Figure 13). It is a diamond-shaped antenna lying in the horizontal plane. The polar pattern is a cloverleaf and it is then an omnidirectional antenna. But consider this: Would a wire, strung around the top of a closet, in a high-rise apartment, seeking signals from several directions, with its feed points connected to a balun, then RG 59 coax run to the TV, work?

UHF screens

The UHF 4 bay screen antenna shown in Figure 14 is the preferred UHF antenna for class B areas.

Where trees or terrain add to the difficulty, an 8-bay UHF antenna is a better choice. (Figure 15). There is no secret to the 6dB gain the 4-bay UHF has over the corner reflector used by itself, or as the UHF section of an all-band antenna. It is simple: A corner reflector has one pickup element, aided by some directors and the 45-degree reflectors. The 4-bay screen has 4 bow-tie pickup elements, aided by the screen reflector. Four antennas are better than 1 antenna. Not four times as powerful, but exactly two times. If a common corner reflector U antenna can produce 50uV of signal, subbing a 4-bay will produce 100uV. That can be the critical difference between a satisfactory signal and an unsatisfactory one. An 8-bay UHF screen will produce 3.5dB more than a 4-bay bowtie screen, or 9.5dB more

than a corner reflector. Prove it to yourself by measuring them.

Other styles

Here are several other types of antennas.

The Winegard U-800 (Figure 16) has a narrow polar pattern and near 11dB gain because of the reflectors and the directors. The pickup element is a folded dipole to broaden the bandwidth. (470MHz to 806 MHz is the UHF TV range)

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Antenna Study Quiz

1. Adding a reflector to a basic dipole TV antenna can increase gain by:
 - a. 1dB
 - b. 3dB
 - c. 6dB
 - d. 9dB
2. Adding both a reflector and a director can increase the gain of a basic TV dipole antenna by:
 - a. 2dB
 - b. 4dB
 - c. 6dB
 - d. 10dB
3. If your antenna receives a direct signal and also a reflected signal which arrives 6.2 microseconds later than the direct, about what distance on the TV screen will the reflected signal image appear?
 - a. 1/6th of the width of the screen — offset to the right
 - b. 1/6th of the width of the screen — offset to the left
 - c. 1/10th of the width of the screen — offset to the right
 - d. 1/10th of the width of the screen — offset to the left
4. Which of the following is most likely to have only one driven element?
 - a. log periodic TV antenna
 - b. "V" type UHF-VHF antenna
 - c. 4-bay UHF antenna
 - d. Yagi
5. Area-special combination antenna arrays most likely:
 - a. are fixed in direction.
 - b. utilize a rotor.
 - c. utilize a pre-amplifier.
 - d. are usually "veed."
6. Antenna element "multimoding" allows:
 - a. one V element to resonate at the VHF channel frequencies as well as the UHF's.
 - b. one side of an element to resonate at twice the fundamental frequency as well as the fundamental.
 - c. better 10 VHF channel frequency response.
 - d. one element to resonate at its frequency and 1-1/2 times the fundamental.
7. Compared with a basic half-wave dipole, the conical VHF antenna has . . .
 - a. a wider bandwidth.
 - b. a narrower beamwidth.
 - c. less than 1/2 the gain.
 - d. more than twice the gain.
8. The UHF 4 bay screen antenna has a gain of _____ more than a UHF corner reflector.
 - a. 1dB
 - b. 3dB
 - c. 6dB
 - d. 9.5dB
9. The active elements of a "veed" VHF antenna are . . .
 - a. tilted to the rear at approximately a 30 degree angle.
 - b. insulated from the support boom.
 - c. longer than the corresponding elements on a "non-veed" antenna.
 - d. connected to the transmission line at the rear element.
10. Light or electromagnetic TV signals travel about how far in a microsecond?
 - a. 62.5 feet
 - b. 100 feet
 - c. 1,000 feet
 - d. 1 million feet

1-b; 2-c; 3-c; 4-d; 5-a; 6-d; 7-d; 8-c; 9-b; 10-c

Answers

The U/V antenna shown in Figure 17 is commonly used around the metro areas.

The parabolic (Figure 18) is truly the highest gain UHF antenna. Because of its size, this antenna is rarely used for residential reception. The 8-bay UHF is the most practical given its much smaller wind-load area and weight and 9.5dB gain over the corner UHF reflector.

The 8-bay UHF has up to 18dB gain over a simple dipole. That is 8 times the signal you will get from a simple dipole. It is 3.5dB more than that obtained from a 4-bay UHF screen, which has twice the

gain of a corner reflector! Adding a 30dB pre-amplifier to the 8-bay then can boost a fringe area signal from a -30dBmV level from a simple dipole to an 18dBmV signal. (You could serve multiple outlets in a home with 18dBmV).

The limit

There is a limit to what a long-range antenna can do. If the antenna cannot reproduce a broadcast signal that is stronger than the thermal and man-made noise level in the area, you can easily have a 0dBmV (1,000 uV) signal after ampli-

fication, yet the picture will appear unwatchable and seem to be more like a -30dBmV signal. You may at first think your amplifier is not working! The only answer to this problem is to increase the antenna height or find a more open area.

You can see that the choices are many for TV antennas. Price, type of usage, available signals, ghosting, wind-loading, even appearance can affect the choice for you and the customer. Getting a "feel" for the right antenna comes with experience and problem-solving. The results can be a tribute to your professionalism. ■

1999 Buyers' Guide

Companies, including those that supply products for the consumer electronics service industry, are formed by people who have a vision, who see an opportunity to provide a product or service for a profit given the current cultural and economic conditions. If the conditions are right they mature, thrive. Sometimes for a very long time. Sometimes, because of poor management, changing economic conditions, or other factors, companies fail very early.

But even those companies that remain in business year after year outgrow the buildings that house them and have to move. Sometimes a company is bought by, or merges with another company. Sometimes companies change the products they sell, discontinuing some items and adding others.

All of this change makes it difficult for other companies that buy products from these companies to keep up with them. It's certainly true in the consumer electronics service industry.

The ES&T Buyers' Guide

Because of all this change, every year **ES&T** updates the Annual Buyers' Guide. Every year we send questionnaires to hundreds of manufacturers, distributors, publishers, software publishers; every type of company that might possibly have a piece of test equipment, a replacement part, a schematic diagram, a book, or a piece of software that one of our readers might find useful. The questionnaire asks the recipient to update all of the vital information that makes it easy for a service center to contact them: name, address, telephone, toll-free and fax numbers, and whether the company is a manufacturer or a distributor. Now, we even ask them for e-mail and website information.

The questionnaire also includes a list of over one hundred products, services, documents, information products, software products, and more, that service centers use. The recipients check off those products that apply to them, and when we receive that information, we enter it into our database.

So the listings that you'll find in this Buyers' Guide are current, up-to-date as of the fourth quarter of 1998, or possibly even January of 1999.

Except. Well there are always exceptions. We don't understand it, but many of the companies to whom we send questionnaires don't send them back.

So please keep in mind as you use this Buyers' Guide that it is as current, up-to-date, and useful as we could make it. If you call one of the listees and find that the information that you found in this guide was out-of-date, it may not have been our fault. Of course, the way companies move around these days, it's possible that the information was up-to-date when we published it, but has since gone out-of-date.

These days telephone area codes are changing constantly, so that the area code for any of the companies listed here may have changed since publication. If you have a problem, check with your local telephone company or directory assistance.

We welcome you to this new Buyers' Guide, and we hope you find it useful in finding companies that provide just the product or service you need. If you find it helpful, please let us

know. Or if you think it could be improved to make it even more useful, please contact us with any suggestions you may have.

Using the Buyers' Guide

We've broken down information in the Buyers' Guide into five categories:

- Product Directory..... page 20.
- Replacement Parts/Components Directory..... page 47.
- Association/Educational Sources Directory.....page 53.
- Software/Services Directory.....page 54.
- Company Address Directorypage 55.

We have subdivided the product directory according to certain types of products:

- Test equipment
- Test equipment accessories
- Circuit damage protective equipment and supplies
- Supplies/accessories equipment
- Audio and video accessories
- Tools

For example, if you are looking for a VCR test jig kit, turn to the test equipment accessories section of the Product Directory. The companies listed there all say they offer test jig kits. If the company name is followed by a *D, that tells you this company is a distributor, not a manufacturer, of that product.

You will notice that certain company names are in color. Those companies have advertised in this issue. If you want to learn a little more about that company, turn to the page number listed to the far right. The ad alone might give you enough information to help you decide.

Once you know who you want to contact for more information, turn to the Company Address Directory. The address, telephone number, and fax number for each company are listed there. (Of course, if the company you are interested in has advertised in this issue, you can just pull out your Reader Service card on page 45 and circle the reply number listed under the advertisement.)

The Replacement Parts/Components Directory works the same way. Just look up the type of component you need, then turn to the Company Address Directory to find out how to contact a company that supplies that product. The Company Address Directory lists information on over 600 companies and associations that offer products or services for the electronics servicer.

Checking out services

Use the Services Directory if you need to contact a consultant, get a disk drive or head refurbished, plug into an on-line service, find a company to repair or rework a PC board, rent or lease equipment, calibrate your old test equipment, or repair a tuner.

Your source for continuing education

The Association/Educational Sources Directory helps you find books, schools, and training seminars for continuing your servicing education. It also points you toward sources for service literature and schematics for the products you service. Finally, it lists those companies that produce management software systems that can help you run your business. ■

Product Directory

Note: An entry followed by *D means that this company is a distributor, not a manufacturer. An entry followed by a *MD means that this company is both a manufacturer and a distributor.

A line listing that is in color indicates that the company has an ad in this issue. The number following the listing is the number of the page on which the ad is located. BC means Back Cover; IBC means Inside Back Cover; IFC means Inside Front Cover.

See Adv. Page	See Adv. Page	See Adv. Page	See Adv. Page
Test equipment			
AC LEAKAGE TESTERS	Kelvin Electronics* D	CELLULAR TELEPHONE	Parts Express International*
Accutest Instruments, Inc.* D	LaserImpact	TEST EQUIPMENT	Print Products International
Amprobe	Marshall Industries* D	Bird Electronics Corp.	Progressive Electronics
AVO International	National Instruments Corp.	The Current Source* D	QuadTech, Inc.
Brunelle Instruments, Inc.	Omega-Vanzetti, Inc.	Fotronic Corporation* D	RAG Electronics Inc.* D
Consolidated Electronics, Inc.* D	PC Instruments Incorporated	Harco Electronics* D	RNJ Electronics Inc.* D
Contact East, Inc.* D	H.C. Protek	Keithley Instruments	RS Electronics* D
CSTS Inc.	QuadTech, Inc.	Marconi Instruments Inc.	Simpson Electronic Company
The Current Source* D	Racal Instruments Inc.	MCM Electronics* D	A.W. Sperry Instruments, Inc
East Coast Transistor* D	RNJ Electronics Inc.* D	Omnitron Electronics* MD	Tandy National Parts* D
Exttech Instruments Corp.* D	RS Electronics* D	Print Products International	TechAmerica* D
Fotronic Corporation* D	Schlumberger Technologies	Racal Instruments Inc.	Techni-Tool Inc.* D
L-Com Inc.	Snap-On Incorporated	RNJ Electronics Inc.* D	Tenna Test Equipment
Marshall Industries* D	Specialized Prods Company* D	Schlumberger Technologies	Test Equipment Depot* D
M.A.T. Electronics*D75	A.W. Sperry Instruments, Inc	Techni-Tool Inc.* D	Time Motion Tools* D
MCM Electronics* D	Techni-Tool Inc.* D	Tektronix, Inc.	Union Electronics Distrib* D
Metric Supply* D	Tektronix, Inc.	Telogy* D	Weidmuller Inc.
Omnitron Electronics* MD	Telogy* D	Test Equipment Depot* D	Wholesale Electronics Inc.* D
Print Products International	Test Equipment Depot* D	Union Electronics Distrib* D	Zack Electronics* D
QuadTech, Inc.	Time Motion Tools* D	Wavetek Corporation	Zack/Joseph Electronics* D
RAG Electronics Inc.* D	Tucker Electronics Co.	Zack Electronics* D	
RNJ Electronics Inc.* D	UBM Corp	Zack/Joseph Electronics* D	
RS Electronics* D	Ultra-X, Inc.		
SencoreIFC	Zack Electronics* D		
Simpson Electronic Company	Zack/Joseph Electronics* D		
Snap-On Incorporated		CONTINUITY TESTERS	
A.W. Sperry Instruments, Inc	BREAKOUT BOXES	Accutest Instruments, Inc.* D	CRT TESTERS/RESTORERS
Techni-Tool Inc.* D	Arrow Electronics	Ames Supply Co.* D	Vance Baldwin Inc.* D
Tenna Test Equipment	B&B Electronics Manufacturing	AVO International	B&K Precision
Test Equipment Depot* D	Vance Baldwin Inc.* D	Vance Baldwin Inc.* D	Bursma Electronic Distrib.* D
TIF Instruments, Inc.	Benedict Computer	B-B&W Electronics* D	C&S Sales* D
Time Motion Tools* D	Computer Svcs of America* D	Bel Merit Corporation	Computer Svcs of America* D
Tucker Electronics Co.	Contact East, Inc.* D	B&K Precision	Connector Corporation
Vector-VID Inc.	The Current Source* D	Brunelle Instruments, Inc.	Consolidated Elctrnics, Inc.*
Wavetek Corporation	Dalco Electronics* D	Bursma Electronic Distrib.* D	Conway Engineering, Inc.
Wholesale Electronics Inc.* D	E.I.L. Instruments, Inc.* D	Cablescon	The Current Source* D
Zack Electronics* D	Electronic Express* D	Consolidated Elctrnics, Inc.*	Dandy Mfg. Co.
Zack/Joseph Electronics* D	Fotronic Corporation* D	Contact East, Inc.* D	East Coast Transistor* D
	Harco Electronics* D	CSTS Inc.	Eiger Electronics* D
	Heath Company	The Current Source* D	Electronic Parts Supply* D
	HMC - Hub Material Co.* D	Dalbani Corporation* D	Fotronic Corporation* D
	Hosfelt Electronics, Inc.* D	Digi-Key D *	Herman Electronics*D80
	International Disk Svcs, Inc	East Coast Transistor* D	IET Labs, Inc.
	Jameco Electronic Components* D	Eiger Electronics* D	W.S. Jenks & Son* D
	JDR Microdevices* D	E.I.L. Instruments, Inc.* D	M.A.T. Electronics*D75
	W.S. Jenks & Son* D	Electro Tool, Inc.	MCM Electronics* D
	Kasco Distributing* D	Electronic Design Specialists	Metric Supply* D
	Kelvin Electronics* D	Exttech Instruments Corp.* D	Omnitron Electronics* MD
	L-Com Inc.	Foley-Belsaw* D	Print Products International
	Marshall Industries* D	Fotronic Corporation* D	RNJ Electronics Inc.* D
	Nationwide Electronics	GC Electronics* D	RS Electronics* D
	Omnitron Electronics* MD	Harco Electronics* D	SencoreIFC
	Print Products International	HMC - Hub Material Co.* D	Specialized Prods Company* D
	RNJ Electronics Inc.* D	Hy Tec Dealer Service	Techni-Tool Inc.* D
	RS Electronics* D	IET Labs, Inc.	Telematic
	Specialized Prods Company* D	JDR Microdevices* D	Test Equipment Depot* D
	Techni-Tool Inc.* D	W.S. Jenks & Son* D	Time Motion Tools* D
	Test Equipment Depot* D	JIT Resources, Inc.	Tritronics, Inc.*D80
	Time Motion Tools* D	Kelvin Electronics* D	Tucker Electronics Co.
	Union Electronics Distrib* D	Klein Tools, Inc.	Union Electronics Distrib* D
	Wavetek Corporation	L-Com Inc.	Wholesale Electronics Inc.* D
	Wholesale Electronics Inc.* D	Marshall Industries* D	Zack Electronics* D
	Zack Electronics* D	Mouser Electronics* D	Zack/Joseph Electronics* D
	Zack/Joseph Electronics* D	Omega Engineering, Inc.	
		Omnitron Electronics* MD	CURVE TRACERS
			Accutest Instruments, Inc.* D
			Antique Electronic Supply* D
			Computer Svcs of America* D

See Adv. Page	See Adv. Page	See Adv. Page	See Adv. Page
The Current Source* ^D	DISC DRIVE ANALYZERS/ TESTERS	Hameg Instruments, Inc.	Fotronic Corporation* ^D
East Coast Transistor* ^D	Accurite Technologies Inc.	Harco Electronics* ^D	Global Specialties
Fotronic Corporation* ^D	Computer Svcs of America* ^D	Heath Company	Hameg Instruments, Inc.
Hameg Instruments, Inc.	CSTS Inc.	Herman Electronics*^D.....80	Harco Electronics* ^D
Huntron Instruments, Inc.	The Current Source* ^D	HMC - Hub Material Co.* ^D	Heath Company
IET Labs, Inc.	Data Depot, Inc.	Instek Corp.* ^D	HMC - Hub Material Co.* ^D
Laser/Impact	Fotronic Corporation* ^D	Jameco Electric Components* ^D	Instek Corp.* ^D
Marshall Industries* ^D	HMC - Hub Material Co.* ^D	JDR Microdevices* ^D	Jameco Electric Components* ^D
MCM Electronics* ^D	W.S. Jenks & Son* ^D	W.S. Jenks & Son* ^D	JDR Microdevices* ^D
Omnitron Electronics* ^{MD}	Kenwood U.S.A. Corp.	Keithley Instruments	W.S. Jenks & Son* ^D
Print Products International	Marshall Industries* ^D	Kelvin Electronics* ^D	Jensen Tools, Inc.* ^D
RAG Electronics Inc.* ^D	Omnitron Electronics* ^{MD}	Kenwood U.S.A. Corp.	Keithley Instruments
RNJ Electronics Inc.* ^D	Pioneer Research	Leader Instruments Corp.	Kelvin Electronics* ^D
RS Electronics* ^D	RAG Electronics Inc.* ^D	LG Precision	Kenwood U.S.A. Corp.
Herman H. Sticht Co., Inc.* ^D	Test Equipment Depot* ^D	Marconi Instruments Inc.	Leader Instruments Corp.
Tektronix	Time Motion Tools* ^D	Marshall Industries* ^D	LG Precision
Tenma Test Equipment	Ultra-X, Inc.	M.A.T. Electronics*^D.....75	Marshall Industries* ^D
Test Equipment Connection Co	Zack/Joseph Electronics* ^D	MCM Electronics* ^D	M.A.T. Electronics*^D.....75
Test Equipment Depot* ^D		Metric Supply* ^D	MCM Electronics* ^D
Time Motion Tools* ^D		Mouser Electronics* ^D	Metric Supply* ^D
Tucker Electronics Co.	DISTORTION ANALYZERS	Omnitron Electronics* ^{MD}	National Instruments Corp.
Union Electronics Distrib* ^D	Accutest Instruments, Inc.* ^D	Parts Express International*	Omnitron Electronics* ^{MD}
Wholesale Electronics Inc.* ^D	Alfa Electronics* ^D	Print Products International	Parts Express International*
Zack Electronics* ^D	The Current Source* ^D	H.C. Protek	PC Instruments Incorporated
Zack/Joseph Electronics* ^D	East Coast Transistor* ^D	RAG Electronics Inc.* ^D	Print Products International
	Fotronic Corporation* ^D	RNJ Electronics Inc.* ^D	RAG Electronics Inc.* ^D
	Galco Industrial Electronics	RS Electronics* ^D	RNJ Electronics Inc.* ^D
	Instek Corp.* ^D	Salen Enterprises* ^D	RS Electronics* ^D
	MCM Electronics* ^D	Sencore.....IFC	Salen Enterprises* ^D
	Metric Supply* ^D	Sibex, Inc.	Sibex, Inc.
	Omnitron Electronics* ^{MD}	Simpson Electronic Company	Specialized Prods Company* ^D
	Print Products International	Herman H. Sticht Co., Inc.* ^D	Herman H. Sticht Co., Inc.* ^D
	RAG Electronics Inc.* ^D	Sun Equipment Corporation	Sun Equipment Corporation
	R.C. Distributing Co	Tandy National Parts* ^D	Tandy National Parts* ^D
	Schlumberger Technologies	TechAmerica* ^D	TechAmerica* ^D
	Herman H. Sticht Co., Inc.* ^D	Techni-Tool Inc.* ^D	Techni-Tool Inc.* ^D
	Sun Equipment Corporation	Tektronix	Tektronix
	Telogy* ^D	Telogy* ^D	Teledata Systems
	Tenma Test Equipment	Tenma Test Equipment	Telogy* ^D
	Test Equipment Depot* ^D	Test Equipment Connection Co	Telulex, Inc.
	Time Motion Tools* ^D	Test Equipment Depot* ^D	Tenma Test Equipment
	Tucker Electronics Co.	TIF Instruments, Inc.	Test Equipment Connection Co
	Union Electronics Distrib* ^D	Time Motion Tools* ^D	Test Equipment Depot* ^D
	Zack Electronics* ^D	Tucker Electronics Co.	Tucker Electronics Co.
	Zack/Joseph Electronics* ^D	Union Electronics Distrib* ^D	Union Electronics Distrib* ^D
		Wavetek Corporation	Wavetek Corporation
		Wholesale Electronics Inc.* ^D	Wholesale Electronics Inc.* ^D
		Zack Electronics* ^D	Zack Electronics* ^D
		Zack/Joseph Electronics* ^D	Zack/Joseph Electronics* ^D
			Global Specialties
			Metric Supply* ^D
DATA COMMUNICATION ANALYZERS/MONITORS/ TESTERS	FREQUENCY COUNTERS	FUNCTION GENERATORS	GAUGES: HEAD PROTRUSION/ SPRING TENSION/STYLUS FORCE/OTHER
Allison Technology Corporation	Accutest Instruments, Inc.* ^D	Accutest Instruments, Inc.* ^D	The Current Source* ^D
Ames Supply Co.* ^D	Alfa Electronics* ^D	Alfa Electronics* ^D	Dalbani Corporation* ^D
Analogic Corp.	Arrow Electronics	American Reliance	Electronic Parts Supply* ^D
B&B Electronics Manufacturing	Vance Baldwin Inc.* ^D	Arrow Electronics	Fieldpiece Instruments
Vance Baldwin Inc.* ^D	Bel Merit Corporation	Vance Baldwin Inc.* ^D	Fotronic Corporation* ^D
Benedict Computer	B&K Precision	B-B&W Electronics* ^D	HMC - Hub Material Co.* ^D
Conway Engineering, Inc.	Brunelle Instruments, Inc.	Bel Merit Corporation	Hunter Products, Inc.
The Current Source* ^D	Bursma Electronic Distrib.* ^D	B&K Precision	Jonard Industries Corp.
Dalco Electronics* ^D	C&S Sales* ^D	Brunelle Instruments, Inc.	M.A.T. Electronics*^D.....75
East Coast Transistor* ^D	Computer Svcs of America* ^D	Bursma Electronic Distrib.* ^D	Omega-Vanzetti, Inc.
E.I.L. Instruments, Inc.* ^D	Consolidated Electronics, Inc.*	C&S Sales* ^D	RNJ Electronics Inc.* ^D
Electro Standards Lab, Inc.	Contact East, Inc.* ^D	Consolidated Electronics, Inc.*	Sprague Magnetics, Inc.* ^D
Electroservice Laboratories	The Current Source* ^D	Contact East, Inc.* ^D	Techni-Tool Inc.* ^D
Fluke Corporation	Dalbani Corporation* ^D	The Current Source* ^D	Tentel
Fotec Inc	East Coast Transistor* ^D	Dalbani Corporation* ^D	Test Equipment Depot* ^D
Fotronic Corporation* ^D	E.I.L. Instruments, Inc.* ^D	East Coast Transistor* ^D	TIF Instruments, Inc.
Frederick Engineering, Inc.	Electro Tool, Inc.	E.I.L. Instruments, Inc.* ^D	UBM Corp
Global Specialties	Electronic Parts Supply* ^D	Electro Tool, Inc.	Wavetek Corporation
Gould Instrument Systems Inc	Electronix Express* ^D	Electro Tool, Inc.	Zack/Joseph Electronics* ^D
Harco Electronics* ^D	Electroservice Laboratories	Electronic Parts Supply* ^D	
International Disk Svcs, Inc	Elenco Electronics, Inc.	Electronix Express* ^D	
W.S. Jenks & Son* ^D	Extch Instruments Corp.* ^D	Electroservice Laboratories	
Kasco Distributing* ^D	Fieldpiece Instruments	Elenco Electronics, Inc.	
Marconi Instruments Inc.	Fluke Corporation	Fluke Corporation	
Marshall Industries* ^D	Fotronic Corporation* ^D	Fluke Corporation	
Omega-Vanzetti, Inc.	Galco Industrial Electronics	Fluke Corporation	
Omnitron Electronics* ^{MD}	Global Specialties		
Print Products International			
Racal Instruments Inc.			
RF Industries			
RNJ Electronics Inc.* ^D			
RS Electronics* ^D			
Schlumberger Technologies			
Simpson Electronic Company			
Techni-Tool Inc.* ^D			
Tektronix, Inc.			
Telematic			
Telogy* ^D			
Telulex, Inc.			
Test Equipment Depot* ^D			
Time Motion Tools* ^D			
Tucker Electronics Co.			
Ultra-X, Inc.			
Wavetek Corporation			
Zack Electronics* ^D			
Zack/Joseph Electronics* ^D			

See Adv. Page	See Adv. Page	See Adv. Page	See Adv. Page
GENERATORS, AUDIO	Eiger Electronics* ^D	Heath Company	RNJ Electronics Inc.* ^D
Accutest Instruments, Inc.* ^D	Electro Tool, Inc.	Herman Electronics*^D 80	RS Electronics* ^D
Alfa Electronics* ^D	Electronic Parts Supply* ^D	W.S. Jenks & Son* ^D	Score IFC
Antique Electronic Supply* ^D	Electronix Express* ^D	Kelvin Electronics* ^D	Simpson Electronic Company
AudioVisual Inc.* ^D	Elenco Electronics, Inc.	Leader Instruments Corp.	Specialized Prods Company* ^D
Vance Baldwin Inc.* ^D	Fluke Corporation	Marshall Industries* ^D	Sun Equipment Corporation
Bel Merit Corporation	Fotronic Corporation* ^D	M.A.T. Electronics*^D 75	Techni-Tool Inc.* ^D
B&K Precision	Global Specialties	Metric Supply* ^D	Tektronix
Brunelle Instruments, Inc.	Harco Electronics* ^D	Multidyne Inc	Telematic
C&S Sales* ^D	Heath Company	NCM Electronics	Tenna Test Equipment
Compuvideo	Herman Electronics*^D 80	Network Technologies Inc.	Test Equipment Depot* ^D
Consolidated Electronics, Inc.*	ICM Components* ^D	Omnitron Electronics* ^{MD}	Tucker Electronics Co.
The Current Source* ^D	Instek Corp.* ^D	PC Instruments Incorporated	Union Electronics Distrib* ^D
Daleco Electronics* ^D	W.S. Jenks & Son* ^D	Print Products International	Wholesale Electronics Inc.* ^D
East Coast Transistor* ^D	Kelvin Electronics* ^D	H.C. Protek	Zack Electronics* ^D
Electro Tool, Inc.	Leader Instruments Corp.	Quantum Data	Zack/Joseph Electronics* ^D
Electronic Parts Supply* ^D	Marconi Instruments Inc.	RAG Electronics Inc.* ^D	
Electronix Express* ^D	Marshall Industries* ^D	R.C. Distributing Co	LOGIC ANALYZERS:
Elenco Electronics, Inc.	M.A.T. Electronics*^D 75	Richardson Electronics, Ltd.	SIGNATURE/STATE
Fotronic Corporation* ^D	Metric Supply* ^D	RNJ Electronics Inc.* ^D	Accutest Instruments, Inc.* ^D
Heath Company	Multidyne Inc	RS Electronics* ^D	Contact East, Inc.* ^D
Herman Electronics*^D 80	NCM Electronics	Salen Enterprises* ^D	CSI/SPCCO
Instek Corp.* ^D	Omnitron Electronics* ^{MD}	Score IFC	The Current Source* ^D
W.S. Jenks & Son* ^D	PC Instruments Incorporated	Sirius Technologies	Dalbani Corporation* ^D
Kelvin Electronics* ^D	Print Products International	Sonera Technologies	East Coast Transistor* ^D
Kenwood U.S.A. Corp.	Progressive Electronics	Sun Equipment Corporation	E.I.L. Instruments, Inc.* ^D
Leader Instruments Corp.	H.C. Protek	A.G. Tannenbaum* ^D	Electronix Express* ^D
LG Precision	RAG Electronics Inc.* ^D	TEAM Systems, Inc.	Electroservice Laboratories
Marshall Industries* ^D	R.C. Distributing Co	Techni-Tool Inc.* ^D	Fotronic Corporation* ^D
M.A.T. Electronics*^D 75	Richardson Electronics, Ltd.	Tektronix, Inc.	Global Specialties
Multidyne Inc	RNJ Electronics Inc.* ^D	Ten-Lab	Harco Electronics* ^D
Parts Express International* ^D	RS Electronics* ^D	Tenna Test Equipment	Heath Company
PC Instruments Incorporated	Salen Enterprises* ^D	Test Equipment Depot* ^D	Hy-Tronix Instruments, Inc.
Print Products International	Score IFC	Tucker Electronics Co.	W.S. Jenks & Son* ^D
H.C. Protek	Sibex, Inc.	Ultech Corp	Jensen Tools, Inc.* ^D
RAG Electronics Inc.* ^D	Specialized Prods Company* ^D	Union Electronics Distrib* ^D	LaserImpact
RNJ Electronics Inc.* ^D	Herman H. Sticht Co., Inc.* ^D	Wholesale Electronics Inc.* ^D	Marshall Industries* ^D
Salen Enterprises* ^D	Sun Equipment Corporation	Zack Electronics* ^D	MCM Electronics* ^D
Score IFC	A.G. Tannenbaum* ^D	Zack/Joseph Electronics* ^D	Metric Supply* ^D
Herman H. Sticht Co., Inc.* ^D	TEAM Systems, Inc.		Omnitron Electronics* ^{MD}
Sun Equipment Corporation	TechAmerica* ^D	HV PROBES	Orion Instruments, Inc.
A.G. Tannenbaum* ^D	Techni-Tool Inc.* ^D	Accutest Instruments, Inc.* ^D	Print Products International
TechAmerica* ^D	Tektronix, Inc.	Alfa Electronics* ^D	RAG Electronics Inc.* ^D
Techni-Tool Inc.* ^D	Telogy* ^D	Allison Technology Corporati	RNJ Electronics Inc.* ^D
Tektronix, Inc.	Telulex, Inc.	AVO International	RS Electronics* ^D
Telulex, Inc.	Tenna Test Equipment	Vance Baldwin Inc.* ^D	Schlumberger Technologies
Tenna Test Equipment	Test Equipment Connection Co	B-B&W Electronics* ^D	Specialized Prods Company* ^D
Test Equipment Depot* ^D	Test Equipment Depot* ^D	B&K Precision	Tandy National Parts* ^D
Tucker Electronics Co.	Tucker Electronics Co.	Brunelle Instruments, Inc.	Techni-Tool Inc.* ^D
Union Electronics Distrib* ^D	Union Electronics Distrib* ^D	Bursma Electronic Distrib.* ^D	Tektronix, Inc.
Wholesale Electronics Inc.* ^D	Vector-VID Inc.	C&S Sales* ^D	Telogy* ^D
Zack Electronics* ^D	Wavetek Corporation	Consolidated Elctrnics, Inc.*	Test Equipment Connection Co
Zack/Joseph Electronics* ^D	Wholesale Electronics Inc.* ^D	The Current Source* ^D	Test Equipment Depot* ^D
	Zack Electronics* ^D	East Coast Transistor* ^D	Tucker Electronics Co.
	Zack/Joseph Electronics* ^D	Eiger Electronics* ^D	Zack Electronics* ^D
		Electronic Parts Supply* ^D	Zack/Joseph Electronics* ^D
		Electronix Express* ^D	
GENERATORS, SIGNAL	GENERATORS, VIDEO	Fieldpiece Instruments	LOGIC PROBES
Accutest Instruments, Inc.* ^D	Accutest Instruments, Inc.* ^D	Fotronic Corporation* ^D	Accutest Instruments, Inc.* ^D
Alfa Electronics* ^D	ACM Company	Fox International* ^D	Alfa Electronics* ^D
Analogic Corp.	Alfa Electronics* ^D	Harco Electronics* ^D	American Reliance
Antique Electronic Supply* ^D	AudioVisual Inc.* ^D	Herman Electronics*^D 80	Vance Baldwin Inc.* ^D
AudioVisual Inc.* ^D	Vance Baldwin Inc.* ^D	HMC - Hub Material Co.* ^D	B-B&W Electronics* ^D
Vance Baldwin Inc.* ^D	B&K Precision	W.S. Jenks & Son* ^D	Bel Merit Corporation
Bel Merit Corporation	Brunelle Instruments, Inc.	Kelvin Electronics* ^D	B&K Precision
B&K Precision	Computer & Monitor Maintenance	Leader Instruments Corp.	Brunelle Instruments, Inc.
Brunelle Instruments, Inc.	Computer Svcs of America* ^D	Marshall Industries* ^D	Bursma Electronic Distrib.* ^D
C&S Sales* ^D	Compuvideo	M.A.T. Electronics*^D 75	C&S Sales* ^D
Compuvideo	Consolidated Elctrnics, Inc.*	Metric Supply* ^D	Consolidated Electronics, Inc.*
Consolidated Electronics, Inc.*	The Current Source* ^D	Nationwide Electronics	Contact East, Inc.* ^D
Contact East, Inc.* ^D	East Coast Transistor* ^D	Omnitron Electronics* ^{MD}	The Current Source* ^D
Conway Engineering, Inc.	Eiger Electronics* ^D	PC Instruments Incorporated	Dalbani Corporation* ^D
CSI/SPCCO	Elenco Electronics, Inc.	Print Products International	Data Depot, Inc.
The Current Source* ^D	Fluke Corporation	RAG Electronics Inc.* ^D	Digi-Key D*
Dalbani Corporation* ^D	Fotronic Corporation* ^D		
Daleco Electronics* ^D			
East Coast Transistor* ^D			

See Adv. Page	See Adv. Page	See Adv. Page	See Adv. Page
East Coast Transistor*D	Techni-Tool Inc.*D	Omnitron Electronics*MD	W.S. Jenks & Son*D
E.I.L. Instruments, Inc.*D	Tenna Test Equipment	Pacer Industries, Inc.	Jensen Tools, Inc.*D
Electronic Parts Supply*D	Test Equipment Depot*D	Parts Express International*	Kelvin Electronics*D
Electronix Express*D	Tucker Electronics Co.	Philips ECG Company*D	LEM Instruments Inc
Elenco Electronics, Inc.	Union Electronics Distrib*D	Philips ECG	Marshall Industries*D
Foley-Belsaw*D	Wholesale Electronics Inc.*D	Print Products International	Metric Supply*D
Fotronic Corporation*D	Zack Electronics*D	QuadTech, Inc.	Mouser Electronics*D
Global Specialties	Zack/Joseph Electronics*D	RAG Electronics Inc.*D	Omega Engineering, Inc.
Harco Electronics*D		RNJ Electronics Inc.*D	Omega-Vanzetti, Inc.
Heath Company	MAGNETRON TESTERS	RS Electronics*D	Omnitron Electronics*MD
HMC - Hub Material Co.*D	B-B&W Electronics*D	Salen Enterprises*D	Philips ECG Company*D
Hy Tec Dealer Service	The Current Source*D	SencoreIFC	Philips ECG
Jameco Electronic Components*D	Electronic Parts Supply*D	Simpson Electronic Company	Print Products International
JDR Microdevices*D	Electronix Corp.*D80	A.W. Sperry Instruments, Inc	RAG Electronics Inc.*D
W.S. Jenks & Son*D	Fotronic Corporation*D	Herman H. Sticht Co., Inc.*D	RNJ Electronics Inc.*D
Kelvin Electronics*D	W.S. Jenks & Son*D	Sun Equipment Corporation	RS Electronics*D
Kenwood U.S.A. Corp.	M.A.T. Electronics*D75	Tandy National Parts*D	Salen Enterprises*D
L'il Bitty Tester	Omnitron Electronics*MD	A.G. Tannenbaum*D	Simpson Electronic Company
Marshall Industries*D	RNJ Electronics Inc.*D	TechAmerica*D	A.W. Sperry Instruments, Inc
M.A.T. Electronics*D75	Test Equipment Depot*D	Techni-Tool Inc.*D	Sun Equipment Corporation
MCM Electronics*D	Zack Electronics*D	Telogy*D	TechAmerica*D
Metric Supply*D	Zack/Joseph Electronics*D	Tenna Test Equipment	Techni-Tool Inc.*D
Micro 2000, Inc.	METERS, CAPACITANCE/	Test Equipment Depot*D	Tenna Test Equipment
Omnitron Electronics*MD	INDUCTANCE	TIF Instruments, Inc.	Test Equipment Depot*D
Philips ECG Company*D	Accutest Instruments, Inc.*D	Time Motion Tools*D	TIF Instruments, Inc.
Print Products International	Alfa Electronics*D	Triplett Corp.	Time Motion Tools*D
RAG Electronics Inc.*D	American Reliance	Tucker Electronics Co.	Triplett Corp.
RNJ Electronics Inc.*D	Ames Supply Co.*D	Union Electronics Distrib*D	Tucker Electronics Co.
RS Electronics*D	Antique Electronic Supply*D	Universal Enterprises (UEI)	Union Electronics Distrib*D
Salen Enterprises*D	AVO International	Wavetek Corporation	Universal Enterprises (UEI)
Sun Equipment Corporation	Vance Baldwin Inc.*D	Wholesale Electronics Inc.*D	Wavetek Corporation
Tandy National Parts*D	B-B&W Electronics*D	Zack Electronics*D	Wholesale Electronics Inc.*D
TechAmerica*D	Bel Merit Corporation	Zack/Joseph Electronics*D	Zack Electronics*D
Techni-Tool Inc.*D	B&K Precision		Zack/Joseph Electronics*D
Tektronix, Inc.	Brunelle Instruments, Inc.	METERS, CLAMP ON	
Tenna Test Equipment	C&S Sales*D	Accutest Instruments, Inc.*D	
Test Equipment Depot*D	Computer Component Source*D	Alfa Electronics*D	METERS, FIELD STRENGTH
Tucker Electronics Co.	Consolidated Electronics, Inc.*	American Reliance	Accutest Instruments, Inc.*D
Union Electronics Distrib*D	Contact East, Inc.*D	Amprobe	Alfa Electronics*D
Wavetek Corporation	Creative Electronics	AVO International	Vance Baldwin Inc.*D
Wholesale Electronics Inc.*D	CSTS Inc.	Vance Baldwin Inc.*D	Bel Merit Corporation
Zack Electronics*D	The Current Source*D	B-B&W Electronics*D	Bird Electronics Corp.
Zack/Joseph Electronics*D	Dalbani Corporation*D	Bel Merit Corporation	Bursma Electronic Distrib.*D
	Digi-Key D*	B&K Precision	C&S Sales*D
	East Coast Transistor*D	Brunelle Instruments, Inc.	Contact East, Inc.*D
	Eiger Electronics*D	C&S Sales*D	The Current Source*D
	E.I.L. Instruments, Inc.*D	Cleveland Inst. of Electroni	East Coast Transistor*D
	Electronic Design Specialist	Computer Component Source*D	Eiger Electronics*D
	Electronic Parts Supply*D	Consolidated Electrnics, Inc.*	Electroservice Laboratories
	Electronix Corp.*D80	Contact East, Inc.*D	Fotronic Corporation*D
	Electronix Express*D	CSI/SPCCO	Harco Electronics*D
	Elenco Electronics, Inc.	The Current Source*D	Hy Tec Dealer Service
	Exttech Instruments Corp.*D	Dalbani Corporation*D	Integrity Design & Research
	Fieldpiece Instruments	East Coast Transistor*D	JDR Microdevices*D
	Foley-Belsaw*D	E.I.L. Instruments, Inc.*D	W.S. Jenks & Son*D
	Fotronic Corporation*D	Electro Tool, Inc.	JIT Resources, Inc.
	Global Micro-Parts Depot*MD	Electronic Parts Supply*D	Kelvin Electronics*D
	Global Specialties	Electronix Express*D	Metric Supply*D
	Harco Electronics*D	Elenco Electronics, Inc.	Omega Engineering, Inc.
	HMC - Hub Material Co.*D	Exttech Instruments Corp.*D	Omnitron Electronics*MD
	Hosfelt Electronics, Inc.*D	Fieldpiece Instruments	Print Products International
	Howard Electronic Insts Inc.*D4	Fluke Corporation	RNJ Electronics Inc.*D
	Hy Tec Dealer Service	Foley-Belsaw*D	RS Electronics*D
	IET Labs, Inc.	Fotronic Corporation*D	SencoreIFC
	Instek Corp.*D	Galco Industrial Electronics	Snap-On Incorporated
	Jameco Electrn Components*D	Global Micro-Parts Depot*MD	Specialized Prods Company*D
	JDR Microdevices*D	Harco Electronics*D	A.W. Sperry Instruments, Inc
	W.S. Jenks & Son*D	Heath Company	Herman H. Sticht Co., Inc.*D
	Kelvin Electronics*D	Herman Electronics*D80	Sun Equipment Corporation
	Leader Instruments Corp.	HMC - Hub Material Co.*D	Techni-Tool Inc.*D
	Marshall Industries*D	Hosfelt Electronics, Inc.*D	Test Equipment Depot*D
	M.A.T. Electronics*D75	Hy Tec Dealer Service	Time Motion Tools*D
	Metric Supply*D	Instek Corp.*D	Tucker Electronics Co.
	Omega Engineering, Inc.	Jameco Electrn Components*D	Union Electronics Distrib*D
			Wavetek Corporation

See Adv. Page	See Adv. Page	See Adv. Page	See Adv. Page
Zack Electronics* ^D	Print Products International	MCM Electronics* ^D	Union Electronics Distrib* ^D
Zack/Joseph Electronics* ^D	RAG Electronics Inc.* ^D	Metric Supply* ^D	Wholesale Electronics Inc.* ^D
METERS, SIGNAL LEVEL	RNJ Electronics Inc.* ^D	Newport Electronics, Inc.	Zack Electronics* ^D
Accutest Instruments, Inc.* ^D	Simpson Electronic Company	Omega Engineering, Inc.	Zack/Joseph Electronics* ^D
Alfa Electronics* ^D	Snap-On Incorporated	Omega-Vanzetti, Inc.	
American Reliance	Sun Equipment Corporation	Omnitron Electronics* ^{MD}	MICROWAVE LEAKAGE
Vance Baldwin Inc.* ^D	Techni-Tool Inc.* ^D	Parts Express International* ^D	TESTERS
B-B&W Electronics* ^D	Telulex, Inc.	Philips ECG Company* ^D	Accutest Instruments, Inc.* ^D
Brunelle Instruments, Inc.	Tenna Test Equipment	Prime Technology, Inc.	Arrow Electronics
Bursma Electronic Distrib.* ^D	Test Equipment Depot* ^D	Print Products International	B-B&W Electronics* ^D
Conway Engineering, Inc.	Time Motion Tools* ^D	H.C. Protek	Brunelle Instruments, Inc.
CSI/SPCCO	Tucker Electronics Co.	RAG Electronics Inc.* ^D	C&S Sales* ^D
The Current Source* ^D	Union Electronics Distrib* ^D	RNJ Electronics Inc.* ^D	Consolidated Electronics, Inc.* ^D
Dalbani Corporation* ^D	Universal Enterprises (UEI)	RS Electronics* ^D	The Current Source* ^D
East Coast Transistor* ^D	Wholesale Electronics Inc.* ^D	Salen Enterprises* ^D	Dalbani Corporation* ^D
Electronix Express* ^D	Zack Electronics* ^D	Schlumberger Technologies	Eiger Electronics* ^D
Fotronic Corporation* ^D	Zack/Joseph Electronics* ^D	SencoreIFC	E.I.L. Instruments, Inc.* ^D
Harco Electronics* ^D	METERS, VOLTMETERS, AC	Simpson Electronic Company	Electronix Corp.*^D80
W.S. Jenks & Son* ^D	Accutest Instruments, Inc.* ^D	Snap-On Incorporated	Fotronic Corporation* ^D
Marshall Industries* ^D	Alfa Electronics* ^D	Specialized Prods Company* ^D	Global Micro-Parts Depot* ^{MD}
M.A.T. Electronics*^D75	American Reliance	A.W. Sperry Instruments, Inc	W.S. Jenks & Son* ^D
Newport Electronics, Inc.	Ames Supply Co.* ^D	Herman H. Sticht Co., Inc.* ^D	Marshall Industries* ^D
Omega Engineering, Inc.	Amprobe	Sun Equipment Corporation	M.A.T. Electronics*^D75
Omega-Vanzetti, Inc.	Antique Electronic Supply* ^D	A.G. Tannenbaum* ^D	MCM Electronics* ^D
Omnitron Electronics* ^{MD}	Arrow Electronics	TechAmerica* ^D	Metric Supply* ^D
Parts Express International* ^D	AVO International	Techni-Tool Inc.* ^D	Nationwide Electronics
Prime Technology, Inc.	Vance Baldwin Inc.* ^D	Tegam Inc.	Omnitron Electronics* ^{MD}
Print Products International	B-B&W Electronics* ^D	Tektronix, Inc.	Print Products International
RAG Electronics Inc.* ^D	Bel Merit Corporation	Telogy* ^D	Q B Products* ^D
RNJ Electronics Inc.* ^D	B&K Precision	Telulex, Inc.	RAG Electronics Inc.* ^D
RS Electronics* ^D	Brunelle Instruments, Inc.	Tenna Test Equipment	RNJ Electronics Inc.* ^D
SencoreIFC	Bursma Electronic Distrib.* ^D	Test Equipment Connection Co	Simpson Electronic Company
Snap-On Incorporated	C&S Sales* ^D	Test Equipment Depot* ^D	A.W. Sperry Instruments, Inc
Herman H. Sticht Co., Inc.* ^D	Consolidated Electronics, Inc.* ^D	TIF Instruments, Inc.	Techni-Tool Inc.* ^D
Sun Equipment Corporation	Contact East, Inc.* ^D	Time Motion Tools* ^D	Telogy* ^D
Techni-Tool Inc.* ^D	CSI/SPCCO	Triplet Corp.	Test Equipment Depot* ^D
Tektronix, Inc.	The Current Source* ^D	Tritronics, Inc.*^D80	Tritronics, Inc.*^D80
Telogy* ^D	Dalbani Corporation* ^D	Tucker Electronics Co.	Tucker Electronics Co.
Telulex, Inc.	Digi-Key D* ^D	Union Electronics Distrib* ^D	Union Electronics Distrib* ^D
Tenna Test Equipment	Dragnetz-BMI	Universal Enterprises (UEI)	Universal Enterprises (UEI)
Test Equipment Depot* ^D	East Coast Transistor* ^D	Wavetek Corporation	Zack Electronics* ^D
Time Motion Tools* ^D	Eiger Electronics* ^D	Wholesale Electronics Inc.* ^D	Zack/Joseph Electronics* ^D
Tritronics, Inc.*^D80	E.I.L. Instruments, Inc.* ^D	Zack Electronics* ^D	
Tucker Electronics Co.	Electro Tool, Inc.	Zack/Joseph Electronics* ^D	
Union Electronics Distrib* ^D	Electronic Parts Supply* ^D	METERS, WOW AND FLUTTER	
Wavetek Corporation	Electronix Express* ^D	Accutest Instruments, Inc.* ^D	Accutest Instruments, Inc.* ^D
Zack Electronics* ^D	Extch Instruments Corp.* ^D	Alfa Electronics* ^D	Alfa Electronics* ^D
Zack/Joseph Electronics* ^D	Fieldpiece Instruments	Arrow Electronics	Allison Technology Corporati
	Fluke Corporation	Brunelle Instruments, Inc.	American Reliance
METERS, SOUND LEVEL	Foley-Belsaw* ^D	The Current Source* ^D	Amprobe
Accutest Instruments, Inc.* ^D	Fotronic Corporation* ^D	East Coast Transistor* ^D	Antique Electronic Supply* ^D
Alfa Electronics* ^D	Fox International* ^D	E.I.L. Instruments, Inc.* ^D	Arrow Electronics
American Reliance	Galco Industrial Electronics	Electronic Parts Supply* ^D	AVO International
B-B&W Electronics* ^D	GC Electronics* ^D	Fotronic Corporation* ^D	Vance Baldwin Inc.* ^D
Brunelle Instruments, Inc.	Global Micro-Parts Depot* ^{MD}	Instek Corp.* ^D	B-B&W Electronics* ^D
Consolidated Electronics, Inc.* ^D	Harco Electronics* ^D	W.S. Jenks & Son* ^D	Bel Merit Corporation
CSI/SPCCO	Herman Electronics*^D80	Kenwood U.S.A. Corp.	B&K Precision
The Current Source* ^D	HMC - Hub Material Co.* ^D	Leader Instruments Corp.	Brilliant King, Inc.
East Coast Transistor* ^D	Hosfelt Electronics, Inc.* ^D	Marshall Industries* ^D	Brunelle Instruments, Inc.
E.I.L. Instruments, Inc.* ^D	Hy Tec Dealer Service	M.A.T. Electronics*^D75	Bursma Electronic Distrib.* ^D
Extch Instruments Corp.* ^D	Instek Corp.* ^D	MCM Electronics* ^D	C&S Sales* ^D
Fotronic Corporation* ^D	Jameco Electric Components* ^D	Metric Supply* ^D	Computer Component Source* ^D
Harco Electronics* ^D	JDR Microdevices* ^D	Omnitron Electronics* ^{MD}	Computer Svcs of America* ^D
HMC - Hub Material Co.* ^D	W.S. Jenks & Son* ^D	Print Products International	Consolidated Electronics, Inc.* ^D
Hunter Products, Inc.	Jensen Tools, Inc.* ^D	RAG Electronics Inc.* ^D	Contact East, Inc.* ^D
Jameco Electronic Components* ^D	Keithley Instruments	RNJ Electronics Inc.* ^D	Conway Engineering, Inc.
W.S. Jenks & Son* ^D	Kelvin Electronics* ^D	RS Electronics* ^D	The Current Source* ^D
Marshall Industries* ^D	Kenwood U.S.A. Corp.	Specialized Prods Company* ^D	Dalbani Corporation* ^D
M.A.T. Electronics*^D75	Lascar Electronics Inc.	Herman H. Sticht Co., Inc.* ^D	Dragnetz-BMI
Metric Supply* ^D	Leader Instruments Corp.	Sun Equipment Corporation	East Coast Transistor* ^D
Omnitron Electronics* ^{MD}	Marconi Instruments	Tenna Test Equipment	Eiger Electronics* ^D
Pacer Industries, Inc.	Marshall Industries* ^D	Test Equipment Depot* ^D	E.I.L. Instruments, Inc.* ^D
Prime Technology, Inc.	M.A.T. Electronics*^D75	Tucker Electronics Co.	Electro Tool, Inc.
			Electronic Prod. Specialties

See Adv. Page	See Adv. Page	See Adv. Page	See Adv. Page
Electronic Parts Supply*D	Allison Technology Corporation	ScorecoreIFC	Ultra-X, Inc.
Elenco Electronics, Inc.	Ames Supply Co.*D	Snap-On Incorporated	Warrantech Corp.
Extech Instruments Corp.*D	Analog Corp.	Specialized Prods Company*D	Wescorp
Fieldpiece Instruments	Arrow Electronics	Herman H. Sticht Co., Inc.*D	Zack Electronics*D
Fluke Corporation	Vance Baldwin Inc.*D	Sun Equipment Corporation	Zack/Joseph Electronics*D
Foley-Belsaw*D	B-B&W Electronics*D	Tandy National Parts*D	
Fotronic Corporation*D	Bel Merit Corporation	TechAmerica*D	RECEPTACLE CIRCUIT
Fox International*D	B&K Precision	Techni-Tool Inc.*D	TESTERS
Galco Industrial Electronics	Brunelle Instruments, Inc.	Tektronix, Inc.	Vance Baldwin Inc.*D
Hameg Instruments, Inc.	Burma Electronic Distrib.*D	Telogy*D	Contact East, Inc.*D
Harco Electronics*D	C&S Sales*D	Tenna Test Equipment	The Current Source*D
Heath Company	Cleveland Inst. of Electronics	Test Equipment Connection Co	East Coast Transistor*D
Herman Electronics*D80	Computer Component Source*D	Test Equipment Depot*D	E.I.L. Instruments, Inc.*D
HMC - Hub Material Co.*D	Compuvideo	Tritronics, Inc.*D80	Electro Tool, Inc.
Hy Tec Dealer Service	Consolidated Electronics, Inc.*	Tucker Electronics Co.	Foley-Belsaw*D
IET Labs, Inc.	Contact East, Inc.*D	Union Electronics Distrib*D	Fotronic Corporation*D
Instek Corp.*D	Conway Engineering, Inc.	Universal Enterprises (UEI)	HMC - Hub Material Co.*D
Jameco Electronic Components*D	The Current Source*D	Wavetek Corporation	W.S. Jenks & Son*D
JDR Microdevices*D	Dalbani Corporation*D	Wholesale Electronics Inc.*D	L-Com Inc.
W.S. Jenks & Son*D	Digi-Key D*	Zack Electronics*D	Marshall Industries*D
Jensen Tools, Inc.*D	East Coast Transistor*D	Zack/Joseph Electronics*D	Omnitron Electronics*MD
Keithley Instruments	Eiger Electronics*D		Print Products International
Kelvin Electronics*D	E.I.L. Instruments, Inc.*D	PERSONAL COMPUTER	RNJ Electronics Inc.*D
Kenwood U.S.A. Corp.	Electro Tool, Inc.	REPAIR/ TEST EQUIPMENT	RS Electronics*D
LaserImpact	Electronic Prod. Specialties	Accutest Instruments, Inc.*D	ScorecoreIFC
Leader Instruments Corp.	Electronic Parts Supply*D	Ames Supply Co.*D	Techni-Tool Inc.*D
LG Precision	Electronix Corp.*D80	Aristo Computers, Inc.	Test Equipment Depot*D
Marshall Industries*D	Electronix Express*D	Arrow Electronics	Time Motion Tools*D
M.A.T. Electronics*D75	Elenco Electronics, Inc.	B&B Electronics Manufacturing	Tucker Electronics Co.
MCM Electronics*D	Extech Instruments Corp.*D	Vance Baldwin Inc.*D	Wholesale Electronics Inc.*D
Metric Supply*D	Fluke Corporation	Cleveland Inst. of Electroni	Zack Electronics*D
Mouser Electronics*D	Fotronic Corporation*D	Computer & Monitor Maintenance	Zack/Joseph Electronics*D
National Instruments Corp.	Galco Industrial Electronics	Contact East, Inc.*D	
Omega Engineering, Inc.	Global Micro-Parts Depot*MD	CSTS Inc.	SEMICONDUCTOR TESTERS
Omega-Vanzetti, Inc.	Global Specialties	The Current Source*D	Accutest Instruments, Inc.*D
Omnitron Electronics*MD	Gould Instrument Systems Inc	Dalco Electronics*D	Arrow Electronics
Philips ECG Company*D	Hameg Instruments, Inc.	Data Depot, Inc.	Vance Baldwin Inc.*D
Philips ECG	Harco Electronics*D	Eagan Technical Services, In	B-B&W Electronics*D
Print Products International	Heath Company	Electro Tool, Inc.	B&K Precision
H.C. Protek	Herman Electronics*D80	Electronic Parts Supply*D	Computer Component Source*D
RAG Electronics Inc.*D	Hi-Techniques, Inc.	Elenco Electronics, Inc.	Consolidated Electronics, Inc.*
RNJ Electronics Inc.*D	HMC - Hub Material Co.*D	Fluke Corporation	The Current Source*D
RS Electronics*D	Hosfelt Electronics, Inc.*D	Fotronic Corporation*D	East Coast Transistor*D
Salen Enterprises*D	Instek Corp.*D	Harco Electronics*D	Eiger Electronics*D
Schlumberger Technologies	Iwatsu America	HMC - Hub Material Co.*D	E.I.L. Instruments, Inc.*D
Simpson Electronic Company	Jameco Electrnc Components*D	Hy-Tronix Instruments, Inc.	Electronic Design Specialist
Snap-On Incorporated	JDR Microdevices*D	JDR Microdevices*D	Electronic Parts Supply*D
Specialized Prods Company*D	W.S. Jenks & Son*D	W.S. Jenks & Son*D	Electronix Express*D
A.W. Sperty Instruments, Inc	Jensen Tools, Inc.*D	Jensen Tools, Inc.*D	Elenco Electronics, Inc.
Sun Equipment Corporation	Kelvin Electronics*D	Kasco Distributing*D	Fotronic Corporation*D
A.G. Tannenbaum*D	Kenwood U.S.A. Corp.	LaserImpact	Fox International*D
TechAmerica*D	LaserImpact	L.J. Enterprises*D	Galco Industrial Electronics
Techni-Tool Inc.*D	Leader Instruments Corp.	Marshall Industries*D	Harco Electronics*D
Tegam Inc.	LG Precision	MCM Electronics*D	Hosfelt Electronics, Inc.*D
Tektronix, Inc.	Marconi Instruments Inc.	MG Chemicals	Hy-Tronix Instruments, Inc.
Telogy*D	Marshall Industries*D	Micro 2000, Inc.	IET Labs, Inc.
Tenna Test Equipment	M.A.T. Electronics*D75	Nationwide Electronics	Jameco Electronic Components*D
Test Equipment Connection Co	MCM Electronics*D	O.K. Industries, Inc.	W.S. Jenks & Son*D
Test Equipment Depot*D	Metric Supply*D	Omega-Vanzetti, Inc.	Keithley Instruments
TIF Instruments, Inc.	Mouser Electronics*D	Omnitron Electronics*MD	L'il Bitty Tester
Time Motion Tools*D	National Instruments Corp.	Print Products International	Marshall Industries*D
Triplett Corp.	Oldaker Corp.	Richardson Electronics, Ltd.	M.A.T. Electronics*D75
Tritronics, Inc.*D80	Omega-Vanzetti, Inc.	RNJ Electronics Inc.*D	MCM Electronics*D
Tucker Electronics Co.	Omnitron Electronics*MD	RS Electronics*D	Omega-Vanzetti, Inc.
Union Electronics Distrib*D	Orion Instruments, Inc.	ScorecoreIFC	Omnitron Electronics*MD
Universal Enterprises (UEI)	Panasonic Industrial Co.	SMH Electronics Co., Inc.	Print Products International
Wavetek Corporation	Parts Express International*	Sonera Technologies	RAG Electronics Inc.*D
Wholesale Electronics Inc.*D	PC Instruments Incorporated	Sprague Magnetics, Inc.*D	RNJ Electronics Inc.*D
Zack Electronics*D	Print Products International	Sun Equipment Corporation	RS Electronics*D
Zack/Joseph Electronics*D	H.C. Protek	Techni-Tool Inc.*D	Specialized Prods Company*D
	RAG Electronics Inc.*D	Telematic	TechAmerica*D
OSCILLOSCOPES	RNJ Electronics Inc.*D	Tenna Test Equipment	Telogy*D
Accutest Instruments, Inc.*D	RS Electronics*D	Test Equipment Depot*D	Tenna Test Equipment
Alfa Electronics*D	Salen Enterprises*D	Time Motion Tools*D	Test Equipment Depot*D

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Tucker Electronics Co.	Fotronic Corporation* D	Time Motion Tools* D	Sencore IFC
Union Electronics Distrib* D	Fox International* D	Tucker Electronics Co.	Tektronix, Inc.
Wholesale Electronics Inc.* D	Harco Electronics* D	Union Electronics Distrib* D	Tenma Test Equipment
Zack Electronics* D	Herman Electronics*D 80	Universal Enterprises (UEI)	Test Equipment Depot* D
Zack/Joseph Electronics* D	HMC - Hub Material Co.* D	Wavetek Corporation	Tucker Electronics Co.
	W.S. Jenks & Son* D	Wholesale Electronics Inc.* D	Union Electronics Distrib* D
	Jensen Tools, Inc.* D	Zack Electronics* D	Zack Electronics* D
	L-Com Inc.	Zack/Joseph Electronics* D	Zack/Joseph Electronics* D
	Marshall Industries* D		Specialized Prods Company* D
SPECTRUM ANALYZERS	MCM Electronics* D	TRANSISTOR TESTERS	
Accutest Instruments, Inc.* D	Metric Supply* D	Accutest Instruments, Inc.* D	WAVEFORM MONITORS
Alfa Electronics* D	Omnitron Electronics* MD	Arrow Electronics	Accutest Instruments, Inc.* D
Allison Technology Corporation	Print Products International	Bel Merit Corporation	Allison Technology Corporation
Analogic Corp.	RAG Electronics Inc.* D	B&K Precision	Arrow Electronics
Arrow Electronics	RNJ Electronics Inc.* D	Bursma Electronic Distrib.* D	AudioVisual Inc.* D
Vance Baldwin Inc.* D	RS Electronics* D	Computer Component Source* D	Vance Baldwin Inc.* D
B&K Precision	Specialized Prods Company* D	Consolidated Electrnics, Inc.*	Compuvideo
Brunelle Instruments, Inc.	Techni-Tool Inc.* D	The Current Source* D	Contact East, Inc.* D
Bursma Electronic Distrib.* D	Tektronix, Inc.	East Coast Transistor* D	The Current Source* D
C&S Sales* D	Telogy* D	Eiger Electronics* D	East Coast Transistor* D
Consolidated Electronics, Inc.*	Telulex, Inc.	Electronic Parts Supply* D	E.I.L. Instruments, Inc.* D
The Current Source* D	Test Equipment Depot* D	Elenco Electronics, Inc.	Fotronic Corporation* D
East Coast Transistor* D	Time Motion Tools* D	Fotronic Corporation* D	Gould Instrument Systems Inc
E.I.L. Instruments, Inc.* D	Triplett Corp.	Fox International* D	Herman Electronics*D 80
Electronix Express* D	Tucker Electronics Co.	HMC - Hub Material Co.* D	Hi-Techniques, Inc.
Fotronic Corporation* D	Union Electronics Distrib* D	IET Labs, Inc.	W.S. Jenks & Son* D
Global Specialties	Wavetek Corporation	W.S. Jenks & Son* D	Kenwood U.S.A. Corp.
Hameg Instruments, Inc.	Wholesale Electronics Inc.* D	Kelvin Electronics* D	LaserImpact
Harco Electronics* D	Zack Electronics* D	L'il Bitty Tester	Leader Instruments Corp.
Hi-Techniques, Inc.	Zack/Joseph Electronics* D	Marshall Industries* D	Marshall Industries* D
Integrity Design & Research		M.A.T. Electronics*D 75	MCM Electronics* D
W.S. Jenks & Son* D		Omnitron Electronics* MD	Metric Supply* D
Leader Instruments Corp.	TEMPERATURE SENSORS	Print Products International	Omega-Vanzetti, Inc.
LG Precision	Accutest Instruments, Inc.* D	RAG Electronics Inc.* D	Omnitron Electronics* MD
Marconi Instruments Inc.	Alfa Electronics* D	RNJ Electronics Inc.* D	Print Products International
Marshall Industries* D	Allison Technology Corporation	RS Electronics* D	RAG Electronics Inc.* D
MCM Electronics* D	Amprobe	Salen Enterprises* D	RNJ Electronics Inc.* D
National Instruments Corp.	Anritsu Products	Sencore IFC	RS Electronics* D
Omnitron Electronics* MD	Arrow Electronics	Sun Equipment Corporation	Sencore IFC
Print Products International	Consolidated Electronics, Inc.*	A.G. Tannenbaum* D	Sun Equipment Corporation
H.C. Protek	Contact East, Inc.* D	Techni-Tool Inc.* D	Tandy National Parts* D
RAG Electronics Inc.* D	The Current Source* D	Telogy* D	Techni-Tool Inc.* D
RNJ Electronics Inc.* D	Dalbani Corporation* D	Tenma Test Equipment	Tektronix, Inc.
RS Electronics* D	Dranetz-BMI	Test Equipment Depot* D	Telogy* D
Schlumberger Technologies	East Coast Transistor* D	Time Motion Tools* D	Tenma Test Equipment
Smith Design	E.I.L. Instruments, Inc.* D	Tucker Electronics Co.	Test Equipment Connection Co
Specialized Prods Company* D	Electronix Express* D	Union Electronics Distrib* D	Test Equipment Depot* D
Tandy National Parts* D	Extech Instruments Corp.* D	Wholesale Electronics Inc.* D	Tucker Electronics Co.
Techni-Tool Inc.* D	Fieldpiece Instruments	Zack Electronics* D	Ultech Corp
Technology Programs	Fotronic Corporation* D	Zack/Joseph Electronics* D	Union Electronics Distrib* D
Tektronix, Inc.	Galco Industrial Electronics		Wavetek Corporation
Telogy* D	Hexacon Electric Co.		Wholesale Electronics Inc.* D
Tenma Test Equipment	HMC - Hub Material Co.* D		Zack Electronics* D
Test Equipment Connection Co	JDR Microdevices* D		Zack/Joseph Electronics* D
Test Equipment Depot* D	W.S. Jenks & Son* D	VECTORSCHOPEs	
Tucker Electronics Co.	Jensen Tools, Inc.* D	Accutest Instruments, Inc.* D	
Union Electronics Distrib* D	Lascar Electronics Inc.	Arrow Electronics	
Wholesale Electronics Inc.* D	Marshall Industries* D	AudioVisual Inc.* D	
Zack Electronics* D	MCM Electronics* D	Vance Baldwin Inc.* D	
Zack/Joseph Electronics* D	Multicore Solders	Compuvideo	
	Newport Electronics, Inc.	The Current Source* D	
TELEPHONE ANALYZERS/TESTERS	Omega Engineering, Inc.	East Coast Transistor* D	
Accutest Instruments, Inc.* D	Omega-Vanzetti, Inc.	E.I.L. Instruments, Inc.* D	
American Reliance	Omnitron Electronics* MD	Fotronic Corporation* D	
Vance Baldwin Inc.* D	Pacer Industries, Inc.	Herman Electronics*D 80	
B&K Precision	Philips ECG Company* D	W.S. Jenks & Son* D	
Brunelle Instruments, Inc.	Print Products International	Kenwood U.S.A. Corp.	
C&S Sales* D	RAG Electronics Inc.* D	Leader Instruments Corp.	
Consolidated Electronics, Inc.*	RNJ Electronics Inc.* D	Marshall Industries* D	
Contact East, Inc.* D	RS Electronics* D	MCM Electronics* D	
Conway Engineering, Inc.	Simpson Electronic Company	Metric Supply* D	
CUI Stack	SAI/ A SPIRIG CO.* D	Omnitron Electronics* MD	
The Current Source* D	Techni-Tool Inc.* D	Print Products International	
East Coast Transistor* D	Technology Programs	RAG Electronics Inc.* D	
Electro Tool, Inc.	Test Equipment Depot* D	RNJ Electronics Inc.* D	
Elenco Electronics, Inc.		RS Electronics* D	
		Salen Enterprises* D	

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Hy-Tronix Instruments, Inc.	RAG Electronics Inc.*D	Zack Electronics*D	Leader Instruments Corp.
W.S. Jenks & Son*D	RNJ Electronics Inc.*D	Zack/Joseph Electronics*D	Marshall Industries*D
M-Tronics*D	RS Electronics*D		M.A.T. Electronics*D75
Nationwide Electronics	Salen Enterprises*D	VCR TEST JIG KITS	MCM Electronics*D
Omnitron Electronics*MD	Schurter, Inc.	Vance Baldwin Inc.*D	MG Chemicals
Print Products International	SencoreIFC	Computer Component Source*D	Mouser Electronics*D
RNJ Electronics Inc.*D	Simpson Electronic Company	The Current Source*D	Nationwide Electronics
RS Electronics*D	Specialized Prods Company*D	Dalbani Corporation*D	Omega-Vanzetti, Inc.
Schurter, Inc.	Sun Equipment Corporation	East Coast Transistor*D	Omnitron Electronics*MD
Techni-Tool Inc.*D	Tandy National Parts*D	Electronic Parts Supply*D	Parts Express International*
Telematic	TechAmerica*D	Electronix Corp.*D80	Philips ECG Company*D
Test Equipment Depot*D	Techni-Tool Inc.*D	Electroservice Laboratories	Pomona ElectronicsIBC
Tritronics, Inc.*D80	Tegam Inc.	Foley-Belsaw*D	Premium Parts+ Electronics Co*
Union Electronics Distrib*D	Tektronix, Inc.	Fotronic Corporation*D	Print Products International
Zack Electronics*D	Tenma Test Equipment	Herman Electronics*D80	Probe Master, Inc.
Zack/Joseph Electronics*D	Test Equipment Depot*D	Hitachi Home Electronics	RAG Electronics Inc.*D
	TIF Instruments, Inc.	M-Tronics*D	R.C. Distributing Co
TEST LEADS AND PROBES	Time Motion Tools*D	Marshall Industries*D	RNJ Electronics Inc.*D
Accutest Instruments, Inc.*D	Triplett Corp.	M.A.T. Electronics*D75	RS Electronics*D
Allison Technology Corporati	Tritronics, Inc.*D80	MCM Electronics*D	Salen Enterprises*D
Aves Probes, Inc. (API)	Tucker Electronics Co.	Nationwide Electronics	SencoreIFC
Vance Baldwin Inc.*D	Union Electronics Distrib*D	Omnitron Electronics*MD	Sibley TV*D79
B-B&W Electronics*D	Universal Enterprises (UEI)	RNJ Electronics Inc.*D	Simpson Electronic Company
Bel Merit Corporation	Wavetek Corporation	Test Equipment Depot*D	Sorensen
B&K Precision	Wholesale Electronics Inc.*D	Tritronics, Inc.*D80	Specialized Prods Company*D
Bursma Electronic Distrib.*D	Zack Electronics*D	Union Electronics Distrib*D	A.W. Sperry Instruments, Inc
Computer Component Source*D	Zack/Joseph Electronics*D	Zack Electronics*D	Support Systems International
Consolidated Electronics, Inc.*		Zack/Joseph Electronics*D	TechAmerica*D
Contact East, Inc.*D	TRANSFORMERS:		Techni-Tool Inc.*D
CSI/SPCCO	ISOLATION/VARIABLE	OTHER TEST	Tektronix, Inc.
CSTS Inc.	Accutest Instruments, Inc.*D	EQUIPMENT ACCESSORIES	Telematic
CUI Stack	Antique Electronic Supply*D	Accutest Instruments, Inc.*D	Temptronic Corp.
The Current Source*D	Arrow Electronics	Allison Technology Corporation	Tenma Test Equipment
Dalbani Corporation*D	Vance Baldwin Inc.*D	Amprobe	Tentel
Dalco Electronics*D	B-B&W Electronics*D	Anritsu Products	Test Equipment Depot*D
Dranetz-BMI	B&K Precision	Aristo Computers, Inc.	Time Motion Tools*D
East Coast Transistor*D	Brunelle Instruments, Inc.	Vance Baldwin Inc.*D	Tritronics, Inc.*D80
Eiger Electronics*D	C&S Sales*D	Bel Merit Corporation	Tucker Electronics Co.
E.I.L. Instruments, Inc.*D	Consolidated Electronics, Inc.*	B&K Precision	UBM Corp
Electro Standards Lab, Inc.	The Current Source*D	Brunelle Instruments, Inc.	Ultech Corp
Electronic Parts Supply*D	Dana Corp Warner Electric	Bursma Electronic Distrib.*D	Union Electronics Distrib*D
Elenco Electronics, Inc.	Electronic Parts Supply*D	C&S Sales*D	Universal Enterprises (UEI)
E-Z Hook	Electronic Specialists, Inc.	Chicago Case Company	Wavetek Corporation
Fluke Corporation	Electronix Express*D	Computer Component Source*D	Zack Electronics*D
Fotronic Corporation*D	Electroservice Laboratories	Compuvideo	Zack/Joseph Electronics*D
Harco Electronics*D	Elenco Electronics, Inc.	Consolidated Electronics, Inc.*	
Heath Company	Elgar Corp.	The Current Source*D	Circuit damage
Herman Electronics*D80	Fotronic Corporation*D	Dalbani Corporation*D	protective
Richard Hirschmann of America	Harco Electronics*D	Dalco Electronics*D	equipment/supplies
HMC - Hub Material Co.*D	HMC - Hub Material Co.*D	East Coast Transistor*D	
Hosfelt Electronics, Inc.*D	Hosfelt Electronics, Inc.*D	E.I.L. Instruments, Inc.*D	GROUNDING SYSTEMS
Huntron Instruments, Inc.	Jameco Electronic Components*D	Electro Standards Lab, Inc.	Accutest Instruments, Inc.*D
Interconnect Devices, Inc.	JDR Microdevices*D	Electronic Parts Supply*D	Arrow Electronics
Jameco Electric Components*D	W.S. Jenks & Son*D	Electroservice Laboratories	Bi-Tronics Inc.
JDR Microdevices*D	Kelvin Electronics*D	Elenco Electronics, Inc.	Bivar Inc
W.S. Jenks & Son*D	Marshall Industries*D	Elgar Corp.	Bursma Electronic Distrib.*D
Jim-Pak*D	M.A.T. Electronics*D75	E-Z Hook	Compuvideo
Kelvin Electronics*D	Mouser Electronics*D	Fluke Corporation	Contact East, Inc.*D
Kenwood U.S.A. Corp.	Omega-Vanzetti, Inc.	Fotec Inc	The Current Source*D
Leader Instruments Corp.	Omnitron Electronics*MD	Fotronic Corporation*D	Electroservice Laboratories
M-Tronics*D	Print Products International	Gemini Inc.	HMC - Hub Material Co.*D
Marshall Industries*D	RAG Electronics Inc.*D	Global Specialties	W.S. Jenks & Son*D
M.A.T. Electronics*D75	RNJ Electronics Inc.*D	Hameg Instruments, Inc.	JIT Resources, Inc.
Oldaker Corp.	RS Electronics*D	Herman Electronics*D80	M.A.T. Electronics*D75
Omega-Vanzetti, Inc.	Salen Enterprises*D	HMC - Hub Material Co.*D	RNJ Electronics Inc.*D
Omnitron Electronics*MD	SencoreIFC	Hy-Tronix Instruments, Inc.	Specialized Prods Company*D
Parts Express International*	Staco Energy Products	IET Labs, Inc.	Time Motion Tools*D
PC Instruments Incorporated	Sun Equipment Corporation	Interconnect Devices, Inc.	Zack Electronics*D
Philips ECG Company*D	TechAmerica*D	JDR Microdevices*D	Zack/Joseph Electronics*D
Philips ECG	Tenma Test Equipment	W.S. Jenks & Son*D	
Pomona ElectronicsIBC	Test Equipment Depot*D	JIT Resources, Inc.	POWER LINE MONITORS
Premium Parts+ Electronics Co*	Union Electronics Distrib*D	Kenwood U.S.A. Corp.	Accutest Instruments, Inc.*D
Print Products International	Vector-VID Inc.	LaserImpact	Ames Supply Co.*D
Probe Master, Inc.	Wholesale Electronics Inc.*D	L-Com Inc.	Arrow Electronics

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Time Motion Tools* ^D Tritronics, Inc.* ^D80	Micro Care Corp. Mouser Electronics* ^D Nationwide Electronics Pomona ElectronicsIBC	JIT Resources, Inc. Marshall Industries* ^D Nationwide Electronics Print Products International Prostat Corporation Richmond Technology Inc. RNJ Electronics Inc.* ^D RS Electronics* ^D Semtronics Corp. Simco Static Cntrl & Clnrm P Specialized Prods Company* ^D Techni-Tool Inc.* ^D 3M Electrnc Hndlg & Prot Div 3M Electronic Prods Division Time Motion Tools* ^D Wescorp Wholesale Electronics Inc.* ^D Zack Electronics* ^D Zack/Joseph Electronics* ^D	Premium Parts+ Electronics Co* RNJ Electronics Inc.* ^D RS Electronics* ^D Tandy National Parts* ^D TEC TechAmerica* ^D Techni-Tool Inc.* ^D Time Motion Tools* ^D Total Power International* ^{MD} Tritronics, Inc.* ^D80 Wholesale Electronics Inc.* ^D Zack Electronics* ^D Zack/Joseph Electronics* ^D Zenith Sales Co.
ANTISTATIC IONIZATION DEVICES Charleswater Computer Svcs of America* ^D Contact East, Inc.* ^D The Current Source* ^D Desco Digi-Key D* Electronic Prod. Specialties Electro-Tech Systems, Inc. Harco Electronics* ^D HMC - Hub Material Co.* ^D W.S. Jenks & Son* ^D JIT Resources, Inc. Marshall Industries* ^D Nationwide Electronics Print Products International RNJ Electronics Inc.* ^D RS Electronics* ^D Semtronics Corp. Simco Static Cntrl & Clnrm P Techni-Tool Inc.* ^D 3M Electrnc Hndlg & Prot Div 3M Electronic Prods Division Time Motion Tools* ^D Wescorp Wholesale Electronics Inc.* ^D Zack Electronics* ^D Zack/Joseph Electronics* ^D	Specialized Prods Company* ^D Sun Equipment Corporation Tandy National Parts* ^D TechAmerica* ^D Techni-Tool Inc.* ^D Teclab 3M Electrnc Hndlg & Prot Div 3M Electronic Prods Division Time Motion Tools* ^D Tritronics, Inc.* ^D80 Union Electronics Distrib* ^D Wescorp Wholesale Electronics Inc.* ^D Wiha Tools Zack Electronics* ^D Zack/Joseph Electronics* ^D	Supplies/ accessories/ equipment	BENCHES/CABINETS Alpha Technologies Arrow Electronics Vance Baldwin Inc.* ^D Computer Svcs of America* ^D Contact East, Inc.* ^D The Current Source* ^D Dalco Electronics* ^D East Coast Transistor* ^D Electronic Prod. Specialties Electroservice Laboratories Galco Industrial Electronics Harco Electronics* ^D Herman Electronics* ^D80 HMC - Hub Material Co.* ^D I.A.C. Industries JDR Microdevices* ^D W.S. Jenks & Son* ^D Jensen Tools, Inc.* ^D JIT Resources, Inc. Klein Tools, Inc. Lista International Corp. M-Tronics* ^D Marshall Industries* ^D MCM Electronics* ^D J.S. Popper, Inc. Print Products International RNJ Electronics Inc.* ^D RS Electronics* ^D Specialized Prods Company* ^D Techni-Tool Inc.* ^D Teclab Time Motion Tools* ^D Workplace Systems, Inc. Zack Electronics* ^D Zack/Joseph Electronics* ^D Zero Corp., East Div.
ANTISTATIC MATS/ BENCHTOPS/WRIST STRAPS/ OTHERS Ames Supply Co.* ^D Andrews Electronics* ^D8 Aven Tools, Inc. Vance Baldwin Inc.* ^D B-B&W Electronics* ^D Bursma Electronic Distrib.* ^D Charleswater Claus Electronics Div. Computer Component Source* ^D Computer Svcs of America* ^D Contact East, Inc.* ^D The Current Source* ^D Dalco Electronics* ^D Den-On Instruments (USA), Inc. Desco Digi-Key D* Electro Tool, Inc. Electronic Prod. Specialties Electro-Tech Systems, Inc. Electronix Express* ^D Electroservice Laboratories Elenco Electronics, Inc. Excel Distributing* ^D Harco Electronics* ^D Herman Electronics* ^D80 HMC - Hub Material Co.* ^D Hosfelt Electronics, Inc.* ^D Jameco Electronic Components* ^D W.S. Jenks & Son* ^D Jim-Pak* ^D JIT Resources, Inc. Kasco Distributing* ^D Marshall Industries* ^D	ESD FLEXIBLE PACKAGING Ames Supply Co.* ^D Armand Mfg. Inc. Charleswater Contact East, Inc.* ^D The Current Source* ^D Dalco Electronics* ^D Desco Electronic Prod. Specialties Electro-Tech Systems, Inc. Electroservice Laboratories Harco Electronics* ^D HMC - Hub Material Co.* ^D W.S. Jenks & Son* ^D JIT Resources, Inc. Marshall Industries* ^D Nationwide Electronics Print Products International Richmond Technology Inc. RNJ Electronics Inc.* ^D RS Electronics* ^D Seco Industries Semtronics Corp. Techni-Tool Inc.* ^D 3M Electrnc Hndlg & Prot Div 3M Electronic Prods Division Time Motion Tools* ^D Wescorp Zack Electronics* ^D Zack/Joseph Electronics* ^D	BATTERIES Alpha Technologies Ames Supply Co.* ^D Andrews Electronics* ^D8 Antique Electronic Supply* ^D Arrow Electronics Vance Baldwin Inc.* ^D B&D Enterprises* ^D Bursma Electronic Distrib.* ^D Computer Component Source* ^D Compuvideo Consolidated Electronics, Inc.* The Current Source* ^D Dalbani Corporation* ^D Dalco Electronics* ^D Digi-Key D* Diversified Parts* ^D East Coast Transistor* ^D Electro Dynamics, Inc.* ^D Electronic Parts Supply* ^D Electronix Express* ^D Electroservice Laboratories Elenco Electronics, Inc. Excel Distributing* ^D Fedco Electronics, Inc.* ^D Galco Industrial Electronics Harco Electronics* ^D Herman Electronics* ^D80 HMC - Hub Material Co.* ^D Hosfelt Electronics, Inc.* ^D Jameco Electronic Components* ^D JDR Microdevices* ^D W.S. Jenks & Son* ^D Jim-Pak* ^D Kelvin Electronics* ^D Leader Instruments Corp. M-Tronics* ^D Marshall Industries* ^D M.A.T. Electronics* ^D75 MCM Electronics* ^D Mouser Electronics* ^D Nationwide Electronics Nesco Batteries ORA Electronics Panasonic Industrial Co. Parts Express International* Philips ECG Company* ^D J.S. Popper, Inc. Powerline* ^D	CHEMICALS Aervo-Pacific Co. Alternative Technical Servc Ames Supply Co.* ^D Andrews Electronics* ^D8 Antique Electronic Supply* ^D Arrow Electronics Vance Baldwin Inc.* ^D B-B&W Electronics* ^D Bursma Electronic Distrib.* ^D CAIG Laboratories, Inc. Ciba Specialty Chemicals Computer Component Source* ^D Computer Svcs of America* ^D Consolidated Electronics, Inc.* CRC Industries, Inc. The Current Source* ^D Dalbani Corporation* ^D Dymax Corporation Dynaloy, Inc. East Coast Transistor* ^D

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Echelon Industries*D
 Eiger Electronics*D
 E.I.L. Instruments, Inc.*D
 Electro Dynamics, Inc.*D
 Electronic Prod. Specialties
 Electronic Parts Supply*D
Electronix Corp.*D80
 Electronix Express*D
 Excel Distributing*D
 Foley-Belsaw*D
 Four Star Chemical
 Fox International*D
 Galco Industrial Electronics
 GC Electronics*D
 Global Micro-Parts Depot*MD
 Harco Electronics*D
Herman Electronics*D80
 HMC - Hub Material Co.*D
 Hosfelt Electronics, Inc.*D
 Hy Tec Dealer Service
 Jameco Electronic Components*D
 W.S. Jenks & Son*D
 Klein Tools, Inc.
 L.J. Enterprises*D
 M-Tronics*D
 Marshall Industries*D
M.A.T. Electronics*D75
 MCM Electronics*D
 MG Chemicals
 Micro Care Corp.
 Miller-Stephenson Chemical C
 Mouser Electronics*D
 Multicore Solders
 Nationwide Electronics
 P.K. Neuses*D
 Parts Express International*
 Philips ECG Company*D
 Philips ECG
 Planned Products
 Premium Parts+ Electronics Co*
 Print Products International
 Rawn Co. Inc.
 RNJ Electronics Inc.*D
 Rogers Anti-Static Chemicals
 RS Electronics*D
 Russell Industries*D
 Stoner, Inc.
 Syon Corporation
 Tandy National Parts*D
 Tech Spray, Inc.
 TechAmerica*D
 Techni-Tool Inc.*D
 The Texwipe Company/CleanTex
Tritronics, Inc.*D80
 Union Electronics Distrib*D
 Wholesale Electronics Inc.*D
 Zack Electronics*D
 Zack/Joseph Electronics*D
 Zenith Sales Co.

CLEANING SUPPLIES

Aervo-Pacific Co.
 Alternative Technical Servc
 Ames Supply Co.*D
Andrews Electronics*D8
 Antique Electronic Supply*D
 Bursma Electronic Distrib.*D
 Chemtronics
 Computer Component Source*D
 Computer Svcs of America*D
 Consolidated Electronics, Inc.*
 Contact East, Inc.*D
 CRC Industries, Inc.
 The Current Source*D

Dalbani Corporation*D
 Dalco Electronics*D
 East Coast Transistor*D
 Echelon Industries*D
 Eiger Electronics*D
 Electro Dynamics, Inc.*D
 Electronic Prod. Specialties
 Electronic Parts Supply*D
Electronix Corp.*D80
 Electroservice Laboratories
 Falcon Safety Products
 Foley-Belsaw*D
 Four Star Chemical
 Fox International*D
 Galco Industrial Electronics
 Global Micro-Parts Depot*MD
 Harco Electronics*D
 HMC - Hub Material Co.*D
 Hosfelt Electronics, Inc.*D
 Hy Tec Dealer Service
 Jameco Electronic Components*D
 W.S. Jenks & Son*D
 Kasco Distributing*D
 Klein Tools, Inc.
 Leland Ltd., Inc.
 Marshall Industries*D
M.A.T. Electronics*D75
 MCM Electronics*D
 MG Chemicals
 Micro Care Corp.
 Multicore Solders
 P.K. Neuses*D
 Parts Express International*
 PC Service Source*D
 Print Products International
 RNJ Electronics Inc.*D
 Rogers Anti-Static Chemicals
 RS Electronics*D
 Stoner, Inc.
 Syon Corporation
 Tech Spray, Inc.
 TechAmerica*D
 Techni-Tool Inc.*D
 The Texwipe Company/CleanTex
 Time Motion Tools*D
Tritronics, Inc.*D80
 Wholesale Electronics Inc.*D
 Zack Electronics*D
 Zack/Joseph Electronics*D

LAMP

Antique Electronic Supply*D
 Arrow Electronics
 Aven Tools, Inc.
 B-B&W Electronics*D
 Bonkote America, Inc.
 Bursma Electronic Distrib.*D
 Computer Svcs of America*D
 Consolidated Electronics, Inc.*
 Contact East, Inc.*D
 The Current Source*D
 Dalbani Corporation*D
 Digi-Key D*
 Diversified Parts*D
 East Coast Transistor*D
 Electronic Prod. Specialties
 Electronic Parts Supply*D
 Electronix Express*D
 Foley-Belsaw*D
 Galco Industrial Electronics
 Global Micro-Parts Depot*MD
 Harco Electronics*D
Herman Electronics*D80
 HMC - Hub Material Co.*D

Hosfelt Electronics, Inc.*D
 Jameco Electronic Components*D
 Jensen Tools, Inc.*D
 Kelvin Electronics*D
 Luxo Corp.
 Marshall Industries*D
M.A.T. Electronics*D75
 MCM Electronics*D
 Mouser Electronics*D
 O.C. White
 Parts Express International*
 Premium Parts+ Electronics Co*
 Print Products International
 RNJ Electronics Inc.*D
 RS Electronics*D
 Schurter, Inc.
 Specialized Prods Company*D
 TechAmerica*D
 Techni-Tool Inc.*D
 Teclab
 Time Motion Tools*D
Tritronics, Inc.*D80
 Union Electronics Distrib*D
 Waldmann Lighting Company
 Wholesale Electronics Inc.*D
 Zack Electronics*D
 Zack/Joseph Electronics*D

MAGNIFIERS

Andrews Electronics*D8
 Aven Tools, Inc.
 Vance Baldwin Inc.*D
 B-B&W Electronics*D
 Bonkote America, Inc.
 Computer Component Source*D
 Consolidated Electronics, Inc.*
 Contact East, Inc.*D
 The Current Source*D
 Dalbani Corporation*D
 Dazor Manufacturing Corp.
 Digi-Key D*
 East Coast Transistor*D
 Edroy Products
 Electro Tool, Inc.
 Electronic Prod. Specialties
 Electronic Parts Supply*D
 Electroservice Laboratories
 Foley-Belsaw*D
 Harco Electronics*D
Herman Electronics*D80
 HMC - Hub Material Co.*D
 Hosfelt Electronics, Inc.*D
 Jameco Electronic Components*D
 JDR Microdevices*D
 W.S. Jenks & Son*D
 Jensen Tools, Inc.*D
 Luxo Corp.
 Marshall Industries*D
M.A.T. Electronics*D75
 MCM Electronics*D
 O.C. White
 Print Products International
 RNJ Electronics Inc.*D
 RS Electronics*D
 Specialized Prods Company*D
 TechAmerica*D
 Techni-Tool Inc.*D
 Teclab
 Time Motion Tools*D
 Union Electronics Distrib*D
 Waldmann Lighting Company
 Zack Electronics*D
 Zack/Joseph Electronics*D

SHELVES/RACKS/BINS

Arrow Electronics
 Bi-Tronics Inc.
 Bonkote America, Inc.
 Computer Component Source*D
 Contact East, Inc.*D
 The Current Source*D
 Electronic Prod. Specialties
 Electronic Parts Supply*D
 Electroservice Laboratories
Herman Electronics*D80
 HMC - Hub Material Co.*D
 Hosfelt Electronics, Inc.*D
 Hy Tec Dealer Service
 JDR Microdevices*D
 W.S. Jenks & Son*D
 Jensen Tools, Inc.*D
 JIT Resources, Inc.
 M-Tronics*D
 Marshall Industries*D
M.A.T. Electronics*D75
 MCM Electronics*D
 RNJ Electronics Inc.*D
 Snap-On Incorporated
 Specialized Prods Company*D
 Techni-Tool Inc.*D
 Teclab
 Tektronix, Inc.
 Time Motion Tools*D
 Trace Racks
 Union Electronics Distrib*D
 Zack Electronics*D
 Zack/Joseph Electronics*D

**SOLDER/DESOLDERING
 BRAID/FLUX**

Ames Supply Co.*D
Andrews Electronics*D8
 Antique Electronic Supply*D
 Arrow Electronics
 Aven Tools, Inc.
 Vance Baldwin Inc.*D
 B-B&W Electronics*D
 Bursma Electronic Distrib.*D
 C&S Sales*D
 Chemtronics
 Cleveland Inst. of Electronics
 Computer Component Source*D
 Consolidated Electronics, Inc.*
 Contact East, Inc.*D
 The Current Source*D
 Den-On Instruments (USA), In
 Digi-Key D*
 Diversified Parts*D
 East Coast Transistor*D
 Eiger Electronics*D
 Electro Tool, Inc.
 Electro Dynamics, Inc.*D
 Electronic Prod. Specialties
 Electronic Parts Supply*D
Electronix Corp.*D80
 Electronix Express*D
 Electroservice Laboratories
 Elenco Electronics, Inc.
 Excel Distributing*D
 Foley-Belsaw*D
 Fox International*D
 Galco Industrial Electronics
 Global Micro-Parts Depot*MD
 Harco Electronics*D
Herman Electronics*D80
 Hexacon Electric Co.
 HMC - Hub Material Co.*D
 Hosfelt Electronics, Inc.*D

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Metric Supply*D	Hosfelt Electronics, Inc.*D	Harco Electronics*D	Dremel
Mouser Electronics*D	Hy Tec Dealer Service	Heath Company	East Coast Transistor*D
Multicore Solders	Jameco Electronic Components*D	Herman Electronics*D 80	Eiger Electronics*D
Nationwide Electronics	JDR Microdevices*D	HMC - Hub Material Co.*D	Electro Tool, Inc.
P.K. Neuses*D	JDV Products Inc.	Hosfelt Electronics, Inc.*D	Electro Dynamics, Inc.*D
M.M. Newman Corporation	W.S. Jenks & Son*D	Hy Tec Dealer Service	Electronic Prod. Specialties
O.K. Industries, Inc.	Jensen Tools, Inc.*D	Jameco Electronic Components*D	Electronic Parts Supply*D
Oldaker Corp.	Jonard Industries Corp.	JDR Microdevices*D	Electronix Corp.*D 80
Omega Engineering, Inc.	Kelvin Electronics*D	JDV Products Inc.	Electronix Express*D
Omnitron Electronics*MD	Klein Tools, Inc.	W.S. Jenks & Son*D	Electroservice Laboratories
PACE, Inc.	M-Tronics*D	Jensen Tools, Inc.*D	Elenco Electronics, Inc.
Parts Express International*	Marshall Industries*D	Jim-Pak*D	The Eraser Company, Inc.
Philips ECG	MCM Electronics*D	JIT Resources, Inc.	Excel Distributing*D
Plato Products, Inc.	P.K. Neuses*D	Jonard Industries Corp.	Foley-Belsaw*D
Portasol, Inc.	Omega Engineering, Inc.	Kasco Distributing*D	Fox International*D
Premium Parts+ Electronics Co*	Omnitron Electronics*MD	Kelvin Electronics*D	Galco Industrial Electronics
Print Products International	Platt Luggage, Inc.	Klein Tools, Inc.	GC Electronics*D
RNJ Electronics Inc.*D	Premium Parts+ Electronics Co*	M-Tronics*D	Global Micro-Parts Depot*MD
RS Electronics*D	Print Products International	Marshall Industries*D	The Granite Corp.
Snap-On Incorporated	RNJ Electronics Inc.*D	MCM Electronics*D	Willi Hahn Corp U.S.A.
SAT/ A SPIRIG CO.*D	RS Electronics*D	Moody Tools, Inc.	Harco Electronics*D
Specialized Prods Company*D	Snap-On Incorporated	P.K. Neuses*D	Herman Electronics*D 80
Sun Equipment Corporation	Specialized Prods Company*D	Omega Engineering, Inc.	HMC - Hub Material Co.*D
Tandy National Parts*D	Spencer Industries	Omnitron Electronics*MD	Hosfelt Electronics, Inc.*D
TechAmerica*D	Sun Equipment Corporation	PC Service Source*D	Hy Tec Dealer Service
Techni-Tool Inc.*D	Tandy National Parts*D	Premium Parts+ Electronics Co*	Jameco Electronic Components*D
Tenma Test Equipment	Techni-Tool Inc.*D	Print Products International	JDR Microdevices*D
Time Motion Tools*D	Time Motion Tools*D	RF Industries	JDV Products Inc.
Tritronics, Inc.*D 80	Tritronics, Inc.*D 80	RNJ Electronics Inc.*D	W.S. Jenks & Son*D
Tucker Electronics Co.	Tucker Electronics Co.	RS Electronics*D	Jensen Tools, Inc.*D
Ungar, A Rubbermaid Co.	Union Electronics Distrib*D	Snap-On Incorporated	Jim-Pak*D
Union Electronics Distrib*D	Weller/Cooper Tools	Specialized Prods Company*D	Jonard Industries Corp.
Wahl Clipper Corporation	Wholesale Electronics Inc.*D	Spencer Industries	Kasco Distributing*D
Weller/Cooper Tools	Wiha Tools	Sun Equipment Corporation	Kelvin Electronics*D
Wholesale Electronics Inc.*D	Zack Electronics*D	Tandy National Parts*D	Klein Tools, Inc.
Xytronic	Zack/Joseph Electronics*D	TechAmerica*D	M-Tronics*D
Zack Electronics*D	Zero Corp., East Div.	Techni-Tool Inc.*D	Marshall Industries*D
Zack/Joseph Electronics*D		Time Motion Tools*D	MCM Electronics*D
		Trompeter Electronics	Micro Care Corp.
		Tucker Electronics Co.	Moody Tools, Inc.
		Union Electronics Distrib*D	Mouser Electronics*D
		Weidmuller Inc.	Nationwide Electronics
		Weller/Cooper Tools	P.K. Neuses*D
		Wholesale Electronics Inc.*D	O.K. Industries, Inc.
		Wiha Tools	Omega Engineering, Inc.
		Zack Electronics*D	Omnitron Electronics*MD
		Zack/Joseph Electronics*D	PanaVise Products
			Parts Express International*
			Portasol, Inc.
			Premium Parts+ Electronics Co*
			Print Products International
			RF Industries
			Ripley Company
			RNJ Electronics Inc.*D
			RS Electronics*D
			Smithy Co. 80
			Snap-On Incorporated
			Specialized Prods Company*D
			A.W. Sperry Instruments, Inc
			Sun Equipment Corporation
			Tandy National Parts*D
			TechAmerica*D
			Techni-Tool Inc.*D
			Time Motion Tools*D
			Tritronics, Inc.*D 80
			Tucker Electronics Co.
			Ungar, A Rubbermaid Co.
			Union Electronics Distrib*D
			Virtual Industries
			Weidmuller Inc.
			Weller/Cooper Tools
			Wholesale Electronics Inc.*D
			Wiha Tools
			Zack Electronics*D
			Zack/Joseph Electronics*D

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Electroservice Laboratories	RF Parts*D	Video Display Corporation	Arrow Electronics
Excel Distributing*D	RNJ Electronics Inc.*D	Wholesale Electronics Inc.*D	Vance Baldwin Inc.*D
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ES&T Calendar

1999 All Service Convention
 March 10-14
 Radisson Resort Parkway Hotel
 Orlando, FL
 Sponsoring Associations:
 Professional Service
 Association — PSA
 Electronics Technicians
 Association — ETA
 Florida Electronic Service
 Association — FESA
 Satellite Dealers
 Association — SDA ETA
 604 N. Jackson, Greencastle, IN 46135
 765-653-8262 • Fax: 765-653-4287
 e-mail: eta@indy.tdsnet.com
 Website: http://www.eta-sda.com

Tri-States Annual State Convention '99
 March 11-14, 1999
 Hood River Inn
 Hood River, OR
 Mike McCray (OR)
 503-288-5356 • Fax 503.288.0359
 mmccray @cowboyz.com

Electronic Distribution Show: EDS '99
 May 18-20, 1999
 Educational Programs May 17th
 Las Vegas Hilton Hotel
 Las Vegas, NV

PCS '99
 September 22-24, 1999
 New Orleans, LA
 703-739-0300

Association/educational services directory

Note: An entry followed by *D means that this company is a distributor, not a manufacturer. An entry followed by a *MD means that this company is both a manufacturer and a distributor.

A line listing that is in color indicates that the company has an ad in this issue. The number following the listing is the number of the page on which the ad is located. BC means Back Cover; IBC means Inside Back Cover; IFC means Inside Front Cover.

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D.A.T.A.	JIT Resources, Inc.	Hitachi Home Electronics	Universal Electronics
Diversified Parts*D	Learning Group International	ICM Components*D	Utilimaster
Dynamic Learning Systems	Micro 2000, Inc.	ISCET	York Chemical
East Coast Transistor*D	Nat'l Assoc. of Svc Dealers	JDR Microdevices*D	JDV Products Inc.
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IC Master	United Servicers Association		
ISCET79	Warrantech Corp.		
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Mouser Electronics*D	SBS Direct		
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Sun Equipment Corporation	World College		
Tab Books			
A.G. Tannenbaum*D			
Tech Assist, Inc.			
TechAmerica*D			
Tektronix, Inc.			
Tritronics, Inc.*D			



Electronics Technicians Association

and

Satellite Dealers Association

In Conjunction with

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The convention for electronic and appliance service dealers and technicians.

Orlando, Florida, March 10-14, 1999

The All Service Convention will include an all day trade show, informative technical and management seminars, and training forums.

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For more information contact **ETA** at 765-653-8262 or 765-653-4301

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Greencastle, IN 46135
Fax: 763-653-4287
e-mail: eta@indy.tdsnet.com
Web site: www.eta-sda.com







Circle (64) on Reply Card

Company mailing addresses

- A**
- A-Tech Electronics**
198 Lincoln Highway
Fairless Hills, PA 19030
215-949-0400
Fax: 215-949-0403
E-mail: A_tech@juno.com
Website: <http://www.a-tech-inc.com>
- Abbot, Langer & Associates**
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Crete, IL 60417
708-672-4200
Fax: 708-672-4674
E-mail: Slanger@abbot-langer.com
- ACCSCCT**
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Arlington, VA 22201
703-247-4142
Fax: 703-247-4533
E-mail: Info@accsct.org
Website: <http://www.accsct.org/>
- Accurite Technologies Inc.**
48460 Lakeview Blvd
Fremont, CA 94538
510-668-4900
Fax: 510-668-4905
E-mail: Sales@accurite.com
Website: <http://www.accurite.com>
- Accutest Instruments, Inc.*D**
1 Crown Plaza
Hazlet, NJ 07730
732-203-0890
800-524-0747
Fax: 732-203-0893
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Fax: 203-481-8937

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Fax: 609-921-7691

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619-258-7303
800-824-4226
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Bensenville, IL 60106
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Website: [Http://www.prostatcorp.com](http://www.prostatcorp.com)

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E-mail: Hcprotek@aol.com

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Marlborough, MA 01752
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800-253-1230
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E-mail: Sales@quadtechinc.com
Website: [Http://www.quadtechinc.com](http://www.quadtechinc.com)

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847-888-0450
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800-327-1237
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Ripley Company

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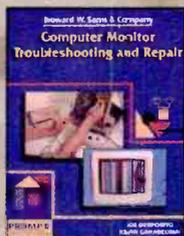
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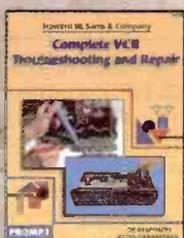
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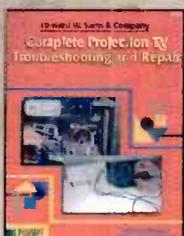
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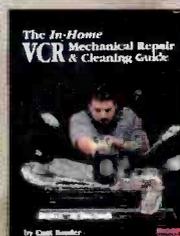
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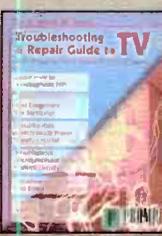
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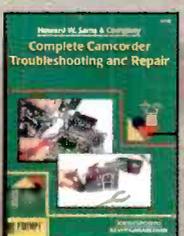
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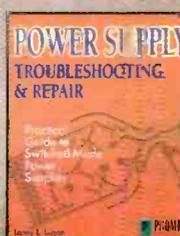
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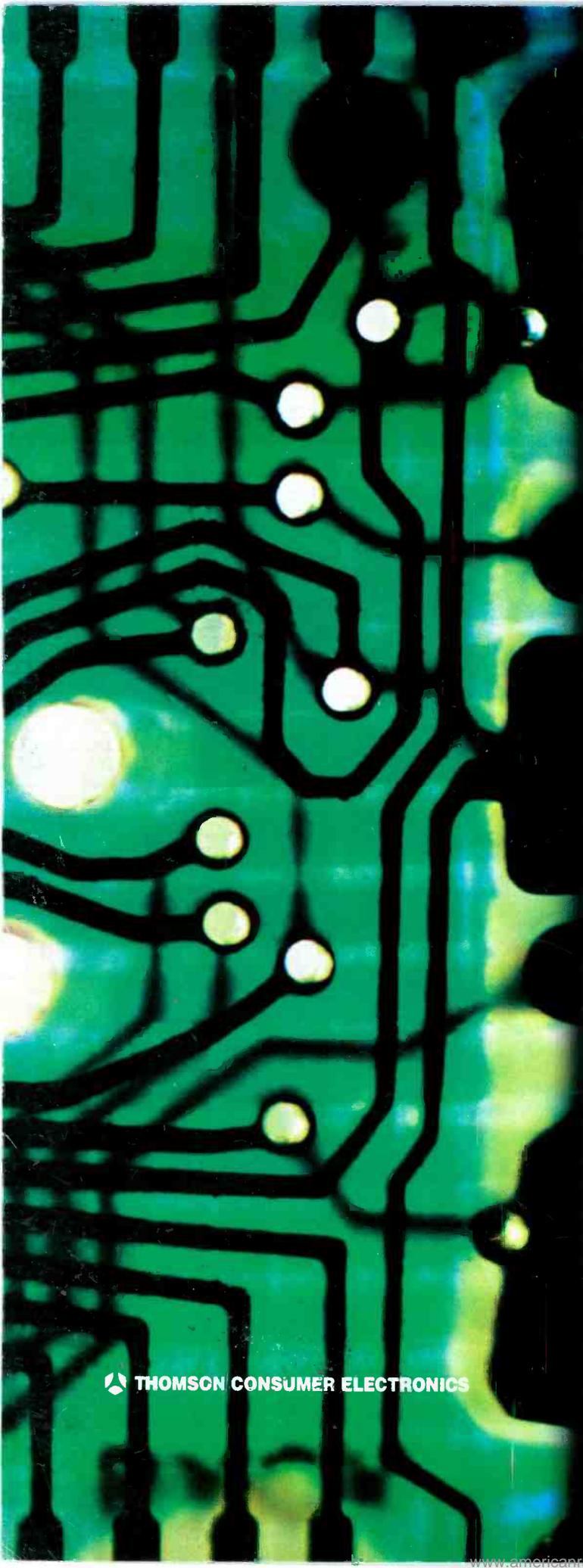
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