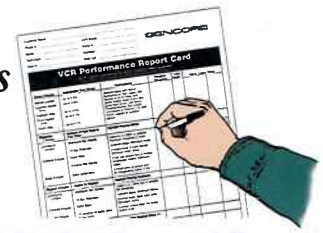
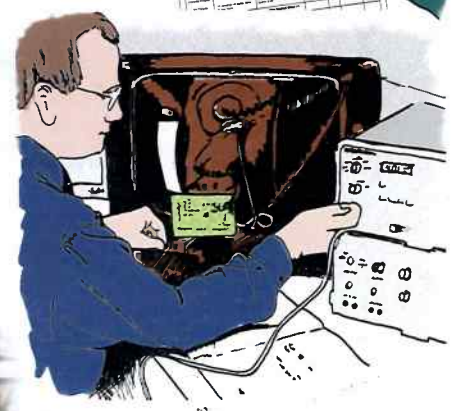
SENCORE NEWS

Issue #169 March/April 1995

Plan Your Strategy...

Estimates and Repairs





Customer Relations

Promoting Your Business

Training

There Is More To Running A Successful Service Center Than Repairing TVs And VCRs

See Page 9

Selling Your Services

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When Substituting For The Horizontal Output Transistor....

There Is No Substitute For The TVA92 TV Video Analyzer!

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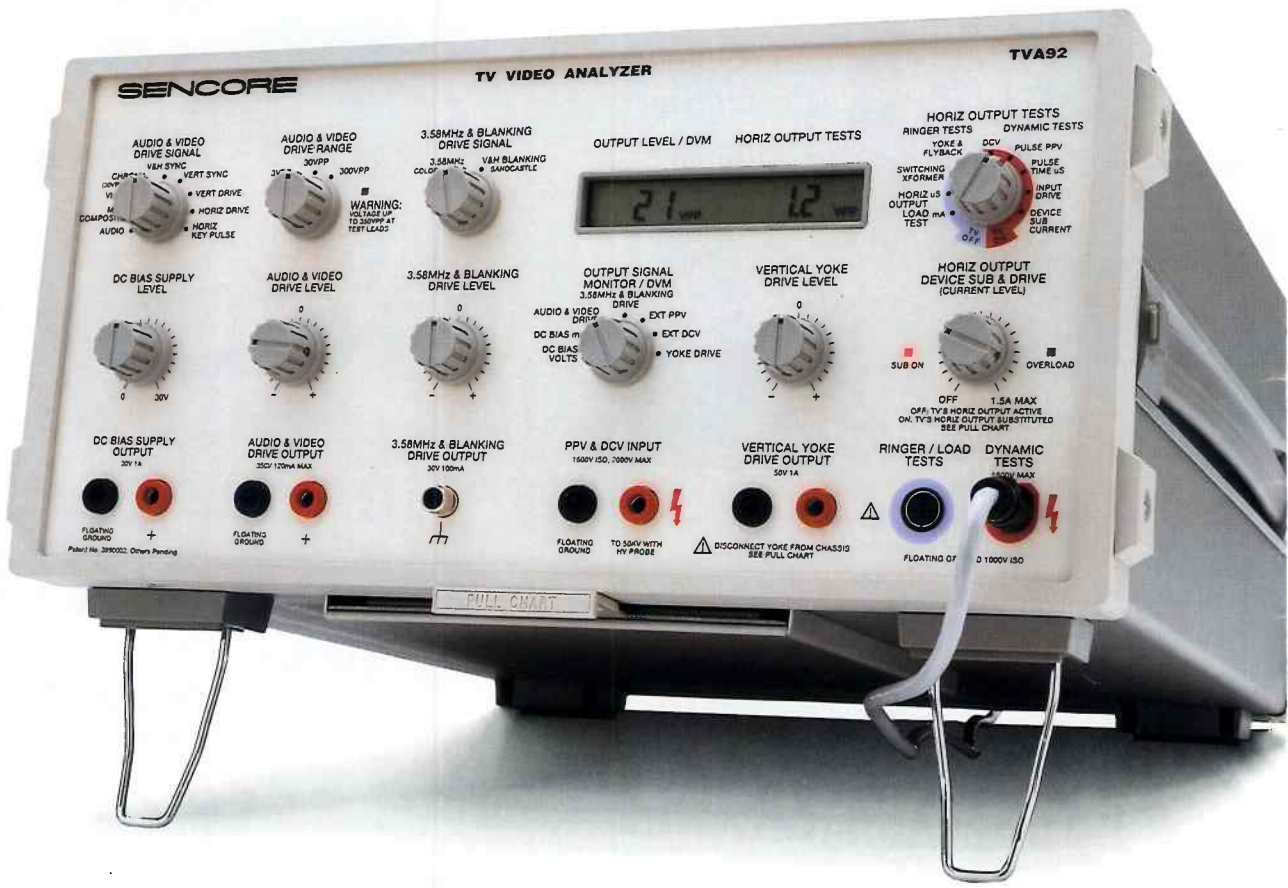

** The TVA92 is a companion unit to the VG91 Universal Video Generator.*

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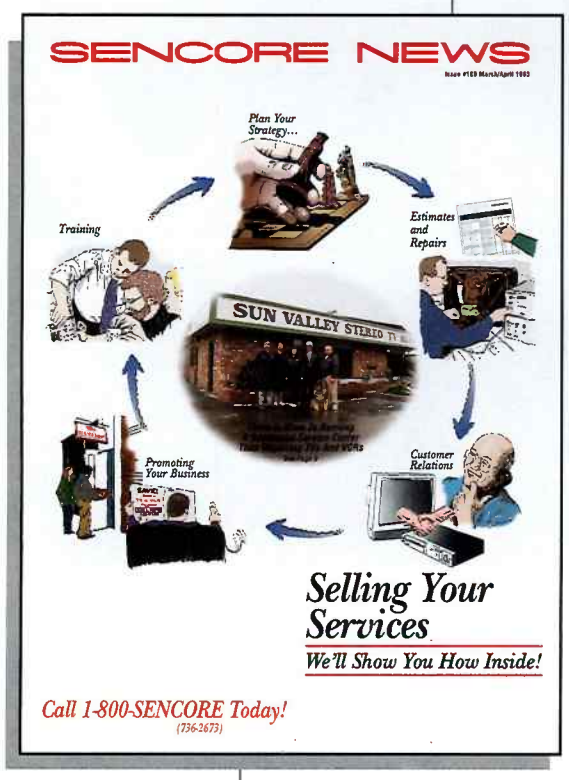
Selling Your Services – How Important Is It?



By George Gonos
Marketing Manager
Sencore Electronics

It was the summer of 1969 and I was barely a teenager back when I got my first glimpse of what I wanted to become in life. A family friend, Jimmy, owned the local electronics service center – primarily servicing stereo equipment and black and white TVs (color TV back then was a real treat). Jimmy was a one man shop – always eager to "fix" things. He was the ultimate tech in the neighborhood. Back then, Jimmy wanted to be the best – he loved his diplomas and certificates – always keeping them dusted off and prominently displayed. A bench full of exotic equipment with buttons, knobs, switches, lights, and oh-boy screens with green lines on them were all over his bench. And, he knew what every switch did. He knew what the green lines meant – he was a tech – he was my hero – he was what I wanted to be!

I used to experiment (more like play) with AM transmission at the time (with a wire strung between two houses to use as an antenna) and he used to help me with parts (my AM modulator/amp was right out of a communications 101 book – needless to say it had been through a teenager's soldering war). Jimmy was a strong tech, but he had a huge weakness – a weakness that he recognized but chose to do nothing about. He loved to repair, but hated dealing with customers. "They (the customers) get in the way of what I do best" he used to say. The people in the neighborhood loved his work but cringed every time they had to drop off a unit. Let's face it – Jimmy was near anti-social. Today, Jimmy works for the service center that opened three blocks away. The fellow who owns it deals with customers in a jovial way. Jimmy is in the back doing what he likes to do – repairing equipment. And he is making money for someone else – someone who could be effective in dealing with the people who pay the bills – dealing with customers.

Life works in mysterious ways. I always wanted to learn all about those green lines and all of the switches and buttons, so I went to engineering school (learned how to spell oscilloscope) and, for a few years, I designed various gadgets for the communications and defense industry. Eventually, I moved into service and then sales and marketing. As I look at the service industry today, working for Sencore – a company that leads the way in consumer electronics service equipment – I have a very similar perspective of what service is all about. Understanding electronics – the magic that most of us love – is only a small part of the game. The real skill is the ability to create, maintain, and increase a customer base that will support service operations indefinitely. The key is to understand who the real boss is and treat him accordingly. The key is successful, long lasting customer relations.

It is said that people do not appreciate something until they lose it, so, before we proceed, let's see if we can gain a good understanding of what it means to lose a customer:

- Lose all potential future business from the customer.
- Lose potential future word-of-mouth advertising from the customer.
- Get negative publicity from the lost customer.
- Lose your competitive edge – the customer will use another service center and the profits that your competitor gets from your customer will be used to advertise – possibly advertise to get more of your customers.
- Finally, consider all of the promotion investment you made to get the customer to begin with. All of this is also lost.

As you can see, losing a customer is possibly one of the worst things that can happen to a service business. Now, how do we lose a customer? (Jimmy once chased a customer out of the shop with a hot soldering iron.)

Well, the most obvious is to have a drag out fight with the customer over a repair bill. Most shops have an estimate and work approval process to avoid these issues and we are all smarter than to get into a fight with our customer. Now, let's see if we can list some of the more "subtle" ways that we can lose a customer and not even know it:

Not Worth Repair: Your customer comes in the shop looking to repair a unit. You play it safe and estimate high because you do not want to get stuck with an unprofitable repair. The

On The Cover

Selling your services is an essential part of the success of your business. This issue shows you how to make your services more attractive to your customers with sound business practices, new ideas, and helpful hints.

In This Issue

customer leaves – claims that it is not worth it and he'll buy a new unit. He walks to the next service shop and he gets a better estimate and repairs his unit there. Good-bye customer – forever – and hello bad publicity. In this customer's mind, you were trying to rip him off!

Cannot Repair: Customer walks in with a camcorder or a computer monitor. You do not repair/handle these, but the shop down the street does. So, you send the customer down the street and the next time he needs to repair a TV or VCR, he'll go back to the shop that handled his camcorder or monitor. After all, the shop that handled the camcorder (or monitor) seems to be the more sophisticated service establishment. Good-bye customer and hello more word-of-mouth advertising for the competition.

Delayed Repair: You promise the customer his set back by Friday. After the customer calls a couple of times, you let him know that you'll be a few days late. The customer receives his set a week late. Is he coming back? It all depends on how you handled it.

Let's take these three situations, one at a time, and see if we can use some sales "savvy" to address these issues for the mutual benefit of our customer and of our service center.

Not Worth Repair

First, we need to realize that "price" and "value" are not the same thing. A can of soda pop is priced at fifty cents out of a vending machine and most people pay this price for the refreshment it provides. What is the value of a can of soda pop in the middle of the Sahara? Not much if you have a flask of water with you – but it's worth a life if you're out of water in the middle of nowhere. It is the same with the price that you quote – to you, price is revenue, but your customer must see "value" in the repair before he purchases your services. Does the customer have an alternative (i.e., buying new instead of repairing) and is the alternative a reality or is it just an excuse to go out and get another quote from the next service shop?

As an experienced service professional, you know which sets are "worth" repairing and which ones are not worth it. Your customer is not always aware of this – in fact, sometimes he may even be mis-informed. You must be up front with your customer and provide him with the knowledge he needs to make the decision – you are not just a service tech – you are a service consultant. Estimating high just to make sure that you do not get stuck with an unprofitable repair may be the answer that benefits your business for the short term, but it does very little for customer service (and we talked about the cost of losing customers). Discussing this issue with your customer and spending a little extra time to provide a better, more accurate estimate is the way to keep the customer coming back. In situations where the repair estimate (the dollar amount) will determine whether the customer repairs his unit with you or buys new, you could:

1. Discuss the customer's value perception of the set. Is it his main set in the living room or is it a secondary set for the den? Can he wait an extra few days for the repair or does he need the set right now? This will help you understand the need that the customer has for the set. If he needs it right away, you may be forced on providing a high estimate to protect yourself. If he is willing to wait for a couple of days, you may be able to get the job done at a mutually beneficial price.

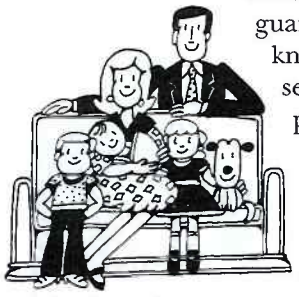
2. Let your customer know that you understand his position and that you appreciate the fact that he is trying to make a decision – make him believe that you want to provide accurate information (an accurate estimate) for him to make an accurate decision. You want to be as up-front as possible.

3. Let the customer know that this may be a very inexpensive or a very expensive repair and you won't really be able to provide an estimate until you look into the unit a bit further. Explain the cost associated with estimating the unit and explain that there is a small charge he'd have to incur for an accurate estimate (the estimate charge is waived if he chooses to repair the unit). Try to find out what the customer is willing to spend to repair the unit and assure him that you'll try to squeeze the invoice to fit his needs if possible.

4. Take the time and estimate the repair properly (you need the right tools to be efficient at this, but that's a subject for a different article). If the estimate is reasonable and you feel that the customer will give you the job, call him and get permission to do the repair. If you feel that the estimate is too high and he will not go for the repair, be up front – tell him what the estimate is and advise him that he may be better off to buy a new set. This

may sound altruistic and not conducive to good business practices but consider your customer's perspective. Your customer thinks of you as a professional, as a knowledgeable technical consultant and will trust you with the next job.

5. As you discuss these issues with your customer make sure that you mention the benefits associated with the repair of his set - build the value of your services. Let the customer know that you will guarantee your work, let him know about the complete service that you will perform - tests and alignment - to bring the unit back to "near new" working condition. Communicate your concerns on safety and let him know how your service center is dedicated to ensuring that the repaired equipment is safe - safe to protect himself and his family. Building the value of all these services in the customer's mind makes your estimated "price" seem less expensive.



Cannot Repair

How many techs do you know that have spent a whole night trying to repair something near worthless just for the challenge of it? How many of us have spent hours on obscure technical challenges just because we were too proud to give up? Let's face it - athletes train hard to achieve higher standards and get a gold medal; lawyers work hard to win one more case; doctors study hard to keep up with their field and repair "humans" - and, we do much of the same - we train ourselves on the latest technologies, we study new methods and we have the inherent need (much like all other professionals) to succeed at what we do. Yet, we feel perfectly content to tell one of our own hard earned customers that we do not repair a specific type of equipment (i.e. camcorders, computer monitors etc). How do we keep the customer from leaving our establishment in favor of another service center that does repair camcorders or monitors?

Well, the obvious solution is to provide the services ourselves; but, there is an interim solution:

1. Develop a relationship with a shop that repairs camcorders or monitors (or whatever equipment that you get service requests for). Make sure that the shop provides you with better rates, a defined turnaround time and the same (or similar) warranties that you provide your customer. Keep track of the amount of business you lose or send to another service center for handling. If the demand is steady you may want to consider expanding your service business into the new technology (for example, it takes repairing two camcorders per week to cost justify getting into the business - only one per week if you are already doing VCRs - again, a subject for a different article).

2. Tell the customer that you do not handle that particular product but you would be glad to send it out to an associate who does. Explain that he would receive the same type of warranty he has always received from your service center and that you would handle the estimate and invoicing yourself - it would be as if you repaired the unit yourself.

3. If the customer chooses to use your service center for handling - great! You handle the unit and add on a service handling charge to the invoice. Remember - building value - people are willing to pay for piece of mind - knowing that your service center is handling the repair provides that piece of mind - especially when the customer has received satisfactory service from you before.

4. If the customer chooses to go to another service center - apologize to him. Tell him that you are sorry you cannot service his needs and that you hope you'll be able to help him in the future and give him a coupon ($5 or $10 savings) toward his next repair in your shop. This way, even if he does give his business to another service center he still has a reason to come back to you for his other repairs.

Delayed Repair

This should not happen but it does. An important account bumps other repairs, parts do not arrive on time, mis-diagnosed problems requiring additional parts and the list goes on and on. How you handle a customer waiting for his set is critical in maintaining the customer.

1. As soon as you are aware of the delay you must inform the customer. Do not wait for the customer to call and find out that his unit will be delayed - be proactive.

2. If the delay is going to cause additional costs (more parts/labor) that you will have to add to the invoice and exceed the estimate - you need to inform the customer of both the price difference and the delay. Failure to do this is what causes "uncomfortable" situations and eventually confrontations between the customer and the service center.

3. In discussing delays with your customer you need to make sure that you communicate your desire to service his unit in the highest quality possible and that the delay is a result of a better service process that will ultimately provide better, more dependable service to his unit. Build, build, build value - it will help the customer feel that the invoice and the extra time was well worth it.

4. In the event that the customer's unit was bumped because of another, more important, service job, you can be a bit more generous. If you have to bump a customer's unit, try to select a customer that is not eager for his unit. Possibly a customer who is willing to wait for an estimate (as discussed earlier). Don't be afraid to provide an additional discount for the delay - this will keep the customer satisfied and will ensure that you get the job - albeit at a slightly reduced price.

There are many more situations and different variations that come up every day in customer relations. Is there an answer to these issues? Is there a way to handle these situations without losing the customer and still stay profitable? You bet there is. That is what "selling" is all about. It is the art of persuasion - the ability to make your customer understand that the services you provide are valuable to him (not to you) and are worth the investment he is making. There is a proven process that you can use to "sell" your services - we call it the DDT process and it stands for:

Determine the need
Discuss the solution
Tell about the service

In the next few issues of the Sencore News we will be concentrating on explaining the DDT process and how it can work for a service center. In addition, we will be following up on our "Strategic Planning" (last issue - Sencore News 168) and will be discussing some of the hottest issues surrounding service center operations such as:

Business Promotion: Making the public aware of these services and providing a reason for the customer to visit the service center - thus building a customer base.

Training: Ensuring that people are competent at what they do so that they can effectively and efficiently provide services to the customer.

Estimates And Repairs: Ensuring that the equipment and methods are available to get the service job done.

Customer Relations: Ensuring that the customer base is maintained and serviced - keeping customers coming back and augmenting business promotion with word-of-mouth advertising.

As we move into the end of the century, we find a service industry that is changing - shaping itself to deal with the challenges of a diverse economy in a high technology arena. Understanding our business from the customer's perspective is a huge challenge - for us as a test equipment company and for our customers as service professionals. We will examine all of these issues together - as it should be - sharing ideas with you our customers, and helping you deal with your customers. After all, isn't it true that your customers are really our indirect customers as well?

As we explore the arena of service business and pick through the vast selection of subjects to discuss in our articles, we would like your help. If you have a specific question or see an apparent need that is not being addressed in our work, please let us know. In today's agile business world we want our Sencore News to be up to date with information that you want to read about. Call us at **1-(800)-SENCORE (736-2673)** and speak to your Area Sales Representative, to a Merchandising Specialist or to our automated Customer Feedback Line (ask for ext. 545). We are waiting for your call. ■

The Secret Weapon To Giving Accurate Estimates

By Brad Johnson
Communications Product Marketing Specialist
Sencore Electronics

Look around your service area. Are there unrepaired TVs sitting around that don't belong to you, but nobody has come around to pick them up? Why didn't those potential customers come back to get their set?

You probably know the answer, but maybe you don't want to believe it. It's easier to accept that they can't afford the repair charges right now rather than admit the estimate you gave encouraged them to buy new versus repairing their old set. But you had to give a high estimate to make sure you didn't get stuck with an expensive component that wasn't part of your estimate. Did you know there's a way you can protect yourself from this scenario?

In this article, we've outlined some methods and strategies to follow that will protect your service center from becoming a storage area for unrepaired sets. By running a few simple performance and diagnostic tests before giving your estimate, you can have the confidence you need to give an estimate that will be accurate even after the repair is finished. You'll increase your approved estimate rate, increase your profits, and your service center won't become a graveyard for deceased TVs.

Take Out Your Secret Weapon

If you were to ask 10 technicians where they spend a majority of their television troubleshooting time, 8 of 10 will tell you "shutdown problems." But are they really all shutdown problems? Some are startup, shutdown, and vertical drive, while some are switch mode power supply problems. The reason for some of the confusion is simple. It is difficult to diagnose all these problems accurately without making some assumptions and/or guesses.

The real problem is that all these types of problems can cost you right from the beginning. How can you provide an accurate estimate to the customer when you're staring at a blank television screen? Here's where you take out the dice and give them a roll, or go to your secret weapon - the TVA92 TV Video Analyzer.

The TVA92 isn't really a secret weapon, but it can save you from losing your behind on estimating all types of TV vertical, horizontal, and power supply problems. As we mentioned earlier, it is very difficult to diagnose something you can't see, and in the case of a shutdown problem, it takes longer to hook up your probe than for the television to go into shutdown. This leaves you no time to make voltage or waveform measurements.

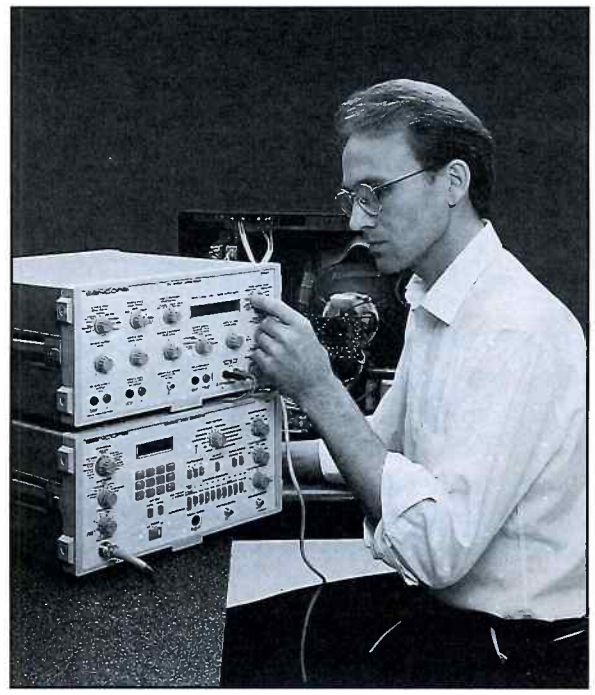


Fig. 1: The TVA92 TV Video Analyzer can help you save money by providing faster and more accurate estimates.

You can make a guess and replace the burnt parts, but you run the risk of burning up these new parts. Will the customer pay for those parts willingly? The other alternative is to over-estimate the cost of repairing the television to protect yourself against the worst case scenario, but then you run the risk of having the customer say, "That's too much for this TV, I'll just buy a new one." That leaves you standing there with no work and bills to pay.

To prevent this situation from happening, consider trying the following methods and procedures, some of which use your VG91 Universal Video Generator and TVA92 TV Video Analyzer. Using these methods guarantees you'll have less headaches and greater success in transforming estimates into profits for your pockets.

Before you give the customer an estimate or begin any troubleshooting, you should performance test the television to confirm the customer's symptoms. A good rule of thumb is to test the major (expensive) components first. Let's face it, if one of these components are bad, the chances of your customer wanting to follow through on the repair are reduced significantly.

Let's begin with the CRT. If it is an older set, it's best to test the CRT before going any further. A set with a bad CRT is going to be very expensive to repair. And when the cost of a new set is comparable to the cost of replacing a CRT, chances are you won't be repairing that set for a customer. In the cases where the CRT tests good,

Sencore Tech Talk

Don't Forget The CRT

Another expensive part in a television is the cathode ray tube (CRT). A bad CRT produces several common symptoms which are easily observed on the picture screen. However, the same symptoms that are produced by a bad CRT may also be the result of a problem that is external to the CRT. Here are some examples:

Dark or dim picture: This could result from a CRT with weak emission, a shorted gun element, or an open cathode (K). Other possibilities include wrong bias, insufficient second anode voltage, low or missing filament voltage, or a problem in the video circuits.

Dark blacks and overdriven whites: A weak CRT gun could result in non-linear light output from the tube (called bad "gamma"). The same symptoms are also caused by problems in the video amps, or wrong bias voltages to the tube.

Bad color tracking or gray scale: A tri-color CRT that has a weak gun will produce a picture that cannot be color balanced. Instead of pure whites and shades of gray, the picture may look reddish, greenish, etc. Misadjusted background or bias controls, or a defective chroma demodulator also produces these symptoms.

Intense color: Another symptom possibly caused by a defective CRT is a bright colored rastor that cannot be adjusted. This may result from a short inside the CRT, or an open control grid. An external defect such as a shorted driver may also cause the symptom.

Test the CRT First

Never assume that the CRT is at fault based only on the fact that it produces a bad picture. Before you attempt to restore a tube, always test it first with the CR70 "BEAM BUILDER." The CR70 dynamically tests CRTs with the most thorough and accurate tests anywhere, including tests for:

1. H-K Shorts
2. G1 Shorts
3. Cutoff
4. Emission
5. Emission Life
6. Color Tracking

By testing the CRT with the CR70 before you make the estimate, you'll be absolutely certain of the CRT's condition. The CR70's dynamic tests indicate the true condition of any CRT - from TV CRTs to camera tubes.

Deciding Which Restoration To Use

Different CRT gun failures require different levels and types of restoration, as determined by the CR70 test results. The CR70 provides five different levels of restoration and shorts removal to match the CRT gun failure. The table below lists the restoration method you should use based upon the tube's test results. A detailed explanation of these methods of restoration is included in Tech Tip #156. Call **1-800-SENCORE** for your FREE copy.

CR70 Test Results				CR70 Restoration Procedure
Cutoff	Emission	Life	Tracking	
Good	Bad			Auto Cycle, then MAN1 if still weak.
Bad	Good			Auto Cycle once.
Bad	Bad			Auto Cycle, REJUV if less than 20 mA restore current.
Good	Good	Bad		Auto Cycle once.
Good	Good	Good	Bad	Auto Cycle lowest gun(s).

Table 1: Use the CR70 test results to determine which restoration procedure to use.

but shows marginal cutoff or a weak gun, you can rejuvenate it with your CR70 "BEAM BUILDER" and move on to the next high dollar area of concern. If the CRT is beyond repair, knowing that fact up front may save you hours of troubleshooting time, only to discover the CRT is bad at the end (see Tech Talk box).

The next section or area you'll want to check is the shutdown, vertical, and horizontal stages. Here's where your TVA92 TV Video Analyzer can pay for itself time and time again.

Whether you have a dead set or a set with marginal problems, the horizontal output transistor (HOT) is usually the best place to start testing or troubleshooting. The HOT is possibly the single most important test point in a TV. The horizontal output stage is the key to detecting power supply loading and "power up" problems. It's also responsible for taking current (power from the B+ supply) and transferring it to much of the TV circuitry through the flyback transformer. Plus, the timing action of the horizontal output stage determines the amplitude of the flyback pulse that is used to develop the TV's high voltage.

Can you see a problem here? If the HOT is shorted or open, the set is basically non-operational. And how do you make an accurate estimate on a set like this?

Fig. 2: The TVA92 detects high current loading and shorted conditions in the horizontal output circuit without even turning on the TV.

Enter the secret weapon, your TVA92. The TVA92 allows you to simulate the normal operation of the TV's horizontal output stage by substituting directly for the horizontal output transistor. Three simple connections and you're ready to completely test the vital horizontal section (and other sections) of any television.

The TVA92 also performs a circuit load test that allows you to detect high current loading or shorted conditions in the horizontal output or B+ supply circuits with no AC power applied to the TV. This exclusive test works by simulating the operation of the horizontal output stage while measuring the loading and timing of the resultant signals. You simply hook up three clips to the chassis, and test.

If you get a "GOOD" reading from the TVA92's Horizontal Output Load Test, you can confidently say that the IHVT and yoke are okay and move on to the next stage. If you received a "BAD" reading from the TVA92, you'll need to isolate whether it is the yoke, IHVT, or surrounding components using the TVA92's Ringing Test and conventional methods before you call the customer with an estimate. The problem may appear as if either the yoke or IHVT is shorted, but could be caused by an inexpensive diode, capacitor, or resistor. The rule here is to be sure before you call the customer. It could be the difference between

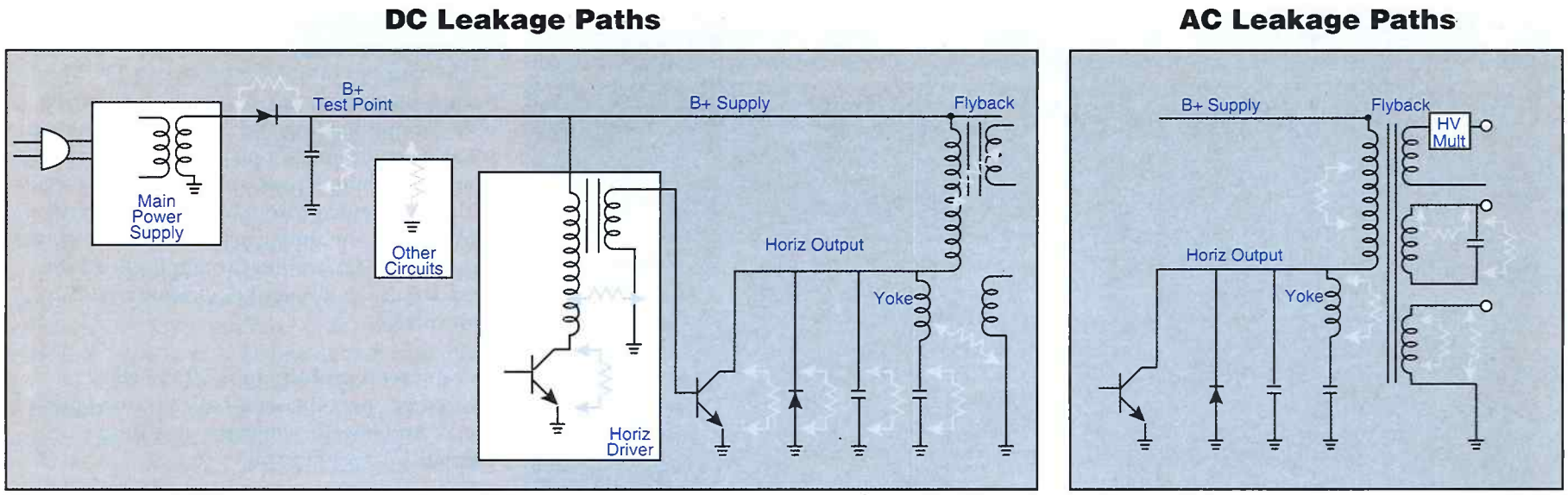


Fig. 3: Possible short or leakage paths which can load down the TV's B+ power supply.

finishing the repair and getting paid, or storing a TV for several months.

You'll also want to test the television's power supply before you make an estimate. Again, there are some expensive components here, and you will want to make sure you aren't surprised by an expensive oscillator IC or switching transformer before you give an estimate to the customer. Be sure to reference the chassis schematic for voltages and waveforms, as they will vary from chassis to chassis.

The tuner of the television is a section that will trip up many technicians. To replace a tuner these days is very expensive and once again can approach the cost of buying a new television once you add labor and replacement parts into the set. Once you have repaired any problems in the power supply, horizontal, or vertical stages, be sure to make a quick performance test of the tuner using your VG91 Universal Video Generator. With the number of channels that are now available from most cable companies, you'll want to test the set on the lower, midband, and hyperband channels. Testing the tuner section also allows you to review the picture clarity, color, and hue from a known good signal before you make your estimate to the customer. This could save you from callbacks once the customer gets the television back home and also provides a valuable customer service.

As you can see, the proper procedures and test equipment are essential in protecting yourself against inaccurate estimates, lost profits from high estimates, and wasted time troubleshooting the problem. Plus, they can help you with customer relations that can lead to improved business practices and referral business. If you'd like to learn more about clearing out your deceased TV warehouse while keeping profits in your service center, call your Area Representative at **1-800-SENCORE**, today and ask about the secret weapon! ■

Gene Tinsley must be doing something right. Every time I called Sun Valley Stereo/TV Repair in Sparks, Nevada (near Reno), the phone was ringing off the wall and Gene was swamped with work that just kept coming in the door. He says that's more of the "norm" around there and they don't really have any slow periods. After listening to his philosophies and ideas, I can see why. I hope you enjoy this issue's service center profile.

Why did you start in the servicing industry?

"I started working with various repair shops and industrial electronic troubleshooting, until I opened my own business, 14 years ago. I was always the type to tinker with things and tear them apart just to see how they worked. I suppose that led to my current profession along with the fact that I wanted to be my own boss."

How has your location affected your business success?

"Location really hasn't made much of a difference in our business. We've found that if you've got good word-of-mouth advertising, people will find you. Especially now that we're an established business, I don't believe our location is that important."

How do you advertise?

"We use Yellow Pages and word-of-mouth, like I just mentioned. We've had good luck with our Yellow Pages ad, but our business was built mostly on word-of-mouth and repeat business."

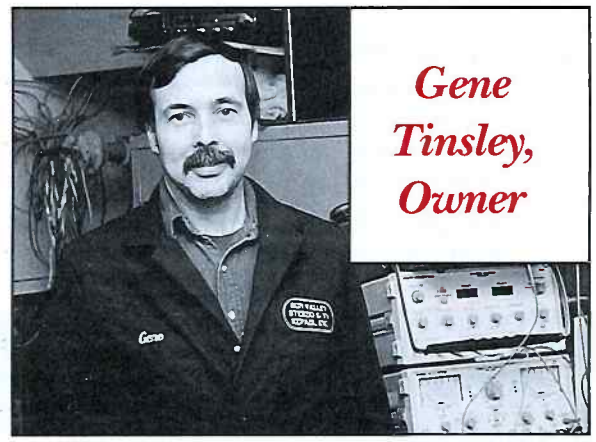
What products do you presently service?

"We service almost anything electronic. Naturally our biggest workload comes from TVs and VCRs, but we also do a lot of audio work, including stereos, CD players, and record changers. Our camera and camcorder business has also taken off, partly since we're really the only service center around here with the equipment for repairing these units.

I'm glad we started repairing computer monitors several years ago, too. Monitor repair has opened up a whole different market to us. We've also been doing quite a bit of projection television service. We try and service them in the home, if possible, but if we can't, we arrange for the transportation so our customer doesn't have to deal with it. Plus that gives us a little better control on how the TV is transported and when it comes in. Our antique radio service and restoration has also been a steady item for us."

What circuit do you consider the most challenging?

"The most challenging would be the new designs. Every time a new product comes out, we have to learn new circuits and new designs. My subscription to ES&T helps, but mostly I have to become familiar with these circuits by just working with them."



Gene Tinsley, Owner

List your three most important keys to business success.

"In my opinion, the three keys to business success would be:

By Larry Schnabel
Sencore News Editor

Sencore Electronics

Sun Valley Stereo & TV Repair, Inc.

Customer Name: Eugene Tinsley
Business Name: Sun Valley Stereo/TV Repair, Inc.
City: Sparks
State: Nevada
Years In Business: 14 years
Products Serviced: TVs, VCRs, stereos, tape players, cameras, antique radios, monitors, record changers, CD players, laser video disc
Number Of Employees: Gene, 1 technician (Joe), Aldean (mother) - office, Forrest (father) - marketing
Sencore Instruments Owned: VC93, CVA94, CM2000, PR57 (3), VA62A, SG80, PA81, SL750I, CR70, SC61

1. **Honesty.** We don't lead our customers on at Sun Valley and we don't promise things or prices we can't deliver. If we don't think an item is worth repairing, we'll tell them up front. I can't justify sticking a $60 repair bill on a $40 boom box. Some other shops may do this, but that's not our style.
2. **Quality.** We offer a six month warranty on our repairs. We've found this policy persuades more customers to have their products repaired. Sure, we might not make money on a few repairs, but in the long run, we generate more business and gain customer loyalty.
3. **Integrity to our customers.** We don't tell our customer anything we can't deliver. We do a good job on everything we send out the door. If we don't, we'll make it right. We're building long-term relationships at Sun Valley, we might not make money on the first repair, but we hope our integrity will bring the customer back for all his service work."

What do you do about customers who don't pick up their repairs?

"We sell or junk out repairs that aren't picked up and enter a history of the customer to our computer files. Our computer files help us keep track and "weed-out" the bad customers. Actually "non-desirable" customers would be a better term, but we don't have that much of a problem with this, mostly because we sell the repair up-front."

How do you combat the "buying new vs. repair" battle?

"We explain the differences of today's products vs. the products manufactured several years ago. Some of today's products just don't have the same quality standards compared to older equipment. We don't have too much trouble justifying $75-$100 to repair a product, as long as we convince the customer that the repair will result in several more years of reliable service. Our Sencore equipment, especially the VCR analyzer, has helped us out a lot in justifying VCR repair charges."

We're building long-term relationships at Sun Valley, we might not make money on the first repair, but we hope our integrity will bring the customer back for all his service work."

How has your business been able to grow while others have barely maintained or failed?

"Two things stand out in my mind. Our code of ethics and honesty has helped us build respect among our customer base. The other thing is the variety and quality of service we provide. We fix most electronic products, and we fix them right the first time. Customers don't like to take a shoddy repair job home with them. They'll either call right away and complain, or they'll take their business someplace else. We're actually the recipient of a lot of re-repairs that come from other shops. We've got the skills and equipment to do the repair, and from what we hear from customers, no one else around can compete with us."

What is the most frustrating aspect of your business? How do you handle that challenge?

"I suppose it's satisfying those hard-to-please customers. We try to make everyone happy, but for some customers, it's almost impossible. I handle each problem as the job calls for, but sometimes it's best if we send the customer someplace else. I don't like doing that, but sometimes for profit sake, we have to."

How do you stay on top of new circuits and technologies?

"By reading Electronic Servicing & Technology and attending seminars of various manufacturers. We find it's important not to sit back and wait for new technologies to hit us. We try and get a jump on them before they get a jump on us."

How do you compensate your technicians (commission, flat rate, etc.)?

"Our technician, Joe, is paid a flat salary."

How do you handle estimates?

"We charge a standard bench charge for an estimate. We find the problem, check the price of the part(s), and estimate the job accordingly. Then if the estimate is approved, the bench charge is already added into the repair. For VCRs, the estimate bench charge includes a free cleaning. We don't have much of a problem with estimates being turned down. Our turndown ratio is running less than one out of every 10."

What kind of service warranty do you offer?

"We offer six months parts and labor on all repairs. We do warranty work for Emerson, Goldstar, Mitsubishi, and Sanyo/Fisher. We also have contracts with casinos and other various companies."

What is the key to making a customer happy?

"This may be over-simplification, but I think it boils down to this: Providing quick and accurate repairs at a fair cost. Customers, in general, are pretty understanding. They know we have to make money, they just don't want to feel like they're being taken to the bank."

What convinced you to first purchase Sencore test equipment?

"The Sencore reputation preceded itself. I saw the products in various magazines and articles before I became interested. Sencore equipment is more for the servicer than anybody else, and that what's I liked about their equipment."

If you didn't have Sencore equipment, where would your business be today?

"I would probably be out of business and working for someone else."

Gene and his technician, Joe, concentrate on honesty and building customer relationships.

How has Sencore test equipment helped your business in the long run?

"The equipment allows me to test, diagnose, and repair customer's equipment to factory levels of repair. That's one thing that differentiates Sun Valley from other service centers around here. We can run tests and look at signals that help us diagnose and troubleshoot problems. The Sencore gear gives us a competitive advantage that is darned hard to beat."

What do you see as the biggest challenge facing the industry right now?

"Importing products from foreign countries at cheaper cost."

Where do you see the industry in 10 years?

"I don't know if I can see that far ahead. Look at the last 10 years and look at the changes we've seen. And since changes seem to keep coming at us at a faster rate, all I can do is look out as far as technology lets me. Your guess is as good as mine."

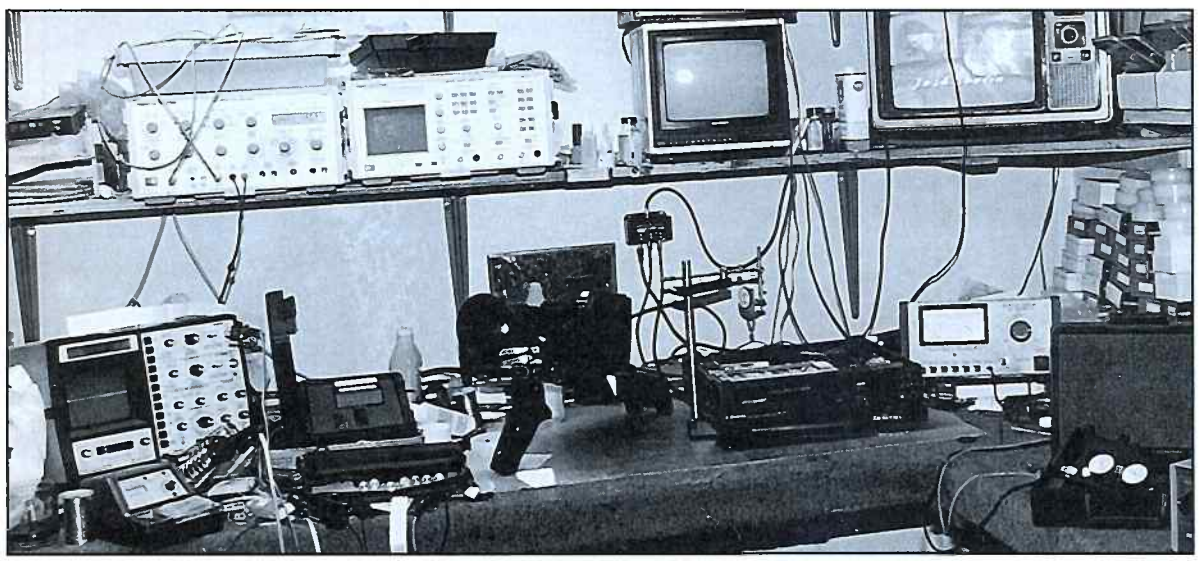
What would be your advice to other servicers?

"In all sincerity, I'd advise other servicers to purchase Sencore test equipment. I wouldn't say this if the equipment hadn't helped us out tremendously, and I'm not being paid to say so. We rely on the equipment day-in and day-out for most of our work here. I just don't see how we could have gotten ahead without the equipment. Our success has been determined by a number of factors, but I can tell you one thing. Sencore test equipment and their support have been their for us in the long run."

What's the most amusing thing that has happened to you in your years of servicing?

"I don't really have a single amusing story, but I'm always amazed at the customers' lack of understanding on how to operate new products on the market. Even VCRs which have been around for over a decade, people still have trouble setting the clock and figuring out the difference between regular TV channels and Cable channels. I guess some things never change."

For more information on the Sencore instruments used at Sun Valley Stereo & TV and how they're used, call your Area Sales Representative at ***1-800-SENCORE.*** ■



Gene likes Sencore equipment because it's "more for the servicer than anybody else."

How To Make Computer Monitor Analyzing More Profitable

Part One

By Stan Warner
Application Engineer

Sencore Electronics

Editor's Note: *This article is part one of a two part series on analyzing computer monitors more efficiently and how to make more profits in the process. It also describes applications where you would use the CM125 "Pix Pak" and where you would use the CM2125 Computer Monitor Analyzer. The second part of the article will be published in the next Sencore News.*

Would you like to expand your service business into the growing field of computer monitor repair? If you already repair computer monitors, would you like to increase your business and make it more profitable? This article covers some of the troubleshooting and service center management applications using the CM125 "Pix Pak" and CM2125 Computer Monitor Analyzer that will help your computer monitor repair business grow and increase profits.

After reviewing the eight applications, think about your own computer monitor applications. We're here to discuss the frustrations and successes you experience in your service center. Call us today at **1-800-SENCORE**, and we'll listen to your ideas and questions. Look for more monitor applications in the next issue.

Application #1

CM125 and CM2125 ***High Performance, Fully Programmable RGB Generator***

Fig. 1: The CM125 and CM2125 provide the features you need for efficient computer monitor servicing.

Technology advances at a rapid pace in the computer monitor industry. Every year new monitor models hit the market with higher resolution, larger display size, and extra user controls. To stay competitive, your business needs to grow along with these changes.

Both the CM125 "Pix Pak" and the CM2125 Computer Monitor Analyzer provide the high performance RGB signal generation and programmability to meet your monitor repair needs today and in the future. Lower cost competitors and alternative service solutions exist but none provide long term cost effectiveness.

Application #2

CM125 "Pix Pak" ***Tight Spaces (limited bench space)***

Fig. 2: The CM125 "Pix Pak" works great on benches where space is limited.

Many service benches severely lack the needed real estate to operate efficiently. This limits the work area and hinders the final output in repairs per day.

The CM125 "Pix Pak" Computer Monitor Signal Generator works great on the service bench. Its small footprint helps open up precious workspace on your bench, and the full RGB video generating capabilities will help you conquer the high resolution computer monitors that come through your service center.

Application #3

CM125 and CM2125 ***Video Patterns For Troubleshooting & Performance Testing***

Fig. 3: Use the video patterns for analyzing the problem, troubleshooting, and doing a final alignment.

In computer monitor servicing, you need video patterns three times during the repair process: (1) Determining the nature of the problem, (2) Servicing the problem, and (3) Completing a final alignment and performance test.

Both the CM125 "Pix Pak" and CM2125 provide the video patterns you need for all three phases of the service process. The exclusive Sencore computer monitor products provide patterns for testing purity, power supply regulation, convergence, color performance, color tracking, linearity, focus, and alignment.

Application #4

CM125 "Pix Pak" — ***Computer Monitor Burn-In Rack***

After a completed repair, the computer monitor needs to "burn-in" for a 12 or 24 hour period before you return it to the customer. This burn-in period tests the new repair, properly ages the newly replaced components, and gives you the confidence no other problems exist. Bottom line, it greatly reduces the possibility of callbacks.

The CM125 "Pix Pak", when coupled with the EX220 Output Expander, make an excellent computer monitor burn-in system. Because of the CM125's miniature footprint, it fits conveniently on the burn-in rack. The programmability and flexibility of the CM125 let you burn-in all of the monitor types you service. The EX220 Output Expander lets you drive up to ten computer monitors at one time (more if you daisy chain them together).

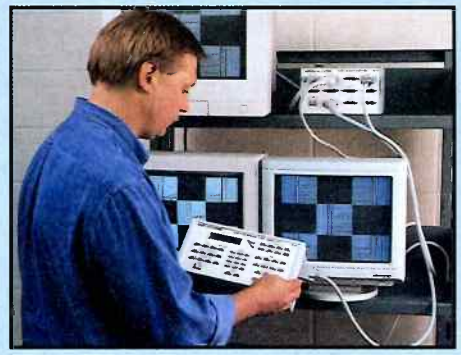


Fig. 4: Use the CM125 and EX220 Output Expander for a computer monitor burn-in rack.

Application #5

CM2125 — ***Signal Injection For Isolating Computer Monitor Defects***

The signal injection troubleshooting procedure lets you inject a "known good" signal into a defective computer monitor circuit. If the circuit responds and a good picture returns to the display, you know all of the stages from the injection point to the CRT work properly. Signal injection helps you "divide" a circuit and isolate a problem to a single stage.

The CM2125 computer monitor analyzer provides you with the drive signals you need to signal inject and isolate problems in a computer monitor's video, vertical sync, horizontal sync and drive circuits.

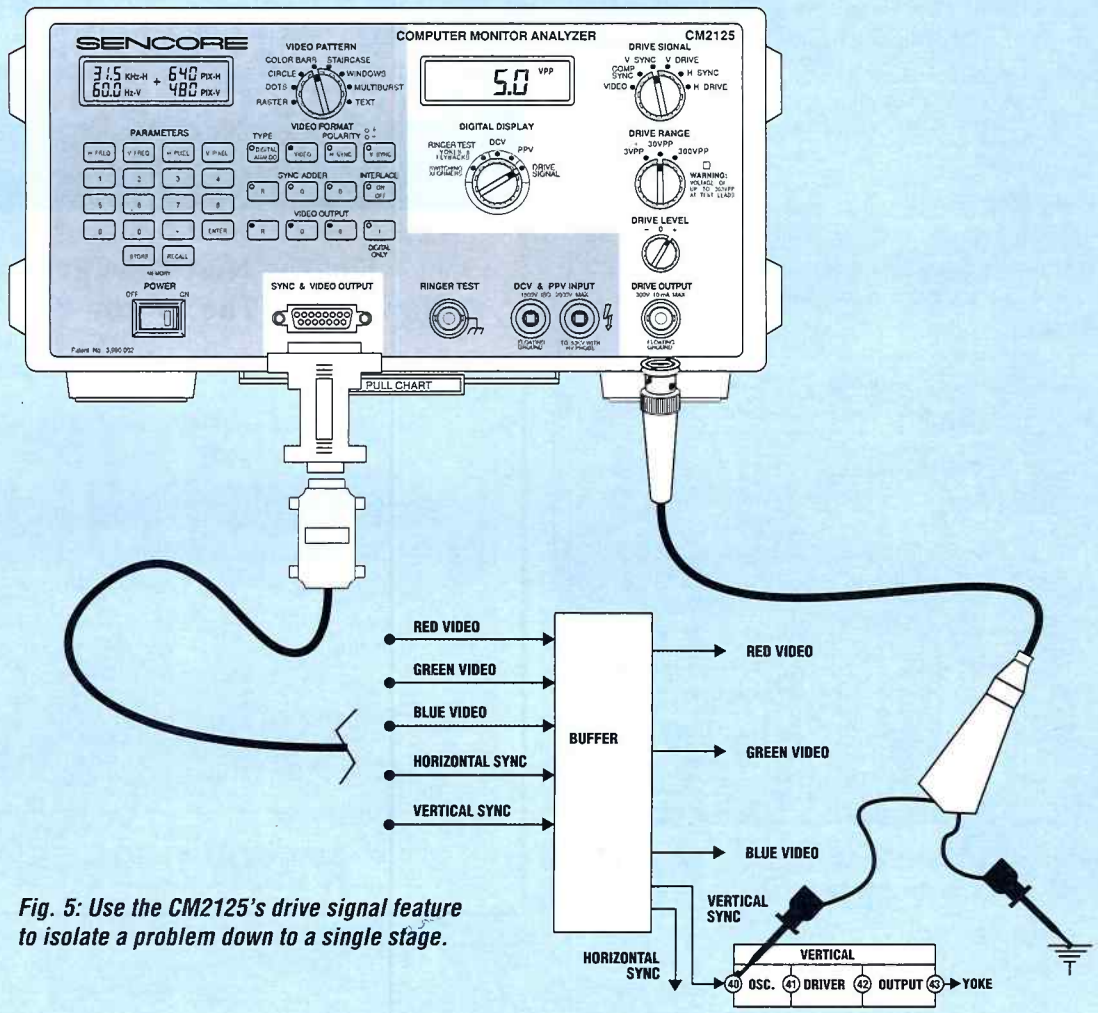


Fig. 5: Use the CM2125's drive signal feature to isolate a problem down to a single stage.

Application #6

CM2125 — ***Innovative Yoke And Flyback Testing***

In computer monitor servicing, you'll find the flyback transformer to be a high failure component. Yokes also fail periodically, producing confusing monitor symptoms.

The most common failures of both of these "coil" type components occur when they develop a shorted turn. And an ohmmeter cannot successfully isolate a shorted turn problem because of the coil's low resistance.

Due to the relative high cost of these components and the time spent in ordering, removing, and replacing the component; regularly mis-diagnosed yokes and flybacks can rob profits from your business' bottom line.

The CM2125 Computer Monitor Analyzer provides you with a dynamic test that helps you troubleshoot yokes and flybacks with confidence. With the patented "Ringer" test, the CM2125 automatically tells you if a yoke or flyback transformer is good or bad.

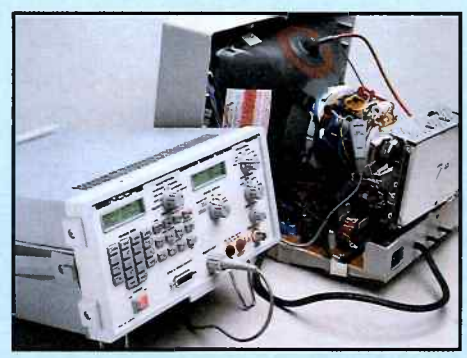


Fig. 6: The patented CM2125 "Ringer" test lets you diagnose yokes and flybacks with the most reliable test available.

Application #7

CM125 & CM2125 ***Testing "Green" Energy Star Computer Monitors***

Many of the new computer monitors on the market contain a "display power management" feature that aides in cutting energy consumption. This feature shuts down the monitor if the computer hasn't been used for a preset period.

The shutdown occurs in three stages: (1) video removed from the computer monitor (similar to a screen saver); (2) horizontal sync removed from the monitor, and (3) vertical sync removed from the monitor. At each stage, the computer monitor consumes less power as the corresponding circuit shuts off.

The CM125 and CM2125 effectively test the power management stages by simulating the step-by-step shutdown action carried out by the video card in the computer. To completely test the power management circuits, take the computer through both the "shutdown" stages as well as the "power-up" stages.

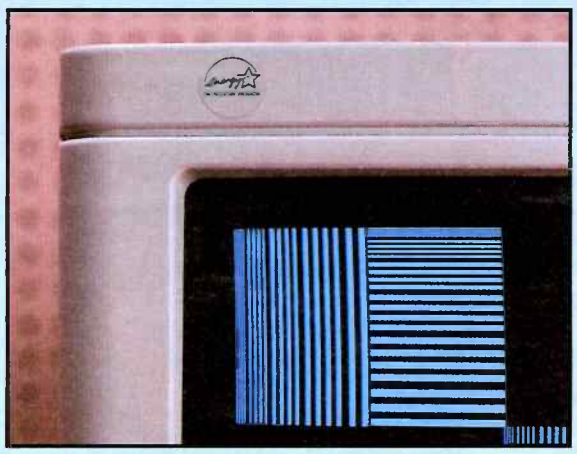


Fig. 7: Use the CM125 or CM2125 to test the new Energy Star computer monitors.

Application #8

CM2125 ***Analyze The Signal At The Collector Of The Horizontal Output Transistor***

Measuring the peak-to-peak and DC voltage at the collector of the horizontal output transistor gives a wealth of information about the monitor's operation. The DC voltage gives an overall indication of the performance of the power supply and the peak voltage gives you insight on the horizontal and output circuits.

Use the integrated DC and peak-to-peak voltage features on the CM2125 Computer Monitor Analyzer. The input protection of 2,000 volts lets you connect your probe directly to the collector to make these important measurements.

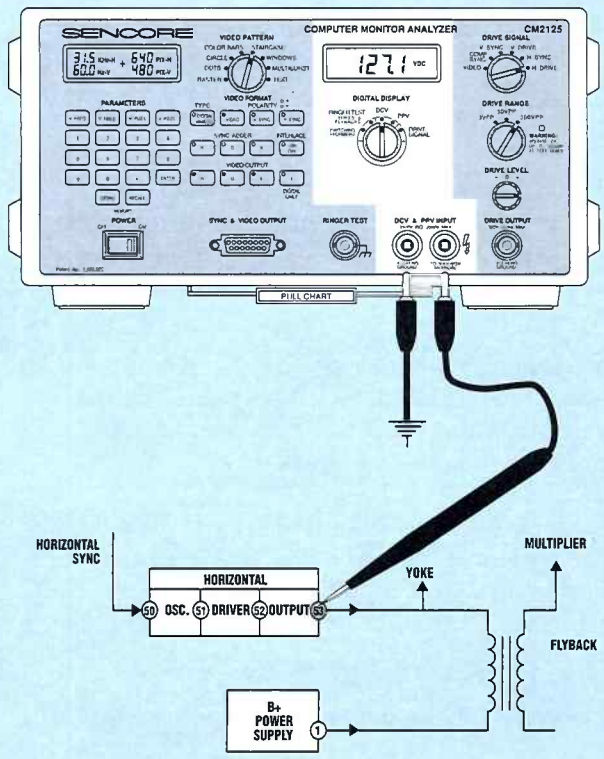


Fig. 8: Use the CM2125's integrated DC and peak-to-peak voltmeter to safely analyze the pulse at the collector of the horizontal output transistor.

Have questions? Need answers? Call us at ***1-800-SENCORE*** *(736-2673). We'll do everthing we can to answer your monitor analyzing questions.* ■

♦ MONITOR ANALYZING ♦

The Perfect Balance Of Application And Performance

...The Sencore Line Of Computer Monitor Analyzers

Now there's a solution to all your computer monitor testing needs. The Sencore line of computer monitor analyzers give you the capability to analyze analog, TTL, and ECL formats with 125 MHz bandwidth and 2048 x 2048 pixels. Pre-programmed setups and our exclusive monitor setup guide (over 1,000 setups) reduce your testing time. For monitor analyzing, Sencore has the perfect balance you've been looking for. Balance that helps you justify the right instrument for your application.

Where do I need a CM2125?

- Monitors requiring in-depth troubleshooting analysis
- Tough dog monitor bench
- Multiple monitor brands
- Classroom training

The CM2125 offers complete computer monitor analyzing features that help you quickly narrow problems down to a single circuit or component.

Where do I need a CM125?

- Monitor showcase or product display area
- High volume testing
- Field testing
- Test rack (burn-in)

The CM125 "Pix Pak" is a portable computer monitor signal generator for monitor testing at the bench, the burn-in rack, or in the field.

For A Free Fact Kit, Call 1-800-SENCORE Today!
(736-2673)

CM2125 Computer Monitor Analyzer

New!

CM125 "Pix Pak" Computer Monitor Signal Generator

SENCORE
3200 Sencore Drive, Sioux Falls, SD 57107
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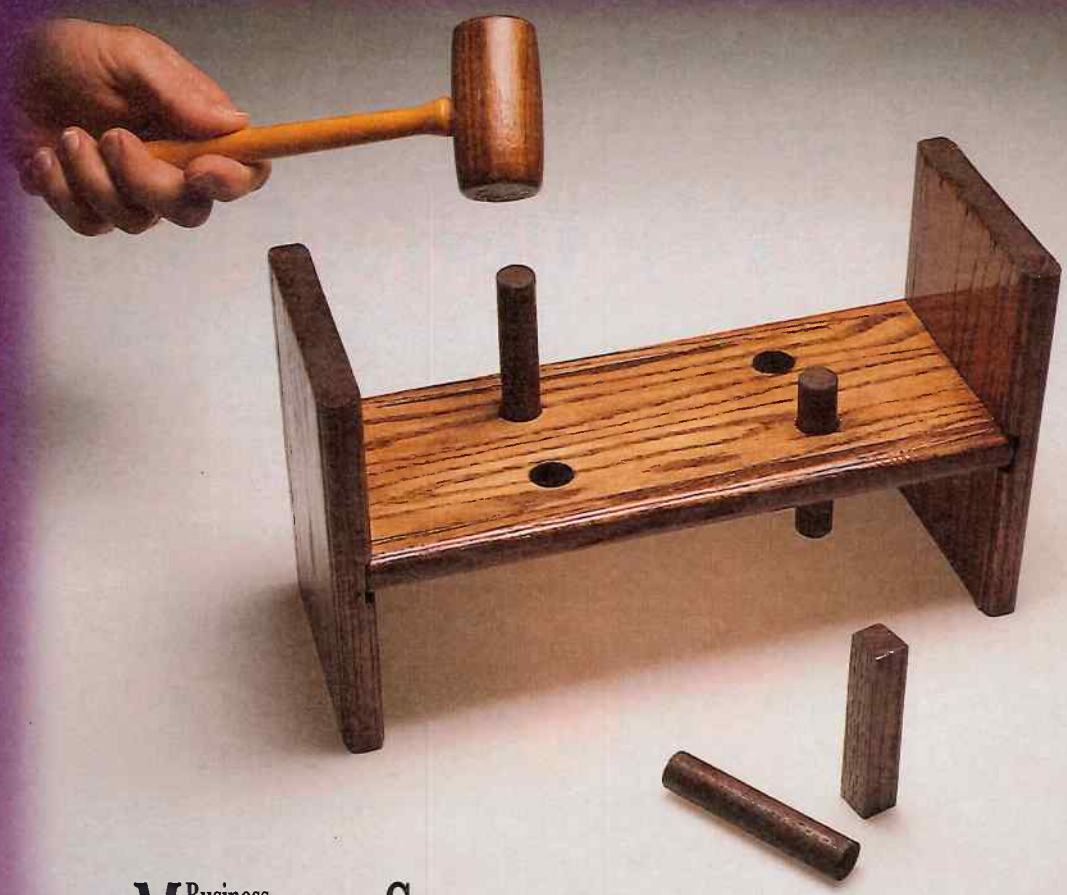
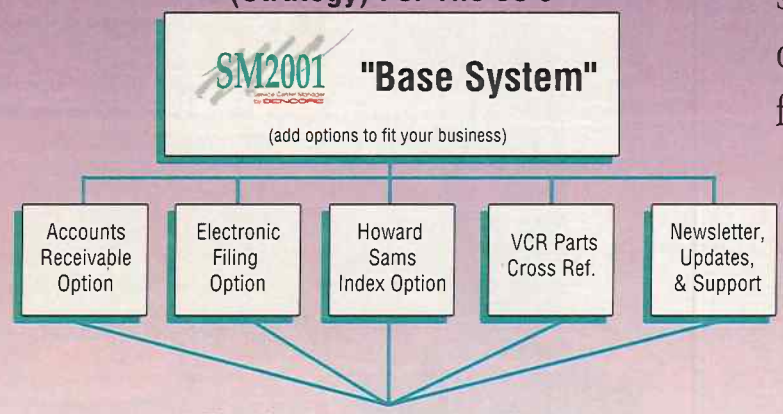
Some Things Naturally Fit Together...

. . . and your "Business Management Solution" should fit naturally into the way you run your business!



Business Management Solutions

Business Management Solutions (Strategy) For The 90's



Profit, Customer Service, Efficiency, Unity, Solutions

The SM2001 Service Center Manager is the business management solution for today's service center. The SM2001's new modular design allows you to build your solution to fit your business as well as:

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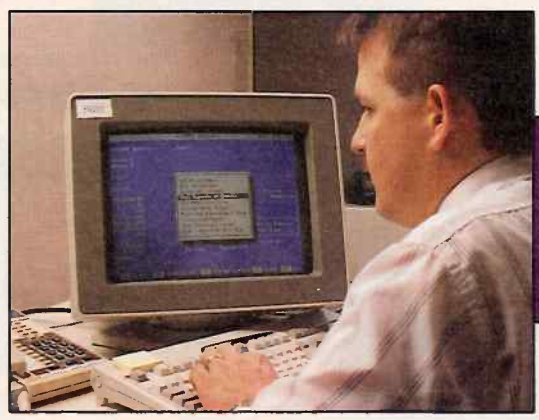
- generate, track, and control parts orders
- gain inventory control
- automate your accounts receivable
- electronically file warranty claims
- and much more.



It's a natural fit for the service centers of the '90s.

To receive your FREE Demo package - call 1-800-SENCORE today!
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Improve Customer Satisfaction With Complete Camcorder Repairs

By Tom Schulte
Application Engineer, CET

Sencore Electronics

Your customers appreciate and remember good service value and reward it with their continued business and referrals. For highest servicing profits, you want to distinguish your service business by the high level of customer service you provide.

One area in which customer service is often unintentionally slighted is camcorder service. Once the usual mechanical problems are repaired, the camera section of the camcorder usually receives little attention. As long as it produces a color picture on a monitor when it is pointed across the shop, it is usually assumed that the camera is working properly. Often, however, the owner is less than satisfied with the way the repaired camcorder performs under their operating conditions.

When your customers tape that all-important event with their freshly serviced camcorder, are they disappointed to find that the camera just doesn't work as well as it used to? Or are they pleasantly surprised to find that the picture is sharper, better color, better contrast, or better focused than it was before you serviced their camcorder? The difference is just a few minutes of comprehensive camera tests to insure quality repairs, a high level of customer satisfaction, and higher profits for your servicing business.

Why Can't I Just Check The Camera Signal On A Monitor?

When you repair a camcorder problem, the tendency is to check the camera's final operation by simply watching the picture on a monitor while pointing the camera across the room. However, you don't have much control of the level, uniformity, or color of the light illuminating the scene, or the color amount and hues of objects appearing in the scene. This, along with any inaccuracy of your shop monitor, prevents you from easily judging whether the camera's output signal accurately represents what it is seeing.

Your customer expects the camera to produce acceptable pictures under a much wider range of operating conditions than those present within your service center. A single-condition test, pointing the camera across the room while watching the picture on your shop monitor, just can't show all the camera's potential problems. The camera may very easily produce unacceptable pictures for the owner under some of the different conditions they encounter:

- a candle-lit birthday celebration
- a bright sunny day at the amusement park
- a dimly lit can't-do-it-again church wedding
- an outdoor ball game under sunlight or artificial lights
- an indoor basketball game with mercury vapor (purplish) lamps
- a nighttime street scene with sodium vapor (yellowish) lamps

You need to know that the camera is going to work well for your customer under all of these conditions.

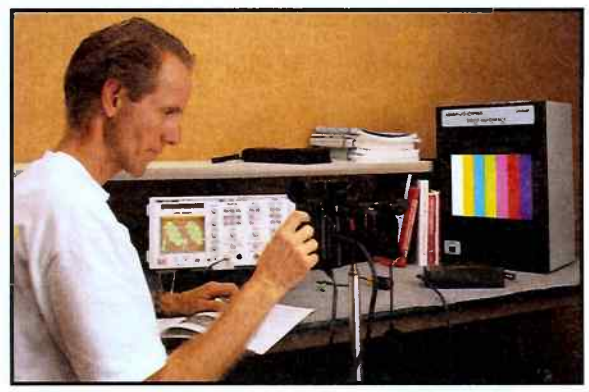


Fig. 1: Cameras need to be checked under all lighting conditions to prevent dissatisfied customers and service callbacks.

Comprehensive Camera Service Approach

The key to complete camera service is a controlled, step-by-step servicing approach that uncovers all camera defects in the least amount of time. Once you've corrected obvious mechanical problems, perform a full set of operational tests that simulate all normal operating conditions to help determine the full extent and probable cause of any additional mechanical or electrical camera problems. Finally, once you believe the repair is complete, repeat the camera operation tests to thoroughly test the camera and catch any lingering camera performance problems that might be missed with a simple point-and-shoot checkout.

Quick Camera Operation Tests

To service your customer's camera more accurately, without wasting troubleshooting time, you need a method of quickly evaluating the camera without taking the covers off the camera. You need:

- An oscilloscope or waveform monitor display to accurately test video and sync levels produced by the camera.
- A vector display with precision chroma demodulators to accurately test chroma saturation and hue.
- A frequency counter to insure camera color compatibility with all TVs and video monitors.
- Also, a method of testing camera output signal quality (including noise, hum, and resolution) speeds the troubleshooting process and assures you of customer satisfaction with the completed repair.

Track And Eliminate Bugs Out Of Cameras And Camcorders!

A technician without test instruments is like an exterminator without bug spray. You must have the right equipment in order to get the job done! This is especially true when analyzing cameras and camcorders. You simply must have a vectorscope and waveform monitor to test the operation of a camera.

The New CVA94 "Video Tracker" Camera Video Analyzer is the only instrument designed specifically for camera analyzing. It provides a complete vectorscope and waveform monitor, and also provides digital waveform measurements for fast signal troubleshooting.

If you'd like to see how your business will benefit from having a new camera video analyzer working for you, simply call 1-800-SENCORE today!

SENCORE
3200 Sencore Drive, Sioux Falls, SD 57107
PH (605) 339-0100 FAX (605)339-0317

Form #5873

The CVA94 "Video Tracker" Camera Video Analyzer provides all of these camera test functions in one easy-to-use service instrument. The "Video Tracker" allows you to quickly perform digital waveform and digital vector camera signal measurements as well as special tests for video and chroma noise, burst frequency, and power adapter hum, all just by analyzing the camera's output signals. The CVA94's tests and measurements are all tailored especially to your service needs for quick and accurate camera servicing.

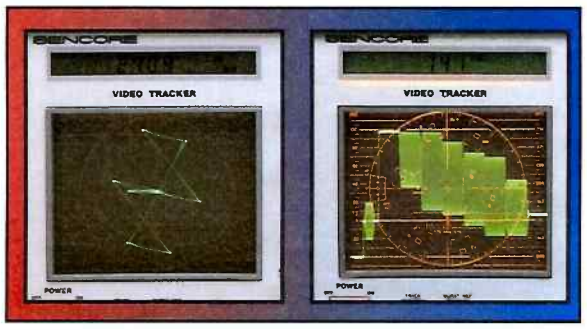


Fig. 2: With a vectorscope, waveform monitor, and special digital troubleshooting tests combined into one instrument, the CVA94 "Video Tracker" is your complete answer to camera/camcorder testing and troubleshooting.

Use Standard Test Patterns For Camera Troubleshooting

One difference in servicing cameras is that their normal input is the light from an illuminated image, rather than an electrical signal. This means that instead of a signal generator, you'll need properly lighted test pattern charts to provide a controlled input to a camera to accurately evaluate its operation.

Properly illuminated test patterns give you complete control of the camera input signal and allow you to easily test a video camera for proper operation under a wide range of conditions. The Sencore VR940 Video Reference provides standard video test patterns at proper light levels with even lighting across the entire pattern for easy camera evaluation. The color of the light (color temperature) illuminating the VR940's patterns is controlled to match both normal indoor and outdoor lighting conditions. The test patterns supplied with the Sencore VR940 simplify quick, complete camera testing.

The CVA94 "Video Tracker" and the VR940 Video Reference allow you to quickly prove that you haven't missed any camera defects and that the camera is adjusted properly to give your customer acceptable pictures under all operating conditions. Now you can confidently and profitably service video cameras with quick troubleshooting methods and know that your customers will be happy with their repaired camcorder's operation.

How Can I Quickly Check Whether A Camera Needs Repair Or Adjustments?

Following are the camera characteristics you should check to insure that a camera will work properly under all operating conditions for your customer:

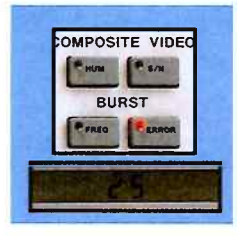
- Proper sync and color burst level and burst frequency for TV compatibility
- Focus at all distances under all light levels
- Proper output signal level at all light levels
- Proper white balance under all lighting conditions
- Proper saturation levels for all scene colors
- Proper hue for all scene colors
- Low signal noise and hum in the video and chroma signals
- No bright light blooming
- Proper video frequency response

It may sound complicated and time-consuming to check all these camera characteristics, particularly if you don't have test equipment designed especially for fast, complete camera servicing. With the CVA94 "Video Tracker" and the VR940 Video Reference, however, you can complete these important camera tests easily in a matter of a few minutes and know exactly what is right or wrong with the camera and know what camera circuits aren't functioning properly.

Video Camera 10 Point Dynamic Test Procedure

On page 17 of this Sencore News you will find a copy of the "Video Camera 10 point Dynamic Test Procedures." Take a moment to detach it and use it to follow along with this article on how to profitably service, estimate, and troubleshoot camcorders. After completing these checks, you'll know the total extent of any camera problems, or, on a completed repair, you'll be confident that the camera will operate satisfactorily for your customer under all operating conditions.

1. ***To Test Burst Reference Frequency:*** Press the CVA94 BURST ERROR button and read the frequency error on the LCD display.



To Test Hum: Press the CVA94 HUM button and read the hum percentage on the LCD display.

Results Expected: Burst frequency within 100 Hz (preferably 50 Hz) of 3.579545 MHz. This is the standard NTSC chroma subcarrier frequency for which all TVs in the U.S. are designed. Hum should be less than 3% of the video signal level.

Camera Circuits(s) Tested: Sync generator master oscillator, power adapter, and power supply filters.

Importance Of Tests: Unless the camera's burst reference signal is within 100 Hz of the standard, many TVs won't produce properly locked color signals. This results in no color or shifted color hues. This test insures that the camera and its recorded signal will be compatible with all TVs and VCRs. Also, if the power adapter or power supply filtering isn't sufficient, excessive 60 Hz ripple will mix with the camera's video output signal, causing hum bars in the picture. This test allows you to catch a developing problem before it becomes visible to your customer.

Test Time: 5 seconds

2. ***To Test Back Focus:*** Turn the camera's autofocus off, zoom the lens to wide angle, and frame the camera on the VR940's Focus Chart with the Neutral Density Filter overlayed. Adjust the manual focus for a sharp pattern, then zoom the lens to telephoto. If the pattern goes out of focus, the camera's back focus is misadjusted.

To Test Autofocus: Turn the camera's autofocus on and frame the camera on the Focus Chart. Then pan the camera to frame on the Paper Focus Chart at 20 feet or further away. Finally pan the camera back to the Focus Chart. In each case, check that the center of the pattern comes sharply into focus as seen on the viewfinder or video monitor.

Camera Circuits(s) Tested: Camera lens backfocus setting and autofocus circuits.

Importance Of Tests: If the back focus is misadjusted, objects will not remain focused as the camera is zoomed from wide angle to telephoto and back. If the autofocus doesn't operate properly and quickly, the camera image will not remain focused as the camera is moved from one part of a scene to another.

Test Time: 20 seconds

3. ***To Test Blooming:*** Frame the camera on the VR940 Blooming Test Chart. Check the video monitor for white smearing to the right of the white block.

Results Expected: If the camera's internal blooming adjustment is properly adjusted, the right edge of the white block will be sharply defined rather than smeared to the right. Overcorrection with the blooming adjustment causes loss of color.

Camera Circuits(s) Tested: Luminance and chrominance circuit.

Importance Of Test: If the blooming adjustment is misadjusted, bright areas of a camera scene will produce a smeared effect to the right side of the bright area.

Test Time: 5 seconds

4. ***To Test Black Setup Luminance Level:*** Cap the camera's lens, select the CVA94 1H Sweep Rate, and check that the black signal level falls on the 7.5 IRE dotted line on the CRT display. (Preset the signal blanking level to the

0 IRE reference line with the Vert Position control.)

To Test Peak White Luminance Level: Frame the camera on the VR940 Gray Scale Chart, select the CVA94 1H Sweep Rate, and check that the white signal level falls on the 100 IRE line on the CRT display.

Camera Circuit(s) Tested: Black clamp and luminance circuit gain.

Importance Of Tests: If the black setup is set too high, or the white luminance level is set too low, camera pictures will have low contrast and appear washed out. If the black setup is set too low, or the white luminance level is set too high, camera pictures will have unstable sync or excessive contrast, or appear overloaded on some TVs.

Test Time: 15 seconds

5. ***To Test Indoor White Balance:*** Frame the camera on the VR940 Gray Scale Chart, select the CVA94 Vector mode, and check that the trace is collected in a single dot at the center of the vector display.

To Test Outdoor White Balance: Frame the camera on the VR940 Gray Scale Chart with the Temperature Conversion Filter overlayed, and again check that the trace is collected in a single dot at the center of the vector display.

Camera Circuits(s) Tested: White balance and auto white balance circuits.

Importance Of Tests: If the indoor or outdoor white balance isn't proper, all colors in the camera output signal will be wrong. This typically is described as green, purple, or blue people. The camera may have good white balance (proper colors) under one light condition, but not under other conditions.

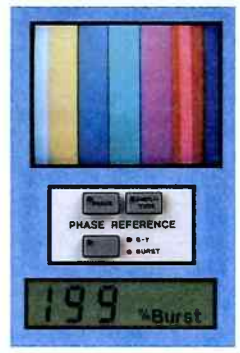
Test Time: 15 seconds

6. ***To Test Video S/N:*** Frame the camera on the VR940 Video S/N Chart, press the CVA94 Video S/N button, and read the video S/N on the LCD display. Repeat the test with the Neutral Density Filter overlayed on the Video S/N Chart to simulate low light conditions.

Results Expected: Greater than 40 dB S/N ratio.
Camera Circuits(s) Tested: Iris control, pickup device, pre-video and luminance process stages.

Importance Of Test: Any circuits involved in processing the luminance signal may be defective and add extra noise to the luminance signal, resulting in a grainy or snowy picture. In particular, if the iris, iris control, or AGC circuits don't function properly, the AGC may be pushed to a higher than normal gain condition. This results in extra noise being added to the luminance signal along with the extra gain.

Test Time: 5 seconds



7. ***To Test Chroma Saturation:*** Frame the camera on the VR940 Color Bars Chart, press the CVA94 Vector Amplitude button, position the Delta Bar on the red color bar (watch the CRT or monitor display), and read the red bar amplitude on the LCD display.

Results Expected: Typically 190 to 220% of Burst, although some cameras are spec'ed as low as 140% of Burst for the red bar amplitude.

Camera Circuits(s) Tested: Chrominance circuit gain.

Importance Of Test: This determines the amount of color that the camera will produce within all objects. If the chroma gain isn't correct, the camera will produce excessive or washed-out color.

Test Time: 15 seconds

8. ***To Test Chroma Hue:*** With the camera still framed on the VR940 Color Bars Chart, press the CVA94 Vector Phase button and read the red bar phase on the LCD display. Reposition the Delta Bar on any other color bar to read its phase.

Results Expected: Typically spec'ed by the camera manufacturer to be within 15° of NTSC standard phase for red (103°) and yellow (167°) bars and within 20° of standard phase for the remaining bars.

Camera Circuits(s) Tested: 3.58 MHz Chroma Modulators.

Importance Of Test: This determines the color hue that the camera will produce for each of the individual objects in a scene. If the chroma modulators are misadjusted, some colors may look right, while others will have the wrong hue.

Test Time: 10 seconds

9. ***To Test Chroma Saturation S/N:*** Frame the camera on the VR940 Red Chart, press the CVA94 SAT S/N button, and read the chroma saturation S/N on the LCD display.

To Test Chroma Hue S/N: With the camera still framed on the VR940 Red Chart, press the CVA94 HUE S/N button and read the Chroma/HUE S/N on the LCD display.
Results Expected: Greater than 40 dB S/N ratio for each of the tests.

Camera Circuits(s) Tested: Iris control, pickup device, pre-video and chrominance process stages.

Importance Of Tests: Any circuits involved in processing the chroma signal may be defective and add extra noise to the luminance signal, resulting in a grainy or snowy picture. This noise will be most visible in the more highly saturated objects in a scene. Since both the amplitude and phase of the chroma signal carry color information, both tests are important. Excessive phase noise is seen primarily as a smearing effect in the more highly saturated objects in a scene. Misadjustment of some types of chroma modulators will also be measured as excessive phase noise.

Test Time: 15 seconds

10. ***To Test Video Frequency Response:*** Frame the camera on the VR940 Registration/Response Chart. On the video monitor, check the vertical wedges at the top and bottom of the pattern to see at what point the wedge lines blend together. Check the chart for the frequency calibration at that point.

Results Expected: Greater than 3.5 MHz for a camera's composite output and greater than 4.0 MHz for a camera's Y/C output. Note: Be sure to use a monochrome or high resolution color monitor for this test.

Camera Circuits(s) Tested: Pickup device, luminance circuit aperture correct.

Importance Of Test: Poor frequency response causes loss of picture detail with a "smooth" look to the picture. This can be caused by any circuit processing the luminance signal. In particular, the aperture correct circuits, which are responsible for increasing the sharpness of picture edges, may cause loss of frequency response and thus picture detail.

Test Time: 10 seconds

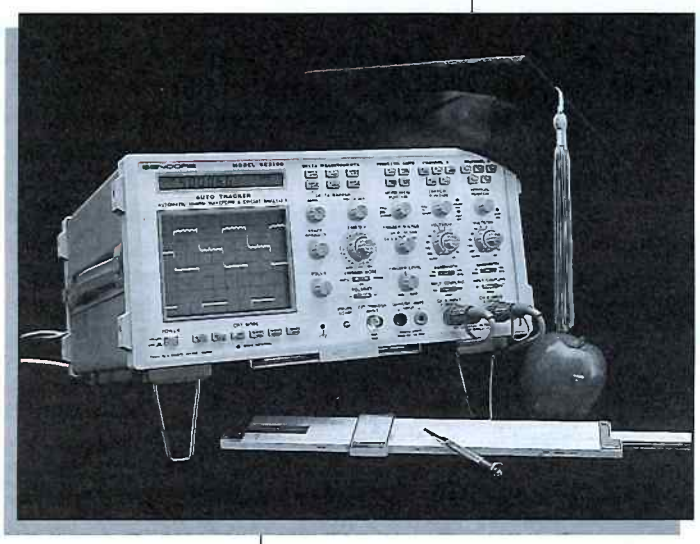
Total Video Camera Test Time: Under 2 minutes

Even with minimal experience, a technician can easily test a camera in less than five minutes to quickly identify which portions of the camera are working properly and which need repair or a touch-up adjustment. Or, after repairs are completed on any portion of the camera or camcorder, these tests are a quick verification that there are no lingering problems with the camera, just waiting for the customer to find when they least expect it.

Total Customer Service For Total Customer Satisfaction

Customer satisfaction is one of the first steps to a profitable electronic service business. The CVA94 "Video Tracker" Camera Video Analyzer and the VR940 Video Reference will help you perform quick, efficient camcorder service to satisfy you and your customers and minimize callbacks for camcorder problems you didn't catch the first time. For more information on how to put this great pair of camera service instruments to work earning profits for your business, call Sencore at **1-800-SENCORE.** We'll help set up your bench for customer satisfying camcorder servicing with our exclusive "no-obligation" trial offer. ■

"Touch-n-Test" – Your Key To Circuit Analyzing Success!



By Brian Phelps
Product Marketing Specialist,
Business Management Solutions Manager

Sencore Electronics

As we move into a new year, it's perhaps time to step back and re-evaluate some key areas of your business. One area many service centers are looking at is, "Am I providing good service to my customers?" Good customer service includes many aspects of a service center, including accurate repairs and estimates, faster repairs, technical image, invoicing, and follow-ups, just to name a few.

What many of our customers don't realize is that to maintain a high level of service, we need to continually invest in our knowledge, tools, and business management techniques. As the products we service become more and more complex, and the cost of replacement comes closer to the cost of repair, it's even more critical that we stay up-to-date with our training, knowledge, and tools. As new consumer products continue to reshape the service industry, you need to keep up with the new technologies and new opportunities.

But today's consumer products require more from the servicer. We're faced with more signals, tighter tolerances, and new service techniques to get the job done. Plus, our customers are putting us in a place where we need to ensure accuracy and speed in our troubleshooting. Where are servicers turning for the advantages they need for servicing? Many servicers are now relying on their oscilloscope to carry them through modern analyzing challenges.

The scope should be the most used piece of analyzing equipment in your service center. In fact, the most recent statistics from NESDA point towards the scope as one of the most frequently purchased pieces of analyzing equipment. Yet, it's amazing the number of servicers who don't use a scope on a routine basis. Many are simply not using the scope because they believe they have found other techniques - such as shotgunning. However, if you look at the larger service centers and manufacturers, you'll quickly notice that the techs are all using their scopes and will swear by them.

Why is that? Perhaps they've found that the oscilloscope is indeed an essential analyzing tool. However, I'm not going to spend a lot of time trying to help you understand the importance of an oscilloscope, I want to (instead) show you how nice and convenient it could be to simply "Touch-n-Test" your way through a circuit with the SC3100 "AUTO TRACKER" Automatic 100 MHz Waveform & Circuit Analyzer.

Fig. 1: The SC3100 "AUTO TRACKER's" error-free tests and easy-to-use features let you analyze more waveforms faster and increase your troubleshooting confidence.

Touch-n-Test – Your Key To Success

What is Touch-n-Test? And how can it help you perform your services faster and more accurately? These are very good questions. Touch-n-Test analyzing is simply touching the probe from the SC3100 "AUTO TRACKER" to a test point and letting the SC3100 do the testing for you.

Imagine total hands-off testing (except pushing the parameter button) of all waveforms and test points. It doesn't take a rocket scientist to see the benefits of this test. Touch-n-Test eliminates errors, speeds your testing, and allows you to spend valuable time in other areas of the service business, such as selling your services to your customer.

To illustrate the advantages of Touch-n-Test analyzing, let's look at how the typical tech uses his/her scope. The following steps are a quick run-through of some of the items performed by servicers each time they reach for their scope. Take a look and see if this looks like your service center.

1. The technician will make an educated guess as to which test point to start the analyzing process. (For example, if the video looks bad, you'll naturally want to go the video stages first.) Then, the tech will reach for the scope to test the video test points.

2. Now let's assume this technician is a routine user of the scope and knows how to search through the menus and maze of controls to obtain measurements and waveform displays. The typical test point can cause a tech to spend as much as two minutes trying to take all the measure-

ments they need to determine if the signal and voltages are correct. Does two minutes sound high? Well, give it a try. Time yourself by connecting your scope to a test point and measuring the DCV, PPV, frequency, timing, etc.

3. After measuring the first test point, the technician decides the signal is good and then goes looking for another test point and is forced to repeat the process of adjusting and searching through menus to make the measurements. Now imagine if you had to test an average of 10 test points to determine the defective component. That's easily 20 minutes of your valuable time spent adjusting your scope. Ouch! You haven't unsoldered the component, looked up the part number, or called the customer with an estimate – each which can take several more minutes of your valuable time. And you haven't even fixed the problem yet.

Now let's take a look at Touch-n-Test with the SC3100 "AUTO TRACKER." The SC3100 is exclusive in its technique of providing virtually hands-free analyzing. Autoranging attenuators quickly scale the waveform for proper viewing on the CRT. The autoranging timebase adjusts the sweep speed for 1-2 cycles of the waveform - automatically. And the pushbutton parameter measurements allow you to quickly step through all tests in a matter or seconds. In essence, you hook to a test point, and before you can look at the SC3100, the waveform is on the CRT - locked in without touching a single knob. The first measurement is already done for you – in less than five seconds.

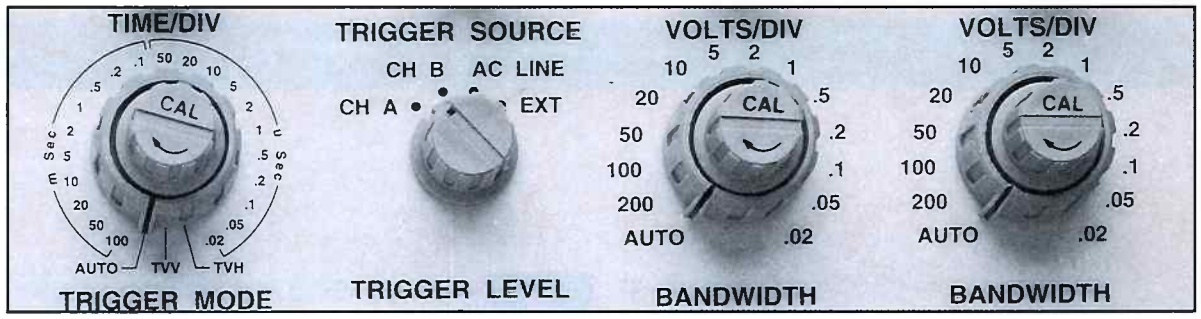


Fig. 2: The "AUTO TRACKER" provides an exclusive and fully autoranged CRT waveform display that let's you "Touch-n-Test" circuits without wasting time adjusting knobs and controls.

Are you seeing the advantages of Touch-n-Test? Now you can completely analyze a test point in less than 30 seconds instead of the two minutes it used to take. Your net savings on 10 test points is 15 minutes, or more. This equates to more repairs, more time to spend selling your services, and more time improving your valuable customer relations.

But Don't Stop Analyzing The Waveform Yet – Auto-Tracking Takes You Even Further!

Conventional oscilloscopes are analog devices which are time consuming, inaccurate, and laced with errors when trying to make measurements. Sencore changed all this by adding the speed, accuracy, and pushbutton ease of digital readings to every waveform voltage and frequency measurement. You simply connect one probe to the circuit and push a button to read the DC volts, peak-to-peak volts, frequency, RMS AC voltage, or dBm level. You'll keep your mind on the circuit, not on making the measurement.

Exclusive Auto-Tracking™ Digital Readout Matches Key Schematic References – no more graticule counting or interpretations normally associated with waveform and circuit testing with this direct readout LCD display.

Delta Measurements Allow You To Completely Analyze Portions Of A Waveform – no manual cursor settings to position on the waveform or guess at for fast troubleshooting and accurate alignments.

Analyze Key Parameters Of Any Waveform – single function push buttons allow you to quickly compare all test point measurements to service literature.

Exclusive Full Ranged/ Autoranged Attenuators – set to the "AUTO" position for hands-free analyzing or manually set the attenuator for measuring from 2mV to 2kV.

Clear Crisp Waveforms – providing the best viewing detail possible. Eliminates drop-outs or holes in the waveform and complicated cluttered CRTs caused by on-screen readouts.

Choice Of Bandwidths –
20 MHz: minimizes noise and high frequency interference on low level signal measurements.
100 MHz: for full waveform analyzing.

Full CRT Mode Capability – view waveforms as your testing requires with:
- alternate
- chopped
- vector
- exclusive add feature
- single or dual trace

Exclusive Time Base Allows You To Step Through Any Circuit – provide practically hands-off analyzing as well as user adjustable 100 mS to 20 nS (with X10 expand) sweep speeds for detailed viewing.

Video Sync Separators For Fast Triggering And Video Troubleshooting – now you will have fiddle-free triggering on hard to hold complex video waveforms.

Integrated Circuit Parameter Tests – eliminates extra test instruments while providing complete circuit analyzing, taking you one step further in your circuit analyzing.

New Probe Design – the SC3100 automatically adjusts the digital display for X10 and direct probes. Plus, the new probe accessory kit adds flexibility and versatility – matching your troubleshooting requirements.

SC3100 "AUTO TRACKER"™
Automatic 100 MHz Waveform & Circuit Analyzer

TECH CHOICE SYSTEM

NEW!

PR570 "POWERITE II"™ Variable Isolation Transformer & Safety Analyzer

Identify And Troubleshoot Virtually Any AC Supply Problem Fast . . . With The PR570 "POWERITE II"!

The **PR570 "POWERITE II"** provides the isolation you need for servicing hot chassis'. Its 470 watt isolation transformer eliminates dangerous shock hazards for you and your employees, plus prevents damage to the chassis and your test equipment.

The **"POWERITE II"** allows you to make all recommended tests on shutdown circuits, as well as sweat out stressed components by providing variable AC from 0-140 volts. The PR570's AC current/power monitor also displays the output current or power being drawn by the device connected to the isolated output socket. Plus, the AC line voltage monitor quickly identifies low or high line voltage conditions.

The **PR570 "POWERITE II"** lets you perform the recommended safety leakage tests in seconds. The PR570 tells you instantly if the chassis you are working on has excessive leakage. These safety leakage tests protect your customers and build profits at the same time.

The **"POWERITE II"** provides you with an exclusive feature that allows you to adjust the amount of available current from 0 to a full 4 amps of power to prevent expensive component damage. This adjustable current trip simplifies power supply troubleshooting and minimizes parts damage.

Here's What The NEW PR570 "POWERITE II"™ Can Offer To Your Troubleshooting Bench:

- Insure your safety and the safety of your test instruments whenever servicing electronic products
- Conquer AC power source problems plus startup, shutdown, and regulator failures with a digitally accurate variable AC supply.
- Have complete confidence your AC line is right with the AC line monitor. Quickly identify high line and low line conditions.
- An adjustable current trip feature minimizes expensive parts damage by automatically removing AC power when excessive current is being drawn.
- Watch voltage levels and current draw with simultaneous current and voltage displays.
- Test AC outlets with an exclusive receptacle checker to insure correct earth grounding for the highest level of safety.
- Protect your customers from electrical shock and protect your business from lawsuit with an automatic, auto-toggling AC line and safety ground leakage test (leakage to 10 microamps). Use the safety leakage test to finance your test instrument purchases.

Call 1-800-SENCORE (736-2673) Today!

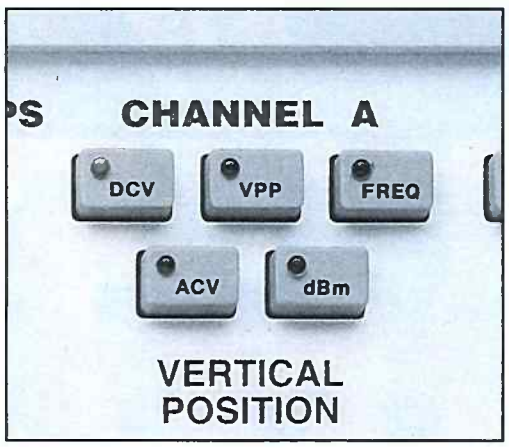


Fig. 3: The SC3100's pushbutton Auto-Tracking tests help you keep your mind on the circuit - not on the instrument.

These tests are called "Auto-Tracking" because they automatically follow the signal that is displayed on the CRT – for either channel A or B. If the signal's level or frequency changes, the digital reading immediately shows the new value.

Auto-Tracking Is Faster

Talk about timesavings. You don't even need to have the waveform locked or displayed to make an Auto-Tracking test. Each test is autoranged for hands-off measurements, and all tests are made through a single probe. It doesn't get any faster.

Auto-Tracking Is More Accurate

The SC3100's 0.5% DCV accuracy is nearly 60 times more accurate than a conventional oscilloscope or competitive digital readout scope, and the frequency measurements are over 1,000 times more accurate. Because all of the measurements are made through a single, low-capacitance probe, you don't need to worry about circuit loading either.

Auto-Tracking Is Error-Free

The digital Auto-Tracking tests are fully independent of the CRT circuits. This means that you'll never make another measurement error because you forgot to set one of the verniers to "CAL", or select "AC" or "DC" input coupling.

But These Features Won't Help If You Can't Use Them

The SC3100 "AUTO TRACKER's" ease-of-use is unmatched by any other instrument. All measurements are based on digital circuits, not the analog CRT. This means fast, easy, and accurate readings. There are no hidden menus, no multiple functions buttons, no complicated setups, and no confusing on-screen displays. Just push a button and read the results on the LCD display.

If you'd like to learn more about the SC3100 "AUTO TRACKER" Automatic 100 MHz Waveform & Circuit Analyzer, or prove to yourself how much easier your troubleshooting can be, call your Area Representative today at **1-800-SENCORE.** ■

SERVICE DEPARTMENT SPECIALS

SC3080 Scope Probes

The Sencore Service Department is running a special on new SC3080 Waveform Analyzer probes through the month of April, 1995. The limited supply of probes are only $89.95 each (regularly $125). If you're looking for an extra probe or need to replace an existing one, now's the time order (you'll save $35).

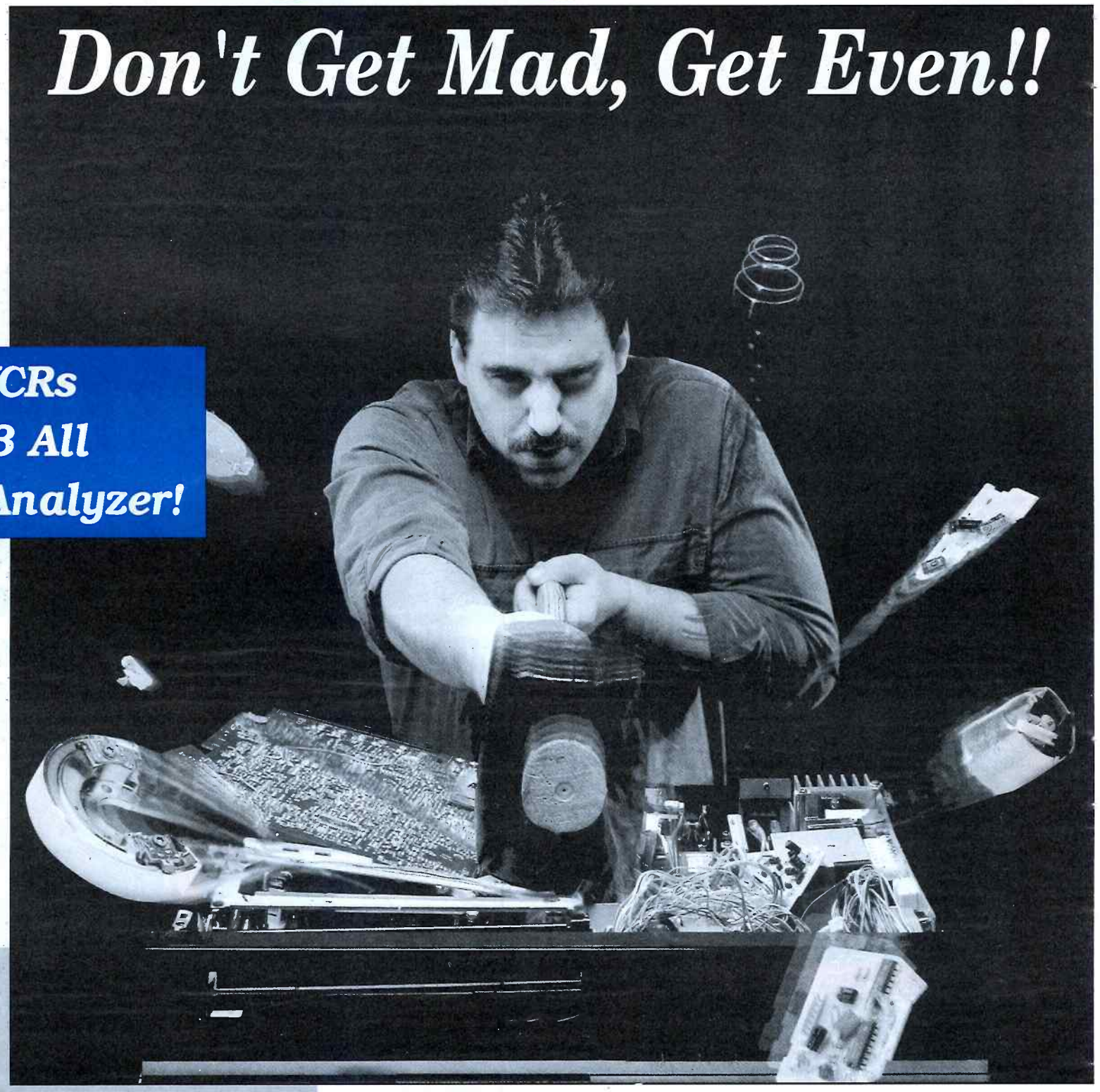
SC61 Scope Probes

Through a special order, the Service Department has a limited supply of new SC61 Waveform Analyzer probes. The $125 regularly priced probes are being offered for only $100 through April 30, 1995. Order now, we don't expect them to last long.

Call 1-800-SENCORE (736-2673)

Frustrated With Servicing The Tough Dog VCRs?

Don't Get Mad, Get Even!!



Would you be interested in servicing all types and formats of VCRs? Have you ever thought it would be possible to analyze a VCR problem without even taking off the VCR cover?

Take on all VCRs with the VC93 All Format VCR Analyzer!

Now, with the VC93, you'll have everything you need to completely analyze all VCR video, audio, tuner, and servo problems.

The VC93 All Format VCR Analyzer brings new, innovative solutions to VCR analyzing by providing:

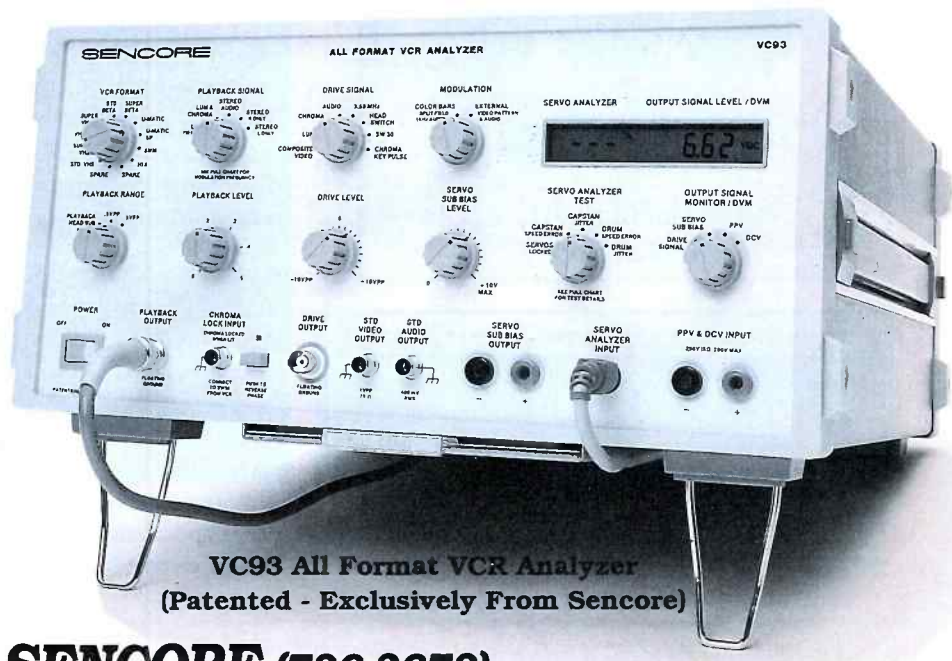
#1: An Automatic Servo Analyzer

#2: A Video Head Signal Substituter

#3: A Hi-Fi Stereo Signal Substituter

#4: A Luminance/Chroma/Audio Troubleshooter

Broken VCRs don't have a chance with the VC93 All Format VCR Analyzer on your bench. It's the latest and most advanced VCR analyzing instrument of the decade. To find out more about this revolutionary VCR analyzing instrument, simply call **1-800-SENCORE** and talk to your Area Sales Representative.



VC93 All Format VCR Analyzer
(Patented - Exclusively From Sencore)

SENCORE
3200 Sencore Drive, Sioux Falls, SD 57107
Direct (605) 339-0100 Fax (605) 339-0317

Call 1-800-SENCORE (736-2673)

Persuading Customers To Have Their VCRs Repaired

By Brad Johnson
Communications Product Marketing Specialist
Sencore Electronics

When I started writing this article featuring the VC93 All Format VCR Analyzer as a profit generator for the electronic service center, I felt it would be a snap. I thought I'd just cover the troubleshooting and time-saving benefits of the servo tests that are included with the VC93. But as I started putting my ideas down in words, I realized there is a lot more to making a profit in VCR servicing.

Some of the profit making ideas are really routine maintenance items that the VC93 can help you with on every VCR repair. The other ideas I thought of are preventative maintenance items that can save you time and money on call-backs. All of these ideas are also sellable features to your customer and can give your service center a more professional appearance. A good first impression keeps your customer coming back and gives you a better chance for positive word-of-mouth advertising.

Today's consumers want to deal with service organizations that will provide good reliable service that they can depend on now and in the future. Most customers don't mind paying a little extra for good service. When they bring their VCR into your shop, they aren't looking to buy a new VCR. They feel their machine is worth repairing, and it's your job to encourage that feeling. You need to make them glad they brought their unit to you for service. Using your knowledge of VCRs and the following tests, you can prove that it is the right decision to repair the VCR versus buying a new one.

Start With A Visual Inspection Before Performing Any Repairs

Many of the problems typically found in VCRs can be located with a quick visual inspection of all the internal mechanical parts. You might find a loose belt or a bad idler wheel, and have the VCR operating correctly in less than five minutes. Remember, though, it's your knowledge of VCRs that plays an important part of this inspection. Just because your acquired skills help you repair a VCR in five minutes, don't sell yourself short. Your skills are the lifeline of your business, and you need to charge a fair price for them.

Many VCR faults or problems can also be remedied by a good cleaning and oiling. Even under normal everyday operation, contamination, sticky gears, or dry bearings can cause a VCR to produce a poor picture. This is the type of knowledge your customer is paying for when they bring their VCR to you for service. It's a simple thing to you, but worth charging for.

Fig. 1: A quick visual inspection of the VCR can locate many common problems including worn belts, idlers, etc.

After all, you don't learn VCR servicing overnight.

Earn More Profits By Displaying A Professional Image To Your Customer

Typically when you take your car to a full servicing dealer for repair, they provide you with a full list of items that they check while the car is in for service. It may cost a little more, but you probably feel better about taking a long trip knowing your car has just been fully tested. Plus, it's nice to have some type of proof that indicates what they tested and repaired.

The same goes for your customer. Most people like to have some documentation or proof of the work done on any repair. That's why we've assembled a VCR Performance Report Card that will help you provide that caring and professional image to your customer. By using this handy report card on every repair, you'll find yourself discovering defects in VCRs quicker and isolating them to single stages by the time you're through with just the items on the report card! It will also help you provide more accurate estimates that can mean more profit for you and your service organization.

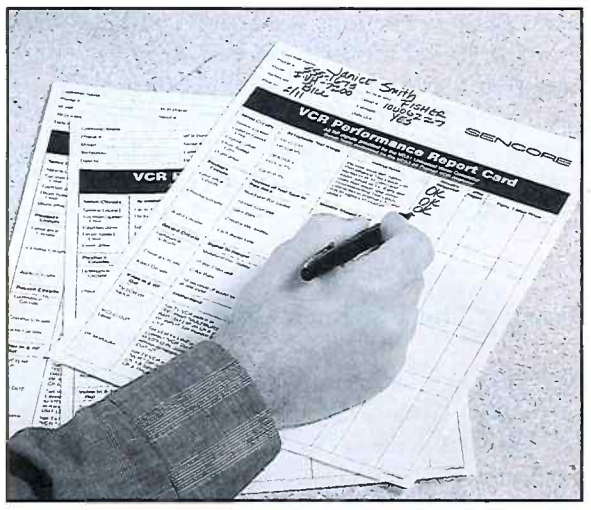


Fig. 2: The VCR Performance Report Card helps you diagnose VCR problems and provides a positive image to your customer. (Call 1-800-SENCORE for a free sample.)

The VCR Performance Report Card begins with a quick test of the servo circuits. By using your VC93 All Format VCR Analyzer, you can quickly test all the servo circuits in less than 30 seconds - without taking the cover off the machine. The VC93 provides five different Servo Analyzing Tests so you can't miss anything that may come back to haunt you later. Each test fully checks out a specific servo section of the VCR to simplify your troubleshooting and estimating. The malfunction of just one servo loop can lead you to believe the VCR has several problems. Remember, you're not just testing these circuits or sections for the customer, it's also for your protection against any future callbacks. Here is a quick rundown of the VC93's servo tests:

- The **Servos Locked** test checks to see if the capstan and the cylinder (drum) are locked to each other. A "Bad" Servos Locked reading most likely indicates a problem in a phase loop between the capstan and the drum.
- The **Capstan Speed Error** test determines if the capstan motor is running at the correct speed. The readout of the VC93 will indicate if the speed is too fast or too slow.
- **Capstan Jitter** test measures the capstan speed similar to the Capstan Speed Error test, but will measure small speed variations that will help you determine speed loop problems from phase loop problems.
- **Drum Speed Error** test checks for the proper drum (head cylinder) rotational speed. Again, the VC93's digital readout tells you if the drum speed is too fast or too slow. (This test applies to all VCR formats, including 8mm.)
- **Drum Jitter** test is the final servo test. It measures small variations in drum speed that will help you separate speed loop problems from phase loop problems.

Many of these exclusive servo tests can help you find a potential problem before it actually happens. For instance, if the capstan speed is too slow, could there be a component that has changed value or a stretched belt that would not have showed up if you had only repaired the original problem?

Testing The Playback Circuits

The next section of the VCR that you'll want to test is the playback circuits. Remember you're not just testing these circuits or sections for the customer, it's for your protection against any future callbacks. The playback section includes the luminance, chroma, and audio circuits.

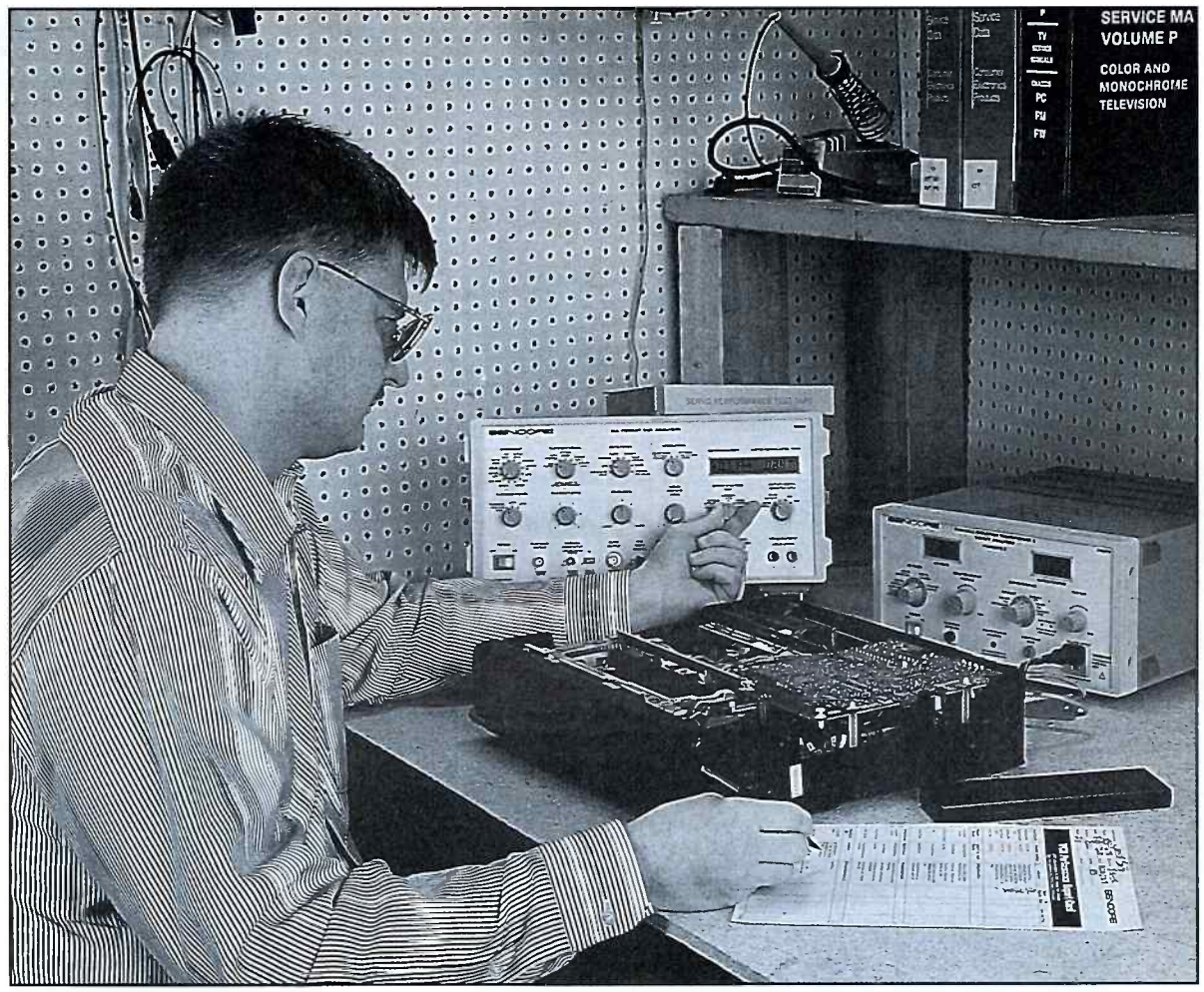


Fig. 3: The VC93 All Format VCR Analyzer lets you analyze the operation of the servo circuits with five exclusive GOOD/BAD analyzing tests.

You'll want to test the luminance circuits for any dropouts or noise, plus ensure that the VCR is providing good picture detail to 2.0 MHz or greater. (A simple adjustment here can make you look like a hero to the customer if they have had poor picture quality in the past.) Next, check the chroma circuits to make sure that the picture has the correct color and that the color is locked with a minimum amount of color noise.

Now move on to the audio stage. This section has become more important to most customers since most newer decks deliver some type of premium sound such as stereo or surround sound features. You'll want to make sure that the correct audio level is at the output jack and that all the audio frequencies are within 3 dB. All of these tests should not take more than three minutes to complete, but make you look more professional in the customer's eyes. It gives them more confidence in your abilities as a servicer and some practical results that they can appreciate.

The next section, RF In and RF Out, is what your customer really sees as the result of your labor and will determine if your customer views you as a true professional. You'll want to check the TV/VCR RF switch to make sure that a clear picture is delivered on both sides of the switch. How many times have you had a VCR come into the shop with the symptom of a poor picture on certain channels and you've found the channel select in the HRC or ICC mode, or simply that the VCR tuner was never tuned in properly? It happens, and your customer feels like you've really taken care of them when you take the time to explain why some of their channels weren't coming in clearly. Again it's your knowledge of VCRs and your ability to explain it to your customer so they can appreciate what you have done for them that counts here.

Fig. 4: Testing all of the circuits in a VCR before you give the repair back to the customer gives the customer proof of the work that's been performed and gives you insurance against callbacks.

Next check the Video Out level. You should have about 1 VPP across the terminated Video Out jack. Also check the RF Modulator to be sure it works properly in both the channel 3 and 4 positions. Again this can be a simple operator error in having the modulator on the wrong channel selection. As you can tell, this quick test takes very little time but can mean the difference between satisfying your customer or spending needless troubleshooting time trying to repair a non-existent operational problem. *Hint: Be sure to return the modulator selector switch to*

the channel the customer had selected, or you may be looking at a callback.

The System Control section is where many customers have problems in understanding their VCR operation. Some simple instructions from you can cure many symptoms they may be experiencing. The System Control section involves many of the normal operator controls and their effects on the VCR's operation.

First check to make sure the tape loads properly and that the tape basket moves freely as the tape is loading. Now check to make sure the tape ejects the same way. Make sure you check the end of tape sensors, the VCR should stop at each end of the tape and also check the function keys to make sure the unit operates properly in all modes, including any special effects that the VCR may have.

Another good check is to see if the VCR records properly. There could be several problems here including a speed problem, electrical record problem, or operator error (trying to record with record tab knocked out). If the customer also brought in their remote control, make sure it also operates properly. (Call your Area Sales Representative for a free Sencore Infrared Detector Card for testing remote controls). Here again, it may not seem like anything special, but providing full service for your customer builds a positive image and protects yourself against callbacks in the process.

Fig. 5: This special infrared detector card helps you identify defective and intermittent remote controls. Call us at 1-800-SENCORE for a free sample.

The last section or area that you'll want to test for is compatibility between machines. Many of today's customers have more than one VCR in their home or play tapes on more than one deck (friend, relative, etc.). There's nothing more frustrating to a customer than to have had their VCR "tuned up" and then it won't play tapes that were recorded on another machine. You can bet you'll either hear from them right away - or never again. It's definitely a good way to chase away any future business from that customer. So take the time to test compatibility between machines!

By using the Sencore VCR Performance Report Card or a similar device, you have a method in which to prove to the customer what work you have performed on their VCR and what effects the repair had on the performance of their unit.

Inform your customer that you will keep a copy of this information on file for any future reference and that you will drop them a note as to when they should bring their machine in for a routine cleaning based on their usage. You may want to offer them an incentive or reduced rate for the next cleaning. It's a good way to build your customer base and ensure repeat business. Plus your customer will feel as though you're treating them special, and that's what their paying for, right? And after providing this type of service to your customers, estimates will be much more believable and acceptable in the future since they trust your work.

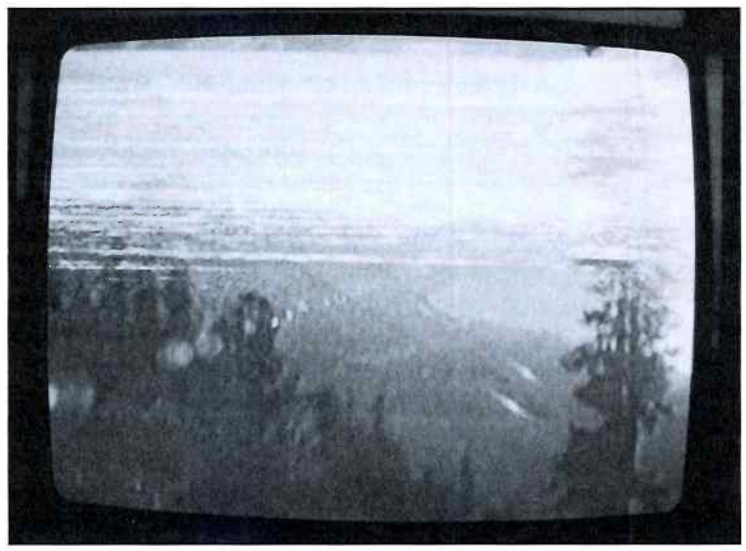


Fig. 6: How would you feel if you had paid $75 and got this kind of picture when you got your VCR back home? A quick compatibility test may help prevent this from happening.

For more ideas on building additional profits from your business call your local Area Representative at **1-800-SENCORE**. He/she will be glad to discuss ideas on new methods to build your business. ■

How To Make Your Service Center Shine Like A Champion!

By Glen Kropuenske
Application Engineer
Sencore Electronics

We all like to be winners. But in the eyes of your customers, are you and your service business truly champions? To be a champion in the electronic service arena sometimes requires more than just making top quality repairs. Technical demands by customers range from helping diagnose problems to proving the performance level of a video product after the repair. Its your performance in these extra innings or "overtimes" with the customer that determine if you are just another player or a true champion.

Your performance can reach championship heights when using a specialized video diagnostic generator such as the Sencore VG91 Universal Video Generator. The VG91 is designed to completely performance test and isolate defects in any NTSC video system. The VG91 is like having a miniature TV transmitter that allows you to generate any TV off/air or cable channel with special video test patterns and audio/MTS/SAP signals. The transmitter's IF signal, video, Y/C, and audio signals are also available as outputs.

Using the VG91 to diagnose conditions or prove video performance goes a long way in justifying your services and fees, plus increases the chances for repeat business. In this article, we will show you just a few of the specialized uses of the VG91 for testing and improving the performance of a TV receiver.

Accurately Adjust Picture Size At Low & High Brightness Levels

A common cause of customer concern after a TV service repair is a subtle problem with the picture. Complaints range from a slightly misadjusted picture size to problems with purity, brightness, or grayscale performance. These customer concerns can be addressed quickly and accurately with the VG91's analyzing test patterns.

Most TV receivers have many adjustments to size and shape the raster. Common adjustments include vertical height & linearity, horizontal width & centering, and pincushion. Parts replacement and component aging in the deflection circuits usually call for some alignment of these controls for best performance and customer satisfaction.

In the past, a crosshatch video test pattern was a popular choice among technicians for these adjustments. But judging the picture edge was difficult and in many cases resulted in a slight misadjustment and customer dissatisfaction. Since the pattern was mostly dark, changes in the deflection due to high voltage regulation often caused the underscan on the top or bottom of the picture with brightness changes.

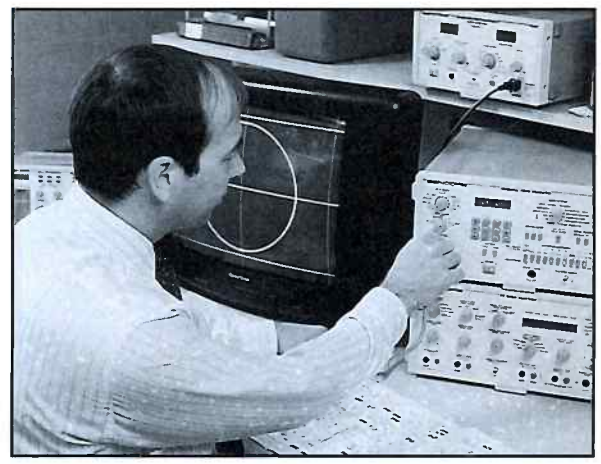


Fig. 1: The VG91's Window Circle pattern with variable background rasters improve the accuracy of picture height and width adjustments compared to the familiar crosshatch pattern.

The VG91's Window Circle video pattern provides a very accurate indication when aligning the raster size and position. The pattern includes crossing lines through the center of the picture and outer lines positioned 5% in from the picture edges. A circle is included in the pattern to indicate when the raster deflection is symmetrical.

To properly adjust picture deflection, position the crossing lines in the center of the picture. Rotate the yoke until the top, center, and middle horizontal lines are straight. Set the vertical height and horizontal width controls until the lines on the outer edges are 5% in from the picture edges. The circle should be round and centered.

The deflection may vary on some chassis as the picture changes brightness levels. This is due to high voltage regulation and is dependent on the chassis design. To test for changes in deflection height and width with picture brightness changes, push and activate the R, G, and B RASTER COLOR buttons of the VG91. The buttons increase the background raster of the Window/Circle pattern from black to an 80% white level. If needed, compensate the height and width controls to offset for slight reductions in deflection. This should insure proper deflection at all brightness levels.

Align The Comb Filter For Highest Resolution & Minimum Color Interference

How good the picture looks in a TV receiver depends on the performance of many circuits. Today's larger CRTs make it easier to see reduced circuit performance and users are more

demanding. One circuit which impacts the detail of the picture displayed on the CRT and performance of the color is the comb filter. Problems or misadjustments in this stage can dramatically affect the performance of the larger screen TV receivers prompting customer complaints.

VCRs, TVs, and most other video systems use comb filters to process the composite video signal consisting of luminance and chroma signals. The luminance signal represents the black and white portion of the video picture and is comprised of many video frequencies from 0 - 4.2 MHz. The chroma or color portion of the video signal is comprised of I and Q signals extending 0.5 MHz above 3.58 MHz and approximately 1.3 MHz below.

Comb filter problems can cause two symptoms: 1) One or both outputs low or missing, or 2) Both outputs produce signals, but the signals are improperly separated. The symptoms differ depending on the type of failure.

If the chroma output is missing, the receiver usually produces a good black and white picture with weak or missing color. If the luminance signal is weak or missing, the receiver produces a dark or blank CRT. If the raster is not blanked, there may be broad areas of color, without the detail carried by the luminance signal.

Often, both comb filter outputs produce a signal, but a bad part or a change in alignment causes the signals to separate incorrectly. The receiver may appear to work normally, but the picture lacks the extra detail the comb filter makes possible. It works about the same as a conventional receiver. At other times, the receiver produces a worse picture than a conventional receiver, because there is improper combing. The poorly combed signals cause excessive interference in the chroma and luminance circuits producing false colors and grainy color picture areas.

The VG91's Luma/Chroma Bar Sweep video pattern provides an improved method of testing and aligning comb filters. The Luma/Chroma Bar Sweep pattern tests for proper separation of the luminance and chroma signals. It also analyzes the frequency response of the luminance and chroma signals.

The Luma/Chroma Bar Sweep pattern has 10 different test frequency bars (see Fig. 2). The test frequency bars include six luminance and four chroma frequency bars in a single test pattern. The frequency bars of the Luma/Chroma pattern are chosen to provide luminance and chroma test frequencies in the frequency spectrum shared by these two signals.

There are six luminance frequency bars from 0 ref to 4.5 MHz. The 3.28, 3.88, and 4.20 MHz luminance bars occupy the same frequency spectrum as chroma and must be combed out by the comb filter. The 4.2 MHz frequency bar is included to test how well the comb filter responds to the highest luminance frequency included in a broadcast signal. Each luminance bar represents a different amount of resolution (picture detail) on the CRT screen.

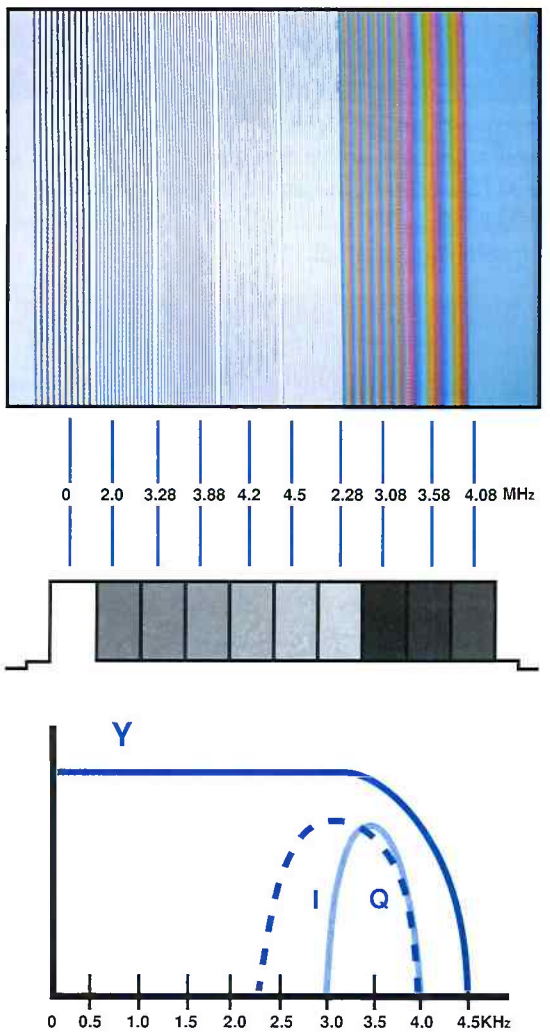


Fig. 2: The Luma/Chroma Bar Sweep video pattern includes luminance and chrominance frequency bars to dynamically test the separation and frequency response of comb filters.

There are four chroma frequency bars in the Luma/Chroma Bar Sweep pattern. The chroma bars include a 3.58 MHz subcarrier with chroma test frequencies of 3.08, 4.08, and 2.28 MHz. These test frequencies occupy the same spectrum with luminance and must be combed out by the comb filter. Each chroma bar represents a different chroma sideband frequency.

The VG91's Luma/Chroma Bar Sweep pattern provides an easy and dynamic check of the performance of the comb filter. When working properly, the comb filter should separate the luminance and chroma frequency bars of the pattern. To test and align the comb filter, apply an RF-TV channel or composite video to the TV/video system. Set the video system appropriately to receive a signal from the antenna or line input.

Select the Luma/Chroma Bar Sweep Video Pattern of the VG91 and set all BAR SWEEP INTERRUPTS switches to "On". Monitor the luma/chroma frequency bars on the CRT display or connect a dual trace oscilloscope to the luminance and chroma outputs of the comb filter.

The comb filter's luminance output should show outputs in the 0 - 3.88 MHz bars. A gradual reduction in the 3.28 and 3.88 bars is normal. If the luminance bar frequencies are passing through the comb filter, distinct vertical stripes will be seen on the CRT. No color should be seen in the luminance bars. Color in the luminance bars indicates poor performance or the need for comb filter adjustment. Receivers which do not use comb filters will normally show color in the luminance bars of the luma/chroma video pattern.

The comb filter's chroma output should produce the 2.28 - 4.08 MHz bars. The bars should be similar amplitudes, although a slight reduction in the 2.28 MHz bar is normal. Observe the monitor for any noticeable luminance interference to the chroma frequency bars. Interference indicates poor performance. *Call your Area Sales Representative for a Free Tech Tip on comb filters.*

Adjust CRT Controls For Proper White Balance

The conduction of the CRT's color guns must balance to produce proper shades of gray from black to white. Biasing and drive to the CRT along with aging of the CRT may affect the conduction (balance) of the CRT's three color guns. These problems or misadjustments cause a colored background on the CRT picture.

Proper settings of the CRT drive and screen controls produce a good black and white display without any background color. The procedure to align these controls to achieve a conduction balance between CRT guns is called "grayscale," "color tracking," or "white balance."

The VG91's 10 Bar Staircase pattern provides a dynamic reference signal for adjusting these controls. In most cases, you do not need to use setup switches or short circuit points. Set the VG91's VIDEO PATTERN switch to "10 BAR STAIRCASE." Connect the VG91 to the receiver to view the video pattern. Set the receiver's brightness and contrast controls to midrange.

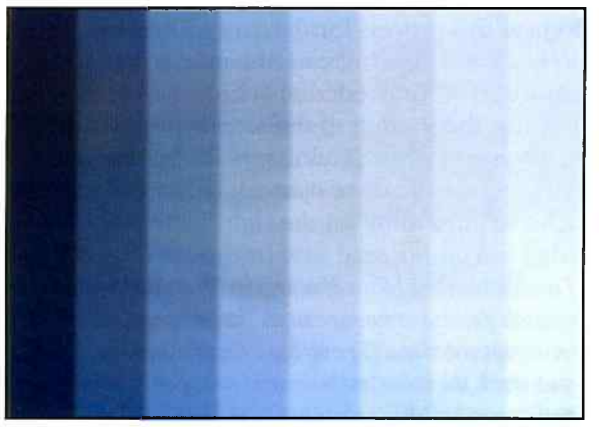


Fig. 3: The 10 Bar Staricase pattern consists of 10 evenly spaced bars, with video level ranging from black to 100% white

In many instances, you need only to touch-up the screen and drive controls. Touch-up the screen controls by looking on the display's left side and adjusting for pure gray on the 2nd bar from the left. *Note: "Cutoff," "Background" and "Bias" are other common terms used to identify the screen controls.* If increasing the screen controls does not provide light in the 2nd bar from the left, increase the master screen control (G2) as needed to achieve visible light. The 1st bar on the left should be set to black.

Adjust the drive controls by looking on the display's right side and adjusting for pure white.

Fig. 4: The VG91's 10 Bar Staircase pattern lets you set CRT controls without jumper wires or setup switches.

You should see 10 distinct gray bars ranging from black to white when you're finished. Vary the brightness and contrast controls as a final check. If color is seen as you turn the brightness control, readjust the screen controls. If color is seen as you turn the contrast control, readjust the drive controls.

When the screen and drive controls are severely misaligned, set the red, green, and blue drive controls to maximum. Set the red, green, and blue screen controls to minimum. Set the master screen control (G2) to minimum (lowest CRT brightness). Increase the red screen control until light is just visible in the 2nd or 3rd bar on the left side of the display.

Repeat this process for the green and blue screen controls. (Increase the master screen control (G2) as needed to achieve visible light.) Balance the settings of the screen controls to achieve gray while retaining black on the far left bar. Reduce the drive controls as needed to achieve pure white on the right hand side.

Troubleshooting Hint: If careful adjustment of the controls fails to remove color in the bars, test the CRT for comparable cutoff readings between the CRT guns and check the color tracking and emission life of each gun.

Resolve Questions Regarding MTS/SAP Performance On Any Cable TV Channel

Almost all TV-video products include circuits to receive or process the audio portion of the TV signal. In the past, the audio circuits have received little attention. If sound was heard, the circuits were assumed to be working. But with recent improvements to the audio circuits and inclusion of MTS decoders, users often question if the audio circuits are performing as they should.

To test the audio circuits, many technicians simply apply a cable or over-the-air TV signal. If audio is heard and the MTS light illuminates, everything is assumed to be OK. But the MTS light provides little or no information regarding the performance of the audio circuits or MTS decoder. The MTS light may be indicating the presence of an MTS pilot, but it may also be falsely triggered on by excessive noise. In fact, the MTS stereo light can be illuminated when the MTS decoder is not providing a two channel or stereo output at all.

Using cable and off-air signals for testing, troubleshooting, and aligning audio and MTS circuits is confusing and unreliable. The signals vary in strength from channel to channel, the audio content continually varies, and the quality of the signal is always questionable. Problems can sometimes appear to be related to certain cable channels because of these variables.

The VG91 provides the audio signals to accurately and reliably test and align the audio stages of monaural receivers and those equipped with MTS/SAP decoder circuits. The mono, MTS, and SAP audio signals of the VG91 can be output on any of the 125 TV-RF cable channels or VHF/UHF channels. It is also output on the 45.75 MHz and 4.5 MHz IF carriers for isolating audio defects using signal substitution.

To test the receiver's audio/MTS circuits, connect the RF/IF cable from the VG91's RF-IF OUTPUT to the receiver's antenna input. Set the VG91's RF-IF RANGE switch to the "HI" position and the RF-IF Level control to "NORM." Select the channel on the TV receiver to match the channel number indicated on the VG91's digital readout.

Turn the VG91's Video Pattern switch to "RASTER" and turn off the Raster Color switches for a black raster. Set the VG91's MTS Stereo Mode switch to "MONO," set the Audio Frequency switch to "300 Hz" and the SAP & Stereo Pilot control to 100%. You should observe a black raster on the CRT screen and hear the 300 Hz audio tone as you increase the volume control of the receiver.

If the TV receiver is capable of MTS and SAP audio reception, you should set the VG91's MTS Stereo Mode switch to "L+R" and select the MTS or STEREO mode of the receiver. You should hear audio from both speakers and the MTS stereo light should illuminate. Move the VG91's MTS Stereo Mode switch to the "SAP" position and select the SAP mode of the receiver. Again the audio should be heard from both speakers and the SAP light should be "on."

Audio IF/detector problems, MTS circuit defects, or misalignments can eliminate stereo operation even when the stereo light is "ON". To tell if the TV receiver is actually outputting a stereo signal requires testing for stereo signal separation. The VG91 checks stereo operation by providing an MTS signal resulting in an audio signal output on only the right or left channel ("L CH" or "R CH" positions of the MTS Stereo switch).

Set the VG91's MTS Stereo Mode switch to "L CH," set the Audio Frequency switch to "300 Hz," and the SAP & Stereo Pilot control to 100%. Select the MTS or Stereo mode of the receiver. Adjust the volume control so you can hear audio. Vary the receiver's balance control from the left channel to the right channel. The left channel speaker should be noticeably louder than the right. Switch the VG91's MTS Stereo

Fig. 5: Use the Mono/MTS Stereo/SAP generator of the VG91 to test tuner, IF and audio circuits of a TV-video system.

Mode switch to "R CH." Again vary the receiver audio balance control from the left to right channel. The right speaker should be noticeably louder than the left.

If there is seemingly no difference in the sound level between the left or right channel, the MTS stereo circuits are not working or performing poorly. To verify this and to perform separation adjustments, hook a dual trace oscilloscope to the receiver's Audio Out jacks, speaker terminals, or available audio test points. Monitor the left and right audio levels. Adjust the volume control to a normal listening level and set the oscilloscope's control to view the left and right audio signals. Set the receiver's audio balance control in the middle so you can observe the audio to each speaker.

A properly working MTS receiver should produce a difference of over 20 dB more output in one channel compared to the other. On the oscilloscope, this is over a 10X difference in PPV levels between the left and right channels. If there is less than a 10X difference, the stereo circuits are performing poorly and require service or alignment. Follow the manufacturer's guidelines to align the stereo decoder for maximum separation. Use the VG91's 300 Hz, 1 kHz and 3 kHz tones as specified while viewing the outputs on the scope.

Be A Champion

Let the VG91 Universal Video Generator lift your performance to the championship status and win in regulation before you get to overtime! For additional information on how the VG91 can be used to performance test and troubleshoot video systems, call your Sencore Area Representative today.

*Call us at **1-800-SENCORE** (736-2673) for a free Tech Tip on "Understanding Multichannel Television Sound (MTS)."*

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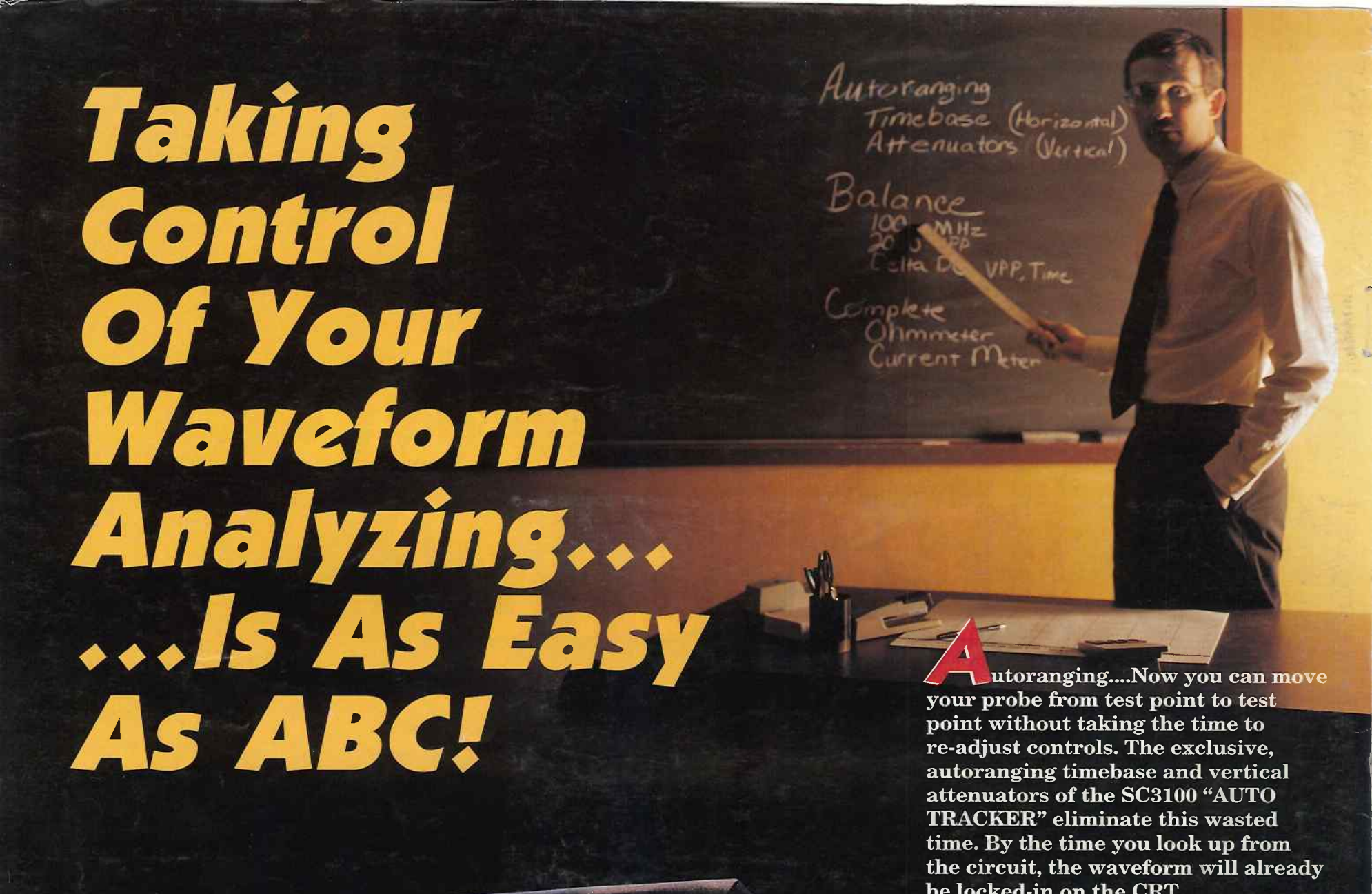

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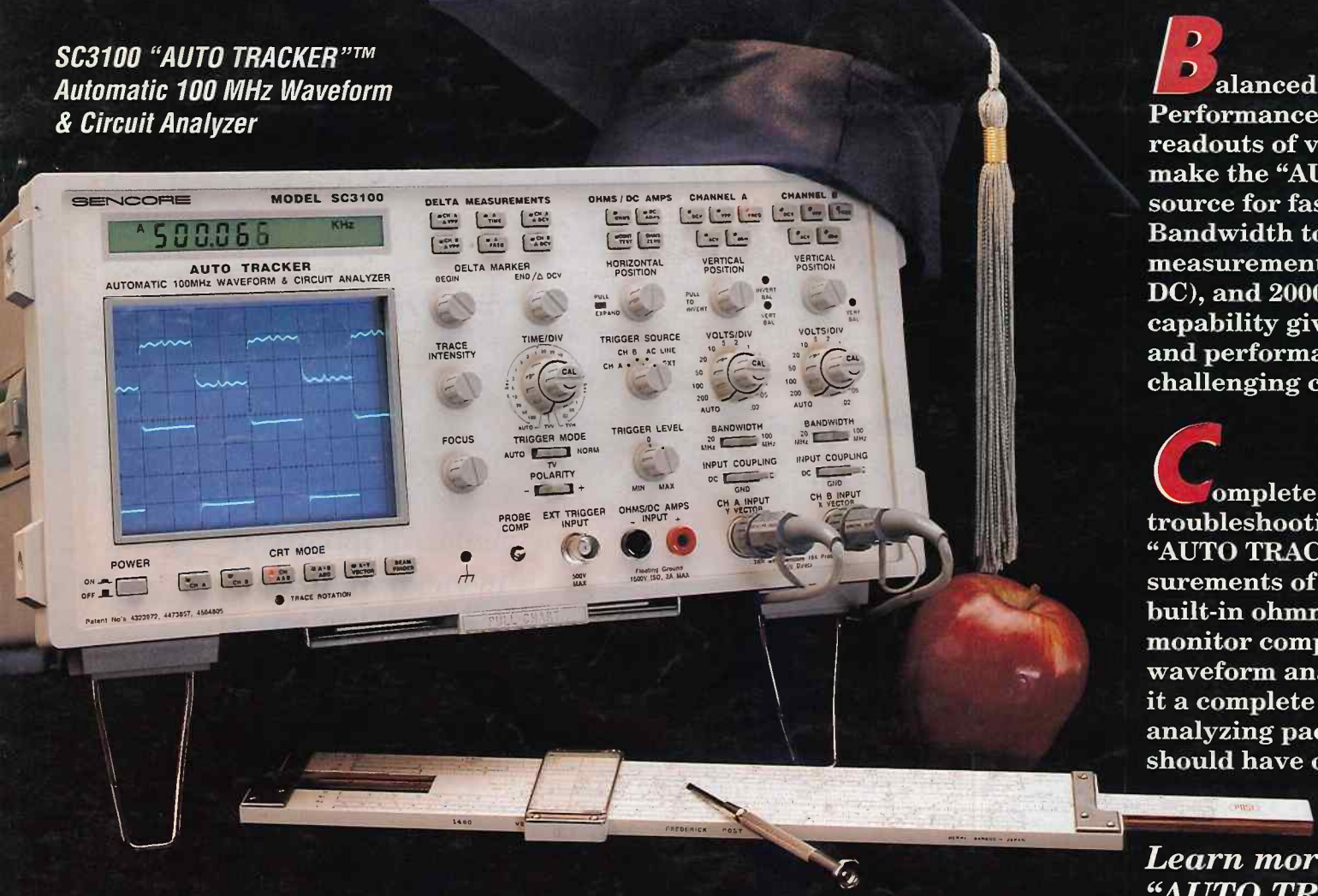

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