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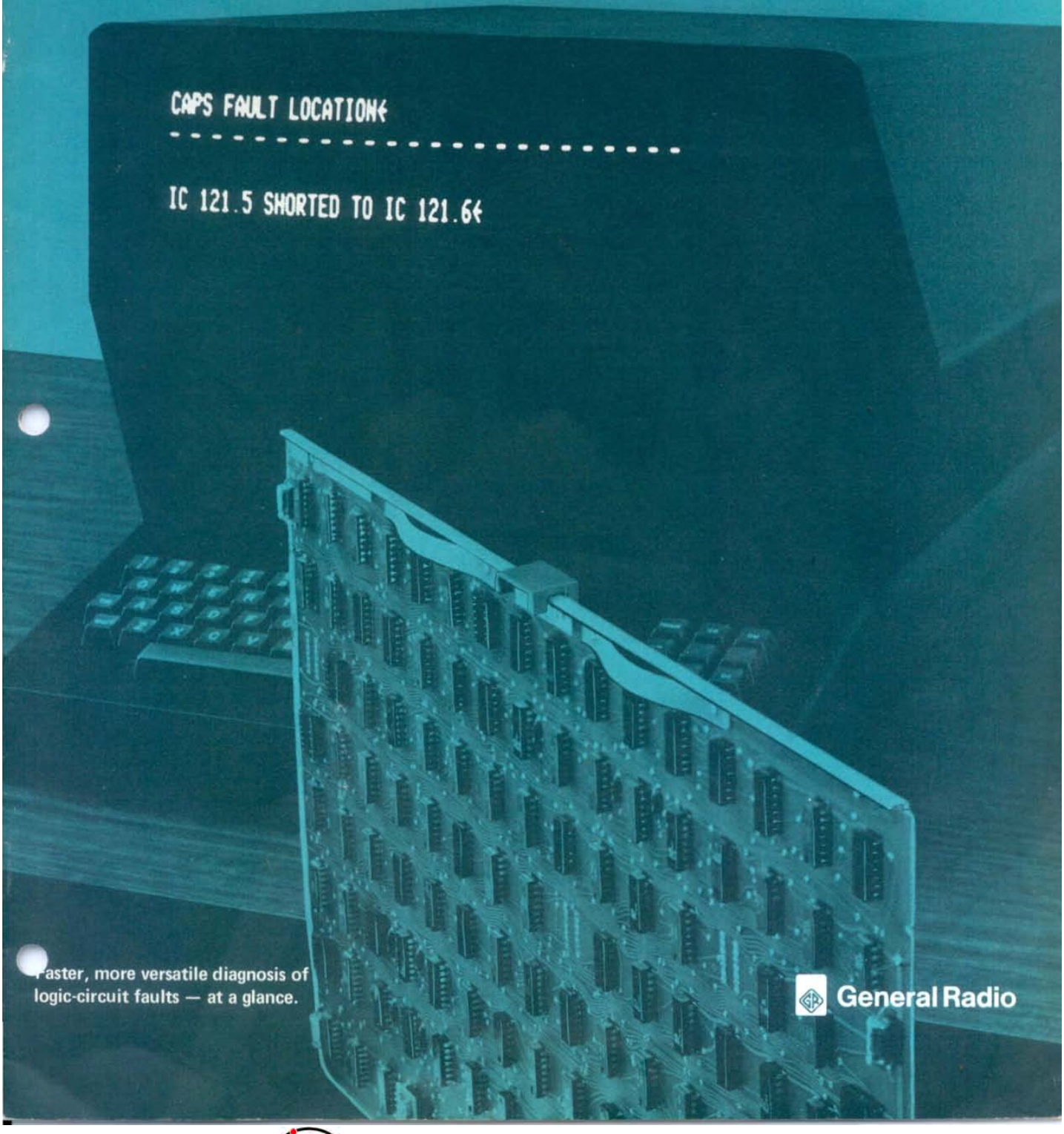
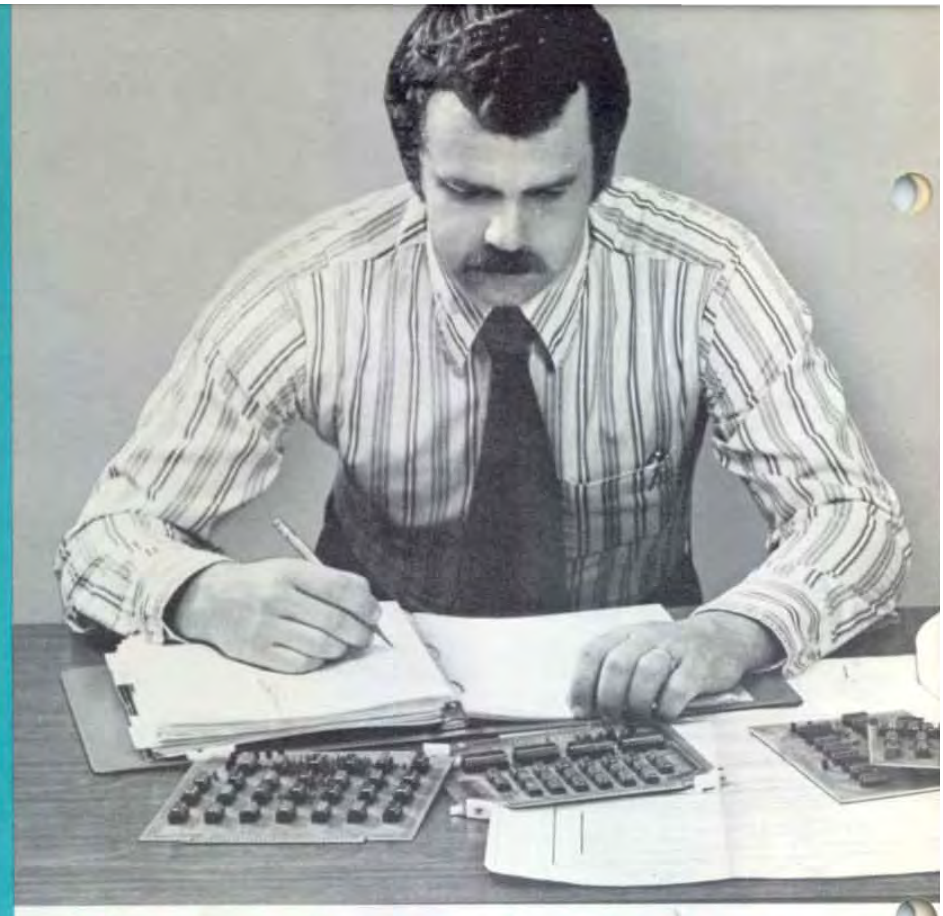


Faster, more versatile diagnosis of logic-circuit faults — at a glance.

General Radio



New software increases diagnostic versatility of GR 1792 Logic-Circuit Tester

A new computer-aided programming software package is now available to increase fault-diagnosis versatility and throughput of any GR 1792 Logic-Circuit Test System with a disk memory. It also gives the user full in-house control of his testing software.

The GR 1792 system performs multiple-logic-level tests of circuits with hundreds of pins. Test results can be displayed in alphanumeric scope readout and teletypewriter printout, or indicated with simple GO/NO-GO panel lights.

Among the features of the basic GR 1792 Logic-Circuit Test System are programmable power supplies for marginal-condition tests, and dual-logic-level drive and sensing that permit testing boards with mixed logic families.

The combination of the GR 1792 system and the optional computer-aided programming software cuts the cost of logic-board testing and generating test programs, as well as the cost of designing new logic boards and staying abreast of design changes.

The new computer-aided programming software – referred to by the acronym CAPS – enables the GR 1792 user to generate and verify test programs, and to troubleshoot boards on-line automatically, without operator intervention.

Through the CAPS package, you learn how good your test program is before you start testing, to give you confidence in your test results. On the average logic board, each fault is isolated within 30 seconds after being detected. Before reporting a diagnosis, the CAPS package simulates the suspected cause of failure and compares the simulated symptom with actual

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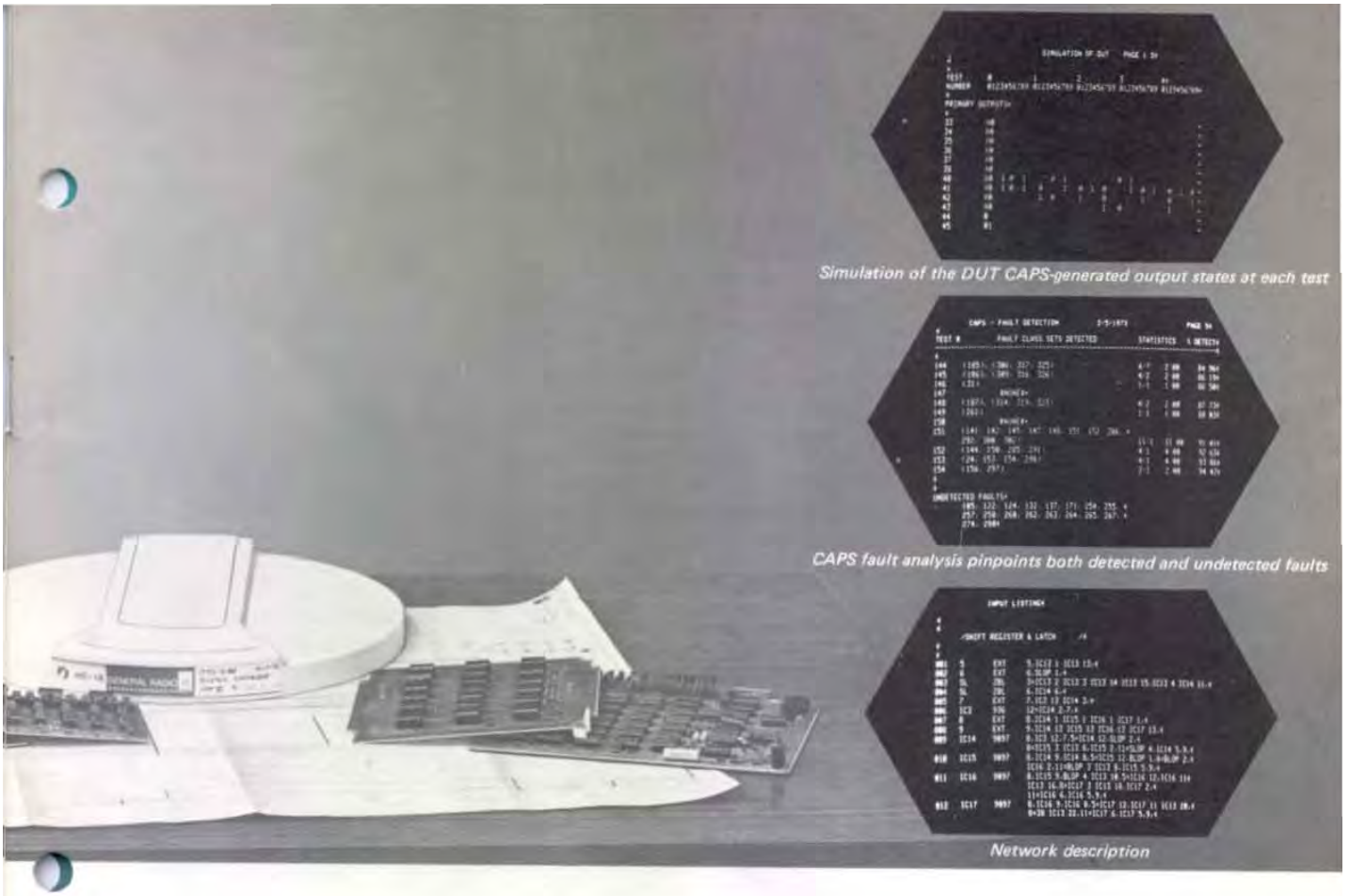


Simulation of the DUT CAPS-generated output states at each test

CAPS fault analysis pinpoints both detected and undetected faults

Network description

board behavior to guarantee accurate detection.

Among the failures that can be recognized are stuck-at-zero, stuck-at-one, IC reversed in socket, loss of ground or power, shorted adjacent tracks, and shorted inputs or outputs.

The CAPS package models circuit diagrams and analyzes their functions, saving time and money at every step in the making and testing of logic-circuit boards. Its computer model of the circuit is used to verify schematics, prototypes, test programs, and production diagnoses.

Once the interconnections and device types have been input-listed, the computer-aided programming software adds device descriptions from an extensive library and creates a model of the circuit. From this it can evaluate circuit design in terms of device utilization, logic errors, circuit function, and testability – even before a prototype logic board has been built.

Modeling of both the circuit and its potential faults expedites future troubleshooting, since fault isolation becomes faster and more thorough. With the prototype boards tested against the previously prepared and verified test program, you get a confirming check of the schematic against the known-good model, and a check of the prototype against the schematic.

Actual production circuit boards are also tested against the known-good computer model. Any failure diagnoses are confirmed against the model in a fault-simulation mode before being reported to the operator.

The CAPS package increases throughput by simplifying preparation of a test program for logic boards with hundreds of IC's. It enables you to locate and identify many of the common types of production failures in a logic board *without* probing. It warns of faults that are undetectable at the board terminals by the test program, or are indistinguishable from other faults because of circuit configuration. And it grades the program on its ability to ferret out these faults.

In event of a design change, the computer-aided programming software allows the original test program to be quickly evaluated against the modified circuit and changed if necessary. It cuts programming time by guiding the preparation and modification of test plans. And it ensures that all test plans are exhaustive and efficient.

The CAPS package can handle SSI, MSI, and LSI logic devices with equal ease. Through this software option, the GR 1792 can reduce both your set-up costs and your recurring costs at virtually every step in the making of logic circuits. And it nets you these savings *in addition to* increasing your throughput.

Nationwide sound-system seminars using GR equipment

A new company headed by Don Davis, nationally known acoustical engineer and sound-system consultant, has initiated a series of unique seminars in techniques of sound-system design, installation, equalization, operation, and maintenance.

The three-day seminars are being conducted by Mr. Davis' firm, Synergetic Audio Concepts, in 21 cities throughout the United States over a two-year period. The first seminar was held in Los Angeles in May, and the second seminar will be held in San Francisco from June 18 to 20. Subsequent seminars, to be announced, will be held at key locations across the nation.

Those attending each seminar use the facilities of a mobile sound laboratory equipped with a computer and over $50,000 worth of test and sound-measuring instruments – including many General Radio products. Among GR equipment with which attendees gain firsthand experience in solving sound-system problems are:

1933 Precision Sound-Level Meter and Analyzer
1564-A Sound and Vibration Analyzer
1921 Real-Time Analyzer
1309-A Oscillator
1396-B Tone-Burst Generator
1650-B Impedance Bridge
1523 Graphic Level Recorder
with: 1523-P1 Preamplifier Plug-In
1523-P2 Sweep Oscillator Plug-In
1523-P3 Stepped 1/3-Octave-Band Analyzer Plug-In
1382 Random-Noise Generator

Prior to forming Synergetic Audio Concepts, Don Davis was a Vice President of Altec Lansing (now Altec Div. of Altec Corp.). While at Altec, he conducted their noted Acousta-Voicing® courses that trained over 1,000 sound specialists in design, installation, and equalization of sound systems to harmonize with acoustic environments.

Don Davis invented the patented sound-system equalization method on which the Altec Acousta-Voicing courses were based, and also wrote the course textbook. He is the author of *Acoustical Tests and Measurements* and *How to Build Speaker Enclosures*. Among his other achievements is development of a novel filter-network console that has revolutionized sound-system design techniques.

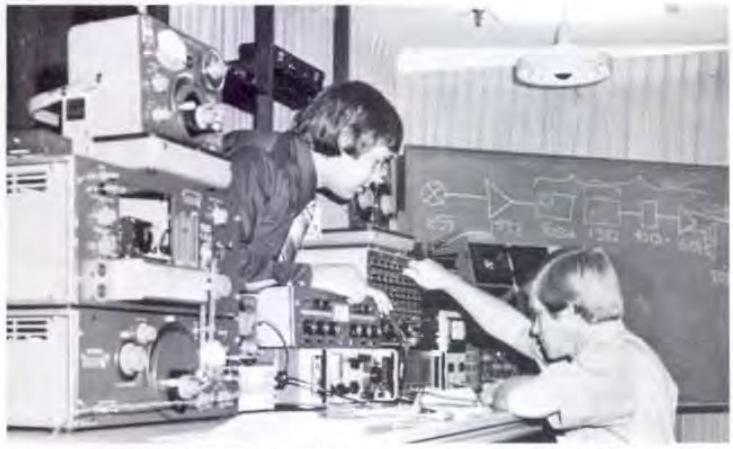
Instruction at the Synergetic Audio Concepts seminars provides a complete updating on basics of sound-system engineering, and covers the acoustic environment as well as all interacting systems within that environment. Recommendations and assistance are given in designing a measuring chain adapted to each individual's needs.

All attendees receive a 250-page textbook specially written for the seminars by Mr. Davis. The book is the most detailed yet available to the sound industry, and reflects the author's 25 years of experience in all phases of sound-system design.

As an introductory bonus, each individual attending the first year's series of seminars, during 1973, will receive up to three free computer reviews of sound systems he subsequently designs, plus regular mailings of technical papers and a quarterly newsletter. Later participants will be charged for these services.

The fee for the three-day seminar is $250 per person, or $225 each for two or more persons from the same company.

Full details on seminar content, registration, plus a schedule of dates and locations are available directly from Don Davis, President, Synergetic Audio Concepts, P.O. Box 1134, Tustin, California 92680.



Seminar participants gain hands-on experience in use of sound-system test instrumentation.

Don Davis, President of Synergetic Audio Concepts, personally directs seminar instruction.

McAleer named Vice President

Harold T. McAleer, most recently Manager of GR's Custom Products Operation, has been appointed Vice President for Engineering. He assumes responsibility for engineering management, engineering staff groups, and engineering services, plus the Corporate Design Standards Group, the Microelectronics Group, and the Custom Products Operation.

A 1953 graduate of the Massachusetts Institute of Technology, Hal first worked at GR as an M.I.T. cooperative student and joined GR full-time as a Development Engineer in 1955. He was named Manager of GR's Custom Products Operation in 1968 – responsible for design, manufacture, and marketing of custom-designed automatic test systems.

The author of many published articles, Hal continues to receive hundreds of requests for reprints of his paper, "A Look at Automatic Testing," that appeared in the May, 1971, issue of *IEEE Spectrum*.

GR 1730 Linear Circuit Tester now measures "popcorn" noise, too

A new optional plug-in card for the GR 1730 Linear Circuit Tester now enables you to test "popcorn" noise of any operational amplifier with input bias current less than 200 nanoamps.

Where operational amplifiers are used in servo loops and nulling schemes, popcorn noise can introduce errors greater than 20% of the setting. If the system samples during a popcorn-noise period, the result will be completely erroneous. Hence the need to test popcorn noise accurately beforehand.

A form of random input noise, popcorn noise is a true current source that remains at the same amplitude and never goes above 10 Hz. Its cause is not known for certain, but contamination during the metallization process of the operational amplifier is suspected.

Designated as 1730-4797, the plug-in card available as an accessory for the GR 1730 Linear Circuit Tester operates over a bandwidth from 0.5 to 10 Hz. It falls off at 6 dB per octave to 30 Hz, and maintains level to 1 kHz. Source impedance for the device under test is 500 kilohms. Total test time is about 9 seconds, with noise detection time about 4 seconds. Two ranges are provided for full-scale readings of 150 and 1500 microvolts peak-to-peak noise referred to the input.

New paper on functional trimming of hybrid circuits

The advantages of adjusting hybrid circuits by trimming film resistors to precise functional circuit parameters rather than to specific resistance values are described in a new paper available from GR.

D. Abenaim

Titled "Functional Trimming: Discussion of a Problem, Description of a Solution," the paper was written by Daniel Abenaim, GR Development Engineer, and presented to the International Society of Hybrid Microelectronics.

The pros and cons of anodizing, air-abrasive, and laser trimming methods are discussed, with the laser method recommended as most advantageous for functional trimming of thick-film and thin-film hybrid circuits.

A detailed description is given of a computer-controlled system that trims film resistors with a laser beam while monitoring frequency, period, ac and dc voltage, and resistance. The system is fully integrated by General Radio using GR 2200 measurement modules and a work station – including laser, beam positioner, and parts handler – manufactured by Micronetic Systems, Inc., a GR associate in Burlington, Mass.

Copies of Mr. Abenaim's paper on functional trimming can be obtained through the attached reply card.

M.I.T. offers program on high-speed photography

A five-day program on "Techniques in High-Speed Photography" will be presented at M.I.T.'s Stroboscopic Light Laboratory from Monday, June 18 to Friday, June 22.

The program will cover scientific and engineering uses of high-speed photographic measurement techniques. Mornings will be devoted to theory and demonstrations, and afternoons to practical laboratory experience with a variety of equipment and instrumentation.

Subjects to be covered will include pulsed stroboscopic lighting, optical high-speed cameras, Kerr cells, Faraday shutters, and image converters.

Full information on the program is available from: Director of Summer Sessions, Room E19-356, Massachusetts Institute of Technology, Cambridge, Mass. 02139.

New GR 2210-A Analog-Circuit Analyzer

The more analog circuits you're testing on a mass-production basis, the greater your need to achieve maximum throughput at lowest cost per unit tested. It's this widespread need for cost-efficient production testing that prompted development of the new GR 2210-A Analog-Circuit Analyzer.

The computer-controlled GR 2210-A was created specifically for testing production runs of any electronic circuit with analog capability – amplifiers, demodulators, A-to-D converters, etc. It handles volumes of either identical circuits or a few different types. And it achieves its high throughput at very low cost per unit, using unskilled operators.

One of the first of the new GR 2210-A Analog-Circuit Analyzers is now helping a major manufacturer save time and money in production-testing of its new automotive-ignition amplifiers. With electronic ignition systems being widely adopted by the automotive industry, the output of ignition amplifiers is expected to reach millions annually.

That's a whopping big load of analog circuits to test. But that's precisely the high-throughput application in which the GR 2210-A shines. In fact, the growing variety of electronic devices on today's cars and trucks promises to make this a major market for high-volume automatic test systems such as the GR 2210-A.

One of the major factors that determine the true cost-efficiency of any test system, in addition to the cost per unit tested, is the initial system cost. The basic GR 2210-A system – complete with minicomputer, high-speed tape reader, and teletypewriter – can be completely installed for less than $60,000. That's almost *half* the cost of comparable automatic systems now being used for production-testing of analog circuits. Yet the GR 2210-A gives you greater throughput and expandability than other systems – in about half their floor space.

Another factor bearing directly upon the cost-efficiency of a test system is its ease of operation. The operating simplicity of the GR 2210-A reflects a major concern with human engineering to ensure fast, accurate, foolproof performance of tests by low-skilled personnel. Operator decisions have been eliminated for many tests, and human intervention reduced to a minimum in all control and adjustment functions.

The GR 2210-A Analog-Circuit Analyzer automatically and flawlessly makes many of the testing decisions that in other systems require human intervention. These include selecting one of several sub-tests according to the outcome of a preliminary test. Or changing measurement sensitivity during a test sequence.

Test results can be indicated by simple GO/NO-GO lights that require no operator decision. But when the operator must manually adjust the tested circuit, the need for a human decision is minimized by use of a computer-controlled tuning meter, complete with illuminated instructions for tuning to a null, a minimum, or a maximum reading. Entry into the tuning mode is under program control.

The use of a tuning meter instead of a digital display is deliberate. It's much faster and easier for the operator to adjust a value by nulling a meter needle than by watching numbers flicker back and forth on a digital display.

Every aspect of the GR 2210-A has been designed to minimize dependence on the human operator. The few necessary controls are designed for easy understanding by an operator with minimum skill and training. And the controls are located at eye level for operator convenience.

The GR 2210-A permits many more tests to be conducted at computer speeds, automatically, than can be done on similar systems. Tests requiring manual intervention demand little operator time or skill. Often, one operator can supervise several test stations with little or no training. Instructions via panel indicators or the

uts cost of high-volume testing

teletypewriter fully control – and limit – the operator's role. Through judicious human engineering of all control functions, the test operator can maintain high productivity with minimum fatigue and error.

Unlike some automatic test systems, the GR 2210-A performs its measurements using modules designed specifically for system use – not manual instruments adapted for automatic operation. The system configuration places the modules as close as possible to the device under test, thus enhancing measurement accuracy by reducing line losses, stray capacitances, etc.

Since the system modules are directly compatible with the minicomputer, slow and costly interfacing equipment is eliminated. Upon command from the minicomputer, the modules respond instantly with computer-compatible data.

Standard modules are available to measure or force dc voltage, dc current, ac voltage, frequency, single or multiple pulses, phase, plus a-m and fm signals.

Measurement capability of the GR 2210-A system extends to 10 MHz. At least 100 pins are available for measurement scanning, and even more for switching power supply and stimulus connections. Accuracies are better than 1% under most conditions. Stimulus ranges are from a few millivolts ac to over 370 volts dc.

The unusual flexibility of the GR 2210-A Analog-Circuit Analyzer enables test methods to be modified easily. A test mode for a long production run of the same circuits can be readily adapted to new or redesigned circuits on short notice. The totally modular construction of the GR 2210-A lets you make changeovers with minimum downtime, and also facilitates servicing. Since multiple-station test systems are not multiplexed, small localized problems do not trigger a massive shutdown.

Numerous programs can be stored for ready access, and device adaptors are interchangeable. Tests for new or redesigned circuits can be easily written into existing test programs through a versatile editor and English-level test language.

The 2210-A software is based on the well-known GR 2200 automatic test systems introduced two years ago. Simple English-level programming statements enable an untrained designer, as well as the test operator, to understand all aspects of the tests being performed. The solution-oriented language (SOL) allows the operator to concentrate on performing the tests rather than on control of the test equipment.

The use of modular, interchangeable components enables your GR 2210-A system to be expanded easily and inexpensively as your future needs grow. Thanks to the system's open-end design, you don't have to try to guess today what your testing requirements will be tomorrow.

The GR 2210-A is compatible with all existing multiple-station measurement systems, enabling you to increase cost-efficiency of your present production testing facilities at minimum investment.

To put you "on-line" immediately with no set-up headaches, the GR 2210-A Analog-Circuit Analyzer is available in a turnkey installation package that includes all hardware and software your application requires. All necessary device adaptors and specific test programs are included in the basic package price. There are no unpleasant surprises to come later in the form of extra-cost peripherals, programs, or accessories.

Wherever masses of analog circuits are to be tested, the GR 2210-A Analog-Circuit Analyzer can save you time and money – from the low initial investment through the low day-to-day operating costs. The true measure of any automatic test system is the ultimate cost per unit tested. And the new GR 2210-A system brings this critical cost down to the lowest figure yet.

Oil producer's "good neighbor" policy

A good neighbor should be a quiet neighbor. But what if your neighbor happens to be an oil refinery or an oil-drilling rig? That's when the best community-relations program is a noise-abatement program.

Aware of its responsibilities as a good neighbor, Standard Oil Company of California has been actively involved in control of environmental noise at its refineries and drilling sites for nearly 20 years. For many of these locations are adjacent to residential and business areas. Several oil-drilling rigs are actually located in downtown Los Angeles.

A special Environmental Health and Toxicology Section provides technical direction on minimizing equipment noise, maintaining acceptable community-noise levels, and protecting employees' hearing at Standard of California. Experienced noise-abatement engineers from this section evaluate new and unusual noise problems. Specially-trained local personnel measure noise levels at key points throughout Standard's production and refining facilities, as well as in nearby communities.

GR instruments have contributed to the success of Standard's noise-abatement program right from its inception, back in the fifties. Starting with a 1551 Sound-Level Meter, a 1555 Sound-Survey Meter, and a 1550 Octave-Band Analyzer, Standard's inventory of GR instruments has expanded in size and variety to keep pace with the expanding noise-abate-ment program.

According to Stan Judd, one of the noise-control experts with the company's Environmental Health and Toxicology Section, the company's current list of GR sound-measuring and analysis instrumentation includes:

- 20 1565 Sound-Level Meters (both A and B models)
- 7 1558 Octave-Band Noise Analyzers
- 6 1560-P40 Preamplifiers
- 2 1933 Precision Sound-Level Meters and Analyzers
- 1 1521-B Graphic-Level Recorder with a 1521-40B Drive Unit
- 1 1564-A Sound and Vibration Analyzer
- 1 1525-A Data Recorder
- 1 1556-A Impact-Noise Analyzer

Plus calibration microphones, vibration pickups, windscreens, and other accessories.

The handy GR 1565 Sound-Level Meters are the most frequently used weapon in Standard's war against noise pollution. For more comprehensive data, Standard engineers turn to specialized instruments such as the GR 1558 Octave-Band Noise Analyzers.

A reflector-mounted microphone, developed by company consultants, is used to make directional noise measurements. This device is particularly useful in measuring noise from sources such as refinery burn-off flares, which are difficult to approach because of their heat and elevation. To measure internal heater noise or noise levels in stacks, Standard uses a microphone coupled to a specially built stainless-steel probe.

Efforts to keep noise levels acceptable to the community began as a bootstrap operation at Standard Oil Company of California, and involved a great deal of trial-and-error research. Over the years, design specifications were developed that now help Standard's facilities to meet community noise-abatement goals wherever the company operates.

But while minimizing neighborhood noise is important from a community relations standpoint, Standard of California is equally concerned about safeguarding the hearing of its employees who work around noisy equipment. Hearing is checked periodically in compliance with the Occupational Safety and Health Act. Charts of noise levels are displayed throughout refineries so that employees can

A full-time monitoring program helps Standard Oil of California keep refinery noise levels acceptable to nearby communities.

starts with GR instruments

check the level in their work area and take necessary precautions. Ear protectors are provided where noise levels cannot be reduced sufficiently.

To keep noise within acceptable limits, strict noise specifications (90 dBA at three feet) are included in all design criteria for Standard's new plants. Standard's engineers work with contractors and suppliers to ensure that major new construction meets acceptable noise levels.

With soundproofed oil-drilling derrick towering behind him, Standard engineer uses GR octave-band noise analyzer to check effectiveness of noise-reduction measures at drill site.

Where equipment noise cannot be reduced in the original design, Standard engineers use a variety of silencing devices and sound-deadening materials to isolate noise and prevent its spread. GR instruments guide the engineers in pinpointing sources of noise and applying necessary acoustic materials for optimum noise reduction.

At some of Standard's urban oil-drilling sites in southern California, entire derricks have been soundproofed. Many have also been "camouflaged" to blend unobtrusively into the neighborhood. At one location, two side-by-side derricks were surrounded with a soundproof enclosure that simulates an office building.

One of Standard's most elaborate noise-abatement programs operates at their El Segundo, California refinery. Here, a combination of noise-suppressing enclosures and specially designed machinery helps keep noise down to acceptable levels. Microphones are mounted at the perimeter of the refinery to monitor noise levels for the protection of adjacent residential areas. If the noise level exceeds a preset limit, an audible alarm sounds in one of the refinery's control rooms—and corrective action is taken immediately.

As testimony to the success of this noise-abatement program, the City of El Segundo has presented Standard Oil Company of California with a "Good Neighbor" award.

To help Standard Oil Company of California remain a good neighbor in all its locations, the company's Board of Engineers publishes a regularly-updated manual of current noise-abatement procedures and noise-suppressing design methods. GR instruments are frequently used in the execution of these procedures and methods. For wherever you find a Standard of California engineer tracking down a noise problem, you'll usually find a GR instrument close at hand.

As sound measuring and analysis techniques become more sophisticated, the control of industrial noise is seen as possibly the most successful of the different pollution-control efforts currently underway. Sharing in this success will be farsighted companies such as Standard Oil Company of California, who pioneered their own noise-abatement programs long before OSHA was ever dreamed of.

New GR 2260 system automates and speeds rf network testing

The past ten years have seen rf network analyzers become widely used tools in the telecommunications and electronic industries. Swept-network analysis made possible by these analyzers offers greater speed, flexibility, and convenience than previous point-by-point methods. The GR 1710 RF Network Analyzer, typical of this class of instrument, has proven very successful in a variety of laboratory and production testing applications.

However, the more rf parameters you must measure with high accuracy over wide frequency ranges, the more costly, complex, and time-consuming manual test methods become. The shortcomings of manual test methods were never more evident than in a major application for rf network analysis – testing of repeater amplifiers used on long-line coaxial systems.

Picture, for example, a 1,000-mile coaxial telephone circuit with 1,000 separate repeater amplifiers regenerating signals at one-mile intervals. Or a 50-mile CATV installation with repeater amplifiers every few thousand feet. Each of these many amplifiers must be accurately tested, since variations among the successive units will accumulate right down the line.

The need for a faster, easier, more accurate and economical method of testing rf-sensitive devices of all types led to development of General Radio's new 2260 Automatic RF Network Analyzer System. The computer-controlled GR 2260 is specially designed for high-accuracy production testing as well as design and research applications involving a large number of measurements.

The GR 2260 Automatic RF Network Analyzer System measures the electrical characteristics of passive and active one-port and two-port devices and networks. These include amplifiers, filters, power splitters, equalizers, attenuators, coaxial cables, antennas, transistors, diodes, and many more devices.

Designed for easy operation by personnel with no prior experience with computers or automatic test equipment, the GR 2260 automatically measures transmission and reflection characteristics or s-parameters of networks and devices. Typical transmission measurements include attenuation, insertion loss, gain, isolation, crosstalk, phase shift, and group delay. Some typical reflection measurements are return loss, SWR, and impedance.

These parameters can be measured over the frequency range from 0.4 to 500 MHz, with a basic accuracy of .01 dB in magnitude and .06 degrees in phase. Measurements of rf parameters at a single frequency, as a function of incident drive power or bias voltage, are possible. Input and output impedances can be either 50 or 75 ohms, mixed in any combination. The measured characteristics are automatically displayed on a large-screen oscilloscope or printed-out on a teletypewriter as numerical data. In addition, measurement data and test programs can be stored on optional magnetic tape or disk units.

The ultrasimple operation of the new GR 2260 system enables personnel to quickly and accurately test a variety of complex rf devices and components. Ready-to-use computer programs supplied with the system allow an operator with little or no prior programming experience to readily change test requirements and parameters.

Using the teletypewriter keyboard, the operator specifies the test procedure for the device to be tested and then selects the test frequencies, test level in dBm, degree of error correction, test parameters, and output format. All of this is done simply by typing a few command-set characters. These characters are the abbreviated English-language equivalent of the desired operation. In addition, the oscilloscope grid calibration can be specified to obtain the desired display resolution. A programming card containing the command set is furnished for easy reference.

The direct-access program set has a built-in initial test procedure that makes the system completely operational at the push of the control-panel RUN button. All procedures can be modified at any time by changing only the parameter of interest. Any errors inherent in the rf measurement instrumentation are automatically corrected, without manual computations. Features such as these further enhance the system's ease of use and operation.

Although testing of rf devices can involve interpretation of continuous traces on an oscilloscope, the GR 2260 can also be operated as a simple GO/NO-GO test system by programming-in limits for comparison with measured data. A set of green and red panel lights are provided for visual indication of PASS or FAIL.

A major advantage of the GR 2260 Automatic RF Network Analyzer System is its real-time capability. Certain rf tests require the operator to manually tune a device while watching resulting changes in the oscilloscope display. The usual time lag between the adjustment and the updating of the display is known in some quarters as the "rubber screwdriver effect." But the speed of the GR 2260 has ended this time lag and enables the display trace to follow the adjustment directly.

The speed and real-time capability of the GR 2260 system also permit up to four different sets of data to be measured and displayed on the oscilloscope in a single measuring sequence. For example, the gain, group delay, input return loss, and output return loss of an amplifier can be measured in a single sequence — and displayed together. Or, as already mentioned, the data can be compared to stored limits for GO/NO-GO test decisions at the end of each measuring sequence.

This display versatility enables you to view the effects that a change in one parameter will have on an interactive parameter. For example, you can watch how a change in a filter's bandpass characteristic affects its group-delay response, and adjust the two parameters for optimum relationship.

The computer-controlled GR 2260 Automatic RF Network Analyzer System enables anyone involved in volume testing or new-product development of rf-sensitive devices to obtain faster, more accurate results with far less time and cost than by manual or semiautomatic methods. And, through the simple, conversational instruction set and interactive display, the user can easily set-up his system for any automatic testing application.

The GR 2260 system is human-engineered for ease and convenience of operation, as well as for ease of maintenance. Full documentation is provided along with the ready-to-use test programs.

One of the first GR 2260 systems is being used by a major telephone utility in testing of its long-line repeater amplifiers. The broadening market for this new automatic rf network analyzer includes manufacturers of telephone equipment, CATV equipment, IC's, modules, hf and vhf components, mobile communications gear, data transmission systems, microwave links, antennas, and satellite relays.

GR personnel active in IEEE INTERCON/73 technical programs

General Radio was well represented among the organizers and speakers for the various technical programs and sessions held at IEEE INTERCON/73 earlier this spring.

Serving as Vice Chairman of the IEEE INTERCON/73 Technical Program Committee was Peter Goebel, GR Product Manufacturing Manager for Component and Network Testing. Working with Peter as a member of the Technical Program Committee was James Skilling, GR Assistant Product Engineering Manager for Component and Network Testing.

At the technical session on "Maintaining the Competitive Edge in International Markets," Peter Macalka, GR Vice President for Marketing, spoke on "The Merchandising Edge."

A technical session on "Environmental Electroacoustics" featured a panel discussion on "The Quality of our Environment," at which GR was represented by Ervin E. Gross, Development Engineer.

Dr. James Faran, GR Group Leader for Engineering Programming, served as organizer and chairman of the technical session on "Program Generation for Automatic Test Equipment." He and Harold Andrews, GR Engineering Programmer, spoke on "A General-Purpose Language for the User of Automatic Test Equipment."

GR's James Skilling also served as an organizer and co-chairman of a panel session on "Applying Computer-Controlled Test Systems," at which Ralph Anderson, GR Product Engineering Manager for Component and Network Testing, spoke on "How Should Resources be Reallocated When Computer-Controlled Test Equipment is Introduced?"


Goebel


Skilling


Macalka

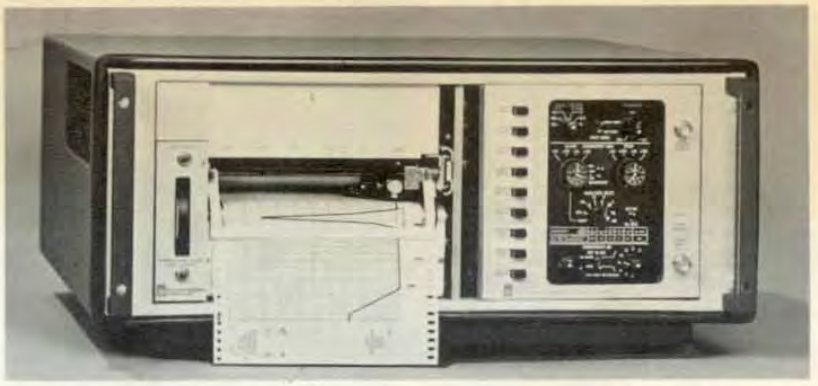

Gross


Faran


Andrews


Anderson

Now GR 1523 Graphic Level Recorder can be a narrow-band analyzer, too



A new wave-analyzer plug-in unit extends the capability of the GR 1523 Graphic Level Recorder to narrow-band wave analyses for detailed noise and vibration measurements.

The new 1523-P4 plug-in enables you to perform high-resolution spectral analysis, swept-frequency analysis with a tuned detector, and amplitude-vs-time measurements at selected frequencies. Applications include noise-reduction programs, spectrum-signature work, vibration studies, distortion measurement, network analysis, and preventive maintenance programs.

Analysis bandwidths of 10 Hz and 100 Hz are provided, plus an all-pass mode covering the range from 10 Hz to 80 kHz. Most signals can be handled without preamplification, since the analyzer will accept inputs over a 140-dB range, with capability to detect and display any 80-dB portion.

Displays are both logarithmic and linear. The logarithmic display, with 2.0", 2.5", and 5.0" decades, is ideal when using the tracking analyzer feature for network measurements or plotting spectra over a wide frequency range. The linear display, with scale factors of 50 Hz, 500 Hz, and 5 kHz per inch, provides detailed analyses over a narrower frequency range.

For maximum versatility, start and stop points for analysis can be set anywhere within the range from 10 Hz to 80 kHz.

The introduction of the 1523-P4 brings to four the number of plug-in options now available for the GR 1523 Graphic Level Recorder. Others are the 1523-P1 Preamplifier for level-vs-time recordings, the 1523-P2 Sweep Oscillator for level-vs-frequency recordings, and the 1523-P3 Stepped 1/3-Octave-Band Analyzer for spectrum recordings.

New GR Telex numbers

The Telex number for GR's Concord, Mass., headquarters has been changed to 92-33-54.
In Canada, the Telex number of GR's Toronto office has been changed to 06-967624.

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