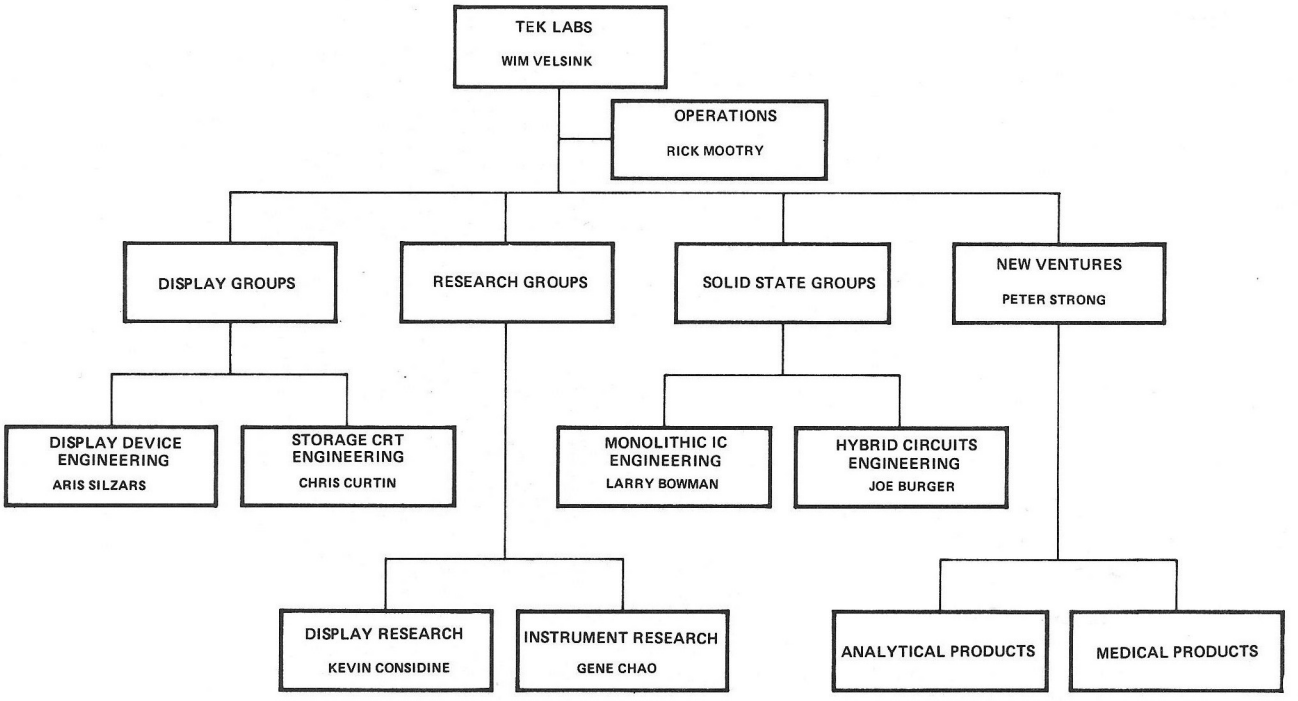
A Look at Tek Labs



We are frequently asked, "What exactly is 'Tek Labs?' What do they do?" The following is the result of talking with managers of the various groups and some of the people who work with them. We would like to thank Rick Mootry, the managers of the groups and Ray Hayes, Binoy Rosario and Jon Fessler for their assistance in getting this information together.

—EN Staff

In an effort to keep pace with rapidly advancing technology, Tek Labs works in the design and development of unique processes, devices and product concepts for ICs, hybrids and CRTs. These developments have contributed greatly to the advanced characteristics of Tektronix instruments.

Tek Labs designs and builds only those components that contribute significantly to product performance and are not available outside on reasonable terms. Recent increases in short term projects at Tektronix has put pressure on long term development. Flat budgets make costly but necessary changes more difficult. The world wide electronic instrument market is demanding that instruments be smaller, cheaper, battery-operated and possess signal processing characteristics. Also, the processes which accompany new technologies are expensive and depend heavily on computer support. All of these factors must be considered in planning new products.

Monolithic ICs—Larry Bowman

When an IC is needed in an instrument design, all groups concerned must consider whether it is economically desirable to build in-house, or if a purchased item will serve the purpose. Considerations include design and performance compromises which are sometimes necessary when an instrument is to interface with a purchased IC. Performance characteristics can usually be controlled better when ICs are built in-house, and sometimes no existing ICs will do the job.

Among the functions of the monolithic IC group is fabrication of linear ICs for the oscilloscope groups, bipolar logic, high performance and discrete bipolar devices, and high speed logic. There is an ongoing process development effort to maintain state-of-the-art processing capabilities. This enables us to respond quickly to specific product requests, and provide yield and performance improvements in current products.

The complexity of component and IC designs is increasing all the time. With this increasing complexity, ICE designers participate in more of the actual circuit design for instruments. When designing a new device or circuit, Monolithic ICs will try to use an existing technology. They will develop new technologies if there is no alternative and it is economically practical.

ICs are made not only to miniaturize existing circuits, but also to improve performance. This was the case with the M:152 Correction Circuit for Geometry and Focus in Electromagnetic Display tubes. This circuit gave Tek a significant competitive advantage.

Put simply, the electron beam from the CRT gun is subject to distortion when it is aimed at the face of the tube. There are two reasons for this: (1) the sine of the deflection angle (not the angle itself) is proportional to the input signal, and (2) on a flat faced tube, different points on the face of the tube are different distances from the beam source.

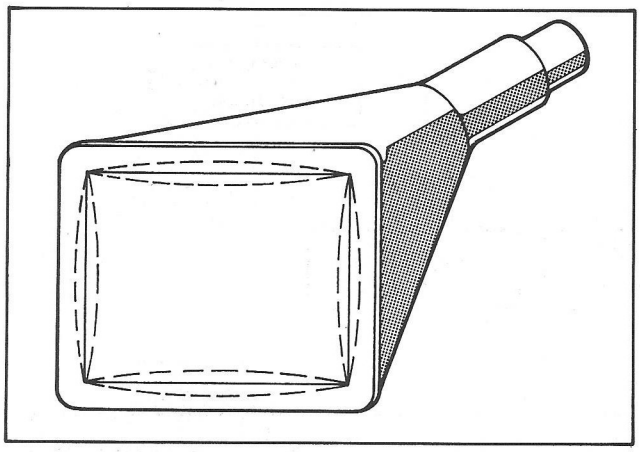


Figure 1. The dotted lines indicate potential distortion on a square picture. The M:152 corrects this problem.

Correction circuits for this distortion are built from discrete components, are expensive, and there are seven trimming steps required during calibration. The M:152 was designed by engineers from IDG and Monolithic ICE. It was built at Tek to replace the correction circuits for many reasons. The desired IC was not available outside Tektronix. The M:152 is a single IC, replacing a large circuit which had many components. It is applicable to different tube sizes by changing the value of two external resistors. This circuit now provides the required nonlinear corrective functions, with only two calibration adjustments. All the other parameters are built in.

Hybrid Circuit Engineering—Joe Burger

The activities of Hybrid Circuit Engineering encompass more than the name implies. Their main function is the design of Hybrid ICs. Hybrid technology offers distinct advantages for component design in the areas of size, cost and performance. And the unique technologies required for hybrids are readily adaptable to other applications such as metallization of prototype monolithic ICs and other components, packaging microcircuits, and microassembly.

Calibration time can be reduced by laser trimming resistors and capacitors on the substrates. This eliminates the need for manual potentiometer and capacitor adjustments, resulting in overall savings.

There are two major reasons for replacing standard circuitry with Hybrid devices. One is cost. In the 455, for example, a hybrid was used for the preamplifier. This let to cost savings in terms of assembly time and serviceability. The other is high performance. Metallization patterns can be very precisely deposited on a substrate. They provide highly accurate transmission lines which are vital to spectrum analyzer circuits and other high frequency devices.

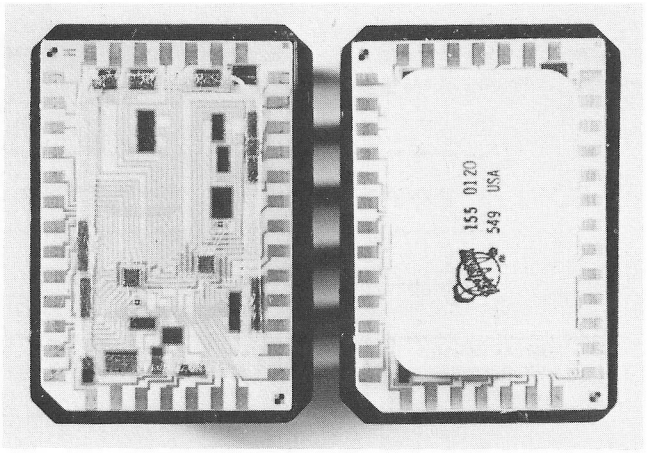


Figure 2. A hybrid device was used for the preamplifier in the 455.

Display Devices—Aris Silzars

It is the responsibility of the Display Devices Group to support new product programs with appropriate display devices. When a new product requires a unique device that cannot be purchased, they must conceive, design and develop the new device. Production support is also provided.

Recent trends have been to higher performance (brightness, writing speed, spot size) and lower cost CRTs. Also some entirely new electron beam technologies are being developed that will add to our future capabilities. New beam forming technologies like meshless scan expansion and new display concepts such as micro channel plates will add significantly to future instrument performance capability.

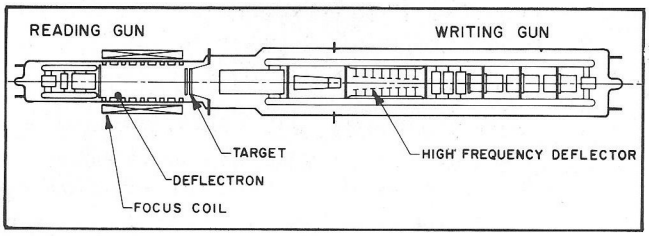


Figure 3. The target in the tube for the R7912 Transient Digitizer is a diode array.

New markets are also being opened by technologies that combine electron beams and semiconductors. An example of this is the R7912 Transient Digitizer. This unique product centers around a diode array which is able to

capture and digitize a single 500 MHz transient. A tube containing the diode array is the key element in the instrument. The successful combination of electron beam and semiconductor technologies for this application was a notable achievement. Other signal acquisition and signal processing devices using this technology are currently under development.

Storage CRT Engineering—Chris Curtin

Storage CRT is primarily concerned with developing new Storage CRTs and engineering improvements on existing devices. The Tektronix invention of meshless bistable storage has provided unique solutions to the problem of low cost computer graphics. Information is stored directly on the CRT screen, eliminating the need for costly separate memory.

Some of the new technologies that are under investigation are: new phosphor combinations to increase CRT performance, improvements in writing gun design for lower power requirements, and new methods of depositing the storage target structure to increase viewability.

One example of a significant new product in the storage field was the 4014/4015 graphics terminal. The addition of large screen graphics to the Tektronix display terminal line greatly increased the number of customer graphics requirements that Tek could fulfill.

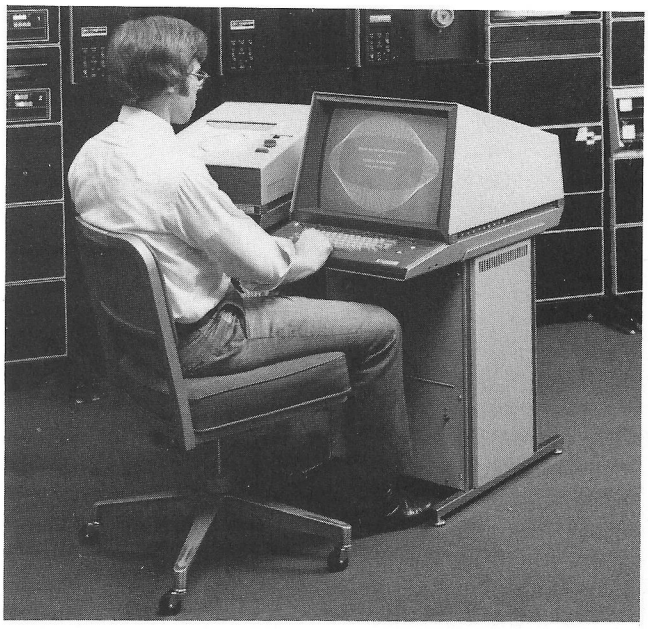


Figure 4. The face area of the 4014/4015 is three times that of our next largest CRT.

To produce the 19 inch storage CRT for the 4014/4015, CRT engineering and production processes were scaled up. Since the face area is three times that of our next sized tube, a new method of depositing the storage target structure was developed to meet the large area requirements.

Storage CRT is also developing mesh type storage target CRTs for oscilloscope application. Tremendous gains in single shot writing speeds have been made in the last three years through the use of mesh transfer storage techniques.

Instrument Research—Gene Chao

The primary objective of the Instrument Research Group is to gather, coordinate and develop new product concepts which will contribute significantly to future Tek products. The group monitors new technologies and assesses their impact on segments of the Tektronix market.

The group investigates long range product concepts by market research and by assessing technology trends and human factors. They focus on novel concepts and conduct feasibility studies.

Current projects include various miniature Surface Acoustic Wave Signal Processing Devices, trade-off studies in analog/digital conversion schemes and memories, and speech/digital conversion.

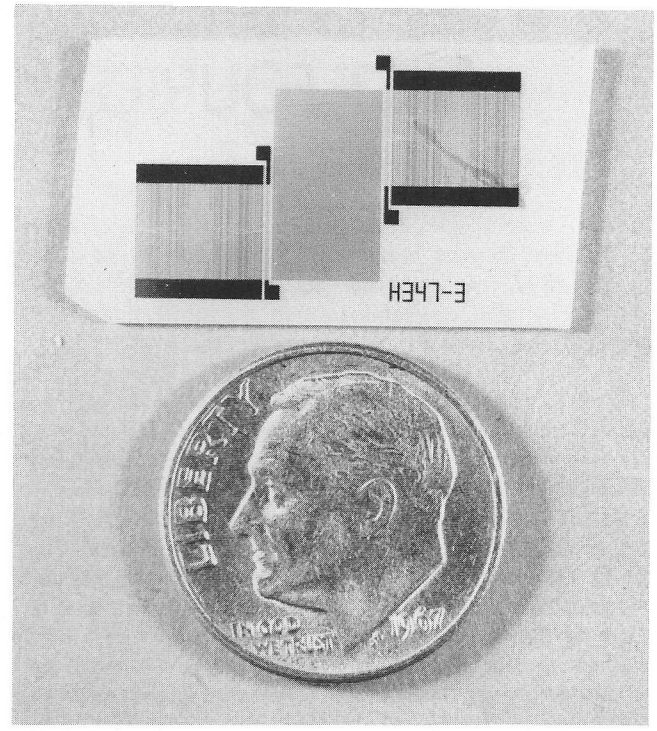


Figure 5. The surface acoustic wave bandpass filter consists of a thin film metal pattern on a single crystal (YZ) lithium niobate.

Display Research—Kevin Considine

Display technology plays a major role in Tek product lines. It is essential that our short and long term display needs be understood and planned for. For this reason, Tek Labs has a Display Program within the Display Research group. The group evaluates the various display technologies and assesses their potential application to our product lines.

For example, if Tektronix were to find it necessary to produce flat panel displays in future products, the Display Research group would be the place where the new technologies would be explored, assessed, and preliminary development work identified.

Not all of our future needs are presently known, so the evaluation is an on-going exercise. Specific requirements for the future cannot be fully determined. It is possible, however, to observe trends and general display requirements. Our Display Program is aimed at developing capacilities that will have wide application throughout our market areas. (See "Flat Panel Display Technologies" in January 1976 Engineering News.)

New Ventures—Peter Strong

The New Ventures group is where new ideas and business opportunities which do not relate to any existing product area are gathered and evaluated. The ideas are received and researched by a logistics group and then evaluated by a planning group under Wim Velsink. The logistics group uses Tektronix resources, as well as outside consultants.

The New Ventures Planning Group determines which opportunities offer Tektronix the best potential for long term financial rewards. Once an opportunity is approved for development, a business unit is formed. Currently, two new venture business units exist; Medical Products and Analytical Products. Both units were actually conceived before the above structure was set up.

The Medical Products group is involved in the portable patient monitoring business. There are three primary products; the 408, 412, and 414 patient monitors.

Analytical Products is engaged in two principal businesses. We entered the field of optical spectroscopy with the 7J20 Rapid Scan Spectrometer (RSS). Electro-optical measurements can be made with instruments from the J16 family of products.