

## WHY USE ABRASIVE TRIMMING?

There are many good reasons to use abrasive resistor trimmers, but perhaps the best is that there are some applications that can only be performed by abrasive trimming. The wide, clean cut gives excellent stability and accuracy without the need for "L" or "scan" cuts. The COMCO abrasive systems are the lowest cost per trim for small or medium quantities. A complete system costs only a fraction of a laser trimmer.

The electronics in the bridge and the mechanical handling of the latest trimmers are quite sophisticated. Interfaces for functional or voltage trimming greatly extend the range of the system, yet are very simple to add.

Think of abrasive and laser resistor trimmers as production tools - as screw drivers. There are times when you need a large one and times when you need a smaller one to fit into that specialized location. A good mechanic has both sizes available in his tool box so that he can select the proper one. Let us tell you about our tool - abrasive resistor trimmers.

# COMCO TRIMMERS

To meet the differing needs of hybrid microelectronics, COMCO has developed three series of resistor trimmers; low cost, rotary & step and repeat. The trim quality is exactly the same for each system. Reliability has been proven in production use worldwide for over 15 years. All control circuits are on plug-in PC Boards for both ease of maintenance and calibration.

Standard features common to all include; trimming to 0.1% accuracy, full Kelvin circuits with extra probes and cables, trim kerfs from .012" to .170"; digital meter readout with indicator lights to show status and vacuum nest for substrate hold down.

Setup is simple, no complicated programming or probe rings are needed. The operator dials the desired resistance value, adjusts the

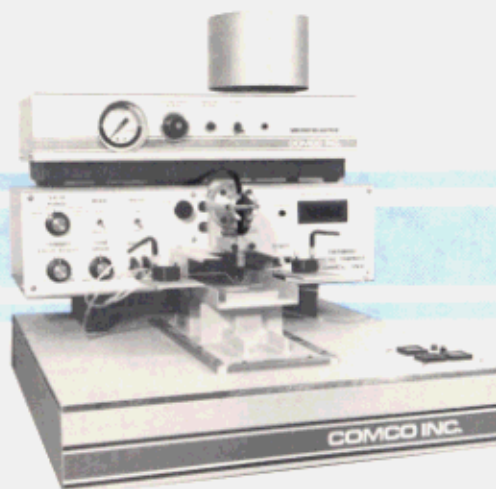
vacuum probes to make contact on the conductor pads, and moves the nozzle to the edge of the resistor. A new setup has been made in a few minutes.

Recognizing that cleanliness is important, COMCO trimmers are designed so the resistor substrate moves into an enclosed trim station where the spent abrasive is quickly picked up by the dust collector.

The key to high accuracy is the closed loop servo system, allowing an infinite range of trim speeds. A proprietary electronic circuit monitors rate of change during trimming and controls the shut-off signal. The greater the as fired 'error' the faster the trim servo speed. As the error approaches '0', the speed is constantly slowing, resulting in high accuracy at maximum production rates.

**TR1800** The TR1800 Micro Trimmer is specifically designed for the laboratory, engineering department, or low-to-medium production house that needs high accuracy, reasonable production rates and very low cost. When it is necessary to make frequent trim changes an operator can make the setup in minutes; and is then ready to trim a few resistors, or 600 trims/hour. The optional

TR1860 interface adds the capability for voltage trimming of active hybrid modules. The operator loads the substrate into the vacuum nest and presses START. Everything else is automatic. As the slide moves forward, the probes lower, making contact. The bridge constantly inspects the resistor during trimming, displaying the "error" on a 4-digit meter. When value is reached, trimming stops, the slide returns to the load position and probes lift - all within a few seconds. In short, a compact trimming station with a great deal of flexibility at a reasonable price.



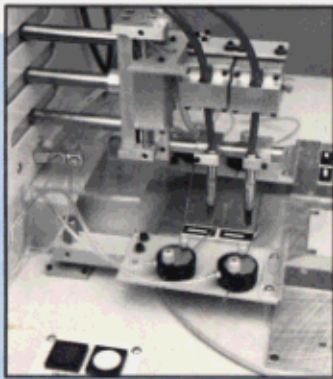
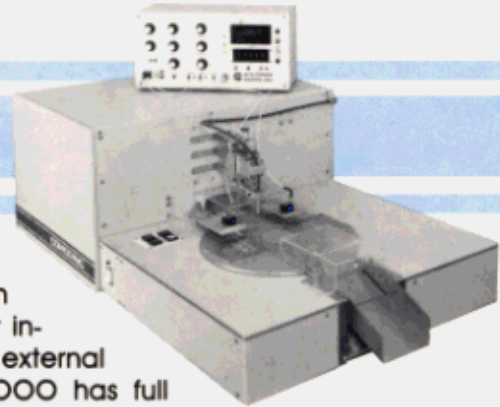
## SYSTEM SPECIFICATIONS

	TR1800	TR2000	and	TR4000
Range	[1 $\Omega$ -100M $\Omega$ ]	[1 $\Omega$ -200M $\Omega$ ]		500M $\Omega$ in ratio]
Accuracy	[to 0.1%]	[to 0.1%]		[to 0.1%]
Trim Rates	[to 600/hr.]	[2,000/hr.]		[2,000/hr.]
Substrate Size	[2" x 2" (5cm)]	[4" x 4" (10.1cm)]		[4" x 4" (10.1cm)]
Type of Table	[linear slide]	[rotary]		[step & repeat]
Trim Kerf	[It depends on the nozzle opening, from .012" to .170" (0.3 - 4.4mm)]			



## TR2000

The TR2000 is a rotary table resistor trimmer. With a 4-position table and automatic off-loading, rates of 2000 trims per hour are reasonable. The operator need only load a substrate into the nest and push START. Everything else happens automatically. A specially designed bridge circuit reduces the effect of static electricity, allowing easy, accurate high megohm trimming. Interfaces are easily added to further increase the resistance range. The bridge is pre-wired with an external port for voltage or active trimming interfaces. The TR2000 has full mechanical and bridge adjustability to handle the most difficult circuits on all types of substrate material. It is the ideal choice when one resistor is to be trimmed on a substrate, and ease of setup is a must.

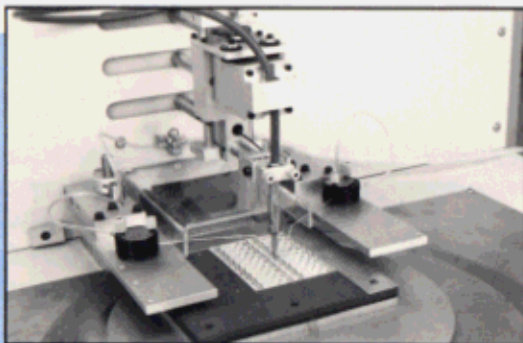


*Battery surge protection circuits provide an excellent example of the benefits of abrasive trimming. In order to pass repeated breakdown tests at 700 volts, it is necessary to have a wide, smooth edge and a very clean cut. To increase production, the machine has been modified to trim both resistors at the same time to 200 ohms. Both ratio and nominal value must be better than 0.5%.*

## TR4000

The TR4000 Step and Repeat trimmer uses the same proven electronics, trimming circuit designs and servo found in the TR2000. The addition of a microprocessor controlled table makes it an excellent choice for ladder networks or step/repeat patterns. The internal microprocessor is easily programmed through a keyboard and display located in the front of the machine.

The X and Y coordinates for each resistor can be loaded in decimal or metric. A table speed of 2"/second (50mm/sec.) and position accuracy of .001"/" (.03mm) provide for high

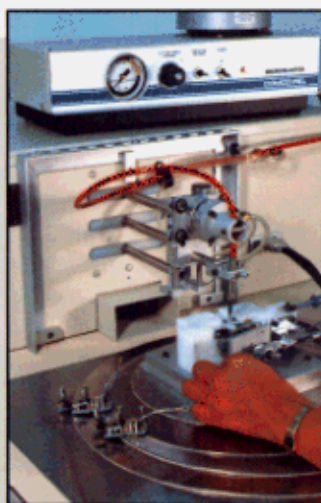


productivity. Although the table movement is 4" x 4", the open nest allows much larger parts to be held in place, an important feature in some PC Board and active trims. The optional TR2059 interface allows each resistor to be trimmed to a different value. An 8K battery operated memory board stores a large number of different programs for rapid recall, and retains them in case of a shutdown or power failure.

This catalog gives data on COMCO's standard resistor trimmers which will handle most trimming jobs. However, there are times when it is important to have a special system. Our engineers welcome the opportunity to work with you on the development of a system to meet your particular needs. The following examples are a few of the functional or active trimming systems we have built. The cost for these "specials" was surprisingly low.



The 4 nest plates on the TR2000 are easily replaced with special fixtures for active trimming. In this example of a television circuit, the nest itself becomes a part of the probing circuit, as well as protecting discrete components on the underside.



Illustrated at left is a TR4000 modified to adjust a truck voltage regulator. Once the operator has loaded the nest, the system conducts 3 pre-trim tests, adjusts the voltage to 14V and then conducts 3 post trim tests. Because the volume was only 100,000 regulators per year, the abrasive system, at 1/6 the cost of a laser system, was able to give excellent results at the lowest cost per trim.

To meet a customer's special requirements, COMCO's engineers developed a 2-position rotary table diode trimmer using components from our capacitor trimmer. Using a spray trim, it adjusts dosimeter diodes to a voltage at one nest, while the operator is loading/unloading the other.



If precision abrasive blasting will solve your production problems in trimming, cleaning, cutting or texturing, COMCO has the answer. We have a complete line of production equipment including Micro Abrasive Blasters, Resistor and Capacitor trimmers, SCR bevelers, Wafer Surface Abraders, DIP Demarking Systems and Precision Profilers. Call or write today for complete information.

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