



Service Scope

USEFUL INFORMATION FOR USERS OF TEKTRONIX INSTRUMENTS

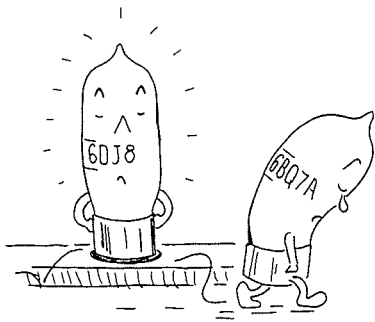
JANUARY 1960

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FIELD CONVERSION OF SOME TEKTRONIX OSCILLOSCOPES to Use Type 6DJ8 Tubes

All type 6BQ7A electron tubes in Tektronix Type 531, 535, 541, 545, RM31, RM35, RM41, and RM45 may be replaced with their more reliable counterpart, the type 6DJ8, provided certain precautions are observed. These tubes have been substituted without making any circuit changes. Minor recalibration checks are required in some instances. In most cases better performance may be obtained, as well as much better reliability.



"Raw-stock" tubes are used as replacements. The type 6DJ8 tube appears to have inherently good short-and-long-term stability. Also, the operating characteristics are very consistent between both sections and from tube to tube. It is anticipated that the need of aged and checked tubes in the several positions that now use aged and checked 6BQ7A's will be eliminated with the change to 6DJ8's.

An instruction sheet with a tube replacement table covering this field conversion is available. Address your request for these sheets to Field Communications Department, Tektronix, Inc., P. O. Box 831, Portland 7, Oregon. Ask for FMR-115.

EXCUSE US PLEASE

The article appearing in the October issue of "Service Scope" under the title "Use of Types 535, 535A, 545, and 545A for Double Sweeps" contained a typographical error. The last part of step 6 should read: "... and set the Slope (Time Base B Trigger Slope)* switch to the + (+Ext.)* position." With this correction the procedure should work. It did for us.

† Polaroid is a registered trademark of the Polaroid Corporation.

* (Captions in parenthesis apply to Types 535A and 545A instruments)

THIS'N THAT

Type 310 has a typical problem:

When the high voltage power supply goes out of regulation, the vertical and horizontal gain or sensitivity is decreased. This has usually been caused by an open connection on the printed circuit board and almost always seems to be in the heater connection to V701A, a 12AT7 tube. Usually it turns out to be a separation of the solder from the copper strip on the printed circuit board at the tube socket. Visual inspection, of course, shows that V701A does not light up.

Reports from Tektronix Field Engineers Geoff Gass and Marvin Crouch, indicate fast oscillograms are being taken with Agfa Isopan Record Film developed for 25 minutes in D76 at 68° F. Ken Davis in Portland informs us that developing 26 minutes in D19 at 68° F., also gives excellent results. Measurements made by Ken indicate that at these developments, Agfa Isopan Record has a writing rate about equal to that of Tri-X.

Compensated Probes are no longer being adjusted to the particular instrument with which they are shipped. Experience indicates that past practice of matching probes and instruments at time of shipment is not necessary or desirable. The probe compensation should always be adjusted by the operator at the time he uses a probe with an instrument. A properly compensated probe is a necessity when accurate readings or measurements are desired.

Quite a few 531 manuals were shipped into the field showing pin 6 of V20 tied to 225 volts through R32. This was a typographical error in the 531 Manuals. R32 should go to 350 volts. This error was reported in the serial number range about 9000.

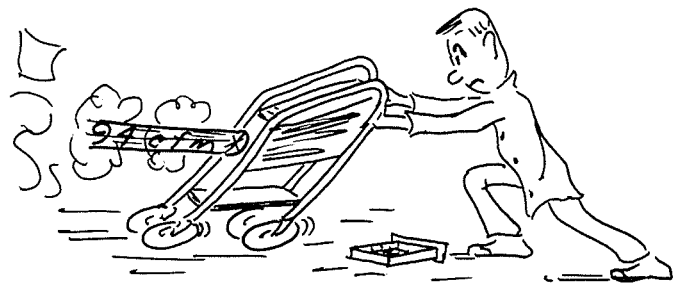
When adjusting C706 and C735 Trimmer capacitors in the 575's collector sweep circuit, be sure that the transistor adapter is in place. Tektronix Field Engineer Lee Cooper reports that the small amount of capacity introduced by the adapter results in a different setting of the trimmers.

In early "R" units, some of the power transistors had what appeared to be unworkmanlike solder connections. The first power transistors used in the "R" unit did not have tinned leads so were very difficult to solder. Later transistors have tinned leads, and a good solder job is being done.

QUESTIONS FROM THE FIELD

1. Q. When using the very fast Polaroid† Land film, why do some exposures give a bright haze on the picture?
 - A. When the CRT phosphors are exposed to ambient room light, the absorbed energy in the phosphor must be given sufficient time to decay. The new Polaroid† Land No. 47 film, faster than Tri-X, can give a bright haze on the picture from the energy retained in the phosphor.
2. Q. Can the Type 110 produce both positive and negative pulses?
 - A. Yes. The operator can choose plus pulses or minus pulses from a plus or minus internal charging supply. (See tentative spec. sheet, "Pulse Polarity" knob selects plus or minus pulses.) Pulse widths may be identical or alternately dif-

AIRFLOW WITH SCOPEMOBILE FAN KIT



Several customers have requested information on the volume of air provided by the Scopemobile Fan Kit modification when it is installed in the Type 500A Scopemobile.

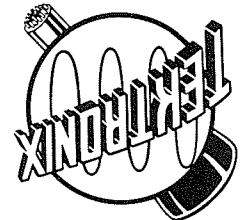
With the Scopemobile drawer in place the airflow is 84 c.f.m. With the drawer removed and a panel covering the drawer opening the airflow is increased to 94 c.f.m. These figures are with line voltage at normal.

Tektronix Instrument-Repair Facilities: There is a fully-equipped and properly-staffed Tektronix Instrument Repair Station near you. Ask your Field Engineer about Tektronix Instrument-Repair facilities.

Tektronix, Inc.
P. O. Box 831
Portland 7, Oregon

USERS OF TEKTRONIX INSTRUMENTS
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- ferent. On "external", the pulses may not only have alternately different widths, but also different polarities if desired.
3. Q. What is the vertical response of the 581 at the 3, 6, 9 and 12 db points with a sinusoidal input?
- A. Approximately: 3db down at 100 mc
6 db down at 140 mc
9 db down at 180 mc
12 db down at 200-250 mc

These values are approximate. The roll-off is not very smooth below the 9-12 db points, and any small termination bump in the vertical will give peaks and dips in responses above 200 mc. and in some cases down as low as 100 mc.

4. Q. What tubes manufactured outside the U.S. do we use in our instruments?
- A. 12AT7, 12AX7—Telefunken. GZ34/5AR4, ECC88/6DJ8, 6360, 6939, E180F/6688—Amperex 12AU7—Telefunken and Amperex
5. Q. What shift in trace is permissible when changing the CA from a condition of having two traces, both centered, to the Added Algebraically position?
- A. Not more than 3-cm shift is allowable. This can be adjusted by changing the vertical position and range (R4376).
6. Q. Can the attenuators for the P80 probe be stacked to provide less sensitivity than 5 volts/cm? Are there any larger attenuators in sight?
- A. At present, the attenuators for the P80 probe cannot be stacked. We are working on a 10x attenuator which has resistive and capacitive characteristics similar to the P80 probe. With this attenuator, it will be possible to use any of the present attenuators, increasing their attenuation ratios by a factor of 10. It will be another

- month or two coming, however.
7. Q. What are the limiting factors in the vertical amplifier of a 545 with a C unit when you overdrive the amplifier with a pulse, and try to look at the top one-volt portion of the pulse which is in the order of 260 volts in amplitude? I realize a differential method of making this measurement can probably be accomplished, but I am looking for limitations in the vertical amplifier.
- One of the reasons this question arises is the fact that you can position the top part of this pulse to the center of the CRT.
- A. One of the Staff Engineers ran a test on this, and found a signal that filled the graticule twice, 8 cm in amplitude, caused some distortion. He used a square wave from a Type 105.

CATHODE-FOLLOWER PROTECTION FOR TYPE 524AD OSCILLOSCOPE S/N 5001-5899

When the instrument is first turned on an excessive voltage exists between the grid and cathode of the cathode-follower sections of V23 and 24. A modification is recommended for all Type 524AD instruments, S/N 5001-5899.

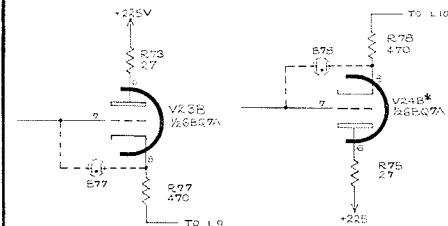
Two NE2 neon bulbs are installed which will ignite for several seconds when the instrument is first turned on. This will hold the grid-to-cathode voltage to a reasonably safe value until the instrument is warmed up and in operation. These neon bulbs are available from your local electronic supply sources.

Procedure:

- () 1. Remove the right and left side panels.
- () 2. Locate V23 (6BQ7) near the center of the VA chassis.
- () 3. Locate ceramic turret near V23 on which is mounted C31. This capacitor is a variable compression type which has large eyelets on both terminals.
- () 4. Place the glass tip of one of the new neon bulbs in the lower hole of C31 so that the leads may be soldered to pins 7 and 8 of

V23. Designate this neon bulb B77.

- () 5. Locate V24 and repeat the procedure with the second neon bulb, placing the neon bulb tip in the corresponding eyelet of C28 and soldering the leads to pin 7 and 8 of V24. Designate this neon bulb B78.
- () 6. Add the parts list to your instruction manual and add the neon bulb symbols to your schematics diagram.



* THE LEGEND IN THE INSTRUCTION MANUAL DIAGRAM FOR THE 524AD VERTICAL AMPLIFIER IS INCORRECT. IT SHOWS THIS TUBE AS V24A INSTEAD OF V24B.

USED INSTRUMENTS WANTED

- | | |
|--|--|
| 1 Type 532/B | George Peterson
The Aircraft Instrument Co.
King of Prussia Rd.
Radnor, Pa. |
| 1 Type 512 or 514 | Allen W. Kurtz
International Electronics Mfg. Co.
515 East Grand Ave.
Springfield, Ohio |
| 1 Type 514 or 515 | Patrick Close
Westgate Laboratories
Box 63
Yellow Springs, Ohio |
| 1 Type 531 or 535 with B or C Plug-In Unit | Rex V. Johnson
39 Newell Avenue.
Haddonfield, New Jersey |
| 1 Type 531 or 535 or 541 or 545 | O. Kienow
5813 E. 19th Street
Tucson, Arizona |

One of the engineers of Maico Co. would like a 3" scope for his basement lab. Tek, Minneapolis will act as go-between.



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AUGUST 1960

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DOES THE SQUARE WAVE RESPONSE OF YOUR SCOPE LOOK LIKE THIS?

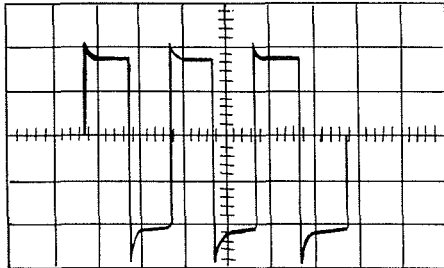


Fig. 1

OR LIKE THIS?

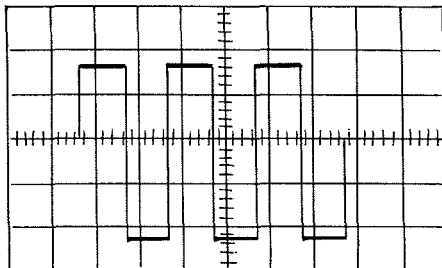


Fig. 2

Unless the squarewave response of your scope resembles the waveform shown in Fig. 2....better keep reading!

A condition known as cathode interface can gradually develop in the vertical amplifier tubes of any oscilloscope, causing degeneration of medium and low frequencies....leaving an overshoot on the leading edge of fast-rise (2 μ sec or less) squarewaves (see Fig. 1).

Low frequency degeneration is caused by the series resistance (50 ohms or more) of an interface layer of chemical impurities that forms between cathode sleeve and the barium oxide cathode coating.

Leading edge overshoot is caused from the by-passing effect of the capacitance (.005 μ f or greater) between oxide coating and cathode sleeve.

NOTE: In a true sense, this is not a pure capacitance, as the electronic action within the interface layer (serving as the dielectric) is highly complex.

The rate at which an interface layer forms within a tube is a function of cathode temperature, number of hours the tube is used, average cathode current, and the amount of impurities originally present in the cathode sleeve material. For example, high cathode temperature, long hours of operation, a high percentage of impurities in the nickel used to make the

cathode sleeve, and a low cathode current flow will hasten the formation of the impurities layer...in many tubes the time required is less than 500 hours.

However, a sizable current flow through the tube tends to minimize the effective formation of an interface layer by penetrating the accumulated impurities with random low resistance current paths (holes) between nickel sleeve and barium oxide coating.

Evidently, interface will manifest itself in any instrument employing vacuum tubes to either display or generate fast-rise square waves. We can assume that since a tube in operation can form an interface layer in less than 500 hours, instruments in operation 8 hours a day should be checked for evidence of this defect every 30 to 60 days, or at least every 500 hours of operation.

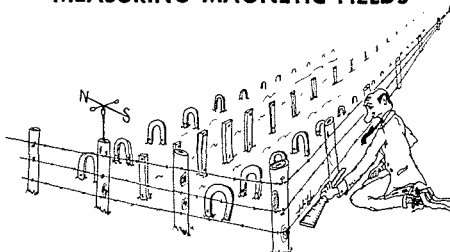
To check the vertical amplifier of an oscilloscope for indications of cathode interface, feed in a fast-rising square wave of about 500 kc. Set the sweep rate to display several cycles. If an overshoot of about $\frac{1}{2}$ microsecond time constant is apparent, some of the vertical amplifier tubes have probably developed cathode interface. For absolute proof, plug the oscilloscope into an ac power source with a variable control. An increase in the output voltage of the power source will increase heater voltage and **reduce** overshoot caused by cathode interface. A decrease in the output voltage of the power source will decrease heater voltage and **increase** overshoot due to cathode interface.

The only cure for the problem caused by cathode interface is replacement of the offending tubes.

The entire instrument should be checked and recalibrated at least every six months. Only through periodic maintenance, can the full usefulness, accuracy, and dependability built into Tektronix oscilloscopes be realized.

Earl Anderson
Customer Service Staff
Tektronix, Inc.

MEASURING MAGNETIC FIELDS



Suggested reading for those people interested in the measuring of magnetic

fields, is the article "Wavemeter, Oscilloscope Measure Magnetic Field By Paramagnetic Resonance". This informative article, which appeared in the December 1959 issue of ELECTRICAL DESIGN NEWS, claims an accuracy of ± 0.06 percent in measuring the gap flux density of a magnet by the method described in the article. A further advantage claimed for this new technique over conventional methods is the speed with which these measurements can be made.

TYPE 502 TRIGGER AMPLIFIER TUBE PROTECTION

Here is a simple modification to protect the Type 502 trigger amplifier tube (V24) from high amplitude signals when used with external trigger input.

Locate R10, a 1-meg, $\frac{1}{2}$ -watt, 10% resistor. This resistor runs from ground to a point on the TRIGGER SELECTOR switch. From this point a wire strap connects to the PLUS-MINUS switch. Replace this strap with a 470-k, $\frac{1}{2}$ -w, 10% resistor shunted by a .001- μ f, 500-v discap.

Type 502's with serial numbers above 623 do not require this change.

SUGGESTED READING

For an excellent discussion on the connection between bandwidth and frequency response, composition of rise-time and other details associated with square wave testing, see Vol. 18, Radiation Laboratory Series, "Vacuum Tube Amplifiers" (McGraw-Hill)

HOT SCOPE!

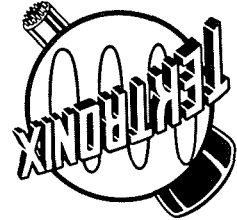
Tektronix Field Engineer Hal Dosch reports he has received word from Naval Intelligence that a Tektronix Type 515A Oscilloscope, S/N 3645 is missing from the U.S. Navy Electronics Laboratory at San Diego and has apparently been stolen.

If you should see this instrument, know of its whereabouts, or have any information regarding it, contact the nearest office of the Naval Intelligence Department immediately.

TYPE 536 AMPLIFIER MODIFICATION

A modification kit, to convert the type 5894 tubes in the Type 536 vertical and horizontal circuits to type 6340's is available. This conversion, which provides improved reliability and simplifies tube

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P. O. Box 500
Beaverton, Oregon



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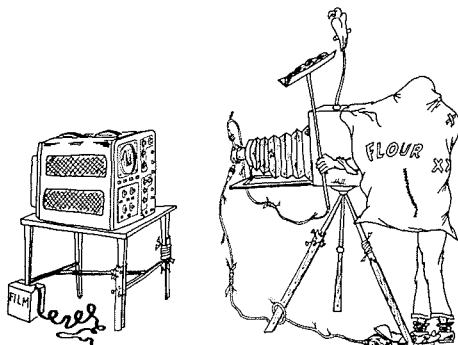
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Permit No. 740

replacement, is applicable to instruments with serial numbers below 615. Instruments with serial numbers above 614 have been factory converted to use the type 6340 tubes. The kit contains: two wired tube socket mounting-plate assemblies, one step-by-step check-off instruction booklet with photos, schematic and parts list, all other components and hardware required in the conversion.

Ask your Tektronix Field Engineer for Type 536 VA-HA Tube Conversion Modification Kit No. 040-192.

OSCILLOSCOPE PHOTOGRAPHY



A bulletin intended as a practical guide to the photography of traces on the cathode-ray tube of Tektronix 5-inch oscilloscopes is available. This is a revised and up-dated edition of a former bulletin many oscilloscope users found helpful. Suggestions are offered and some of the topics discussed are: Polaroid-Land* films, exposure guides and how to photograph different types of traces.

Ask your Tektronix Field Engineer for FIP-3, "Notes on The Practical Photography of Oscilloscope Displays."

*Polaroid is a registered trademark of the Polaroid Corporation.

THIS 'N THAT

Occasionally the graticule studs on a Tektronix 5" oscilloscope work loose. You can replace these with a tapped stud

Ask your Tektronix Field Engineer for:

Tek No.	Description	Price
355-043	Replacement graticule stud	N/C
212-507	Screw, 10-32x3/8" BHS	N/C
210-010	Lockwasher	N/C

We do not recommend the operation of a Tektronix Plug-In Oscilloscope with the side panels removed. The fan will not distribute air properly to the plug-in pre-amplifier area when the side panels are not in place. Continued operation of the instrument under these conditions will decrease tube reliability.

Sometimes on the older Type 524 instruments it is difficult to time the .1 μ sec/cm sweep range. Tektronix Field Engineer Hal Dosch offers this suggestion to correct the difficulty: Be sure the horizontal sweep amplifier is properly compensated. Then, if adjusting the variable capacitor C231A will not bring the .1 μ sec/cm sweep into range, try reducing or shorting out R274. This 1.5-k, $\frac{1}{2}$ -w, 10% resistor is in series with C231A.

USED INSTRUMENTS WANTED

1 Type 524	Larry Hine 120 Elmwood Place Shearill, N. Y.
1 Type 310 or 310A	J. M. Gottschalk 108 Charles Drive B-2 Bryn Mawr, Penn.
1 Type 541 or 541A and CA Plug-in Unit	D. A. Nina Elion Instruments 701 Canal Street Bristol, Pa.
1 Type 515A or 503	Jack Holcomb MacLeod Instrument Corp. Micro-Dyne Division 4250 N.W. 10th Avenue Ft. Lauderdale, Fla. Phone: LO. 4-8518

1 Type 515
or 535/CA

Norm Haugen
Communitronics
2012 Longwood Road
West Palm Beach, Fla.
Phone: TE. 3-8320

1 Type 530
Series or
preferably
540 Series

John Sutherland
2706 21st Avenue S.
Seattle, Wash.

1 Type 524

James Scharman
Alvarado TV Co., Inc.
Albuquerque, New Mexico

1 Type 514

H. L. Ziegler
275 Middle Street
East Weymouth, Mass.

1 Type 511
or 514

Jim Williams
4424 Juniper Avenue
Wichita 16, Kansas

1 Type 514

E. J. Crossen
81 Cherry Lane
Levittown, Penn.

1 Type 514
or 531

Herbert L. Rosenblatt
Dept. 694, Burroughs
Corp.
Great Valley Labs.
Paoli Penn.

1 Type 514
or 531

H. Stuart Dodge
Reliability Dept.
Burroughs Corp.
Great Valley Labs.
Paoli, Penn.

USED INSTRUMENTS FOR SALE

2 Type 511AD S/N 3690 and 3692	C. W. Penque Sperry Products Co. Danbury, Conn.
1 Type 511A S/N 4544	Larry Garcey Electronic Transiston North Bergen, New Jersey
1 Type 515A S/N 2298	Gilbert Levy Semi-Con Electronics River Road Edgewater, New Jersey



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OCTOBER 1960

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VERTICAL AMPLIFIER TUBE PROBLEM

The Type 541A, 543, 545A, 551, and 555 instruments use 6DK6 vacuum tubes in the distributed-amplifier section of their vertical-deflection circuits. Most 6DK6 tubes develop cathode interface after a few hundred hours of operation in these circuits. Tests made at our factory (and in the field) have shown that certain commercially-available 6DK6's, when used in these circuits, develop somewhat less cathode-interface resistance. If you are having trouble with one of the above instruments, we suggest a call to your local Tektronix Field Engineer. He will be glad to help you pin-point the trouble and suggest recommended corrective measures.

TYPE 535/545 DELAYING SWEEP-RANGE MODIFICATION KIT

The sweep delay available in a Type 535 or 545 oscilloscope can be increased one hundred fold. A modification that extends the upper limits of the sweep delay to 10 seconds (upper limit of original equipment is 0.1 second) is available in kit form. The desirable feature of continuous calibrated adjustment has been retained and any period of delay from 1.5 microsecond to 10 seconds can be accurately selected.

The modification is accomplished by replacing the standard 2 microsecond/cm to 10 millisecond/cm delaying-sweep range with a 3 microsecond/cm to 1 second/cm range.

This modification applies only to the Type 535 and Type 545 instruments—all serial numbers. The Types 535A and 545A instruments come equipped with a 2 microsecond/cm to 1 second/cm delaying-sweep range.

The modification kit contains a wired-switch assembly, step-by-step instructions, photos, schematic and parts list. Order through your Tektronix Field Office. Ask for Type 535/545 1 second/cm Delaying Sweep-Range Modification Kit, Tek number 040-179. Price is \$30.00.

THIS'N THAT

In Tektronix instruments, a special silver-bearing solder establishes the bond to the ceramic terminal strips. Repeated use

of ordinary solder or the application of too much heat will break this bond.

We recommend the use of a solder containing about 3% silver when soldering on Tektronix instruments. This type of solder is often used in printed circuitry and should be readily available from your local supply source. If you experience difficulty in obtaining this solder, it may be ordered through your Tektronix Field Office. Ask for Tektronix number 251-514 Solder, Silver Bearing 1# spool (3% silver). Price \$4.50.

The fan motors of most Tektronix instruments should be oiled periodically (see the maintenance section of your instruction manual). A couple of drops on the end of a toothpick is sufficient. A good suggestion would be to oil the motor every time the air filter is cleaned. If the air cleaner is never cleaned, you can oil the new motor you install!

AN INEXPENSIVE COATING FOR WORK BENCH SURFACES

Jack Bannister, a Tektronix Field Maintenance Engineer, has sent in a suggestion for improving the surface of a work bench. He coated his bench top with an epoxy resin. In addition to being easy to keep clean, the resin wears away at a much slower rate than masonite and keeps one from gouging a hole in the work bench when turning instruments—especially the older square-cornered ones—over.

Jack first faced the front of his bench with wood to eliminate a metal rim and then put the resin over this wood also. The resin sticks well to masonite, wood, painted metal and plastic wood. Be sure the plastic wood is completely dry before the resin is applied, otherwise the resin tends to stay soft over it. The material to be covered should be clean and free of wax. All cigarette or soldering-iron burns should be sanded down to clean material—the resin doesn't want to stick to charred surfaces—and any holes, gouges, or indentations filled with plastic wood. Care should be used in this phase as the resin is clear, slightly amber in color and tends to accentuate any messy work. Work the resin in well. It has a tendency to not stick to the surface while it is liquid and working it into the surface helps to overcome this fault. Once dry it adheres very well. A quart provides a two coat finish for a 6' x 3' bench top

and the completed surface will be smoother if you sand a bit between coats.

Surface coat, the desirable type of resin for this work, is made by several companies. Your supplier can provide you with measured amounts of resin and catalyst as well as a 2" inch brush to apply the coating. The brush should have a special resin-resistant glue to hold the bristles.

Cost of the resin, catalyst and brush to do Jack's job was \$5.50.

SILICON RECTIFIER MOD KITS

Below is a partial list of the currently available silicon rectifier field modification kits. These kits replace the selenium rectifiers in the low-voltage power supply of some Tektronix instruments with the silicon type rectifiers. These more reliable rectifiers give longer service and the kits are designed to be installed with a minimum of effort.

Each kit contains a prewired chassis with silicon rectifiers mounted, step-by-step instructions, photos, schematic and parts list.

We strongly recommend that you place your order for these kits through your Tektronix Field Engineer. He can apply the special considerations necessary when ordering some of the kits and thus assure you speedy delivery of the correct kit for your instrument.

Type 310 Oscilloscope, all serial numbers below 7141. Order Tektronix Type 310 Silicon Rectifier Modification Kit, Tek number 040-195. Price: \$40.00.

Type 513 Oscilloscope, all serial numbers. Order Tektronix Type 513 Silicon Rectifier Mod Kit, Tek number 040-211. Price: \$30.00

Type 515 or 515A Oscilloscopes, serial numbers below 4030. Order Tektronix Type 515/515A Silicon Rectifier Mod Kit, Tek number 040-205. Price: \$24.00.

Type RM15 Oscilloscope, serial numbers below 756. Order Tektronix Type RM15 Silicon Rectifier Mod Kit, Tek number 040-208. Price: \$35.00.

Type 524 Oscilloscope. There are special considerations to be made when ordering a silicon rectifier for this instrument. Consult your Tektronix Field Engineer before placing your order.

Type 525 Television Waveform Monitor, serial numbers below 526. Order Tektronix Type 525 Silicon Rectifier Mod Kit, Tek number 040-207. Price: \$28.00.

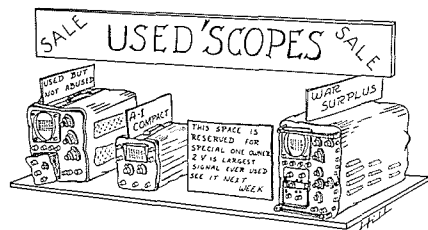
As previously stated, this is but a partial list of the available silicon rectifier modification kits. Contact your Tektronix Field Engineer for information on instruments not included in this list.

IMPROVED TRIGGERING LEVEL CONTROL WHEN TRIGGERING FROM EXTERNAL WAVEFORMS

The TRIGGERING LEVEL control of a Type 530 Series, a Type 540 Series, or a Type 551 Oscilloscope becomes extremely sensitive when the instrument is triggered externally from very low amplitude signals. To some, the ability to trigger reliably from these signals is important. More so than the ability to range through the positive or negative slope of relatively large signals. For these people, Tektronix Field Engineer, John Mulvey, suggests the following modification: Locate, on the TRIGGERING MODE-TRIGGER SLOPE switch a 56 k, 1/2 w, 10% resistor and a 0.001 μ f, 500 v capacitor. These are designated on the Type 531, 535, 541, and 545 schematics as R19 and C17; on the Type 533, 543, and 551 schematics as R21 and C20; and on the Type 532 schematic as R319 and C317. Jumper the top of the resistor to the top of the capacitor. This reduces, by almost 10 to 1, the sensitivity of the TRIGGER LEVEL control to low-amplitude external signals. A switch can be wired in the jumper to allow the operator to select the correct triggering-level range for the external triggers being used.

This modification applies only to the instruments in the Type 530 and 540 Series and to the Type 551. The Type 531A, 535A, 541A, 545A, and 555 trigger reliably on external signals of from 0.2 v to 10 v.

USED INSTRUMENTS FOR SALE



- 1 Type 511AD Ser. #5160 Pennon Electronics, Inc. 7500 South Garfield Ave. Bell Gardens, California.
- 1 Type 513D Ser. #691 Bill Johnson Station W P C A-TV, Ch. 17 Mermaid Lane Philadelphia 18, Penn.

- 1 Type 531 Ser. #114 with Type C Plug-In Unit Ser. #116 Dr. Harry Williams Pharmacology Department Emory University Atlanta, Georgia
- 1 Type 53D Ser. #118
- 1 Type 53/-54C Ser. #7414 Argonaut Attn: Ken Mollenauer 250 Middlefield Road Menlo Park, California.

INSTRUMENTS TO TRADE

- 1 Type 532 wants a Type 575 John Kimber Transitron Electronics Denver, Colorado
- He is willing to pay some additional for the Type 575.

USED INSTRUMENTS WANTED

- 6 Type 514's or 524's DeVry Technical Institute Brendan Hawkins 4141 W. Belmont Ave. Chicago, Ill.
- 1 Type 524 or any Tektronix Wide-Band (10 MC) scope Robert Breed P. O. Box 372 Camden 1, New Jersey
- 1 Type 530 or 540 Series Price \$300 to \$400 (condition no object) L.F. Gilbert Bailey Meter Company 1040 Ivanhoe Road Cleveland 10, Ohio
- 1 Type 517 Warren F. Stubbins University of Cincinnati Eden and Bethesda Ave. Cincinnati 21, Ohio

TROUBLE-SHOOTING HINT

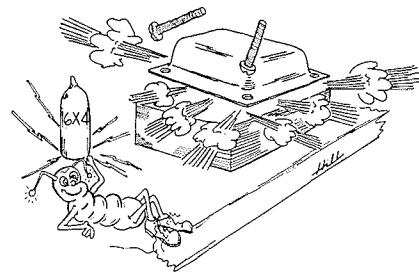
If you are troubled by an erratic triggering problem in your Type 316 Oscilloscope that has defied your efforts to correct it, you might consider the following information.

Tektronix Maintenance Engineer Joe Vistica, when confronted with this problem, determined that the trouble was caused by about 5 to 10 mv of 60 cycle ripple between the sub-panel and the sweep chassis. He eliminated the problem by removing the front panel and sub-panel and sanding the sub-panel, sweep chassis and vertical chassis at their points of contact with each other. Disassembly, sanding and reassembly required about 2 1/2 hours. Joe says, "I am happy to report that after all this the instrument worked perfectly."

CORRECTION

A typographical error slipped past the "not so" eagle eye of your editor in the August issue of SERVICE SCOPE. In the article "Type 536 Amplifier Modification", the tube type number 6340 should read 6360.

TYPE 524D OR 524AD TRANSFORMER MODIFICATION KIT



Early models of the Type 524D and 524AD (instruments with serial numbers below 5729) used 6X4 rectifier tubes in their low-voltage power supply. An internal short developing in this tube could cause a current surge through the transformer that would damage the transformer and require its replacement. A fuse resistor can be installed in the plate leads of the 6X4 tubes to prevent this damage. A modification kit containing schematics, instructions and necessary components to make this installation is available. Ask your Tektronix Field Engineer for Type 524D or 524AD Transformer Protective Modification Kit, Tek number 040-196. There is no charge for this kit.

FLASH! HOT SCOPES!

We have just received word from the Bendix Computer Division of Bendix Aviation Corporation that Tektronix Type 310 Oscilloscopes have apparently been stolen from three of their field engineers. Instruments with serial numbers 10415 and 10867 disappeared from the Chicago area and one with serial number 11735 from the Kansas City, Missouri area. If you have any information on these instruments contact Harvey W. Renfeldt, Customer Engineering Computer Division, The Bendix Corporation, 5630 Arbor Vitae Street, Los Angeles 45, Calif.

Any Tektronix instrument offered for sale without a serial number or one that shows signs of attempts to alter or remove the serial number should be viewed with suspicion. If you have an instrument with these indications, contact your local Tektronix Field Office. In most instances there are ways to trace the instrument and determine if it has been stolen or not.

TEKTRONIX OPENS TWO NEW FIELD OFFICES

With the opening of two new field offices, the services offered by a Tektronix Field Office have been made more conveniently available to people in the Indianapolis, Indiana area and in the section of California composed of Santa Maria, Vandenberg Air Force Base and the San Fernando Valley areas. The office serving this California area is located in Encino.

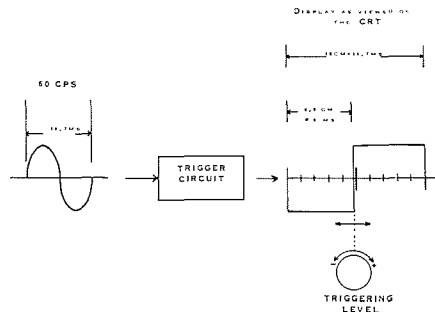
The Indianapolis Office is located at 3937 North Keystone Avenue, Indianapolis 5, Indiana. The phone number is Liberty 6-2408 or 6-2409. At this location you can call on Tektronix Field Engineer Ted Anderson or Field Secretary Ann Dollars to avail yourself of the field services.



The Encino Office is located at 17418 Ventura Boulevard, Encino, California. A phone call to State 8-5170 will put you in touch with Tektronix Field Engineers Duncan Doane, Jim Cook, or Field Secretary Phyllis Worth. This staff will gladly assist you in matters pertaining to Tektronix instruments or services.



TIMING IN A "PINCH"



The following method may be used to adjust the sweep timing in any Tektronix oscilloscope which has a variable sweep-time control and triggering-level control. The oscilloscope itself is the only instrument used in making this adjustment.

The 60-cycle line frequency and the trigger circuit are used to establish a time reference. Set the TRIGGER SLOPE control to + or - LINE and the TRIGGERING MODE control to AC or DC. Using a probe, connect the output of the trigger circuit to the vertical input and set the TIME/CM and VARIABLE TIME/CM to display one cycle in 10 cm of graticule length (see Fig. 1). With the TRIGGERING LEVEL control, adjust the display until the first portion (negative half cycle) occupies 4.8 cm of graticule length (see Fig. 2). This establishes a time reference of 8 milliseconds.

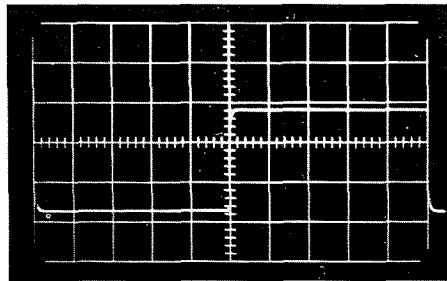


Figure 1

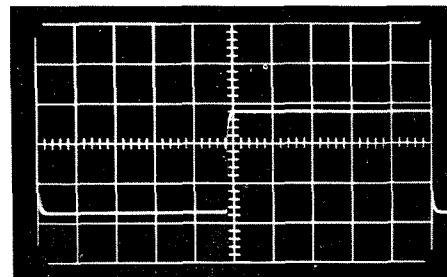


Figure 2

Now that the time reference has been set up, turn the VARIABLE TIME/CM to the CALIBRATED position, set the TIME/CM control to the 1 millisecond position and adjust SWP CAL control so that the first half cycle of the display covers 8 centimeters—between the 2nd and 9th vertical graticule lines (see Fig. 3).

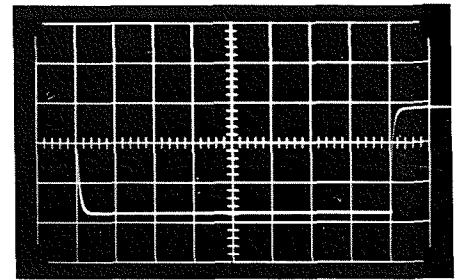


Figure 3

NOTE: This method is not recommended except in instances where an accurate time mark generator such as the Tektronix Type 180 is not available. See your Tektronix Field Engineer for a copy of the factory recommended calibration procedure.

Mike Nash
Customer Service Staff
Tektronix, Inc.

A HELPING HAND

Tektronix Field Engineers are in daily contact with users of cathode-ray oscilloscopes in almost all branches of industry and research. These contacts afford a continually varying experience in oscilloscope uses and applications. For help with an oscilloscope problem that has defied your efforts at solution or one that you feel may have a better solution, consult the Tektronix Field Engineer in your area. He is no farther away than your telephone and he may have the answer to your problem. In any event he will be happy to consult with you and show how to use Tektronix instruments to their fullest capabilities.

CHANGE IN STANDARD P2 PHOSPHOR

A new improved-type phosphor is now used in all Tektronix cathode-ray tubes calling for a P2 phosphor. This new Type P2 phosphor can be distinguished by its blue fluorescence. The older P2 phosphor, as you will recall, fluoresced green.

The primary reason for the phosphor change was to improve the writing rate of the tubes. The new P2 phosphor has a writing rate approximately 75% that of the P11.

Even though the new Type P2 phosphor decays to 10% of full brightness in only 2 milliseconds (compared to about 100 milliseconds for the old type), the long-term persistence components of the two types have nearly the same energy. Furthermore, the brightness of the new phosphor is much better than the old.

There are two peaks in spectral response of the new phosphor. A major peak occurs at 5300 Angstrom units (0.5300 micron) and a minor peak occurs at 4500 Angstrom units (0.4500 microns).

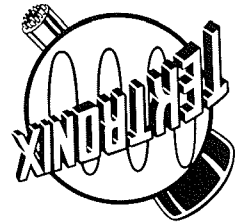
One other desirable characteristic of the new phosphor: it has distinct advantages for oscilloscope photography.

Tektronix Instrument-Repair Facilities: There is a fully-equipped and properly-staffed Tektronix Instrument Repair Station near you. Ask your Field Engineer about Tektronix Instrument-Repair facilities.

Tektronix, Inc.
P. O. Box 500
Beaverton, Oregon

USERS OF TEKTRONIX INSTRUMENTS
USEFUL INFORMATION FOR

Service Scope



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Telephone: Mitchell 4-0161 TWX—BEAV 311 Cable: TEKTRONIX

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*ALSO REPAIR CENTERS



Service Scope

USEFUL INFORMATION FOR USERS OF TEKTRONIX INSTRUMENTS

DECEMBER 1960

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PRINTED IN U. S. A.

TIMING THE TYPE 530A/540A SERIES OSCILLOSCOPES

Here is a procedure that will save the technician, generally familiar with the Type 530A/540A Series Oscilloscopes, considerable time when calibrating the sweep circuits of these instruments. This procedure is not recommended for the technician attempting such calibration for the first time. Technicians in this category will do well to adhere to the instructions as outlined in the factory recommended calibration procedure, copies of which can be obtained through your Tektronix Field Engineer.

This procedure requires the use of a Tektronix Type 180A Time-Mark Generator or any other frequency generator accurate to within 1%. Remember, while timing, position top of marks near the graticule horizontal center line and focus carefully.

Mechanically presetting of the controls as shown in the sketch is the key to saving time in this shortcut procedure. Positions of the controls after final adjustment will not vary appreciably from those shown in the diagram unless tubes or other components are not up to standard. Substandard tubes or components should be located and replaced.

The sketch as shown looks into the instrument with the side panel removed and from a position to the right and slightly above the instrument.

After setting the SWP. CAL. and MAG. GAIN in the normal manner, mechanically preset the identified controls as shown in the sketch. See Fig. 1.

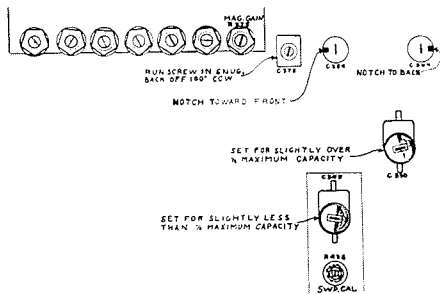


Fig. 1.

Step 1 Set the TIME/CM switch to .1 millisc/cm, 5X MAGNIFIER to ON. Apply 10 μ sec markers to the VERTICAL INPUT. Place first mark near the center vertical graticule line. Rotate the TIME/CM switch between

the .1 millisc and the 50 μ sec positions and adjust C330 for no shift of the start of sweep.

Step 2 Set 5X MAGNIFIER to OFF, TIME/CM switch to 10 μ sec/cm. Apply 10 μ sec markers to VERTICAL INPUT. Position start of sweep on first vertical graticule line and adjust C160E for one mark per centimeter between the second and tenth vertical graticule lines, (disregard the first and tenth centimeter divisions). See Fig. 2.

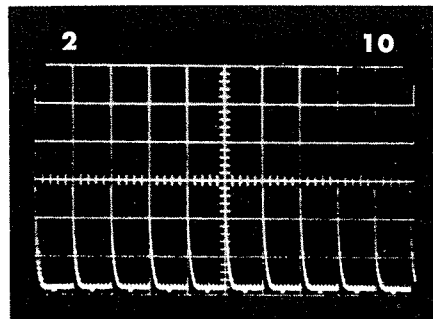


Fig. 2.

Step 3 Set TIME/CM switch to 1 μ sec/cm. Apply 1 μ sec markers to the VERTICAL INPUT and adjust C160C for one mark per cm between the second and tenth vertical graticule lines.

Step 4 Set TIME/CM switch to .5 μ sec/cm. Apply 1 μ sec markers to VERTICAL INPUT. Adjust C160A for 1 mark per 2 cm using the third and ninth vertical graticule lines. See Fig. 3.

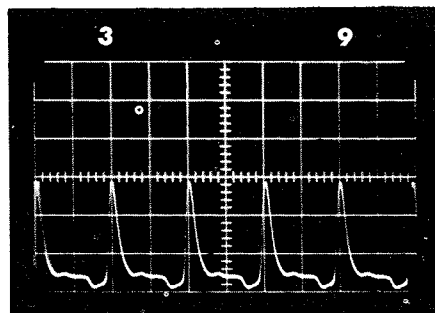


Fig. 3.

Step 5 Set TIME/CM switch to .1 μ sec/cm. Apply a 10 mc sine wave to VERTICAL INPUT. Apply 10 μ sec markers to the TRIGGER INPUT. Set TRIGGER SLOPE switch to + or - EXT. Adjust C348 for one cycle per cm between the second and tenth vertical graticule lines (C375 should not be adjusted at this time).

Step 6 Set TIME/CM switch to .5 μ sec/cm. Apply a 50 mc sine wave to VERTICAL INPUT. Apply 10 μ sec markers to the TRIGGER INPUT. Set TRIGGER SLOPE to + or - EXT. Place start of trace on first vertical graticule line. Turn 5X MAGNIFIER to ON. Adjust C384 for maximum space between cycles of the display. Now adjust C364 precisely for one cycle per cm between the second and tenth vertical graticule lines. If timing will not adjust precisely, reverse the order of adjustment of C384 and C364 above. If this does not allow accurate timing, interchange the two horizontal-output 6DJ8 tubes. As a last resort try replacing one at a time the 6DJ8 output tubes. If the instrument still will not come into adjustment, refer to the trouble shooting section of the particular instrument's instruction manual.

Step 7 Using the HORIZONTAL POSITION control, place the "fifth cycle in" from the left hand side of the trace on the second vertical graticule line and observe the timing between the second and tenth vertical graticule lines. Tolerance is 3%. Check the right hand side of the sweep in the same manner using the "fifth from last cycle" and placing it on the tenth vertical graticule line.

This procedure is used to good advantage by the Field Training and Customer Training Department here at the factory in their training course. We are indebted to Tom Smith of this department for the procedure and for his assistance in bringing it to you.

TYPE 517 SWEEP LOCKOUT MODIFICATION KIT

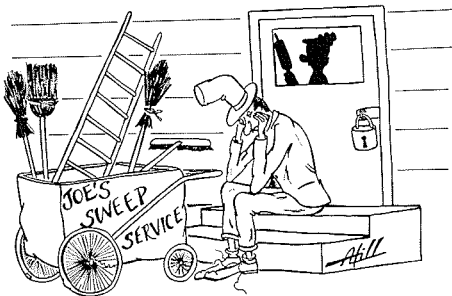
The Sweep Lockout feature, standard on all Type 517A Oscilloscopes, can be

added to your older model Type 517 instruments. Installation of the Type 517 Sweep Lockout Modification Kit will accomplish this. This feature makes possible the study of one-shot phenomena with the Type 517 Oscilloscopes. All Type 517 instruments with serial numbers above 926 will accept this modification. Type 517 instruments below serial number 926 require the installation of another modification (Duty Cycle Limiter Mod*) before the Type 517 Sweep Lockout Modification can be installed.

The Type 517 Sweep Lockout Mod Kit contains the necessary components, wired chassis, step-by-step instructions, schematic, photos and parts list.

Order from your Tektronix Field Office or Engineer. Specify Type 517 Sweep Lockout Mod Kit, Tek number 040-203. Price is \$45.00.

* To obtain this kit, order Type 517 Duty Cycle Limiter Field Mod Kit, Tek number 040-107. Price is \$10.00.



TYPE 502 SWEEP LOCKOUT MODIFICATION KIT

Your Type 502 (all serial numbers) can be modified for the study of one-shot phenomena by installation of a Type 502 Sweep Lockout Mod Kit.

The Sweep Lockout feature permits you to arm the sweep to fire on the next trigger to arrive. After firing once, the sweep is locked out and cannot fire again until rearmed by pressing a RE-SET button.

The modification kit converts your Type 502 Oscilloscope for this type of operation and retains the original features of the instrument. The kit includes a wired chassis assembly, new panel, necessary components, photo, schematic, step-by-step instructions and parts list.

Order from your Tektronix Field Office or Engineer. Specify Type 502 Sweep Lockout Mod Kit, Tek number 040-209. Price is \$45.00.

IMPORTANT: Give serial number of your instrument so new panel can be numbered at factory.

TYPE 575 COLLECTOR CURRENT MULTIPLIER MODIFICATION KIT

This modification increases the current range of the vertical axis of the early models (serial numbers below 862) Type 575 Transistor Curve Tracer. The addition of a X-2 and a X-0.1 push button Collector Current Multiplier controls provides a means of multiplying by 2 or dividing by 10 the 24 calibrated steps of the Vertical Current or Voltage/Division switch. This increases the cur-

rent range of the switch from 1000 — 0.01 ma per division to 2000 — 0.001 ma per division.

Included in the modification kit is a .8 amp circuit breaker to replace the 1 amp fuse in the collector sweep, a wired Collector Current per Division switch, step-by-step instructions for drilling the front panel and for installation of the switch and other parts, and a parts list.

Order from your Tektronix Field Office or Engineer. Specify Type 575 Collector Current Multiplier Mod Kit, Tek number 040-197. Price is \$35.00.

AN ENVIABLE PERFORMANCE RECORD

Recently, we received a report from Tektronix Field Engineer Howard King attesting to a remarkable reliability performance by eight Type 502 Oscilloscopes. These instruments are a permanent part of the Bevatron control system at the University of California Radiation Laboratory. Here they are subjected to a periodic maintenance inspection and a thorough recalibration every six months. Except for the time required to make these inspections and recalibrations, these instruments have been in continuous operation since their installation in March of 1959. The group in charge of this installation has kept very complete maintenance and failure charts. A check of these charts reveals a truly phenomenal record—only 14 failures in a total of almost 100,000 hours of operation. All except two failures were from tubes. Of these exceptions, one was from a defective high voltage transformer, the other from a shorted lead to a tube socket.

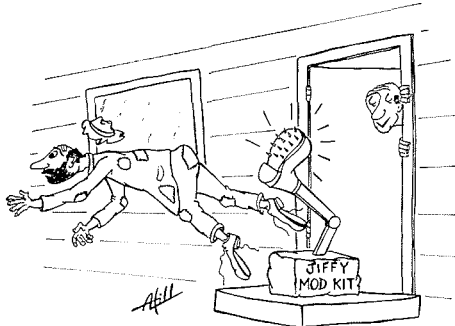
QUESTIONS FROM THE FIELD

1. Q. How much can be cut from the cable of the standard P410 probe before running into trouble?
 - A. A couple of inches can be cut from the standard P410 cable before overshoot is seen with critical eyes. About four inches can be cut from the eight-foot cable.
2. Q. What is the purpose of the small plastic board, containing four adjustable coils, located in the Type 551 upper beam-vertical amplifier? Why is it sometimes left unconnected?
 - A. Normal manufacturing tolerances will sometimes result in a slight delay between vertical amplifiers. These additional coils compensate for this delay and thus offer superior beam registration. Often it is not necessary to use the additional delay.
3. Q. On a Type 517 where is a likely place to look for stray pickup?
 - A. A likely place for this is a poor ground connection. This can occur between the grounded portion of the coax input connector and the pre-amplifier sub-chassis. When checking for pickup, the preamp grids should be shorted as close to the tube as possible. This will eliminate pickup between the input connectors and the grids.
4. Q. Can the Collector Sweep of a Type 575 be modified to provide

a plus and minus voltage, automatically switched, for viewing symmetrical zener diodes?

- A. Yes; this can be accomplished by shorting out one of the power diodes in the collector sweep and disconnecting the opposite diodes. This will give a sine wave at the C terminal.
5. Q. On the RM16, what causes the .02-v/div. position to sometimes seem under compensated while the 0.2-v/div. is OK?
 - A. C545, a 500-mfd cathode by-pass capacitor, has a mechanical ground through its case. A poor ground connection here can cause apparent under compensation of the .02-v/div. setting.
 6. Q. Can the Type 310 Oscilloscope (60 to 800 cycle power supply) be operated on 50 cycle for short periods? If so, how long would external fan cooling help?
 - A. We strongly recommend against using the 60 to 800 cycle Type 310 on 50 cycles. Gordon Sloat, of our Transformer Department, says this is equivalent to operating the primary at 145 volts, 60 cycles. External-fan cooling wouldn't help much as heat builds up fast inside the transformer.
 7. Q. We have a Type 545A which keeps blowing fuses as soon as the instrument is turned on. Investigation has not revealed a short. Have you any solution to this problem?
 - A. Check the silicon rectifiers. Perhaps you have one that has shorted. Because the opposite diode is good, a four-ohm short circuit appears across the winding on one half of the cycle only. The defective diode fuses open completely or becomes intermittently shorted and open. The opposite diode should also be changed since it would be damaged by the high short-circuit current. Either diode could become intermittent if one shorts out.
 8. Q. We have run into some oscillation problems in checking 500-megacycle-type transistors on the Type 575. Are there any other tricks besides the use of ferrite beads to eliminate or minimize these oscillations?
 - A. Here are two other possible solutions to the problem:
 1. Place a small series RC between collector and emitter at the panel socket. Approximate values of 47 pf and 82 ohms seem to do the job with very little effect on the desired curve. The same RC connected from emitter to ground also does the trick for some transistors.
 2. The simplest method is to plug another transistor into the unused socket. However, this solution doesn't work every time. The dummy transistor need not be a mate to the one being checked.

MODIFICATION KIT FOR BLANKING CHOPPING TRANSIENTS



This modification applies to the Type 531, 535, 541, 545, RM31, RM35, RM41 and RM45 Oscilloscopes. When a Type 53C, Type 53/54C or Type CA Dual Trace Plug-In Unit is operated in its chopped mode with these instruments, transients appear with the trace. If you find these transients objectionable, you can eliminate them by the installation of a modification kit.

This modification supplies a blanking voltage that can be applied to the crt cathode (by means of a switch) when a dual-trace plug-in unit is operated in its chopped mode.

The mod kit includes a complete set of components, parts list, schematic, photos and step-by-step instructions. Please order through your Tektronix Field Office or Engineer by the following description:

For Type 531, 535, 541 and 545 Oscilloscopes, serial numbers 101 through 4999, specify Type 530/540 Series Chopping-Transient-Blanking Mod Kit, Tek number 040-200. Price is \$5.25.

For Type 531, 535, 541 and 545 Oscilloscopes, serial numbers 5000 and up, and Type RM31, RM35, RM41 and RM45 Oscilloscopes, all serial numbers, specify Tek number 040-198. Price is \$5.25.

TYPE 162 WAVEFORM GENERATOR SOLVES SINGLE SHOT UNBLANKING PROBLEM

A customer, using a Type 536 Oscilloscope to plot plate current against plate voltage in a diode, was having difficulty. He was using a hand-operated mercury switch to pulse the diode. Because of the single shot type of operation plus the fact that the Type 536 has no unblanking for this type of operation, the crt beam was standing in one spot most of the time. A photograph taken under these conditions was worthless. The brightness of the spot completely wiped out the desired information in the trace.

This customer had recently received a Type 162 Waveform Generator. A feature of this instrument is that one of the output waveforms is a 50-volt pulse gate. Tektronix Field Engineer Bill Carter suggested to the customer that he trigger the Type 162 with either the current or voltage waveform of the diode and then use the 50-volt pulse gate of

the Type 162 to unblank the Type 536 during the trace period. The duration of the gate pulse could be adjusted for the proper amount of unblanking time by varying the sweep rate of the Type 162.

The customer called Bill the next day and expressed his gratitude saying that this was the only method that had worked on his problem.

TRANSISTORIZED CIRCUITRY

If you are interested in transistorized circuitry, you will probably enjoy the article "Battery-Operated Transistor Oscilloscope". This article appeared in the March 18, 1960 issue of *ELECTRONICS*, a trade magazine devoted to the electronic industry and published by the McGraw-Hill Publishing Company.

Oz Svehaug, Project Design Engineer for the Tektronix Type 321 Transistorized Oscilloscope, and John R. Kobbe, Chief Circuit Design Engineer for Tektronix, co-authored the article. Several circuits of the Type 321 are briefly discussed and schematics of some are included in the article.

If you do not have a copy of the March 18, 1960 issue of *Electronics*, suggested sources are your firm's technical library or the local community library. Reprints of articles are generally available from the magazine publisher, in this case the McGraw-Hill Publishing Company, Inc., 330 W. 42nd Street, New York 36, New York.

DOES CONTINUOUS OPERATION OF ELECTRONIC-TUBE EQUIPMENT REDUCE THE INCIDENCE OF TUBE FAILURE?

Andy Jackson, Chief Engineer for Station WAVY, Tidewater Teleradio Inc., Portsmouth, Virginia, evidently believes that it does. He told Tektronix Field Engineer Eb Von Clemm that the control equipment at station WAVY is never turned off except for major repairs. Since this equipment has been on this continuous-operation basis, monthly tube expenditures have shown a marked decrease. Mr. Jackson has collected some rather convincing cost data. Before WAVY instituted their 24-hour operation policy, their equipment contained a total of 3200 tube sockets. Tube-replacement costs for this equipment fell between \$1500 and \$1800 per month. Since these figures were gathered, WAVY has added additional equipment that has increased the tube socket total to 5500. In spite of this increase in tube sockets, tube-replacement costs under the continuous-operation plan have been reduced to an average of around \$900 per month. Although the tube replacement potential was increased by 75%, actual tube-replacement costs were reduced up to 50%. Mr. Jackson says he feels that their policy of 24-hour operation was a big factor in this tube-replacement cost reduction.

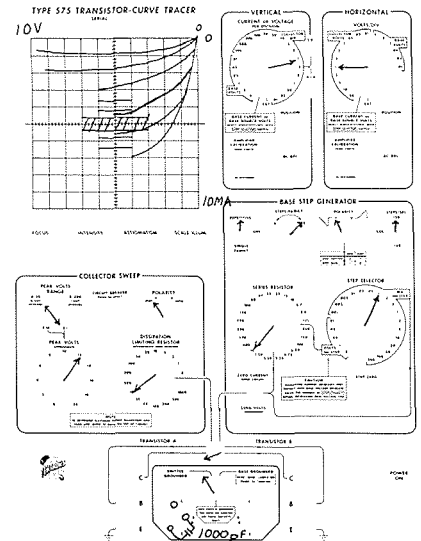
It would be interesting to know our readers' opinions on this question. Why not drop us a line giving your answer to this question and the reasons for your

stand? We will try to evaluate the answers, determine the consensus and publish the results in a future issue of *SERVICE SCOPE*.

Address your answers to Walt Dederick, Editor, *SERVICE SCOPE*, Tektronix Inc., P. O. Box 500, Beaverton, Oregon.

TEST-SETUP CHARTS AVAILABLE FOR FOUR INSTRUMENTS

TYPE 575 TEST SET-UP CHART



COMPONENT: 2N700 151-027

TESTING: BETA SEGREGATION

PROCEDURE: USE SPECIAL SOCKET WITH BY-PASSED BASE LEAD

Test-Setup charts are now available for the Type 502, 503, and 545A Oscilloscopes and the Type 575 Transistor Curve Tracer. The charts provide a ready means of recording instrument control settings for any given test or production setup. A facsimile of the trace resulting from the setup can be drawn on the chart graticule or a photograph of the waveform attached to the chart.

For production testing, an engineer devises the test procedure required to attain the desired result. He then designates the control settings on the chart and draws a picture of the display on the chart graticule, outlining the limits for acceptance or rejection. (If desired, separate instrument graticules for each test can be marked with colored lines or tapes). The production-test facility takes over at this point and performs the test operation with speed and accuracy. Often a non-technical employee can handle this phase and release a highly trained person for more important work.

Your Tektronix Field Engineer will be glad to give you more detailed information on the Test-Setup charts and their uses.

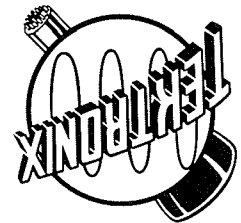
TYPE 575 TEST-SETUP CHART PROVES ITS WORTH

During a recent demonstration on the Type 575 Transistor Curve Tracer, one of the engineers in attendance remarked that engineers could operate the unit without any trouble, but what about the

Tektronix, Inc.
P. O. Box 500
Beaverton, Oregon

USERS OF TEKTRONIX INSTRUMENTS
USEFUL INFORMATION FOR

Service Scope



girls on the line who would be making incoming inspection of transistors? They are all non-technical people. Will they be able to set up and use the Type 575 in their inspection routine?

Tektronix Field Engineer Harvey Worth, who was presenting the demonstration, suggested that one of the girls on the line be brought in. He explained that he felt sure that within five minutes she could set up the instrument from a Test-Setup chart.

Accordingly, one of the girls was brought in and given a previously prepared Test-Setup chart. With very little instruction, she set up the Type 575 and, to the complete satisfaction of the observing engineers, made the incoming inspection check.

USED INSTRUMENTS WANTED

- | | |
|-----------------------------------|---|
| 1 Type 531 or preferably Type 533 | Russel Jensen
223 E. Dean Ave.
Madison 4, Wis. |
| 1 Any Tektronix Scope | Christy Laboratories
Mr. Kazarlan
118 St. Clair
Cleveland 14, Ohio |
| 1 Type 511, 514 or 524 | Carl Smith
5449 Culver
Indianapolis, Ind. |
| 1 Type 315D or Type 514 | Palo Alto Engineering Co.
C. J. Biggerstaff
620 Page Mill Road
Palo Alto, Calif. |
| 1 Type 535 or 545 | John T. Campbell, III
7906 Pickering St.
Philadelphia 50, Pa. |
| 1 Type 535 with Type 53/54C | John West
Tektronix, Inc. |

Plug-In Unit 1122 Main Street
(Approx. \$800) Stamford, Conn.

USED INSTRUMENTS FOR SALE

- | | |
|---------------------------------------|--|
| 1 Type 545A with Type CA Plug-In Unit | P. J. Gentile
Vamco Machine & Tool, Inc.
2 Sedgwich Street
Pittsburgh 9, Pa.
Phone TAYlor 1-6000 |
| 1 Type 130 L-C Meter | |
| 1 Type 524AD | Allan T. Powley
Chief Engineer
WMAL, WMAL-TV
The Evening Star Bestg. Co.
4461 Connecticut Ave., N.W.
Washington 8, D.C. |
| 1 Type 570 s/n 336 | Corbett Electronics
Henry Corbett
2014 S.W. Jefferson Street
Portland, Oregon |
| 2 Type 514D s/n's 2143 and 2144 | Cornell University
Joe Sanford
Lab of Nuclear Studies
Ithaca, N. Y. |
| 1 Type 511AD s/n 1375 | |
| 2 Type 514AD s/n's 4874 and 4895 | |
| 1 Type 310A s/n 10089 | Digitronics, Inc.
Mr. Targia
Albertson Ave.
Albertson, L.I., N.Y. |
| 1 Type 511 s/n 1751 | Fred Pack
Technical Materiel Corp. |

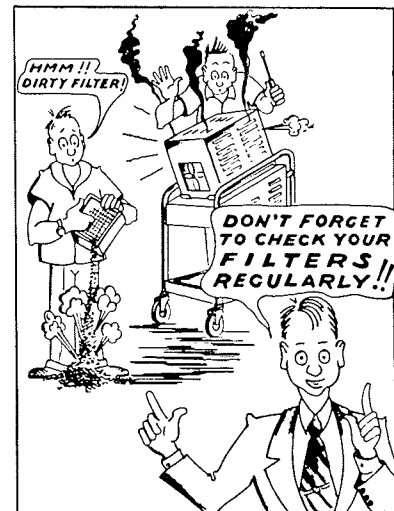
700 Fenimore Road
Mamaroneck, N.Y.

- | | |
|----------------------------|--|
| 1 Type 53/54E (will trade) | Eldema Corporation
Dwayne MacDonald
1805 Belcroft
Elmonte, California |
|----------------------------|--|

ANOTHER "HOT" SCOPE

Our Chicago office reports the loss of a Type 321, s/n 200, Transistorized Oscilloscope. This instrument disappeared from a group of instruments waiting to be returned to the Chicago office after the recent N.E.C. show in Chicago.

If you see this instrument or have any information regarding its whereabouts, please contact your Tektronix Field Office or Engineer, or call the factory collect at Beaverton, Oregon. The phone number is MITchell 4-0161. Ask for Walt Dederick.



Tektronix Instrument-Repair Facilities: There is a fully-equipped and properly-staffed Tektronix Instrument Repair Station near you. Ask your Field Engineer about Tektronix Instrument-Repair facilities.