



# Service Scope

USEFUL INFORMATION FOR USERS OF TEKTRONIX INSTRUMENTS

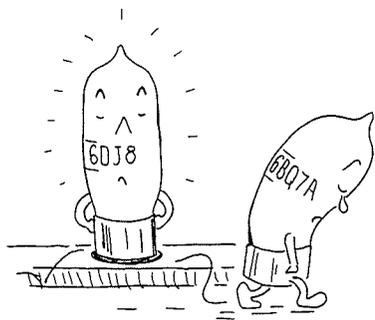
JANUARY 1960

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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.

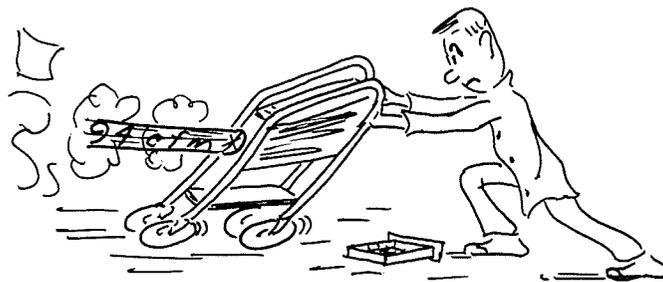
When adjusting C706 and C735 Trimmer capacitors in the 575's collector sweep circuit, be sure that the transistor adapter is in place. Tektronix Field Engineer Lee Cooper reports that the small amount of capacity introduced by the adapter results in a different setting of the trimmers.

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

- 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.
- 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.

USERS OF TEKTRONIX INSTRUMENTS  
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Tektronix, Inc.  
P. O. Box 831  
Portland 7, Oregon



- 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 524-AD instruments, S/N 5001-5899.

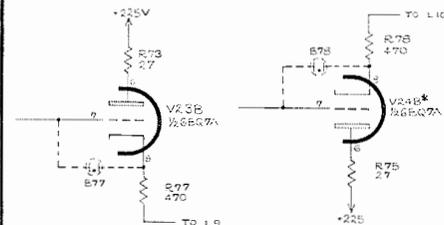
Two NE2 neon bulbs are installed which will ignite for several seconds when the instrument is first turned on. This will hold the grid-to-cathode voltage to a reasonably safe value until the instrument is warmed up and in operation. These neon bulbs are available from your local electronic supply sources.

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