DICK RHIGER:

The 570 is in the pre-production group over in assembly. Metal parts for twelve units have been completed with the exception of the adapter plates which are now being worked out. Progress looks very satisfactory on this instrument for going into production as soon as the twelve models have been checked out. In the meantime, permanent drawings and jigs are being made for this project. A new method of silk screening the under side of the chassis was tried on this instrument, to ease the service problem; that is, circuits are all blocked out as to their position on the chassis. At the present time there seems to be no bottleneck for parts for this run of twelve.

Darrel Wilhoit has been working on a mounting arrangement for the throw-away fiber glass air filter for use on our type 530 and 540 scopes. He also just completed three special high voltage supplies for our Swedish representative, Erik Ferner.

A new 4X "standard probe" for adjusting input trimmer capacitors of attenuators has been worked out for the use of the field and test departments. This project was awaiting the arrival of Teflon UHF connectors which are now here. The model that was constructed seems to perform successfully.

A fiber glass carrying case for the plug-in units was investigated. A local supplier made a sample to show us what could be done, but after getting his prices on the initial investment required, for dies, we gave up the fiber glass project. He estimated this would be "somewhat over $1000." It appears the best way now is to make them out of aluminum with wooden skids and cut down the length of the box slightly from the original models that we made.

An extension plug-in unit for the 53E is being worked on to enable this unit to operate at approximately ten to fifteen feet remote from the scope. This consists of a standard size plug-in unit which plugs into the scope, and contains the extension cord which can then be plugged in on a small cabinet into which the 53E is plugged. When not in use the cable may be folded up, put into the extension plug-in unit, and this extension plug-in unit may be inserted into the remote carrying case.

Henry Fritzler has worked out a new type of mounting for the attenuator capacitors and resistors for attenuation switches. This involves a flat brass plate which mounts over the top of the switch. The capacitors are mounted on top of the plate with the resistors underneath with appropriate holes in the plate. The leads then drop down to the switch contacts. This type of switch is being used in the 515.

Trouble was encountered in the 54K unit in two different ways: Non-availability of 19X8's and severe microphonics of the 19X8's that were being used. Attempts were made to replace this tube with 12AU6's. In the meantime more 19X8's were expedited. Three hundred arrived and were checked and found to have a yield of approximately 60%. 54K units were released to use up the

remaining tubes. In the meantime several K units have been completed with 12AU6's, and tests are now being run to determine the advisability of using 12AU6's. First indications showed that the bandwidth was down approximately 3% in using the 12AU6's. However, the pulse response was considerably better over the range of the variable gain control. John thinks we might even go to a 2-1/2 to 1 gain control if we use 12AU6's. The 12AU6's seem very free from microphonics.

Another problem facing the 41-45 production testing right now is the 6AW8's having low GM averaging approximately 7500 instead of 8500 to 9000 GM we originally had. We are trying to get some other manufacturer's tubes with higher GM. However, in the event that low gain appears to be more or less normal, we may increase the sensitivity of the crt to obtain a good yield.

A 54 type dual trace plug-in unit has been developed and checked out and preliminary models appear to have 25 mcs bandwidth with good switching performance. A great deal of effort was made to obtain the maximum bandwidth and minimum input capacitance. This necessitated a front panel layout different from the present 53C. A second model is now being constructed as this first model has to be shipped to Frank Thomas for an IBM demonstration for the week of August 8.

Along with the 12AU6's-54K combination, a great deal of effort was made to reduce the losses in the delay line to bring up the bandwidth. A number of experimental lines were tried, from 1/8" diameter to 5/16" lines with air trimmers. None of these was any better than our present lines. Apparently we already have nearly the optimum combination.

CHUCK NOLAN:

We plan to introduce the 515 and the 515 rack mount at the San Francisco show at the end of August. This instrument is designed to be more portable than our usual high performance instruments and will weigh approximately forty pounds. The bandwidth is expected to be DC to 15 mcs with sensitivity of .1V per cm. In order to achieve its low selling price of $750 we have simplified in a number of ways. The vertical consists of main amplifier alone with no pre-amplifier and the sweep range has been reduced somewhat on both the fast and the slow end. The high speed sweep performance has to some extent been recaptured by an accurate 10X magnifier, instead of the usual 5X, which makes the highest sweep speed .05μs/cm.

We are expecting this instrument to fill the need of a 511 replacement, as well as cornering a share of the 514AD market.

The type 515 rack mount will have the same specifications as the 515, but will be designed specifically for rack mounting and will differ considerably in appearance from the 515 standard model. This should prove a very suitable instrument for many fixed test installations.

The type 360 is starting through production. In the first run of 6 or so scopes, 3 or 4 have gone through test with minor modifications and it looks

as if it will be successful. So far the printed circuitry looks like it will work out OK. We don't know as yet when to expect delivery on these. It will probably be another couple of months.

The first production models of the 517A have reached test and should go into the field soon.

FRANK HOOD:

Type 310: The 310 is now in full production and these instruments should be reaching the field within a few weeks. The hold-up here has been with selenium rectifiers, but the G. E. high temperature plates have arrived and production is going ahead. It was decided that it was best to use the high temperature plates for the extra safety factor they would give when the instrument was used on high line voltages and at high ambient temperatures without the use of the fan base.

In approximately 60 days we will be able to furnish an AC cord with a right angle female connection, which will permit the use of the 310 in an upright position without pinching the cord. While we still do not recommend using the 310 in this position for long periods of time, it will not harm the instrument if the ambient temperature is not over 75 - 80 degrees, as the thermo cut-out will protect it. At higher temperatures or higher line voltages the instrument can be operated as long as half an hour in this position.

We are looking for a satisfactory carrying case for the 310; however, a suitable material has not been found. Sample cases of canvas were supplied by a local shop, but they looked rather cheap.

Some thought has been given a rack mounting for the 310. We would appreciate your suggestions on this. As yet, no work has actually been possible.

Dual Beam Scopes: We have been doing a lot of thinking and speculating on the possibilities of building a dual beam scope. As yet not too much actual work has been done on this project; however, we are in the process of constructing the first engineering model of such an instrument.

Basically the instrument will be similar to two 541 scopes; that is, two separate vertical amplifiers and two wide range sweep circuits. There will be provisions to use one of the sweep circuits as a delaying sweep for the other, by means of inter-connecting switches and an auxiliary pick-off circuit. There will be two separate horizontal amplifiers with a suitable switch on the front panel so that either amplifier may be switched either to external input sweep #1 or sweep #2. A 5X magnifier will be incorporated in each sweep amplifier.

The vertical amplifier bandwidth will very likely be less than the 540 series due to the difficulty of making low capacitance connections to the dual gun tube. We are confident that it will be in excess of 20 mcs.

Like the 540 series, the pre-amplifier will plug in and all of the available plug-in units will be suitable for this instrument.

The tube department is currently working on the dual gun tube for the instrument. See their report for characteristics.

The unit will be built in two cases due to the weight, which would be over 100 lbs. The indicator unit will be approximately 17 inches wide by 15-1/2 inches high, by 24 inches deep. The power supply unit will be approximately the same size as the power supply unit for the 517.

We hope to have the first engineering model ready within the next two to three months; and it undoubtedly will be a year before we could have any production quantity of this instrument.

16 MM Motion Pictures: We have just completed a 16 mm sound and color motion picture on the engineering and manufacturing of a "Precision Cathode Ray Tube." This film is semi-technical in nature and shows all the steps in the building of our cathode ray tubes. It runs for approximately 35 minutes and was filmed to be presented to such groups as the local chapters of the IRE, AIEE, and others of similar nature. It should be of interest to student groups or to any of the users of our instruments. Prints will be available very soon so that you can arrange showings of it.

Type 316: Work was started on the 316, a 3 inch scope of higher performance than the 315, and the first model was built and operated. However, due to the nature of the comments from the field engineers, and the excellent progress that was made on the 515, it was felt that there was little need for an instrument of these specifications, as its only advantage was slightly smaller size and weight. Therefore, for the time being this project has been tabled.

Some thought has been given to other dual beam scopes. It might be possible to bring out another scope of this type without the plug-in features with lower accelerating voltage on the crt, and of lower bandwidth. This instrument should not cost as much and would be of smaller size. It would be in one case and about the same size and weight as the 514. We would be glad to get any constructive suggestions on such an instrument.

RODGERS JENKINS:

We are working on an equal horizontal and vertical amplifier plug-in type scope with as close as possible indentical phase characteristics to at least 10 mcs, and bandwidth in excess of 10 mcs. The first engineering model of this instrument (tentatively called the 542) is pretty well debugged and appears to give promise of exceeding the designated specs. However, we have lots of work on it before production can start.

Also, in connection with the 542, we have designed a plug-in sweep unit which will probably be called a 53/54S. The first model has the sweep range of the 532, 5 sec/cm to 1 μs/cm.

The 542 also has intensity modulation features with polarity reversing to provide for either positive or negative trace brightening. The intensity amplifier is DC coupled.

With the use of two sweep units, 53/54S, a raster presentation may be obtained, and time markers can be employed on the intensity modulation circuit. The 53S plug-in unit has an additive circuit for impressing external signals on the sweep wave form. At the present time work is coming along very well.

We are completing an auxilliary blocking oscillator and power supply unit which will give a high current pulse of 50 volts in 100 ohms when initiated by the delayed trigger output of the 535, 545, and 532. This will be a very small instrument, probably three or four tubes, and will sell for an economical price.

Work is being done on the 53/54D unit to improve the differential balance in the 10X, 100X, and 1000X attenuator positions. We hope this will be available to you as soon as the parts are available to us.

We have finished developing the 123, a small battery-operated audio pre-amplifier with a gain of 100, and have advertising literature available on this unit now. It is nearly ready for production.

The 180 has been partially re-designed by converting the socket turrets to ceramic strip construction, to make for easier servicing. The power consumption has been reduced somewhat also.

CLIFF MOULTON:

Our projects are aimed at achieving performance beyond the capabilities of the 517. We have been concerned with the following four projects:

(1) A sweep generator capable of sweep speeds of .005 μs per cm at 24 KV, using the Miller stepless sweep generator circuits, and feedback amplifier techniques.

(2) An unblanking amplifier suitable for more rapid unblanking than we now have, for application in the high speed sweep.

(3) A cathode ray tube with distributed signal deflection plates, incorporating a match between the velocity of the crt beam and the signal velocity through the signal deflecting plates.

(4) A vertical amplifier system employing secondary emission principles in a manner conducive to faster rise times than now available in the present distributed amplifier techniques.

This whole combination of projects may provide the necessary circuit principles for the construction of a noticeably improved instrument, which may succeed the type 517A, when satisfactory development has been completed. The completed instrument might conceivably reach 120 mcs bandwidth or better.

JIM DONOGHUE:

524 CF Probe: We are going into production on the first prototype P-500CF. This is an interim model that will be replaced at a later date by a fiber glass molded body when we can make it available. For now, the case will be of gray painted metal with a black end cap, to differentiate from the 517 probe. Also, there will be a silk screened legend indicating for use with the 524AD. A 10X RC attenuator head will be provided with the probe as standard equipment. The bandwidth of the probe will be 10 mcs and the response is down 2-1/2% at 5 mcs.

Cables: Efforts are continuing to find a manufacturer who will supply us with an RG62U type cable with the 2 mil, Evanohm wire as the innerconductor for the P400 series probes. One manufacturer accepted our order and later informed us he was unable to fill it. We now have requests out for a cable with a small innerconductor with either the solid or foamed polyethylene dielectric or in a construction similar to the RG62U.

The P4100: The initial few units showed little loss in bandwidth or risetime on the first 541's. Current production indicates the loss at 30 mcs is nearly 1-1/2 DB rather than the anticipated 1/2DB. These probes will slow the rise time of a 54K - 541 from 12 to 13-1/2 mμs. Some observations have been made which point to the low microphonic (aquadag coated) cable as the primary contributor to the loss in rise time. This situation cannot be improved at present except by sacrificing the low noise characteristic. When the innerconductor is replaced in a conventional RG62U cable, the majority of these cables then have excessive microphonics, probably because the shield is loosened in the process of re-working the cable.

P450 Probes: It was intended that the nose capacitor be the same ceramic piece that is used in the P4100, with a larger silvered area. Current production of these pieces shows an excessive (1-2%) roll-off or slowing of the rise. Fabrication of a low-loss ceramic is being investigated. Meanwhile, an adequate substitute has been devised. We will use a Tru-arc ring or clip attached about the forward end of the Steatite case of the resistor. This provides a good quality capacitor; adjustment to the required value is a simple matter.

P410 and P405: To extend the bandwidth of these probes when used on the 541, a compensating series inductance is inserted in the UHF connector. Dielectric losses and the consequent hooks in the insulating tubing placed about this inductor were too great. The inductance is now wound on a short stubby form (one μf capacitor) which provides clearance within the UHF connector and eliminates the need for any insulation. This construction also makes it possible to grasp the shield and sleeving more firmly and so minimizes the change in the capacitance with the twisting of the cable.

The most recent shipment of 3-12 μf trimmers used in the P510A and P410 probes had relatively high dielectric losses, made evident by a roll-off of 1 to 3% in the square wave response. This behavior was traced to the thin disk forming the capacitor dielectric. The manufacturer has been contacted about the matter. Meanwhile, capacitors are being selected individually, with a unit simulating the electrical circuit of a probe.

This applies to all probes: The possibility of developing our own trimmers for our probes has been explored, with the thought of providing a high quality capacitor of adequate range in a small volume. The possibility of manufacturing our own high dielectric, low loss, ceramic has been discussed also with Ted Goodfellow. Explorations along this line will continue.

As the field engineering department has been receiving inquiries with some regularity concerning a high voltage probe, we have begun to investigate the possibility of using a plastic dielectric in the nose of the high voltage probe. Models using Rexolite and Teflon have been made. To generate a high voltage step function for observing the behavior of these probes a sphere gap has been made. The construction is partially completed; good shielding is necessary to prevent direct pickup of the high voltage discharge by the amplifier circuits in the scope.

B170V Attenuator: Because recent shipments of the toggle switches used in this attenuator box had a large number of rejects, the possibility was investigated of using a mechanically superior toggle switch with a higher capacitance. It was observed that neither the rise time nor the frequency response was measurably degraded when the new switches were substituted. The attenuator was connected between the 517 and a 50-170 ohm pad. Bridge measurements did show that the impedance would be lower, 150-160 ohms, instead of the 170-180 ohms achieved with the current product. It is concluded that this change can be made when procurement of satisfactory switches of the old type is no longer possible.

53A Plug-In: Modifications to provide performance suitable for the use with the 541 have been made on a 53A. Construction of pre-production models will begin this week.

BOB POULIN:

We have recently had a visit from the chief engineer, Mr. R. Wilton, of Welwyn, Canada. One of the most interesting things he told us about precision resistors was that one of the reasons for aging is the small concentration of alkaline ions in the ceramic. This causes a migration of the carbon to the terminals under DC voltage resulting in increased resistance and eventually creating an open circuit. This is one of the reasons that we have trouble in such places as power supply setting dividers. Some of our tests have already verified these conclusions.

They have developed a new ceramic which is supposed to be free of this alkaline ion and we are getting critical resistors made of this ceramic body.

On the subject of metal film resistors, they have been evaluated and found good except for the D.C. stress mentioned and the temperature coefficient which is positive and not compatible with the Mylar timing capacitor.

In the direction of improving the stability of the 535 sweep, we checked the effect of changing room temperature. It was found that changing the ambient temperature 20°C changed the timing about 1/2% on the delayed sweep. The resistors changed in a negative direction and the capacitors changed in a

positive direction. Ideally, these two coefficients should cancel. We are still looking for the resistor with the required T.C.

We have also been investigating the jitter problem of the delay sweep. Wire wound resistors with their lower noise level, reduce the amount of jitter.

Some people may be wondering about the effect of the sandblast cleaning that we do on the ceramic strips on carbon film resistors. Tests were made to determine this. Several direct passes were made on the surface of the resistor with no effects on the characteristics.

We have been testing the new Tek pots used in the K unit for gain control. We have a mechanical pot cycler that cycles once a second which rotates the shaft completely to the stops. We have found that the pots will go easily 25,000 cycles at this accelerated cycling rate. Twenty-five thousand cycles is the equivalent of 100 cycles per day for one year. Continued life tests are being made to see what the maximum life will be at critical adjustments of the arm tension. This pot cycler can be used on all shapes and sizes of pots and rotary switches. We expect to get a lot of good use from this cycler, especially in determining life measurements of various manufacturer's products.

We have been giving consideration to using Borg ten turn pots and dials, of comparable quality and more reasonably priced. We are obtaining samples for evaluation and there is a chance that we will go to these if everything looks OK.

A comparison made between GE high temperature, high voltage selenium plates and our standard plates at 70°C and 20% excess voltage and current. After a 1000 hour period the output from the GE plates remains essentially constant, while our present plates are down 20% in output voltage. There are also indications that the GE plates have lower drop under high ambient conditions. The GE plates are a good answer to the 310 heat problem.

Another good solution to high temperature operations may be to use silicon junction rectifiers. However, at the present time they are much too expensive and evidently hard to come by. When they become available at a reasonable price, we may switch over to them.

We have been investigating the available paper tubular capacitors to try and find an improvement over our present units. As you know we have had some trouble with low leakage resistance on the 400V wax impregnated capacitors and some trouble with oil leakage on the 600V units. Sprague and several other manufacturers have solid impregnated tubulars which appear to be an improvement over the wax and oil impregnated capacitors. These are rated at 125°C and appear to have much higher leakage resistance even after humidity cycling. The physical size is the same as present units. The only point of inferiority of the solid impregnated capacitors is the lower rating for AC peak voltage, and a frequency limitation.

The random tube breakage problem that has existed for some time has been tossed back and forth between the tube manufacturer and the socket manufacturer. The nearest answer that we have is that the sockets are slightly off tolerance. We have changed socket supplier for this reason and others. The new supplier is currently Sylvania. It is a good looking socket and the tolerances are OK on the samples we checked. So we hope in the future that this breakage thing will become minimized.

We have looked into the possibility of throw-away air filters and a test was made on the American Air Filter Company versus the Research Products Co. We found that the glass filter has less impedance and collects more dust over a given period of time under identical operating conditions than the aluminum filter. For mechanical protection an auxiliary screen is required with glass filters. These will be announced by the field engineers as they become available.

We hope to handle our tube selection with the following pieces of equipment: (1) A calibrated microphonics tester which will take all the tube types. (2) A universal differential balance tester. (3) A static tester which might be the 570 or might require a unit with metered indicators. It is hoped that after this equipment is installed we can tell people how we test tubes.

We have recently received information that neon bulbs can be stabilized by aging with high current pulses. When time permits we will investigate this.

We intend to do reliability tests on the 6BQ7 tubes to choose the most desirable source of supply.

CATHODE RAY TUBE DEPARTMENT

Dual Gun Tubes for the Dual Beam Scope: Work is being done at the present time on the dual beam crt. It is expected that the first dual gun tube will be ready in the next ten days. Present expectations are that this gun will be similar to the T54.

Our current ideas on this tube are: The horizontal axes will be separated by 3 cm. The vertical scan of each gun will be plus and minus 2-1/2 cm. Horizontal scan will be plus and minus 5 cm. The vertical sensitivity will be on the order of 5 to 6 volts/cm. Horizontal sensitivity will be approximately 26 volts/cm, at 10 KV accelerating potential.

The tube will have a 3-1/2 inch neck to house the two guns and will have a five inch flat face. The over all length is expected to be 20-1/4 inches.

General Improvements: One of the major causes of damage in the cathode ray tubes is breakage of glass rods at the separation plate between the deflection plates. Our use of heavier glass rods should alleviate this.

By discovering and obtaining more efficient phosphors from the manufacturers and from improvements in our lacquer compositions the phosphor efficiency

of our tubes has been and is being greatly increased. Current phosphor efficiency is at least double that of several months ago and approximately four times that of a year ago.

Button position: On all tubes in the future, button position will be 1-3/8 inches from the face instead of the present 7/8 inches. This makes possible 24 KV operation without special precautions against corona.

We are adopting a new triode gun arrangement for the tube type used in the 570, 532, and 525, which results in a better focus. However, this is achieved at a loss of total beam current, and therefore is not desirable for those tubes requiring maximum writing rate. Experiments are under way, however, on the development of a tube of improved focus and high writing rate.

Statement of Policy: It seems generally agreed that the tube department is in a position and is interested in accepting orders for tubes other than those for use in our own instruments.

JEAN DELORD AND KEN DAVIS:

We have started this summer a new series of experiments to study more closely the performance of our cathode ray tubes. We are now measuring accurately spot size and phosphor efficiency. The purpose of this program is twofold: it allows us to design better crt's and to give our customers more information about the instrument they buy and the way to use them when photographic recordings are needed.

Spot size measurements are made by forming a 5X magnified image of the spot on a narrow slit a few units in width. The light passing through the slit falls in a photomultiplier, the signal of which is displayed on a 535. As the spot is swept over the slit (or an opening of any desired shape), a magnified image is obtained on the 535. We can measure the light distribution in the spot, and the total light output. At the same time, the beam current is measured. We can get quite a lot of information and a considerable amount of detail. The phosphor grains themselves can be resolved within the limits of spot width.

We have already observed that minor structural variations in the gun are responsible for variations of spot size from one to two. We intend to take advantage, of course, of these results in our crt production.

We are also preparing a set of instructions for photographical recording with our scopes. The results obtained with this experimental setup allow us to pin down a number of facts that are difficult to get by simple photographic observation and to make our instructions more definite. A brief outline of the contents of our forthcoming customer's manual follows:

PHOTOGRAPHY OF OSCILLOSCOPE TRACES

Repeated traces: In producing satisfactory pictures of repeated traces it has been found practical and very convenient to use the Tektronix lighted graticule as a photometer for estimating the correct camera setting corresponding to a given intensity control setting.

With the graticule oriented so that the lines are illuminated by white light, the green filter is placed between the graticule and the camera. The brightness of the repeated trace is varied until it matches that of the graticule lines. With the scale illumination calibrated in camera settings for correct exposure one then automatically determines the correct exposure of the trace.

When the green filter is in place and the scale illumination set at a maximum a correct exposure should be obtained with the camera settings given in Table I.

TABLE I

Model	CRT	Tri X, Dev. D19, 26 min at 68°F. Time (sec)	Aperture	Polaroid (Type 400) Time (sec)	Aperture
310, 315D	3WP	1/2	f/11		
511		1/2	f/5.6	1	f/4
512		1/2	f/5.6	1	f/4
514AD	5ABP	1/2	f/5.6	1	f/4
524D	5ABP	1/2	f/5.6	1	f/4
525	T52P	1/2	f/5.6	1	f/4
531, 535	T51P	1/2	f/5.6	1	f/4
541, 545	T54P	1/2	f/5.6	1	f/4
513	T51P (5XP)	1/2	f/5.6	1	f/4
517	T51P (5XP)	1	f/4	5	f/4
Camera reduction ratios:		5 inch - about 4.2 to 1 3 inch - about 2.7 to 1			2.3 to 1

These figures are to be considered as approximate and as starting values from which to work in setting up a definite scale for each individual user and instrument.

Since a wide range of light intensities is available by varying the intensity control, (in some cases as wide as 25,000X) it would not be much help to try to give camera settings for some "medium" position of the intensity control.

For the recording of transients or single pulses the writing rates attainable with the different model Tek scopes are of interest. They are summarized in Table II.

Single Trace: Approximate writing rates for P-11 screens (film trace density 0.1 above fog) are:

TABLE II

Model	Phosphor	W.R. (cm/μsec) lens aperture f/2
310,315D	2	8
514AD	1	40
524D (5ABP)	1	100
532 (T52P)	2	
531, 535, 541, 545	2	250
513	2	280
517	11	1100

Film: Tri-X, 35 mm, Developed 26 min. in D-19 at 68°F. (This should be roughly twice the speed of Linograph Pan Developed 12 min. in D-19 at 68°F)

We hope to have a complete customer's manual on the Photography of Oscilloscope Traces soon and would appreciate comments on what to include or omit. The following is the presently proposed outline:

Outline of More Complete Statement on Photography of Oscilloscope Traces

I Repeated Traces
- The Graticule Photometer
- Variation of Duty Cycle with Sweep Speed
- Types of Films
- Difficulties and Mistakes to Avoid

II Single Traces - Factors involved in obtaining the maximum writing rate.

A. The CRT
1. Voltage from cathode to first anode
2. Post deflection acceleration
3. The phosphor

B. The Optical System: Object-to-image reduction, effective aperture, etc.

C. Recording
1. Choice of film
2. Processing and special treatment

We hope to include several illustrations of unique use of Tek scopes in the final manual and would like to have the field engineers send in any and all examples they have seen. Prints of traces in such cases would be the most useful form.

HENRY HAASE:

We are nearly ready to produce our own wire wound potentiometers for use as gain controls in the 53-54 plug-in units. These are especially designed to insert a controlled amount of inductance as the resistance increases. The resistance element is made of Evanohm wire and the arm has a Paliney contact. This combination shows little or no wear in Bob Poulin's life tests, and will surely result in much less noise trouble than we have had with our current molded pots.

By molding the entire unit including the support from plastic, it was possible to reduce the free space capacitance to only two puffs.

We are operating with a servo-system for regulating the primary voltage to the scope transformers. This is still in a very preliminary stage.

We are doing some work to develop a ceramic switch wafer which will have a printed conductor pattern of fused silver. Tests have been made to determine the best type of material and techniques for applying the metal to the ceramic base.

JIM MORROW:

After years of false starts we have finally come up with a new probe tip which should prove much more acceptable than Klipzon for most applications. It is made of nylon with a rotatable metal insert having a hook in the end. A multicavity die to build this probe tip has been completed and it will shortly go into production.

We have purchased a Baker Automatic molding machine which will be used for compression molding for our 530-540 series knobs. At present these knobs are injection molded from nylon and Tenite. Converting these to urea should result in improved appearance of knobs in addition to production economies. Dies are now being made for the knobs of the 310, and they are being changed to urea.

The trend toward more stream-lined appearance in the instruments, first used on the 310, will be continued in the 515 and related instruments.

We now have a 100-ton press in operation in our shop and dies are being made to form the front panel and sub-panel of the 515 in a manner very similar to the 310. We expect to use this press also to speed up many other operations.

HENRY SCOTT:

In the last month we have been working on the permanent manuals for the 310, 360, 532, 541, 545, 53/54E and 53/54K. Some of these have the preliminary

manuals ready for distribution. Permanent manuals should be ready in the next couple of months for all of the above. We have also been working on a compilation of all circuit diagrams for all Tektronix instruments, to be bound in one volume about 1-1/2 inches thick. We hope to have these ready in the near future, and not later than the end of August. These volumes will go to all Field Engineers, with an accompanying letter of explanation and instructions for use.

Those of you who know Geri Duyck will be interested to know that she is leaving Tektronix as of July 29, to await her first visit from the stork. Geri has been with us for three years. The instruction manual department now consists of Henry Scott, Fred Tinker, Rachel Reeder, Corrine Benson, and Audrey Duyck.

We have been interested in reading your call reports, and would appreciate any suggestions you might have regarding the instruction manuals and their contents.

EARL SCOTT:

We have had a half-dozen pre-production 310 scopes and they have checked out very well, and have been one of the easiest to check out. We should be able to handle several a day when we start receiving them on the 20th of August.

We have had a half-dozen pre-production 360 scopes and they also check out. There is some non-linearity; however, that comes from the 162 sawtooth and for the moment this will be a characteristic of the instrument.

We can make no prophecy on the 517A as yet, as we have had very few T54H's.

The 410 probes are now in very good shape.

We have run into some tube trouble on the 19X8's and this seems to be fairly well under control now. The difficulty seems to be vibration and low GM which results in lack of bandwidth. We are also experimenting with fifteen 12AU6's in the K units. Some of these that have come through have performed satisfactorily.

The 541 and 545 are checking out fairly well. We have had experience of insufficient gain which seems to come from the 6AW8's. With the fastest sweep speeds on the 41 and 45 when the sweep is free running, there is a visible dimming of the trace about one cm. in from the start which is caused by about a 1-volt ringing on the unblanking pulse, and this only shows up with free running. For any triggered sweep this doesn't show up because the intensity is turned higher.

We have six people who are checked out to tune the delay lines on the 54 series. We haven't gotten beyond this stage of producing test people.

We are cabinet checking the 315, 524, 531, 535, 541, and 545. The QC men put the cabinet on after QC-ing and gives a cabinet check immediately. We would be interested to know if there is any reduction in the mis-tuning or any inoperative scopes on arrival. They have been doing this cabinet checking now for six weeks.

We have 43 test men in the test department at the present time.