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by George Washington, Jr.

Summary of:
The Simplification of Television Receivers
by W. B. Whalley

The Attic Inventor
by Charles F. Jacobs

THE RADIO CLUB OF AMERICA

11 West 42nd Street ★ ★ ★ New York City

The Radio Club of America, Inc.

11 West 42nd Street, New York City **Telephone — LOngacre 5-6622**

Officers for 1951

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HALF-TONE CUTS PRODUCED ELECTRONICALLY

By

George Washington, Jr.*

Presented before the Club on December 12, 1950

On March 4, 1880, "The New York Daily Graphic" published the first picture made by half-tone cut, invented by Stephen Horgan. By 1897 Mr. Horgan had improved his process so that it could be stereotyped and run on a high-speed press. From that date to the present little improvement has been made in the process which is strictly photo-chemical.

At the beginning of 1948 Fairchild Camera and Instrument Co. had a radically new means for half-tone cuts; it requires no chemical and is much faster. In one recent instance there was a large fire in a Mid-Western City; the City Editor of one of the papers having a Fairchild Engraver dis-

Fig. 1. The Fairchild Photo - Electric Engraver

patched a photographer to the scene; forty minutes after the click of the photographer's camera shutter the newspaper was on the street with a front page picture of the fire.

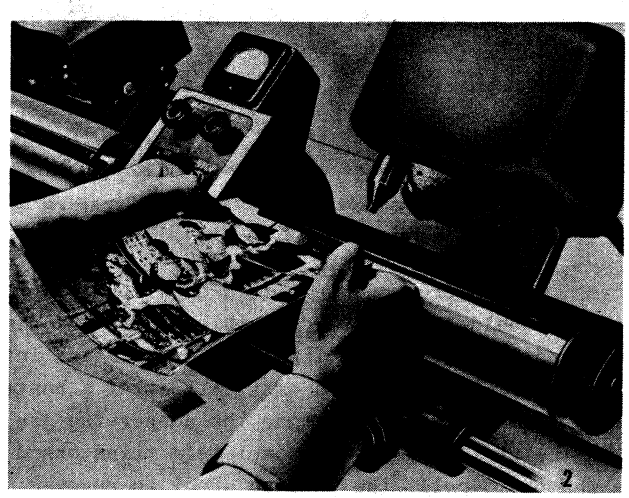


Fig. 2. Glossy Print Being Mounted on Scanning Cylinder.

The conventional way to produce half-tone cuts is done by exposing sensitized metal plate of either zinc or copper over which is placed a specially prepared negative. Then the plate is developed and etched in acid. In all there are about six separate steps which require several hours and have to be performed by skilled hands. The basic parts of the electric engraver are a photo-cell, a microscope and a red hot stylus which jabs into a plastic sheet at a rate of 350 jabs per second. As shown in Figure 2, the photo-

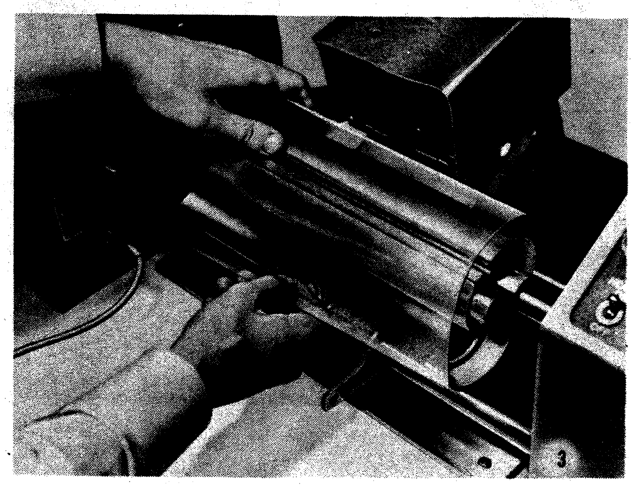


Fig. 3. Mounting of Blank Plastic Plate for Engraving.

*President - G.Washington Electrochrome, Inc.

Fig. 4. Washing Engraved Plate to Remove "Craters".

graph to be reproduced is placed on a revolving cylinder below the photo-cell which scans the picture and transforms the light and dark values into impulses that control the oscillations of a heated stylus. The lighter the tone the deeper the jab. When the picture has been completely transversed by the photo-cell, the plastic sheet is removed from the engraver, washed in plain water, dried with a cloth and now is ready for direct printing or matting, as shown in Figures 4 and 5. The time required for a 5" x 7" half-tone cut is about twelve minutes, and once the engraver is set in motion, no further attention or adjustment is needed. Any normal photographic print can be used, for the engraver automatically applies the screen while scanning the picture.

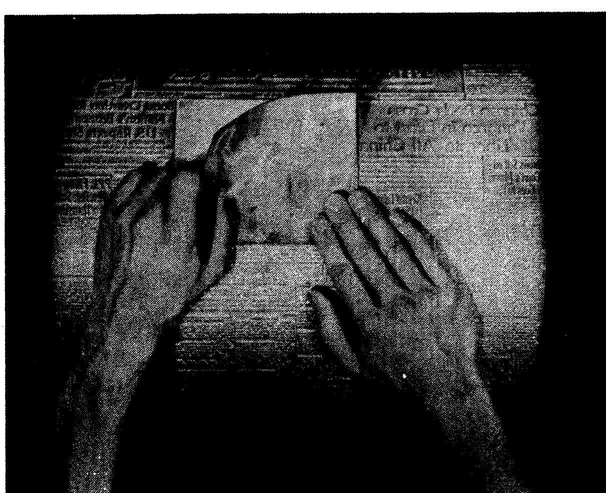


Fig. 5. Mounting Engraved Plate on Cylindrical Stereotype for Direct Printing.

The Fairchild Engraver is more or less similar to a bench lathe. There are two cylinders in line; below them are three parallel rods which are used as ways and also hold the engraver together. The right hand cylinder is for scanning the original picture, and directly above it is the scanning head which consists of a crater lamp and photo-multiplying-cell. The left hand cylinder carries the plastic sheet to be engraved, and behind it at a 45° angle is the engraving head. Both heads move axially with respect to the cylinder, but in opposite direction to each other by a steel tape - thus inverting the half-tone cut for printing.

The two cylinders revolve at the same speed and are driven by a reducing gear box which also actuates the steel tape. To the left of the gear box is located the screen generator which controls the crater lamp. The screen generator will be described later.

It may be of interest to review the history of how the first successful Photo-Electric Engraver for graphic arts was developed by the writer.

My vocation has always been "Instant Coffee". I had no knowledge of the graphic arts but my hobbies were photography and ham radio. The engraver was developed entirely as a hobby, in spare time, and in my basement.

In the fall of 1932 I came across an article in the "Camera Magazine" describing a polychrome process for color photography. After many trials and wasting a lot of materials, only a few prints were acceptable; reproduction of these prints was almost impossible.

One day a friend at the R.C.A. Sound Studio on 24th Street showed me how sound was photographed on film and how the photographic sound could be transferred to a phonograph record.

This set me thinking; if the light and shade portions of the sound track were used for making a phonograph record, why not do the same with a picture and make a print electrically? This thought in mind started me on a great and profitable venture.

The first problem was where to start. I decided, having little equipment with which to work, to find some way to make impressions on paper.

Out of the junk box came a magnetic speaker; a small fountain pen was fastened to its armature; then the speaker was held in the tool post of a lathe while the chuck carried a drum with a sheet of paper wrapped around it; and the lead screw set for a fine feed. The speaker was actuated by 60 cycles through a variable resistor (the resistor was ultimately to be replaced by a photo-cell).

With this set-up I was able to make a series of dots and vary their size. However, after a few trials it was very apparent that some form of synchronization between the motion of the paper and the pulse actuating the pen was necessary, in order to overcome the wave pattern formed due to the irregular motion of the paper with respect to the 60 cycle pulse.

The junk box was again consulted. An old earphone was modified and placed close to one of the gears of the lead screw, thus providing a pulse generator in synchronism with the motion of the paper. This set-up eliminated the wave pattern, but still a pattern was apparent due to eccentricity of the gear, producing a different pattern. Also the residual magnetism in some parts of the gear affected the pattern. Back-lash of the gear train was also apparent. Another defect was that the ink came out of the pen as a fine spray when it was driven above 100 cycles per second. The next step was to replace the pen with a needle and coat the paper with a film of beeswax. The object was to penetrate the wax film. After the entire sheet had been transversed, a dye or ink was brushed over its surface. Whenever the needle perforated the wax film, the paper absorbed the dye forming a series of well-formed dots. Still this was not the answer; for if the perforations were very close together (for instance fine screen work), the wax peeled off the paper, and the dye left a large blotch. At this stage it was apparent that the picture would have to be scanned for each duplicate print - too slow to be practical. The next step was to use a thin brass plate in place of the paper and adjust the needle so it struck the plate causing an indentation on its surface much as a center punch does on metal.

Progress was being made; the dot size could be easily varied by changing the input to the "magnetic speaker" - let us call it the "Stylus Head". A disadvantage of striking the plate with the stylus is that stress and strain are set up in the plate, so when it is removed from the cylinder, it no longer lays flat, and further, the metal that is depressed from the impact of the stylus leaves a dimple around the impression similar to the mark made with a center punch. It might be well to say that now I was trying to produce a printing plate rather than a print. Another attempt was made but it, too, failed; however, it led to the ultimate solution.

The attempt just mentioned consisted of a brass plate which was coated with an acid-proof lacquer and wrapped around the cylinder. The "Stylus Head" was removed from the tool post, and in its place a sharp needle was secured and insulated from the post. A spark coil was connected between the needle and the cylinder. The purpose was to burn small holes in the lacquer coating and then etch the plate with acid. This was a good idea, but it did not work due to ionization of the surrounding air. The spark could not be controlled to burn a hole through the lacquer at just the right point. It would wander all over and sometimes jump to the adjacent line or holes. However, this experiment brought out the solution, for while trying to adjust the gap between the needle and cylinder for a hot spark, I noticed under certain conditions that the point of the needle glowed a cherry red - CHERRY RED! LACQUER? Lacquer burns, why yes, this was IT!

Lacquer and celluloid are akin, so my next experiment was to rob my wife's sewing basket for some of its sewing needles. One was glowed over a Bunsen flame and rapidly plunged into a strip of celluloid; the result was deep pits or impressions in the strip. However, there was a slight crater

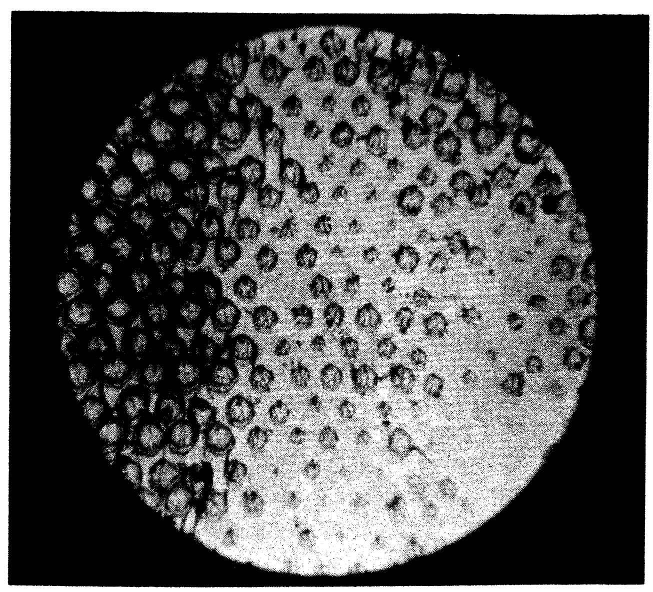


Fig. 6. An Engraved Plate Before Washing.

formation around the pit or impression as shown in Figure 6. A light pressure on the glowing needle made a small pit while a heavy pressure caused a deep one.

An amazing discovery was made - the crater around the pit could be quickly and simply removed by scrubbing the celluloid with a wet brush and rinsing in clean water. Figure 7.

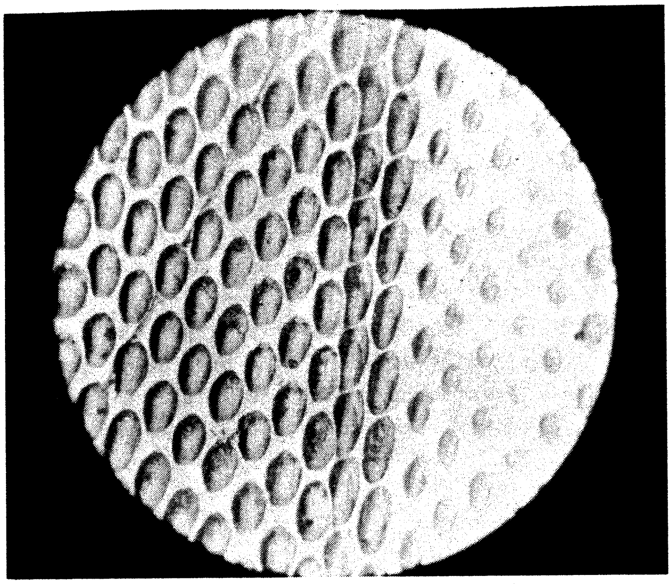


Fig. 7. An Engraved Plate After Washing to Remove "Craters".

Further, the fact that the material in the pit is burned out rather than displaced, as in the case of metal, leaves the celluloid plate free from stress or strain.

Another interesting fact about nitro-celluloid is that at a certain critical temperature it becomes quite fluid before turning into a gas. After the critical temperature is obtained, on

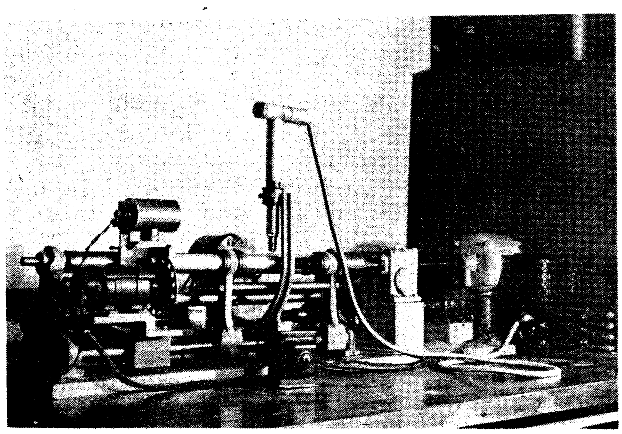


Fig. 8. View of Original Engraver Showing Scanner.

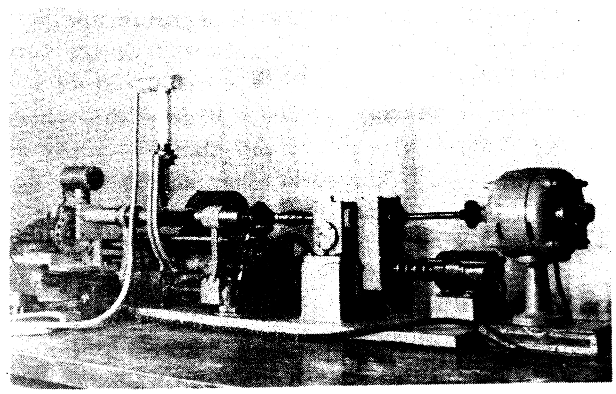


Fig. 9. Gear Reduction Mechanism on Original Scanner Making Possible Screen Formation.

cooling, a chemical change takes place making the celluloid water soluble. I do not know of any other plastic that has this characteristic.

Now that I had the means for making printing plates, the next problem was how to scan a picture and couple it to the heated stylus.

After some thought and consideration the first engraver was designed and built for a five by seven (5" x 7") picture as illustrated in Figures 8, 9 and 10.

There was a metal cylinder on which the celluloid sheet was wrapped, parallel to it was a hollow glass cylinder for holding the picture to be scanned; under the two cylinders were two parallel rods that carried a platen with the stylus head, a scanning light and the photo-cell system. The platen was moved laterally by means of a lead screw driven by a set of gears from the metal cylinder. This cylinder was driven by a 1/4 horse power motor through a 50:1 gear box and a

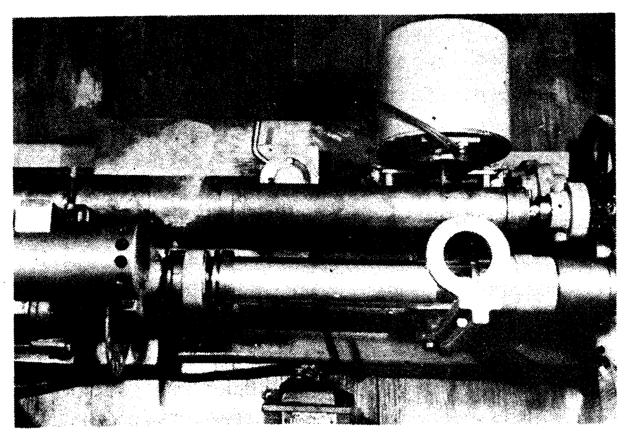


Fig. 10. Modified Speaker Unit Operating Heated Stylus in Original Engraver.

second gear box with a ratio of 1:1 which drove a selsyn transmitter to be described later.

Coming back to a sound recording on film: the density of the sound track varies continuously with the recorded sound; therefore, the output of the photo-cell can be amplified by an audio amplifier. But while scanning a picture, the photo-cell output current cannot be fed into an A-C amplifier, as the photo-cell current, in some instances, has a substantial D-C component. In other words, the photo-cell current could vary

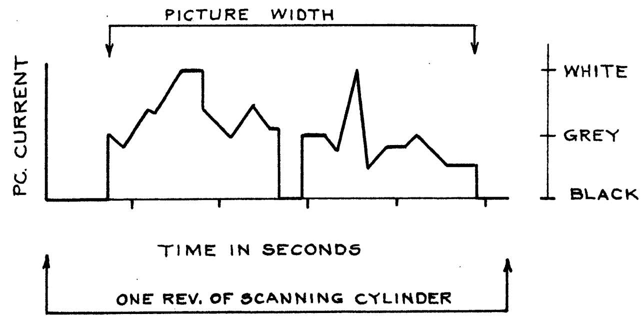


Fig. 11. Variation in Photo-cell Current for One Scanned Line.

from zero to maximum several times in one scanning line, (Figure 11) or could start at zero and gradually rise to a maximum for any given time integral, or remain at a constant D-C level for any scanned line.*

A simple way to modulate the photo-cell current was with a light chopper. This consisted of a disc with 16 holes driven by a selsyn receiver. Selsyn motors were used to assure synchronization between the motion of the printing plate and the heated stylus. The use of a 50:1 gear ratio and a 16 hole disc produced 800 pulses for one revolution of the print plate cylinder or 160 pulses per inch for a 5" circumference; this is equal to 480 cycles per second, not a bad frequency for an A-C amplifier. This system worked well; however, there was something lacking in the finished print. After some study it was found that this was due to the fact that the pits were all in line, (Figure 12a) both in the vertical and the horizontal plane A better screen pattern could be resolved by staggering adjacent lines by 1/2 of the center distance for each scanned line both horizontally and

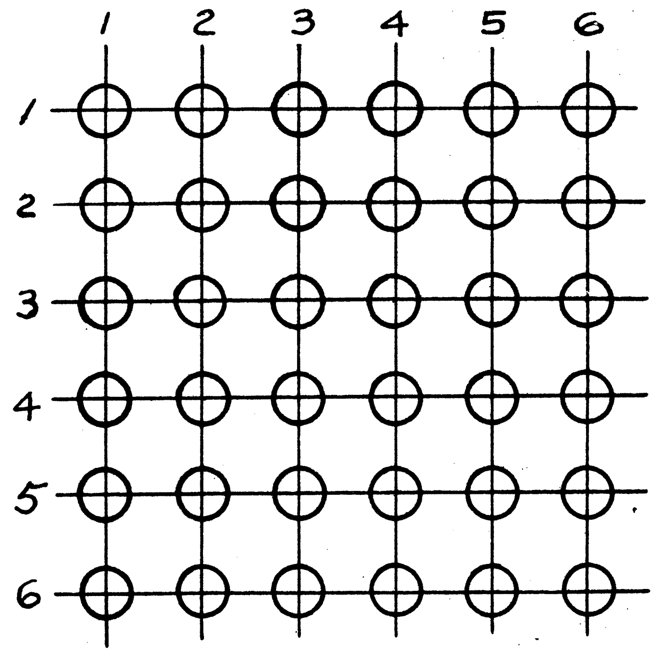


Fig. 12a. Linear Dot Formation with Rotating Cylinder and Light Chopper Operating in a 1 x 1 Ratio.

vertically as shown in Figure 12b. Staggering of the vertical was accomplished by modifying the second gear box from 1:1 to 1600:1599; this small ratio was obtained with four gears: 100 tooth driving 101 tooth and combined to it a 108 tooth driving 107 tooth gear.**

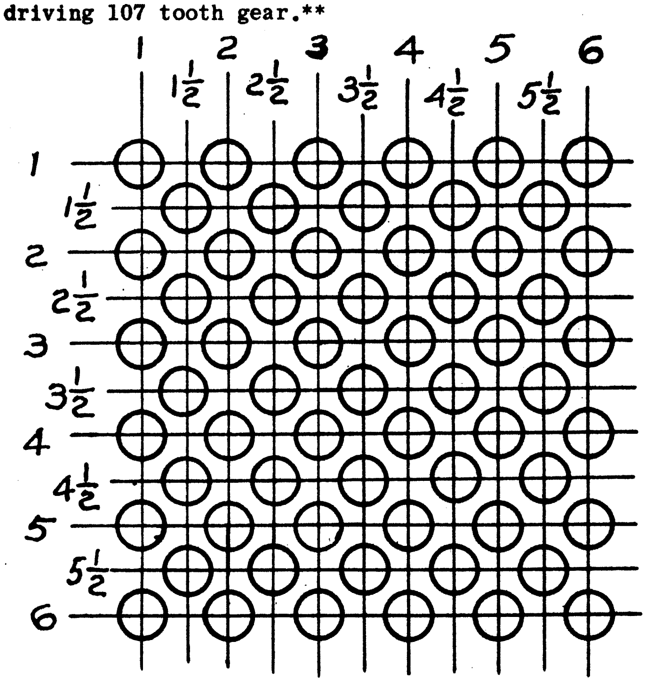


Fig. 12b. Improvement of Screen Pattern by Changing. Ratio in Fig. 12a to 1600:1599.

* This is closely analogous to the problem of transmitting the d.c. component in television. This problem is usually solved by insertion or clamping technique made practical by the presence of repetitive synchronizing signals which act as a carrier.

** This effect has a counterpart accomplished in television by interlacing of the scanning lines to reduce flicker effects without requiring additional bandwidth. This interlacing is also accomplished by using an odd number for division (525).

At the time the machine was designed, the best photo-cell available was the UX868, developed for sound recording; therefore, the light system used was the same as for sound recording with the exception that a light chopping disc and a microscope was between the picture and the photocell. The use of a microscope head was chosen for two reasons: first, to enable me to accurately adjust the size of the area being scanned, which was about .00625 inches in diameter; secondly, to spread this small amount of light over the entire surface of the cathode in order to overcome the non-uniformity of sensitivity for the cathode surface.

The stylus head was made from an old dynamic speaker. The paper cone and spider were removed. A new voice coil was supported by a brass diaphragm and suspended between rubber. By squeezing the rubber, the diaphragm could be broadly tuned to the electrical frequency of the light chopper.

The stylus was heated by a few turns of nichrome wire and fed from a small transformer; thus the stylus was able to oscillate freely in and out of the heating coil.

Selection of the right material for the stylus was quite a problem. Different steels and alloys were tried, but all failed due to the high temperature and the corrosive action of the nitrous gas generated from the celluloid when decomposed by heat. Even platinum-iridium was tried. A carborundum crystal was the least affected by the nitrous gas but was too brittle to withstand the constant impact, and also its thermal conductivity was low; in other words, the apex of the stylus remained dark while the base glowed brightly when operated at maximum amplitude.

The best results were finally obtained with a nichrome rod having a bead of Stellite A welded on one end and ground to a 60° four sided pyramid.

The output of the photocell was fed to a standard 10 watt sound recording amplifier to drive the stylus.

Another vexing problem was the glass cylinder. Nowhere could I find ready made cylinders of the right diameter and perfectly round with inner and outer surfaces concentric. Also, it was not in the pocketbook to have one made on the outside, so "LET GEORGE DO IT", HE DID!

After a lot of sweat and burning of midnight oil, I ground and polished both the inside and outside of a cylinder measuring 1-5/8 inches in diameter and 9 inches long with a 1/8 inch wall. All this on a South Bend lathe.

After about a year and a half of experimenting with the machine just described, it turned out some promising results. However, it was rather light in construction.

Now, that the major problems had been solved there was plenty of room for refinements.

It was decided to build a second engraver, this one to be larger, more rugged, and with plenty of room for modifications. (Figure 13).

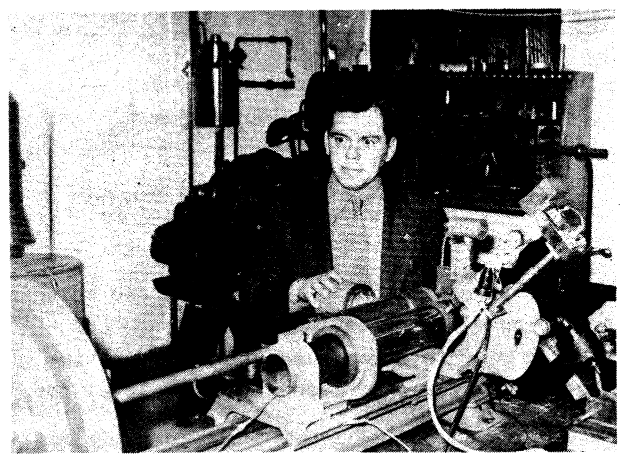


Fig. 13. Second Engraver Built by Author to Produce Engravings up to 10" x 16".

With newspapers in mind, a ten by sixteen inch capacity was chosen for the new engraver (a half page picture). For the sake of economy and the lack of shop facilities, the new design was based around a South Bend lathe which had good ways, lead screw, carriage and a handful of change gears.

The new design was similar to the first with few exceptions: The two gear boxes were combined into one colossal box (later this was removed).

Due to the length of the glass cylinder it was impossible to use a light chopper for modulating the D.C. signal, so a new means of generating the modulating frequency had to be devised.

A 6L7 was used as a modulator. The carrier voltage applied to the first control grid was derived from a photo-cell excited by light passed through a sound track film mounted on a lucite drum secured to the printing plate cylinder.

A point of interest with this set-up was the way the carrier frequency was shifted one-half cycle for each revolution of the printing plate cylinder, in order to stagger the dots in adjacent lines. At the end of one revolution a cam shifted the light gate one-half the distance between the lines of the frequency strip and on the second revolution brought it back. The use of frequency strips made the engraver quite flexible for, with this arrangement, any screen size could be engraved by simply changing the frequency strip and selecting the proper gears for the lead screws, similar to that of cutting a fine or coarse thread screw on a lathe.

The exciter lamp for the picture cell was inside the glass cylinder. The lamps, microscope, picture cell and stylus head were all mounted on the same carriage thus eliminating any lost motion between component parts. The glass cylinder for the second engraver measured 3-1/2 inches in diameter, and 18 inches long and was also ground and polished by the writer.

The output of the carrier photocell was amplified by a single 6J7 (Figure 14) stage; its

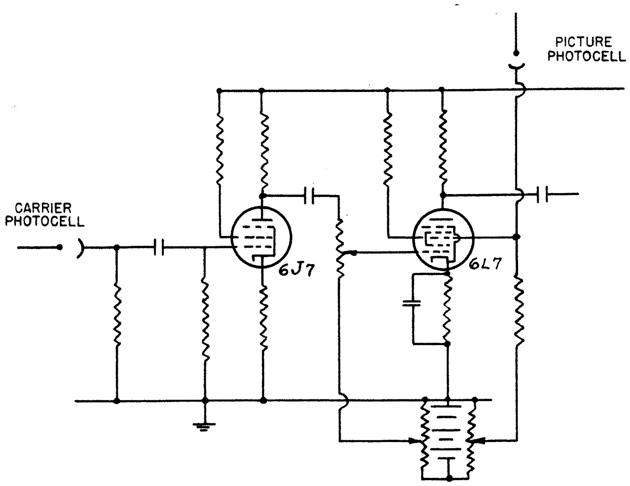


Fig. 14. Picture Photo-Cell Modulator-Amplifier.

output was coupled to the first control grid of a 6L7. The picture cell was coupled to the second control grid. The output of this 6L7 drove a three stage 50 Watt Class B amplifier which operated the stylus.

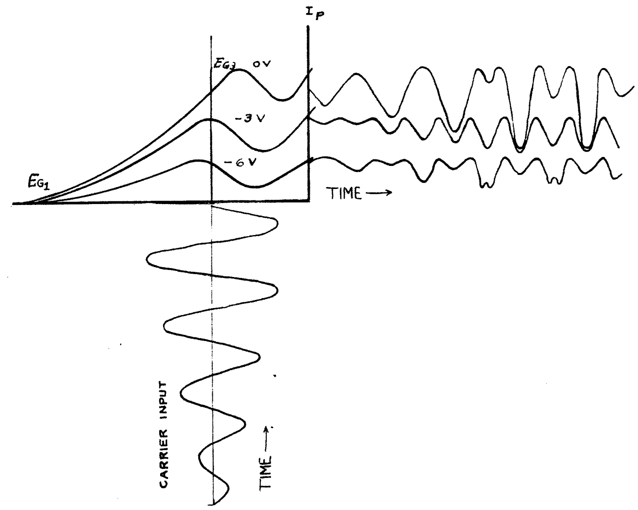


Fig. 15. Grid Voltage vs Plate Current Curve of Modulator Tube.

The heart of the circuit was the 6L7 used as a modulator. Curves of grid voltage versus plate current characteristic curve for a 6L7 is shown in Figure 15, for different values of #3 grid bias. From these curves it can be seen that if the normal bias of both grids is around 3 volts, a small signal on the #1 grid results in no fundamental A-C output voltage. Biasing the #3 grid in either direction results in an A-C output. The phase of this A-C output voltage reverses as the grid is swung through the balance point. It can also be seen that if the #3 grid is swung by the phototube scanning the picture, either a positive or a negative output can be had, depending on the initial bias. It should also be noted that if the carrier input is sufficiently large the output at balance will be double the carrier frequency. This can be tuned out in the amplifier or in the tuned mechanical stylus drive. If the carrier is sufficiently large the fundamental output will be linear right through balance. Figure 16 shows how the output

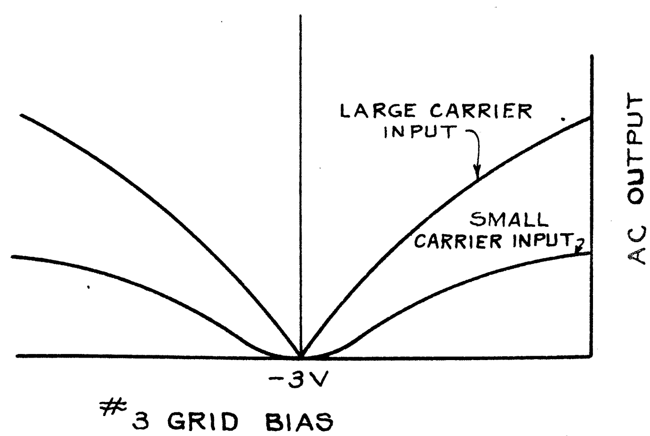


Fig. 16. Adjustment of Grid Bias for Varying Contrast of Printing Plate.

varies with #3 grid potential for two different carrier amplitudes. By controlling the initial bias and the carrier amplitude the contrast of an original picture may be reduced or extended as desired.

This was a desirable feature for it permitted me to adjust the contrast of the printing plate for the paper used for printing, or correct for the contrast of a negative or a positive whichever is used.***

After experimenting for a time with this engraver, trouble developed with the carrier generator. The frequency strip was not stable; it was affected by temperature and moisture which altered the staggering of adjacent lines. Also, a speck of dust appeared as a horizontal line on the halftone cut. In sound work dust is not too troublesome because it never reoccurs at the same interval. A further defect was that any eccentricity of the lucite drum affected the amplitude of the modulating signal and appeared as a light or dark band on the finished cut.

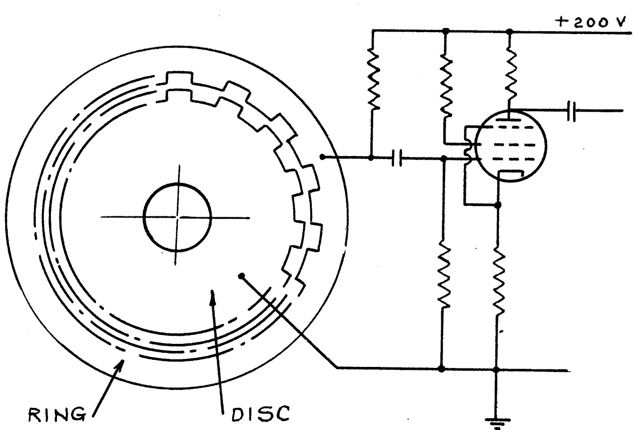


Fig. 17. Stabilizer for Photo-cell Modulator.

Finally these objections were overcome by a very simple and effective method. The lucite drum was replaced by a wide metal disc and a ring (Figure 17). Both disc and ring had a large number of teeth milled on their outer and inner periphery, respectively, similar to an external and internal gear. The width of the teeth were the same as the milled slot.

The rotor disc was grounded through its bearing and rotated with the cylinder while the ring was stationary and insulated from its supporting frame. The diameter of the rotor disc was less than the inner diameter of the ring thus forming a capacitor.

When the teeth of the rotor disc lined up with those of the ring, the capacity was maximum, minimum occurred when the teeth were just out of line.

The advantage of this design was that any eccentricity of the rotor disc was balanced out, as the surface of all the teeth on the rotor disc formed one plate of a variable condenser and those of the ring or stator the other plate. Any irregularity of the surface of some of the teeth had no effect on the output voltage; furthermore, any reasonable change in the speed of rotation had little effect on the output voltage.

The stator was capacitively connected to the first grid of the 6J7, described above. The stator was biased by 250 volts d.c. through a large series resistor.

The staggering of the adjacent lines was accomplished electrically by using a double pole, double throw, ratchet relay which alternately reversed the primary of one of the intermediary audio stages. The relay was tripped each revolution of the cylinder just when the clamping bar for the celluloid plate was in line with the stylus.

With this set-up I was able to position the pits accurately over the entire cut.

Now, I was satisfied that good halftone cuts could be produced electronically.

Through a chain of circumstances one day a demonstration was given to a number of newspapermen. After that my basement was worse than a beehive - all wanting to see the engraver.

In the fall of 1942 an agreement was concluded with The Fairchild Camera and Instrument Co. to manufacture the engraver, but, in lieu of the pending war, it was agreed to withhold the manufacturing until the end of the conflict.

Today there are about three hundred and fifty (350) engravers in operation throughout the country.

In closing I would like to extend my appreciation to The Fairchild Camera and Instrument Company for their efforts and, especially, to the engineering staff, Mr. Russell Lesche, Mr. John Borjeau and their assistants for creditable achievements.

Editor's Note - With the help of a small hand press, a demonstration of printing from one of the "electronic cuts" was given at the close of the meeting. All present had an opportunity to examine the prints and the cut first hand.

*** This might be termed a "gamma" correction means.

SUMMARY OF "THE SIMPLIFICATION OF TELEVISION RECEIVERS"

W. B. Whalley*

This paper was presented before the Radio Club of America on June 15, 1950 in New York City. At the discretion of the Board of Directors of the Radio Club, a summary of this paper is included below.

The paper outlined means for reducing the number of tubes employed in a television receiver. A two-tube tuner, preferably of the "Wallman" type, was suggested along with a band-pass filter coupled i.f. amplifier rather than the stagger tuned type. It was stated that only three i.f. amplifier tubes would be required with the band-pass filter arrangement because of higher gain per stage.

A crystal diode 2nd detector and d.c. coupled single stage video amplifier was chosen as most efficient on basis of performance and noise immunity.

Intercarrier sound with one stage of amplification at 4.5 Mc, a ratio detector, and two stage audio amplifier were selected. The 1st audio amplifier serves a dual purpose in that it also operates as a.g.c. amplifier.

Several other dual purpose tubes were employed to further reduce the total number of tubes in the receiver to 15 tubes, exclusive of the picture tube. It was stated that conventional receivers have employed an average of six tubes more than this for equivalent performance.

* Physics Laboratories, Sylvania Electric Products, Inc., Bayside, N.Y.

THE ATTIC INVENTOR

By

Charles F. Jacobs*

The question is often asked: "Has the independent attic inventor disappeared from the American Scene?" To this my reply is a very definite "No."

It is true many of the major, more important, modern inventions are the result of groups of engineers working in concert in the employ of, and under the jurisdiction of, large corporations.

However, there are countless small, but nevertheless, important inventions, which are still being thought out and developed by the so-called "attic inventor."

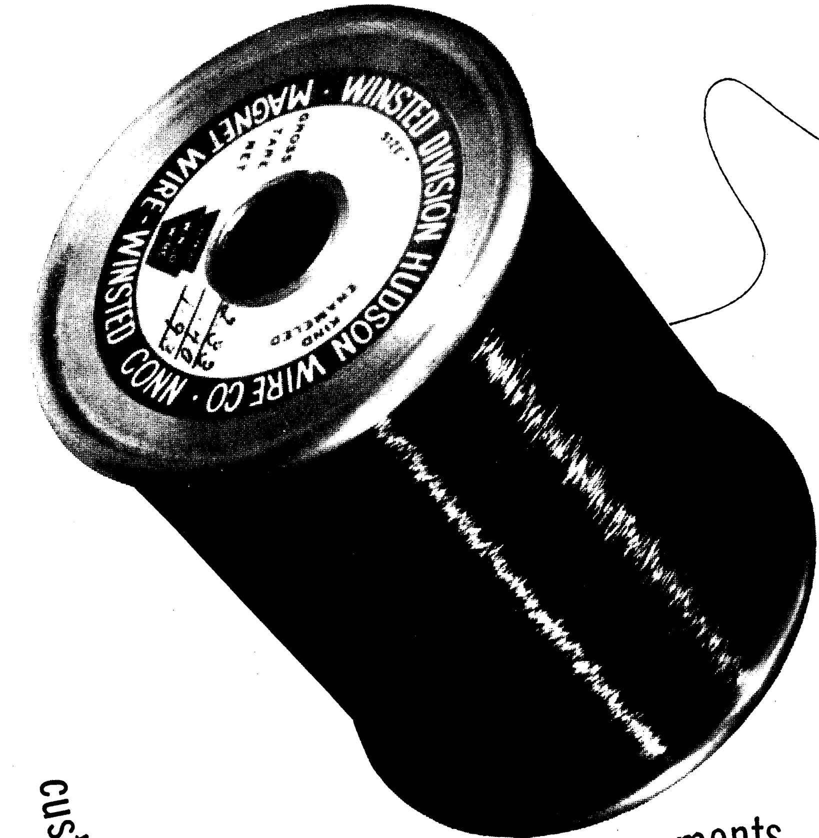
Many of these men have only limited capital, and work under very adverse conditions, and severe handicaps. They labor diligently and indefatigably. Sooner or later their "Brain Child" reaches the open market and becomes successful. As a result two blades of grass now grow where one existed before. Or, perhaps, someone is now performing a very old duty in a very new way. This eventually provides the inventor with the monetary reward he seeks, and another chapter in patent office history has been written.

The fame sought is very often not acquired, because the identity of the inventor in most cases remains forever unknown.

I salute this group of useful citizens, and repeat the oft-heard expression: "More power to you."

Finally, the fact that only a very small percentage of patents become successful inventions should not deter anyone from continuing his efforts to make this a better world in which to live.

* P.O. Box 408, Church St. Station, N.Y. 18, N.Y.



FINE WIRE made finer

custom drawn ◎ custom insulated ◎ custom spooled to your most exacting requirements

◎ Custom-made fine wire! Just specify the electrical properties, flexibility, tensile strength, laying speed, uniformity and other characteristics you must have. Our Hudson and Winsted Divisions will meet and maintain your specifications.

Uniformity of product is guaranteed by our critical supervision which guards against variations in size, structure and electrical values. Yes, "Fine Wire Made Finer!" That is why Hudson-Winsted fine wires are the first choice of electrical, radio, television and electronic manufacturers whose products are noted for reliability and long life.

◎ Tell us your wire problems and requirements. Our research, engineering and production facilities are at your disposal. Let us quote!

BARE WIRES
(HUDSON WIRE DIVISION)

Copper, Brass, Zinc, Tinsel, Tin, Nickel-Silver, Cadmium, Oxygen-free Copper, Silver-plated Bronze, Phosphor-Bronze, Silver, Monel, Lead Wire, Fuse Wire, Specialty Wires

TEXTILE-COVERED WIRES
(WINSTED DIVISION)

Nylon, Celanese, Silk, Cotton, Rayon, Fiberglas

All available on bare or enameled wire, single or double covered.

INSULATED WIRES (WINSTED DIVISION)

MATERIALS	TYPES	COVERINGS
Copper	Instrument Tubing	Plain and Heavy Enamel
Aluminum	Litz	Formvar
Iron	Multiplied and Twisted	EZsol (Liquid Nylon)
Copper-clad Steel		Cement-coated Enamel

FINE WIRES (HUDSON & WINSTED DIVISIONS)

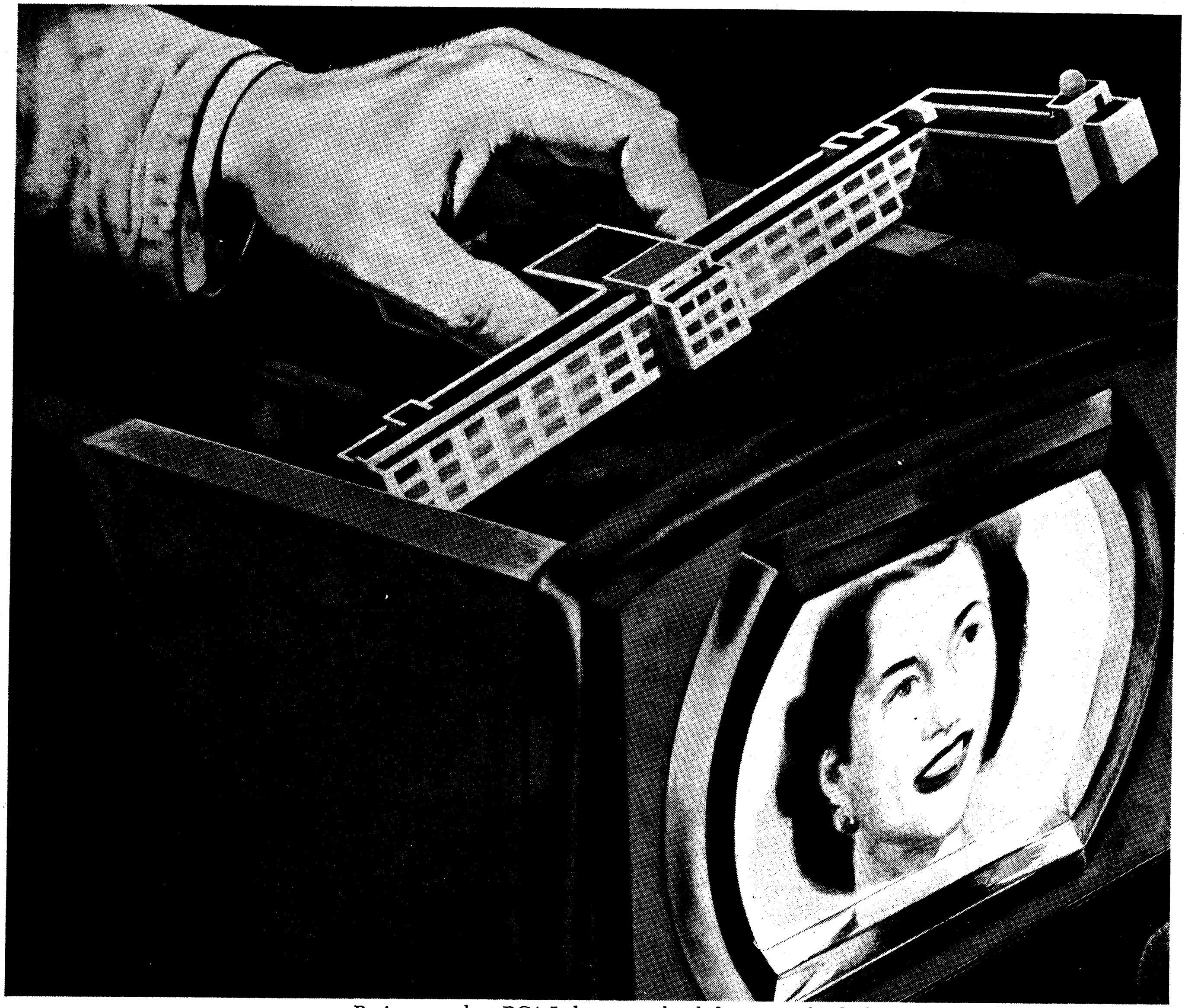
Specializing in fine wires, custom-drawn and insulated, to critical needs—size, material, insulation. Your consideration is called particularly to the finest wire sizes—Nos. 44 to 50.

hudson wire company

HUDCO · Winco

general offices: ossining, n. y.   winsted division: winsted, conn.

This advertisement appears in: ELECTRICAL MANUFACTURING, ELECTRONICS, ETC.



Basic research at RCA Laboratories has led to most of today's all-electronic television advances.

At the heart of every television set!

Why show RCA Laboratories *inside* your television receiver? Because almost every advance leading to all-electronic TV was pioneered by the scientists and research men of this institution.

The supersensitive image orthicon television camera was brought to its present perfection at RCA Laboratories. The kinescope, in these laboratories, became the mass-produced electron tube on the face of which you see television pictures. New sound systems, better microphones—even the phosphors which light your TV screen—first reached practical perfection here.

Most important of all, the great bulk of these advances have been made available to the television industry. If you've ever seen a television picture, you've seen RCA Laboratories at work.

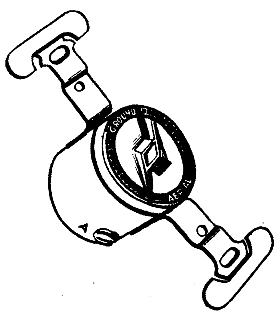
* * *

See the latest wonders of radio, television, and electronics at RCA Exhibition Hall, 36 West 49th St., N. Y. Admission is free. Radio Corporation of America, RCA Building, Radio City, New York 20, New York.

Through research from RCA Laboratories, today's RCA Victor television receivers are the finest example of electronic engineering.

RADIO CORPORATION of AMERICA

World Leader in Radio — First in Television



Better AM, FM and SW for 17,062 Families . . .

The Multicoupler Antenna System is thoroughly covered by basic and detail patents owned by Amy, Aceves & King, Inc.

Licensed manufacturers are supplying multicoupler outlets and other components for the system.

The Arrow-Hart & Hegeman Electric Co., Hartford, Conn., offers all necessary equipment such as installed in the apartment-house developments herein referred to.

Leading electrical contractors handle the installation in various localities, in accordance with the rigid A.A.K. specifications.

The Multicoupler Antenna System for years past has been operating in Parkchester (12,273 radio outlets) and in other apartment colonies and individual apartment houses.

This system is the one tried-tested-perfected means of providing satisfactory reception in multi-family dwellings.

● The Multicoupler Antenna System* now comes to the rescue of the 17,062 families who will reside in New York's five huge apartment-house developments under construction.

Tenants of Clinton Hills (1560 apartments), Peter Cooper Village (2500 apartments), Stuyvesant Town (8761 apartments), Riverton (1236 apartments) and Fresh Meadows (3005 apartments) will soon be enjoying better AM, FM and SW reception merely by plugging their sets into convenient radio outlets.

The usual self-contained loop sets which cannot perform satisfactorily in large apartment houses because of the steel framework and metal lath, will be placed on a par with sets operating in the open country, thanks to the excellent aerial provided by the Multicoupler Antenna System.

Thus five more mighty installations are added to the impressive roster of Multicoupler Antenna Systems providing individual-antenna performance in multi-family dwellings.

● Designed, developed and engineered by Amy, Aceves & King, Inc., and manufactured by licensees. Literature on request.

A. A. K.

NOISE - REDUCING ANTENNA SYSTEMS

AMY, ACEVES & KING, INC.

Inventors, Engineers and Licensors of the MULTICOUPLER ANTENNA SYSTEM

* Reg. U. S. Patent Office

11 West 42nd Street New York City

MEASUREMENTS CORPORATION

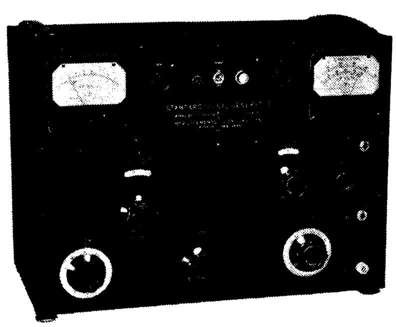
Laboratory Standards

QUALITY ELECTRONIC
MEASURING INSTRUMENTS
FOR ACCURATE, DEPENDABLE SERVICE

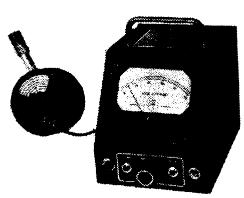
NEW!

CRYSTAL
CALIBRATOR
Model 111
250 Kc. to 1000 Mc.

U. H. F. OSCILLATOR
Model 112
300 Mc. to 1000 Mc.



STANDARD SIGNAL GENERATOR
Model 82
20 Cycles to 50 Mc.



MEGACYCLE
METER
Model 59
2.2 Mc. to 400 Mc.

STANDARD SIGNAL GENERATORS

MODEL	FREQUENCY RANGE	OUTPUT RANGE	MODULATION
65-B	75 Kc.-30 Mc.	0.1 microvolt to 2.2 volts	AM. 0 to 100% 400 cycles or 1000 cycles External mod., 50-10,000 cycles
78	15-25 Mc.; 195-225 Mc. 15-25 Mc.; 90-125 Mc. other ranges on order	1 to 100,000 microvolts	AM. 8200-400 cycles 625-400 cycles Fixed at approximately 30%
78-FM	86 Mc.-108 Mc.	1 to 100,000 microvolts	Deviation 0-300 kc, 2 ranges FM. 400-8200 cycles External modulation to 15 Kc.
80	2 Mc.-400 Mc.	0.1 to 100,000 microvolts	AM. 0 to 30% 400 cycles or 1000 cycles External mod., 50-10,000 cycles.
82	20 cycles to 200 Kc. 80 Kc. to 50 Mc.	0-50 volts 0.1 microvolt to 1 volt	Continuously variable 0-50% from 20 cycles to 20 Kc.
84	300 Mc.-1000 Mc.	0.1 to 100,000 microvolts	AM. 0 to 30%, 400, 1000, or 2500 cycles. Internal pulse modulator. External mod., 50-30,000 cycles.
90	20 Mc.-250 Mc.	0.3 microvolt to 0.1 volt	Continuously variable, 0 to 100% Sinusoidal modulation 30 cycles-5 Mc. Composite TV modulation.

U.H.F. OSCILLATOR

MODEL	FREQUENCY RANGE	OUTPUT RANGE	OUTPUT IMPEDANCE
112	300 Mc. — 1000 Mc.	Maximum varies between 0.3 volt and 2 volts. Adjustable over 40 db range.	50 ohms

PULSE GENERATOR

MODEL	FREQUENCY RANGE	PULSE WIDTH	OUTPUT
79-B	60 to 100,000 cycles	Continuously variable from 0.5 to 40 microseconds	Approximately 150 volts positive with respect to ground. "Sync Output" 75 volts positive with respect to ground.

SQUARE WAVE GENERATOR

MODEL	FREQUENCY RANGE	WAVE SHAPE	OUTPUT
71	Continuously variable 6 to 100,000 cycles	Rise time less than 0.2 microseconds with negligible overshoot	Step attenuator: 75, 50, 25, 15, 10, 5 peak volts fixed and 0 to 2.5 volts continuously variable.

U.H.F. RADIO NOISE and FIELD STRENGTH METER

MODEL	FREQUENCY RANGE	INPUT VOLTAGE RANGE
58	15 Mc. to 150 Mc.	1 to 100,000 microvolts in antenna. 1 to 100 microvolts on semi-logarithmic output meter, balanced resistance attenuator with ratios of 10, 100 and 1000 ahead of all tubes.

VACUUM TUBE VOLTMETERS

MODEL	VOLTAGE RANGE	FREQUENCY RANGE	INPUT IMPEDANCE
62	0-1, 0-3, 0-30 and 0-100 volts AC or DC	30 cycles to over 150 Mc.	Approximately 7 mmfd.
62-U.H.F.	0-1, 0-3, 0-30 and 0-100 volts AC or DC	100 Kc. to 500 Mc.	Approximately 2 mmfd.
67	.0005 to 300 volts peak-to-peak	5 to 100,000 sine-wave cycles per second	1 megohm shunted by 30 mmfd.

MEGACYCLE METER

MODEL	FREQUENCY RANGE	FREQUENCY ACCURACY	MODULATION
59	2.2 Mc. — 400 Mc.	Within ±2%	CW or 120 cycles fixed at approximately 30%. Provision for external modulation

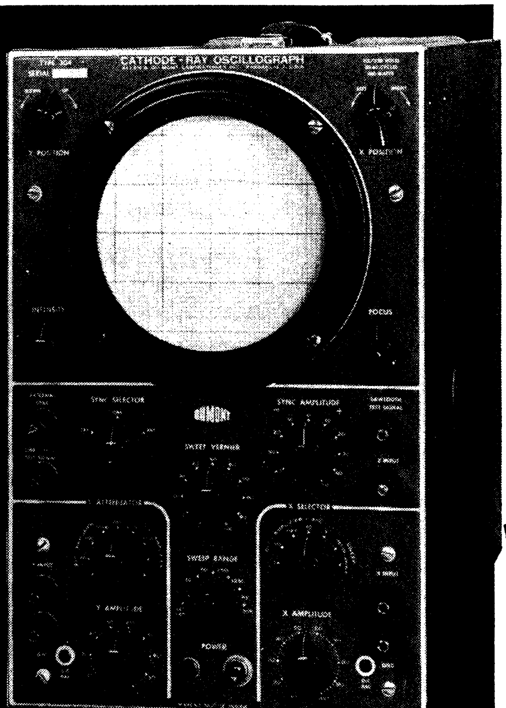
CRYSTAL CALIBRATOR

MODEL	FREQUENCY RANGE	FREQUENCY ACCURACY	HARMONIC RANGE
111	250 Kc. — 1000 Mc.	0.001%	.25 Mc. Oscillator: .25-450 Mc. 1 Mc. Oscillator: 1-600 Mc. 10 Mc. Oscillator: 10-1000 Mc.

BRIDGES

MODEL	INDUCTANCE (L)	CAPACITANCE (C)	AC RESISTANCE (R)
102	0.5 microhenry to 110 henries	1 mmf. to 110 mfd. Power factor 0-30%	1 ohm to 11 megohms

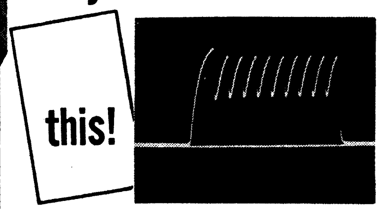
MEASUREMENTS CORPORATION • BOONTON, N. J.



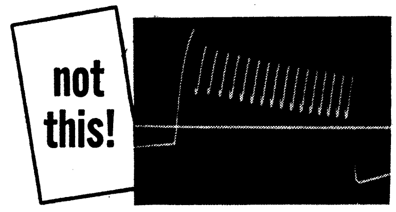
establish the signal's D-C LEVEL

...and measure its a-c and d-c components directly from the oscillograph

you should see...



Both a-c and d-c components are displayed through the d-c amplifiers of the Type 304-H. Base line represents zero volts.



The same signal, applied through a-c amplifiers exhibits a shifted reference line and tilt of the signal which make the oscillogram difficult to interpret.

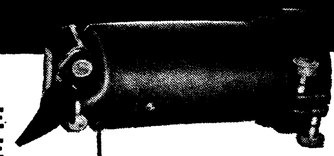
DUMONT type 304-H

...to make direct measurements

THE TYPE 264-B VOLTAGE CALIBRATOR

Simply by applying its square-wave output to the oscillograph and producing a deflection equal to that of the signal, the amplitude of the signal may be read, in volts, directly from the calibrated dial of the Type 264-B. Or the Type 264-B will calibrate your oscillograph to read directly in volts per inch!

...to obtain permanent records



THE TYPE 296 OSCILLOGRAPH-RECORD CAMERA

To complete the study of the signal, permanent records, such as those above, are obtained most efficiently with this inexpensive, single-frame, 35-mm. camera. Operation of the camera is simple and foolproof; construction is compact and rugged. A high-quality f/2.8 coated lens is used, and focus is fixed for best oscillographic results.

The "Standard of Performance" for general-purpose cathode-ray oscillographs.

To study signals containing both a-c and d-c components, direct-coupled amplifiers such as those of the Type 304-H must be used. D-C amplifiers will maintain the true d-c level of the signal and display the actual relationship between the d-c and a-c components of the signal. Then by calibration of the Type 304-H with the Du Mont Type 264-B Voltage Calibrator, these components may be measured directly from the screen of the instrument.

Features such as driven sweeps, sweep expansion, extremely slow sweep speeds, and stabilized synchronization have made the Type 304-H the outstanding general-purpose cathode-ray oscillograph. Its sensitivity of 10 rms millivolts per inch and its versatility often eliminate the need for a second instrument to perform functions not within the range of the ordinary general-purpose oscillograph.

Portability contributes highly to the usefulness of the Type 304-H, especially in field work requiring good performance and in the laboratory where it serves many benches. The Type 304-H measures 13½″ high, 8⅝″ wide, 19″ deep, and weighs only 50 pounds.

Write today for catalog...

Instrument Division, Allen B. Du Mont Labs., Inc.
1000 Main Avenue, Clifton, N.J., U.S.A.

DUMONT 20th YEAR AS PIONEER in Oscillography