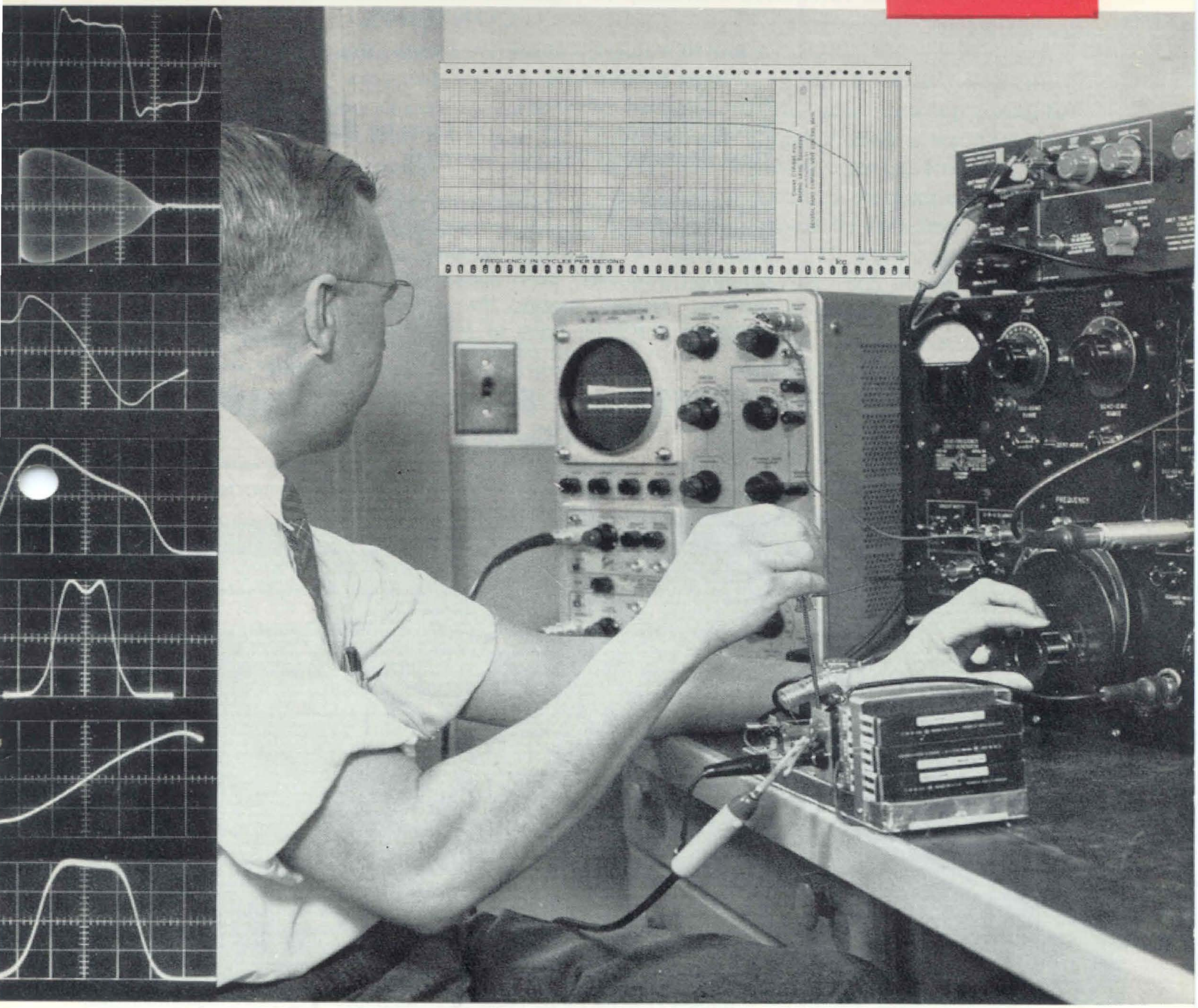
THE GENERAL RADIO
EXPERIMENTER



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IN THIS ISSUE

Beat-Frequency Video Generator
New Coaxial Adaptors

THE GENERAL RADIO

EXPERIMENTER

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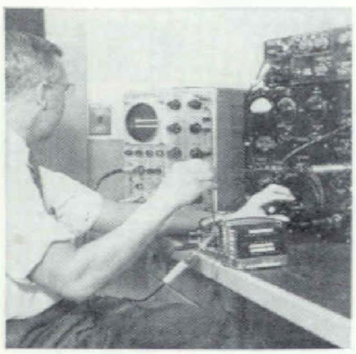


Adjusting the response of a transistor amplifier with the Beat-Frequency Video Generator and an oscilloscope. The Type 1213-D Time/Frequency Calibrator, shown above the generator, furnishes the timing markers. The oscillograms and charts at the left are examples of the many uses of this generator. See text for further details.

A BEAT-FREQUENCY GENERATOR FOR AUDIO, ULTRASONIC, AND VIDEO FREQUENCIES

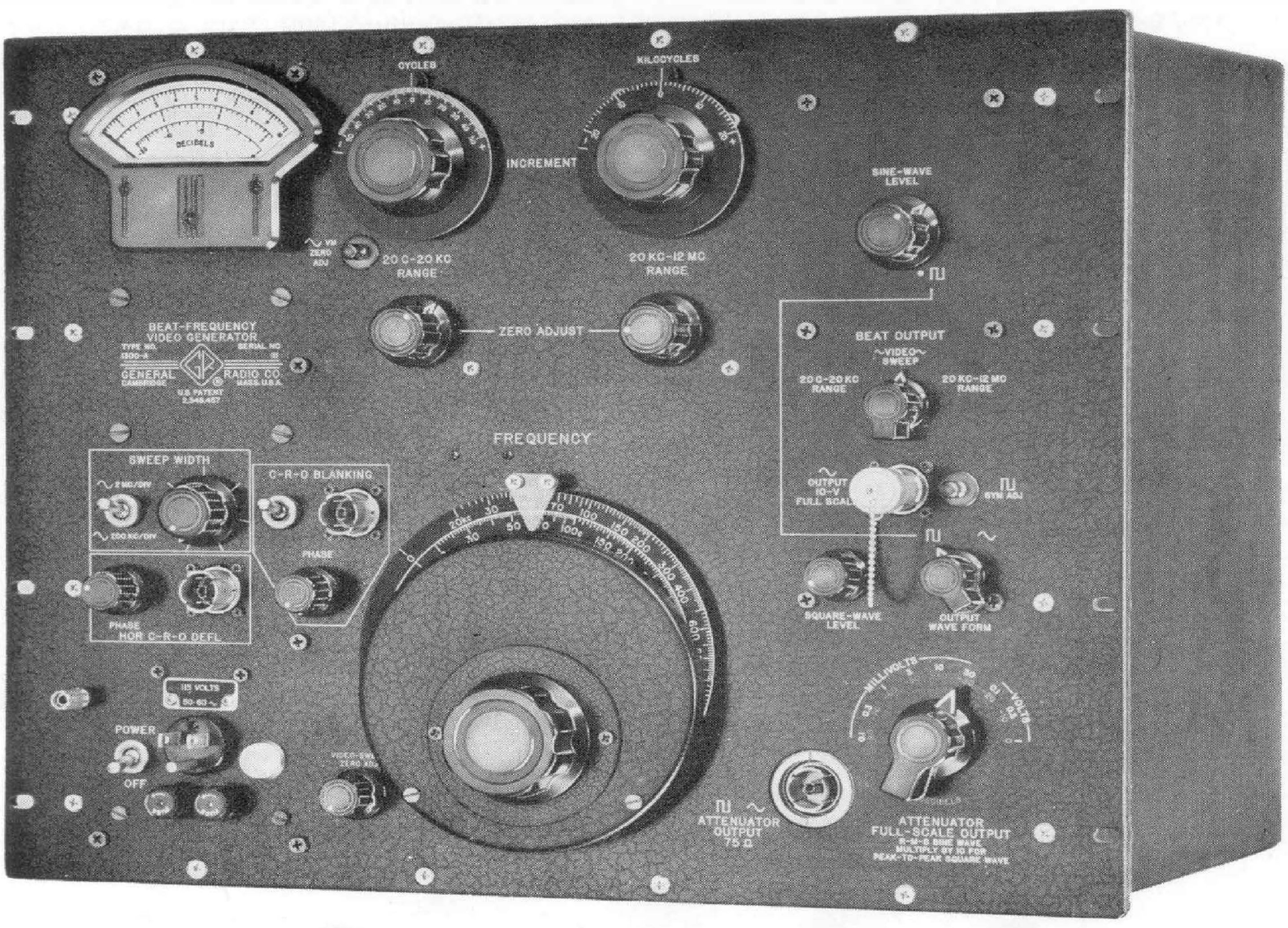
SINE-WAVE, SQUARE-WAVE, AND SWEPT OUTPUTS

For circuit measurements and testing at both audio and video frequencies, the new Type 1300-A Beat-Frequency Video Generator offers an unusual combination of features. To the ability to measure circuit response by four methods, it adds the recognized advantages of beat-frequency generation of the test signal. Prominent among these advantages are: (1) either the audio or the video range can be spanned by a single rotation of the frequency dial and (2) high resolution at any frequency can be provided by a separate control whose calibration is independent of the main dial setting.

This new generator covers frequencies from 20 cycles per second to 12 megacycles in two ranges and provides not only a sine-wave signal for point-to-point measurements but also a sweep signal for oscilloscope display and a square-wave signal for transient tests. Provision for automatic graphic recording adds still a fourth test method to this list.

A maximum of 10 volts, open circuit, is available at all frequencies. An accurate output attenuator is included to give output levels as low as 10 microvolts. For i-f circuit testing, additional outputs are available in the 30-48 megacycle range.

Figure 1. Panel view of the Beat-Frequency Video Generator.



OUTPUT SIGNALS

For Audio-Frequency Response Measurements: A sine-wave signal, adjustable in frequency from 20 c to 20 kc, provides a test signal for frequency response measurements on both active and passive audio networks, transducers, and acoustical devices. The dial calibration is logarithmic, and the dial can be driven by the TYPE 1521-A Graphic Level Recorder for plotting the response automatically on logarithmic charts. A frequency-increment ($\triangle$f) dial, with a range of $\pm$50 c, offers a means of studying the characteristic of narrow-band devices, either manually or with the TYPE 1750-A Sweep Drive.

For Transient Response Tests at Audio Frequencies: A square-wave signal, adjustable in frequency from 20 c to 20 kc, whose excellent waveform permits measurements on amplifiers with low-frequency cut-offs as low as 1 or 2 c.

For Frequency Response Measurements at Ultrasonic and Video Frequencies: A sine-wave signal adjustable from 20 kc to 12 Mc, useful in response measurements on ultrasonic amplifiers, transducers, and networks, and on video systems in television receivers. The $\triangle$f dial, which has a span of $\pm$ 20 kc, is useful in the measurement of very-narrow-band circuits, where a knowledge of the fine structure of the frequency characteristic is important. For oscilloscope display, this dial can be driven by the TYPE 1750-A Sweep Drive.

For graphic records, the dial can be driven by a TYPE 908-R Dial Drive and the data plotted by an X-Y Recorder.

For Transient-Response Tests at Video Frequencies: A square-wave signal from 20 kc to 2 Mc for transient response tests on ultrasonic equipment and video amplifiers.

For Sweep Tests at Video Frequencies: A sine-wave signal swept at the power-line frequency over any bandwidth from 10 kc to 12 Mc. The sweep technique allows the response characteristic of the device under test to be presented on a cathode-ray tube and is thus very useful for rapid production tests and adjustments, as well as for laboratory measurements. Frequency markers at 100 kc and 1 Mc for this range can be provided by the TYPE 1213-D Time/Frequency Calibrator,[1] which is recommended for use with this generator.

Two Additional Uncalibrated and Unadjustable Outputs are Available at Jacks Accessible from the Rear of the Instrument: (1) A sine-wave signal, swept at the power-line frequency up to $\pm$6 Mc, with center frequency adjustable from 36 to 42 Mc, which can be used to test television and other i-f amplifiers, and (2) a high-frequency signal adjustable from 30 to 42 Mc, and useful for general testing in this range.

CIRCUITS

Oscillators

Five internal oscillators are used to obtain the various frequency ranges, as shown in the block diagram of Figure 2.

The fixed oscillator frequencies are approximately 190 kc for the low range and 42 Mc for the high. Approximate frequencies for the variable oscillators are 170 to 190 kc and 30 to 42 Mc, respectively.

The same main tuning capacitor is common to both oscillators and has plates so shaped that the main frequency-dial calibration is logarithmic from 20 c to 20 kc. The dial calibration for the high-frequency range is approximately logarithmic up to about 5 Mc, approaching linearity above 5 Mc.

The frequency of each of the fixed oscillators is adjustable over a small frequency range by means of a small adjustable capacitor whose dial is calibrated in terms of the frequency increment, independent of main dial setting. This is possible only with the beat-frequency type of generator.

The fifth, or sweep, oscillator replaces the high-frequency fixed oscillator for the video-sweep range. The tuned circuit uses a small inductor wound on a ferrite toroidal core located between the pole pieces of an electromagnet and in the constant field of a permanent magnet. A power-line-frequency sine-wave current in the control winding of the electromagnet causes a variation of magnetic flux in the ferrite core, which, when combined with constant bias flux from the permanent magnet, results in a sinusoidally varying flux. The permeability, and therefore the inductance, of the ferrite core varies with this field and causes the frequency of the oscillator to vary with a very nearly sine-wave distribution over a range determined by the magnitude of the current. The frequency variation is adjustable from about 20 kc to over 12 Mc (±6). The center frequency can be adjusted from 36 to 42 Mc by a capacitor accessible from the rear and ±¾ Mc by a panel control. For a 42-Mc setting, the panel FREQUENCY dial indicates the approximate center frequency.

Both the frequency sweep and the horizontal 60-cycle or other power-line frequency deflection voltage are sinusoidal, resulting in an approximately linear CRO display.

Buffer Amplifiers

A cathode-follower amplifier between the mixer and each oscillator decreases coupling between the oscillators through the mixer to such an extent that zero beat on the audio range can be adjusted with an accuracy of ½ cycle or less and on the video range within 1 kc or less.

Mixer

The oscillator signals are fed to the grids of the pentagrid mixer. To minimize the distortion of the output signal from the mixer, a common bias adjustment for grids No. 1 and No. 3 and a separate bias adjustment for grid No. 3 are provided. The common adjustment is used to set output level and the other is used as a nearly independent adjustment to minimize distortion.

Amplifier

The five-stage output amplifier makes use of high-transconductance tubes and negative feedback to supply up to 10 volts at the high-output terminal with low distortion and an output-vs.-fre-

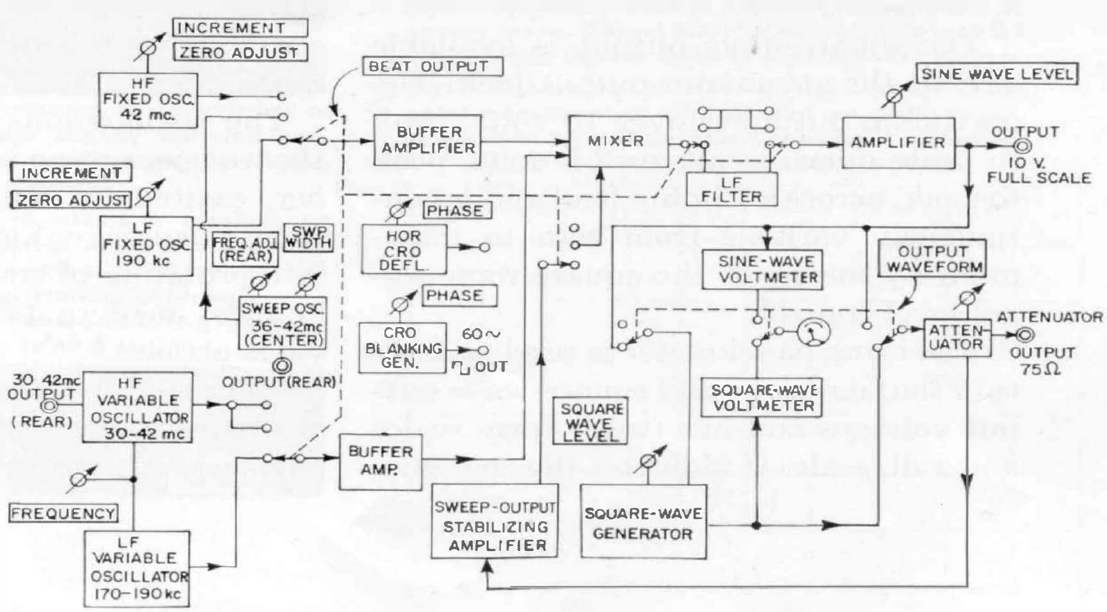


Figure 2. Block diagram of the generator.

quency characteristic that is flat within ±1db up to 12 Mc. When the video sweep range is being used, a portion of the output voltage is rectified, amplified, and fed back to one of the mixer grids in order to maintain the swept output-frequency characteristic flat within ± 1 db for output frequencies up to 12 Mc.

Square-Wave Generator

A Schmitt circuit driven by a sine-wave signal from the amplifier generates the square waves. The output is dc-coupled to the output attenuator in order to minimize ramp-off, and to keep the rise time as short as possible. The positive peaks of the square wave are at ground potential, and so the output contains a negative dc voltage component with a magnitude of one-half the peak-to-peak amplitude of the square-wave output. A separate level control has been provided for continuous adjustment of the output from the square-wave generator.

Output System

A level control, located at the amplifier input, permits the high-output sine-wave voltage to be varied continuously from 0 to 10 volts, open circuit, and the voltage at the 0-db attenuator output to be continuously varied from 0 to 1 volt, open circuit.

The square-wave output is available only at the attenuator output jack. The maximum output is over 10 volts, peak to peak, open circuit, or 2.5 volts, peak to peak, across a 75-ohm load and is continuously variable from zero to maximum by means of the square-wave-signal level control.

The same panel meter is used to indicate the sine-wave and square-wave output voltages and has two voltage scales and a db scale. It indicates the rms sine-wave voltage at the high-output jack and the voltage behind 75 ohms at the attenuator output jack. The square-wave output indication is the peak-to-peak voltage behind 75 ohms at the attenuator output jack.

For both sine-wave and square-wave output the attenuator range is from 0 db to —80 db in steps of 10 db. The attenuator, a recent development, has been designed for use at frequencies in the kilomegacycle region, and thus its frequency error over the frequency range of the video generator is essentially zero.

APPLICATIONS

The wide variety of output functions offered by the Type 1300-A Beat-Frequency Audio Generator suggests many applications both in the laboratory and on the production line. The range of these applications can be partially illustrated by a few examples.

Audio Frequencies

The use of this generator in determining the performance of audio-frequency networks is shown by Figures 3 through 5. Figure 3 is the amplitude-vs.-frequency characteristic of an amplifier over the audio range as recorded automatically on the Type 1521-A Graphic Level Recorder, coupled mechanically to the generator. The right-hand end of the chart shows the response on the video range, up to 200 kc.

The oscillograms of Figure 4 show the transient response of the same amplifier, excited by square waves from the Beat-Frequency Video Generator. The interpretation of such patterns is found in most modern textbooks and in previous articles.[2, 3, 4]

Figure 5 is the frequency characteristic of a narrow-band filter, taken point by point with the frequency increment dial.

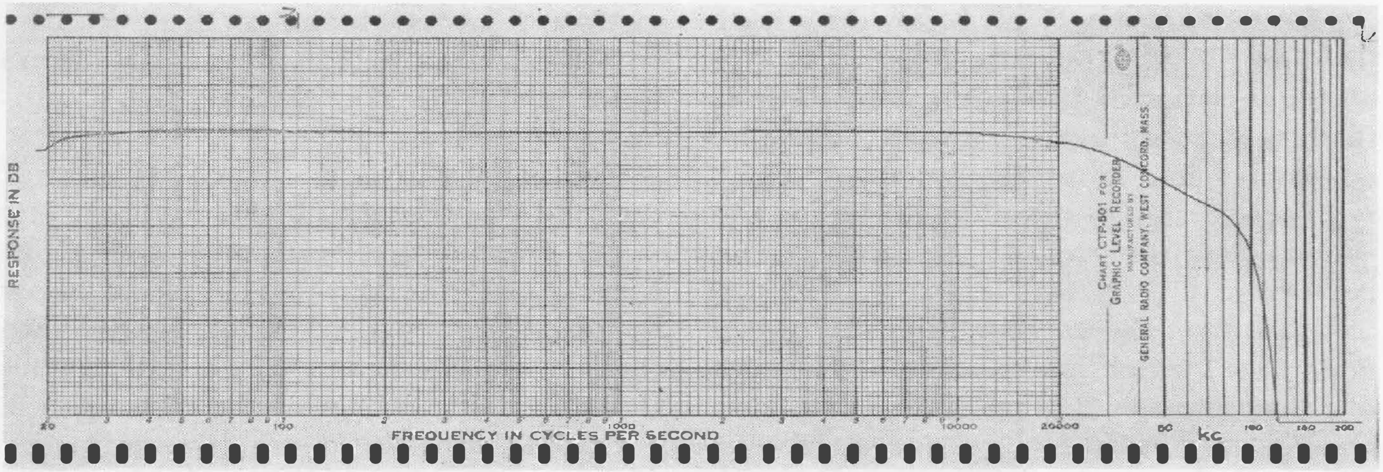


Figure 3. Frequency characteristics of an audio amplifier over the audio range. Generator dial was driven by the Type 1521-A Graphic Level Recorder to plot the curve automatically. Beyond the printed portion of the chart, at the right, is shown response at frequencies above audio range, still plotted automatically but with the video range of the generator.

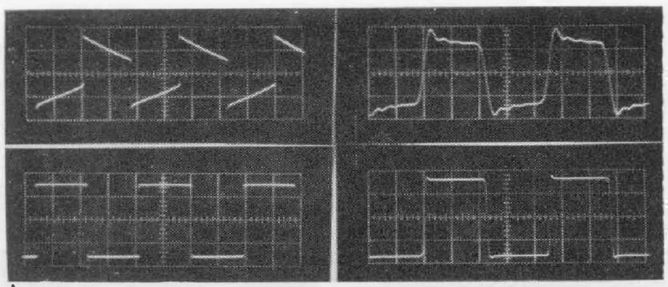


Figure 6. Square-wave response of television receiver video amplifier at (*left*) 60 cycles and (*right*) 400 kilocycles. Output waveform is shown at the top, input waveform at the bottom.

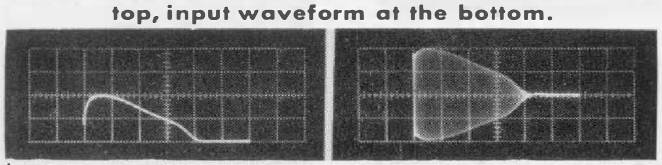


Figure 7. Sweep patterns of video amplifier characteristic of a television receiver. Rectified output is shown at left, video output applied to picture tube at the right. Frequency increases left to right; scale is 1 Mc/cm.

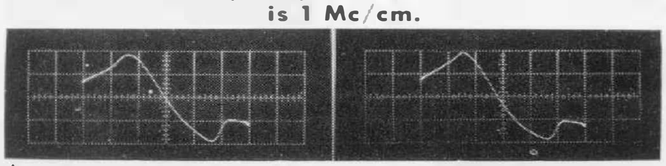
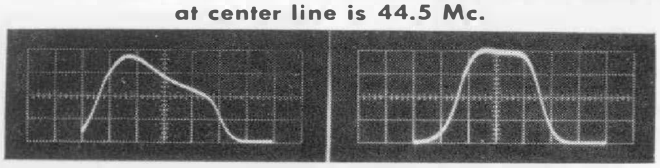


Figure 8. Aural discriminator characteristics of television receiver, under slightly differing conditions of adjustment. Center frequency is 4.5 Mc; scale 50 kc/cm.

Figure 9. I-F response of television receiver, as measured with direct output of sweep oscillator (available at rear of generator). Left-hand curve was taken before adjustment, right-hand curve after adjustment for best characteristic. Frequency at center line is 44.5 Mc.



Video Frequencies

The use of the Beat-Frequency Video Generator at higher frequencies is well illustrated by the oscillograms, shown in Figures 6 through 9, which show the characteristics of a television receiver. Figure 6 shows the square-wave response of the video amplifier at 60 c and 400 kc. This type of transient testing at

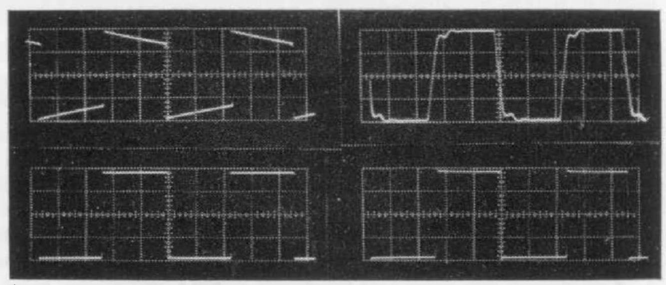
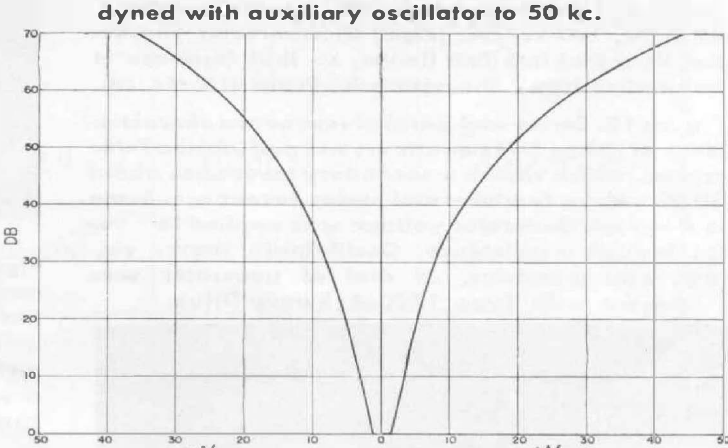


Figure 4. (*Left*) Transient response of same amplifier to 100-cycle square wave from the Beat-Frequency Audio Generator. (*Right*) Transient response to 10-kc square wave. Output level for both signals was 2.5 watts. Input square wave is shown at the bottom.

Figure 5. Response of 50 kc crystal filter. Point-by-point measurement, with Δf dial on audio range, centered at 5 kc. Generator frequency was heterodyned with auxiliary oscillator to 50 kc.



video frequencies has been described previously in the literature.[5,6] The characteristics of the same video amplifier, as determined by sweep methods, are shown in Figure 7.

Figure 8 shows sweep patterns for the sound discriminator of a television receiver.

With the direct output of the sweep generator, which is available at the rear of the generator, it is possible to measure the i-f response of television receivers. Figure 9 shows the i-f response of the previously mentioned television receiver, both before and after adjustments for the best characteristic.

AM-FM Receiver

Measurements on an AM-FM tuner are shown in Figures 10-12. Figure 10 shows the i-f characteristic of the FM section; Figure 11 shows the FM discriminator characteristic of the same tuner both with and without the i-f amplifier included.

Figure 12 shows the characteristic of the AM section when the frequency is swept from either end and with both curves superposed. These curves show the distortion caused by a sweep rate that is too high for the circuit being tested. In this instance, the distortion is not great, and the circuit was adjusted so that approximate mirror image characteristics were obtained in the two directions of sweep.

Other Sweep Tests

Figure 13 is the frequency response to a swept frequency of a transistor video-frequency amplifier under different conditions, as might be encountered

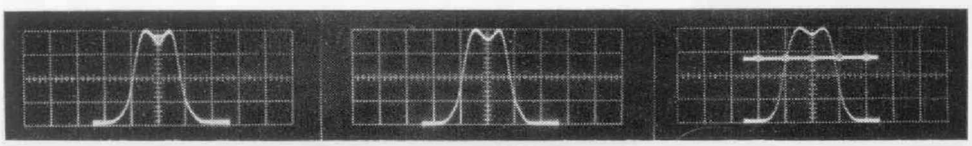


Figure 10. FM i-f characteristic of an FM-AM tuner. Center frequency is 10.7 Mc; (*left*) with marker at 10.7 Mc; (*center*) same without marker; (*right*) with 100-kc markers from the Type 1213-D Time/Frequency Calibrator. Scale, 100 kc/cm.

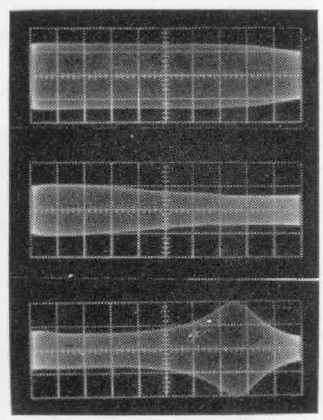


Figure 13. (*Top*) Frequency response of a transistor amplifier; range, 0 to 10 Mc; scale, 1 Mc/cm. (*Center and bottom*) Response characteristics obtained during adjustment of the transistor amplifier. Center pattern shows response from 0 to 10 Mc; the lower pattern, with a center frequency of 11 Mc, shows a peak at approximately 13.5 Mc.

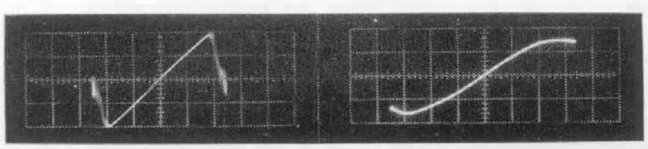


Fig. 11. (*Left*) FM discriminator characteristic of the tuner; signal through i-f amplifier; center frequency, 10.7 Mc, 100 kc/cm. (*Right*) Discriminator characteristic signal into first limiter, so that response is not limited by i-f characteristic. Scale, 0.5 Mc/cm.

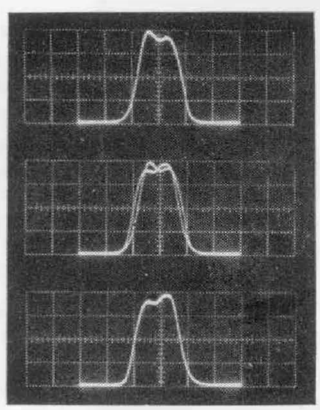
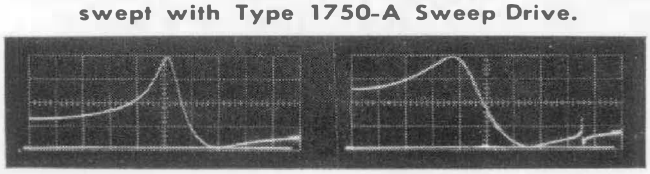


Figure 12. AM i-f characteristic of the tuner. Frequency at center line is 455 kc; scale, 10 kc/cm. (*Top*) Frequency swept from low to high frequency; (*bottom*) from high to low; (*center*) both traces superposed.

Figure 15. Series and parallel resonance characteristics of (*left*) a 5-Mc quartz crystal and (*right*) a 7-Mc crystal, which shows a secondary resonance about 20 kc above fundamental series resonance. Scale is 4 kc/cm. Generator voltage was applied to crystal through a resistance. Oscillogram shows voltage across resistor. Δf dial of generator was swept with Type 1750-A Sweep Drive.



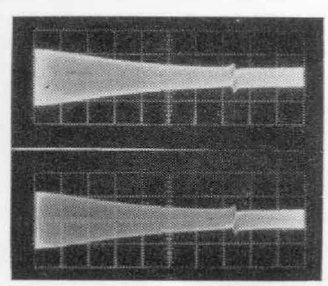


Figure 14. (*Bottom*) This pattern shows a sharp resonance and affords an excellent example of the value of sweep methods of measurement. With a point-by-point method, the resonance might easily escape detection.

during adjustment of circuit capacitors.

Figure 14 shows the frequency response of a transistor amplifier with sharp resonances, which might easily go undetected in a point-by-point measurement.

Mechanical Sweep Drive

For oscilloscope display with a very slow sweep rate, the TYPE 1750-A Sweep Drive is recommended. Figure 15 shows the characteristics of a quartz crystal measured in this way.

For graphic recording, the TYPE 908-R Dial Drive provides a horizontal deflection voltage proportional to dial rotation angle and is suitable for use with an X-Y Recorder.

— C. A. WOODWARD, JR.

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3 L. B. Arguimbau, "Transient Response of a Broadcast System," *General Radio Experimenter*, Vol. XIV, No. 11, April, 1940.

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5 A. V. Bedford and G. L. Fredendable, "Transient Response of Multistage Video-Frequency Amplifiers," *Proc. IRE*, Vol. 25, No. 4, April, 1939.

6 H. A. Samulon, "Video Measurements Employing Transient Techniques," *Proc. IRE*, Vol. 44, No. 5, May, 1956, p. 638.

SPECIFICATIONS

OUTPUT: *Frequency Range*	*Signal*	*Open-Cir. Amplitude*	*Tolerance*	*Impedance*
20-20,000 c	Sine Wave	0-10 v	<±0.25 db	820Ω ±2%
20-20,000 c	Sine Wave	0-1 v	<±0.25 db 40 c-20 kc 0.75 db at 20 c	75Ω ±2% Attenuator
20-20,000 c	Square Wave	0-10 v p-to-p (0-2.5 v p-to-p across 75Ω)	<±0.25 db	75Ω ±2% Attenuator
20 kc-12 Mc	Sine Wave	0-10 v	±1 db	820Ω ±2%
20 kc-12 Mc	Sine Wave	0-1 v	±1 db	75Ω ±2% Attenuator
20 kc-2 Mc	Square Wave	0-10 v p-to-p (0-2.5 v p-to-p across 75Ω)	±0.5 db	75Ω ±2% (Attenuator)
20 kc-12 Mc Center Freq. 0-±6 Mc Sweep	Sine-Wave Sweep*	0-10 v	±1 db (up to 12 Mc)	820Ω ±2%
20 kc-12 Mc Center Freq. 0-±6 Mc Sweep	Sine-Wave Sweep*	0-1 v	±1 db (up to 12 Mc)	75Ω ±2% (Attenuator)
30-42 Mc	Sine Wave	Approx. 50 mv	±1 db**	Approx. 50Ω
36-42 Mc Center Freq. 0-±6 Mc Sweep	Sine-Wave Sweep*	Approx. 100 mv	±2 db**	50Ω or higher load recommended

*Sweep rate is at power-line frequency.

**Typical, not guaranteed.

Frequency Controls: The main control has a dial with two scales.

The inner scale covers the audio range and is calibrated from 20 to 20,000 cycles per second with a true logarithmic distribution. The total scale length is approximately ten inches. The effective angle of rotation is 240° or 80° per decade of frequency.

The outer scale covers the video range and is calibrated from 20 kilocycles per second to 12 megacycles per second. The scale is approximately logarithmic but approaches a linear distribution at the high-frequency end. The total scale length is approximately 12 inches.

The frequency-increment dial for the audio range is calibrated from −50 to +50 cycles per second, and the frequency-increment dial for the video range is calibrated from −20 to +20 kilocycles per second.

Frequency Calibration Accuracy:

Audio Range: The calibration of the main frequency dial can be relied upon within ±(1% + 1 cycle) after the oscillator has been correctly set to zero beat. The accuracy of calibration of the frequency-increment dial is ±1 cycle.

Video Range and Video-Sweep Range: The calibration of the main frequency dial can be relied upon within ±(1% + 1 kc) from 500 kc to 12 Mc and within ±(2% + 1 kc) below 500 kc after the oscillator has been correctly set to zero beat. The accuracy of calibration of the frequency-increment dial is ±0.5 kc. The frequency-increment dial is not effective on the VIDEO-SWEEP RANGE.

Zero-Beat Indicator: The output voltmeter is used to indicate zero beat.

Frequency Stability:

Audio Range: The drift from a cold start is less than 20 cycles in two hours.

Video Range: The drift from a cold start is less than 20 kilocycles in two hours.

Output Voltmeter: The panel meter has two voltage scales, 0 to 10 and 0 to 3, and a db scale, −20 db to 0 db, referred to full deflection on the 0 to 10 scale. Calibration accuracy is within ±3% of full-scale deflection for sine waves, ±5% for square waves. The voltage scales are calibrated to indicate the r-m-s value of sine-wave output voltage and the peak-to-peak value of square-wave output voltage. The sine-wave voltmeter is connected in series with a 10-μf capacitor to the 10-volt output jack.

Output Attenuator: The 75-ohm attenuator has eight steps of 10 db each, with an accuracy of ±1% of the nominal attenuation. Maximum output from the attenuator is one volt for sine-wave output, 10 volts peak-to-peak for square-wave output. Sine-wave, full-scale, open-circuit voltages are 0.1 mv, 0.3 mv, 1 mv, 3 mv, 10 mv, 30 mv, 0.1 v, 0.3 v, and 1 v. Square-wave, full-scale, open-circuit voltages are 1 mv, 3 mv, 10 mv, 30 mv, 100 mv, 300 mv, 1 v, 3 v, and 10 v.

Horizontal Deflection Voltage: 4 volts at 60 cycles (or power-line frequency) are provided for horizontal deflection of a cathode-ray oscilloscope. Since both this voltage and the frequency distribution of the sweep output vary sinusoidally, the oscilloscope pattern is approximately linear. A blanking voltage (50-volt, peak-to-peak, square wave) is also supplied.

Square-Wave Characteristics: At 60 cycles the tops are flat within 2% of the peak-to-peak amplitude, at 20 cycles within 5%. Rise time for frequencies from 300 kc to 2 Mc is less than 75 millimicroseconds. At 20 kc the rise time is approximately 150 millimicroseconds. Overshoot is about 10% of the peak-to-peak output voltage.

Harmonic Distortion: The total harmonic distortion of the sine-wave output is less than 1% of output on the 20 c-20 kc range and less than 4% of output on the VIDEO SWEEP and 20 kc-12 Mc ranges.

A-C Hum: Less than 0.1% of the output for voltmeter readings above 10% of full scale.

Terminals: TYPE 874 Coaxial Terminals are provided for all outputs.

Mounting: Aluminum, 19-inch, relay-rack panel; aluminum cabinet. For table mounting (TYPE 1300-AM), aluminum end frames are supplied to fit ends of cabinet; for relay-rack mounting (TYPE 1300-AR), brackets for holding cabinet in rack are supplied. Relay-rack mounting is so arranged that panel and chassis can be removed from cabinet, leaving cabinet in rack, or cabinet can be removed from rear of rack, leaving panel attached to rack.

Power Supply: 105 to 125 (or 210 to 250) volts, 50 to 60 cycles. Power input at 117 volts is approximately 175 watts, maximum. Instrument will operate normally, except for sweep output, at supply frequencies up to 400 cycles.

Power input receptacle will accept either 2-wire (TYPE CAP-35) or 3-wire (TYPE CAP-15) power cord. Two-wire cord is supplied.

Tube Complement:

1 — OB2	1 — 6BA7
1 — 5651	1 — 6BC4
1 — 6080	1 — 6BK7-B
2 — 6197	1 — 6BQ5
4 — 6AB4	1 — 6J6
2 — 6AQ6	4 — 12AX7
1 — 6AV6	

Accessories Supplied: One TYPE CAP-35 Power Cord; two TYPE 874-R22 50-ohm Patch Cords; one TYPE 874-413 75-ohm Patch Cord; three TYPE 874-C58 Cable Connectors, one TYPE 874-Q2 Adaptor, and spare fuses.

Other Accessories Available: TYPE 1521-A Graphic Level Recorder for automatic recording at audio frequencies; TYPE 1750-A Sweep Drive for slow-speed sweeping; TYPE 908-R Dial Drive for X-Y plots; TYPE 1213-D Unit Time/Frequency Calibrator for timing markers.

Dimensions: 19 (width) x 15¾ (height) x 14⅜ inches (depth) over-all.

Net Weight: 64 pounds.

Type		*Code Word*	*Price*
1300-AM	**Beat-Frequency Video Generator (Bench Model)**	ANGEL	**$1950.00**
1300-AR	**Beat-Frequency Video Generator (Relay-Rack Model)**	ASPEN	**1950.00**

U. S. Patent No. 2,548,457.

NEW COAXIAL ADAPTORS

In line with our aim of providing low-VSWR connections between coaxial line circuits fitted with TYPE 874 Connectors and all other commonly used types of connectors, adaptors to three relatively new types of connectors, TYPE SC, TYPE TNC, and TYPE LT, have been added to the line of TYPE 874 Components. By means of these adaptors, the comprehensive General Radio line of high-frequency instruments and components can be applied to circuits fitted with these connectors with only a very small increase in VSWR.

The TYPE SC Connector is similar to a TYPE C but makes use of screw-type locking arrangement rather than a bayonet type. There are other minor differences, and connectors of the two series will not mate with one another. Adaptors from TYPE 874 Connectors to both male and female TYPE SC Connectors have been designed.

A similar modification of the TYPE BNC Connector has resulted in the TYPE TNC Connector. There are several versions of this connector, which differ slightly from one another. The new adaptors to TYPE 874 Connectors, the TYPE 874-QTNP and the TYPE 874-QTNJ, are designed for proper mating with the Sandia version of this connector.

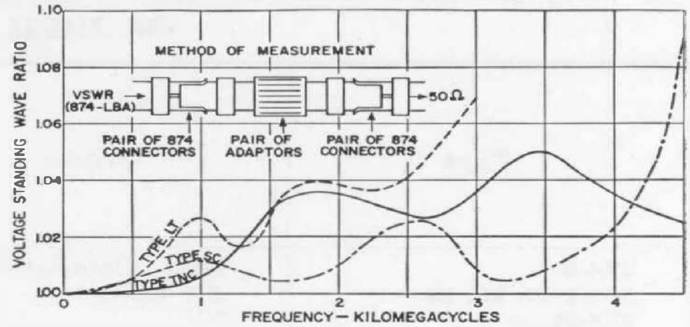


Figure 2. Standing-wave ratio of typical pairs of adaptors as a function of frequency.

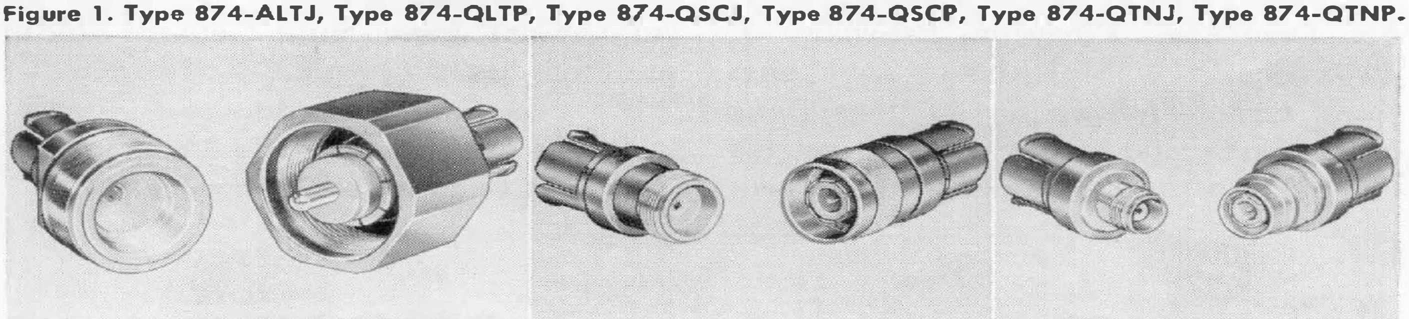
The TYPE LT Connector, intended for use with large-size Teflon cables, TYPES RG-117 and RG-118, has come into widespread use, and low-reflection connections can be made to it by use of the TYPE 874-QLTP and 874-QLTJ Adaptors.

The reflections introduced into a matched 50-ohm line at various frequencies by typical pairs of adaptors are shown in Figure 2. The VSWR of a single adaptor will, in general, be lower than indicated by the curve. Voltage and power ratings of these adaptors are listed in the table on page 12.

Type	*Contains Type 874 Connectors and*	*Fits*	*Code Word*	*Price*
874-QSCP	**Type SC Male**	SC Female	COAXCASHER	**$9.50**
874-QSCJ	**Type SC Female**	SC Male	COAXCOSTER	**9.50**
874-QTNP	**Type TNC Male**	TNC Female	COAXTUSKER	**8.00**
874-QTNJ	**Type TNC Female**	TNC Male	COAXTUNNER	**8.00**
874-QLTP	**Type LT Male**	LT Female	COAXLOBBER	**23.00**
874-QLTJ	**Type LT Female**	LT Male	COAXLAGGER	**23.00**

U. S. Patent No. 2,548,457.

Figure 1. Type 874-ALTJ, Type 874-QLTP, Type 874-QSCJ, Type 874-QSCP, Type 874-QTNJ, Type 874-QTNP.



FOR THE CONVENIENCE OF USERS OF TYPE 874 COAXIAL COMPONENTS, WE ARE LISTING BELOW THE VOLTAGE AND POWER RATINGS FOR ALL OF THESE ELEMENTS

Type	*Name*	*Peak Voltage Volts*	*Max. Allowable Average Power* at 1000 Mc (inversely proportional to square root of frequency)*
874-B 874-L 10, 20, 30 874-EL 874-T	Basic Connector Air Lines Ell Tee	1500	150 w
874-C, C8, C9 874-R20	Cable Connectors Patch Cord	1000	150 w
874-C58 874-R22	Cable Connector Patch Cord	500	55 w
874-LA 874-LK	Adjustable Line Adjustable Line	1500	100 w†
874-K	Coupling Capacitor	500	55 w
874-F Series	Filters	200	55 w
874-LBA	Slotted Line	1500	150 w‡
874-QBP, QBJ QTNP, QTNJ QUP, QUJ	Adaptor to BNC Adaptor to TNC Adaptor to UHF	500	55 w
874-QCP, QCJ QNP, QNJ QSCP, QSCJ	Adaptor to C Adaptor to N Adaptor to SC	1000	150 w
874-QHP, QHJ QLP, QLJ QLTP, QLTJ QU3A, QV3A QU2A, QV2 QU1	Adaptor to HN Adaptor to LC Adaptor to LC Adaptors to Rigid Lines	1500	150 w

* For pulses, peak power rating is the average power rating divided by the duty cycle, within voltage limitations.
† For permanent installations, 30 w maximum at 1000 Mc.
‡ At high powers, the output of the crystal diode must be shunted to limit output voltage to 2 v.

NEW REPRESENTATIVE FOR DENMARK

We announce the appointment of the Danish firm of Semler & Matthiassen as exclusive General Radio representative for Denmark. Effective February 1, 1960, Semler & Matthiassen took over these responsibilities for Mogens Bang & Company and is now directly serving our customers in Denmark and Greenland with competent technical assistance and advice.

All inquiries, whether technical or commercial, concerning General Radio products, should be addressed to:

Semler & Matthiassen
Teglvaerksgade 22
Copenhagen, Denmark