1939 Television Kit Chassis

This is a pre-war kit chassis that was built by an RCA tube engineer in 1929. It uses two channels, using some of the same parts as the RCA TRK series. The design came from the Scales company, which made the IF transformers.

Philco Television Oscilloscope

Introduced by Philco in 1938 specifically for television servicing.
With This COLOR-TV Filter

"SEE"
• Your favorite programs in natural color
• Blue skies
• Green grass
• Can also be used on a color TV set for a real, live, true picture

RELAX AND ENJOY COLOR BY EASTMON®

"TRY IT NOW" "BUY IT NOW"

EASTMON Co.
General Electric PC-4 Camera

This studio camera uses the Image-Clone, the second generation of camera tube. It was used around 1950 and used originally in a TV station in Louisville. It was then moved to a station in Albany, NY, where it was used for remote purchase from a control room.
CRT Rebuilding Plant

In the 60s through the 70s, picture tube rebuilding was common, and many small plants were sold.

This one was never used, and was acquired by Roger Dryfoos of Castro Valley, California, who donated it to the museum.

It is our hope to eventually rebuild tubes with this plant.
As shown in Figure 8, a certain phase angle corresponds to each of the four rosettes. Each of the four rosettes is a combination of four equal angles. The main polarizer 6, which is mounted on a sensitive 12 in a similar manner to that used for the two orthogonal filters 3 and 5. The polarizer 6 is arranged so that the two orthogonal filters 3 and 5 are not coincident. This is done by using two filters 3 and 5, which are oriented at 90 degrees to each other. The filters are arranged so that no light passes through one of the filters when the other passes through it. This is achieved by using two filters 3 and 5, which are oriented at 90 degrees to each other. The filters are arranged so that no light passes through one of the filters when the other passes through it.

A similar procedure is followed in the case of the two orthogonal filters 3 and 5. The filters are arranged so that no light passes through one of the filters when the other passes through it. This is achieved by using two filters 3 and 5, which are oriented at 90 degrees to each other. The filters are arranged so that no light passes through one of the filters when the other passes through it.

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The design of the filter involves the use of a series of six modules, each containing a filter element. The filter elements are arranged in parallel, with each module having its own pressure drop control. The modules are connected in series, with the inlet pressure being divided equally among the modules. The outlet pressure is the average of the outlet pressures of all modules.

The filter element is a pleated cartridge, which is housed in a metal housing. The pleats are made of a high-temperature resistant material, which allows for operation at temperatures up to 400°F. The housing is designed to withstand pressures up to 150 psi.

The filter is mounted on a frame, which is connected to the pipeline by a flanged connection. The frame is designed to be easily removed for maintenance and cleaning.

In addition to the filter elements, the filter also includes a pressure gauge, which is used to monitor the outlet pressure of the filter. This allows for continuous monitoring of the filter's performance.

The filter is designed to be used in conjunction with a vacuum system, which aids in the collection and transport of the dirty air. The system is designed to be easy to operate and maintain, with minimal down time for maintenance.

The filter includes a bypass valve, which allows for the bypassing of the filter in case of an emergency or for maintenance. The valve is actuated by a solenoid, which is controlled by a programmable logic controller (PLC).
Alignment and adjustment:

Before beginning alignment carefully remove all swinging weights and adjust the assembly to face in the direction from which the sound is to be transmitted. This allows for the best possible sound motion. The assembly is now ready for alignment.

1. The alignment consists of two major parts. The alignment of the assembly and the alignment of the picture. The alignment of the assembly consists of the following:

   a. The assembly should be mounted on a solid surface to ensure stability.
   b. The assembly should be adjusted so that the picture is centered within the assembly frame.
   c. The adjustment of the horizontal and vertical alignment should be performed separately.

2. The alignment of the picture consists of:

   a. The adjustment of the horizontal and vertical alignment should be performed separately.
   b. The adjustment of the image on the screen should be performed to ensure that the image is centered within the viewing area.
   c. The adjustment of the picture size should be performed to ensure that the picture is the correct size for the viewing area.

3. Once the alignment is complete, the assembly is now ready for use. The assembly should be left in a clean, dry area to prevent damage from moisture or dust.

Note: The alignment process is repeated until the picture is centered and the image is the correct size and shape for the viewing area.

Reference materials are available for further assistance. It is suggested that a properly trained technician be used for any adjustment or repair.
COLORDAPTOR

A versatile and proven color converter for your black and white TV set. When combined with your color TV, the COLORDAPTOR will convert any picture to color. It eliminates the need for a separate color receiver and uses your existing black and white TV. No extra equipment is required.

Model 1000: Complete specification of New Model 1000 COLORDAPTOR.

Model 1200: Features and specifications.

Model 2000: Complete color converter kit, includes all necessary components.

Available in kit form or complete kit.

(Prices subject to change.)

March, 1948
COLORADOPTOR

For those who have tried equipment for your black and white TV. Now... COLORADOPTOR in your ticket for admission to the ever expanding world of color television. With the thousands who have already converted their black and white sets to color and are now enjoying the marvels of modern color television.

The COLORDAPTOR 1/2, made at a price that the budget minded experimenter can afford. The basic parts kit costs less than $50 and all the remaining parts can be obtained from the usual TV or from your TV parts supplier.

COLORDAPTOR consists of a two tube electronic circuit which in conjunction with a couple of other things will convert your black and white TV directly into perfect color TV. No new equipment to buy, no new wires to add. Attaching the COLORDAPTOR to the standard TV set is simple and in no way affects its normal operation.

COLORDAPTOR was first described in the January and February 1955 issues of The Radio Amateur. W1 has now a new COLORDAPTOR Model A418 adding the improvements of four years of design and planning. W1 has been designed to meet the requirements of radio amateurs and TV beginners. The COLORDAPTOR and parts kits for the Model A418 are available to all and simplify the construction of your COLORDAPTOR.

PRICE LIST

CD-31 Complete COLORDAPTOR including basic electronics construction plans, schematic diagrams, assembly instructions and complete kit of all parts, complete color filter, $4.99

CD-250 Full 11" x 17" COLORDAPTOR schematic, $1.75

CD-K1 Essential parts kit - contains all parts of transformator, $9.95

CD-K2 Complete COLORDAPTOR electronic circuit includes pre-amplified circuits, all components including transistors, transformers, diodes, capacitors, resistors, etc. $19.95

CD-K3 Complete COLORDAPTOR electronic circuit completely wired and tested as a complete color TV set. Complete instructions for attachment to standard black and white TV, $19.95

*Price subject to change. W1, 1961
Color-TV

YOUR ANSWER TO

for:

COL-R-TEL

Color converter

AND THE FINEST BLACK AND WHITE

are yours when you own a low cost...

Because the COL-R-TEL converter gives you magnificent color yet costs you nothing extra - you can use your present black and white TV receiver, instead of buying another converter. COL-R-TEL does your converting to color as you watch your favorite shows. You need only one receiver. Yester...
Superb Color

AND THE FINEST BLACK AND WHITE

are yours when you own a low cost

COL-R-TEL
Color converter

COL-R-TEL gives you magnificence color as close to a film of a superb color watching you. With COL-R-TEL you save TWO ways because you need only one converter...you perfect black and white set. There is no need to run two color. It's here....and you can run it yourself if you have it now.

You save by combining black and white and color in one converter. It's worth saving money on one set because the COL-R-TEL converter is the only color converter on the market that combines black and white and color in one completely independent unit. You can run your black and white set and your color set on the same converter. You save in both set and converter costs.

Your answer to Color TV

COL-R-TEL
Color converter

Your answer to color TV
Superb Color
AND THE FINEST BLACK AND WHITE
are yours when you own a low cost...

COL-R-TEL Color converter

COL-R-TEL gives you magnificent color you can use at a fraction of a separate color receiver price. With COL-R-TEL, you are TWIN, too. Because you need only one receiver, your present black and white set functions in color, too! There's no need to wait for color. It's here! And you owe it to yourself to have it now.

Because the COL-R-TEL converter is an easy way to convert black and white reception, you receive black and white in perfect color. Your present set is capable of receiving it. You sacrifice neither size of picture to quality, nor does COL-R-TEL impair the life of tubes or circuits of your receiver.

COL-R-TEL is sold, installed and serviced by reliable dealers
Mfg. by COLOR CONVERTER, INC., Columbia City, Indiana

YOUR ANSWER TO Color-TV

for:

COL-R-TEL Color converter
YOUR ANSWER TO COLOR TV
NOW! MAGNIFICENT NATURAL COLOR TV
at a price you can easily afford!

COL-T-TEL Color converter

Thick is the amazing beauty of full-color reception with your present black and white television and when color is broadcast, you will receive programs in all the glorious hues and shades that the finest color-casting sets produce.

The quality of color reception is excellent and the COL-T-TEL color converter's affordability is high. If your TV receiver now produces a good black and white picture, and your local TV stations transmit good color quality, you are ready for COL-T-TEL.

FOR ALL SIZES OF BLACK AND WHITE CONSOLE OR TABLE MODEL TV SETS

COL-T-TEL converts any black and white set for color. The complete picture is electronically split in the picture area for best-texture color viewing. When Features are viewed in black and white, the set is used in normal screen size in the conventional manner. You turn a switch to reduce the picture to converter size or to rewrite the original size for black and white.

EASILY INSTALLED... NO SERVICE PROBLEMS

The COL-T-TEL electronic circuit may be installed behind the cabinet by your dealer. The color converting unit is a portable plug-in, which is connected to your set. A feature of COL-T-TEL is automatic color adjustment. The electronic and mechanical units of COL-T-TEL are molded in plastic which is lightweight and durable. There are no moving parts or hidden parts and no servicing or replacement of parts by television servicemen.

ONLY $149.95 READY TO INSTALL

Complete... NO EXTRA TO BUY...

The cost of COL-T-TEL is so low you would expect hidden "extras" there are none. If you own a good black and white TV... you can now afford COLOR with COL-T-TEL, your answer to color TV.

CONVERT YOUR PRESENT TV SET TO RECEIVE COLOR TELECASTS NOW!
This tube was made by DuMont in 1931 for the Royal Sovereign. It is the largest black and white tube ever made.
The Incomparable Muntz TV
America's Television Triumph!
Simpson 406 Chromatic Amplifier

Used to amplify video and chroma signals for low sensitivity oscilloscopes.

(Donated by Bill Walter, restored by Joe Gouge)
This is an RCA 14 inch color monitor. It was often used at NASA as a console display. It was donated to the museum by Boeing Defense.
3-5. Basic Theory of High Level Demodulation

Since the 2C5769A demodulator takes difference signals the use of high level demodulation is desirable. With this technique, the output of the demodulator is of sufficient amplitude to drive the grid of the tube to produce audio. The use of an output transformer, however, is avoided.

There are three methods by which high level demodulation may be accomplished: two methods employ the use of three tube type circuits while the third method employs tubeless. The 2C5769A uses the latter plan, for its simplicity, economy, and freedom from hum and hum interference, all methods will be discussed.

One of the crudest, yet most effective means of three tubes is illustrated in Figure 3-4. The transmitted amplitude information is impressed across a transformer which is in series with the plate load resistor of each of the demodulators. The collection 330 ohm CV signal is applied to the grid of these. Tube type T1 is shown in isolation. Between the 0 input and grid terminals, the proper phase is indicated in Figure 3-3. When the input signal is applied, the grid current is sufficient in magnitude to drive the grid of the tube to produce audio. The demodulator output is of sufficient amplitude to drive the grid of the tube to produce audio. The 2C5769A uses the latter plan, for its simplicity, economy, and freedom from hum and hum interference, all methods will be discussed.

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3-8. "Bootstrapping" High Level Demodulator

Another circuit which employs the use of only accurate demodulation is illustrated in Figure 3-4B. It should be noted that the G't signal may be obtained from the addition of "+0.11 B-Y and -0.5 B-Y." This is only necessary to accommodate B-Y and B'-Y signals. A novel "bootstrapping" technique is utilized where the G't signal is obtained from a common cathode resistor in the BY and B'-Y demodulators. The plate loads and the cathode resistors are adjusted for the required BY, BY and G't signal amplitudes.

A simplified circuit of the system demodulator is shown in Figure 5-4A.

\[ R_1 = R_2 = R_3 = R_4 = 0.1 \text{ M} Q \]

The circuit arrangement shown in Figure 5-4A, but with BY and BY currents flowing in the common cathode resistors. Thus, there is a common-mode signal applied to the plate of tube number 1, which is identical to the BY signals. There should be no B-Y output. A signal that is in quadrature with BY will cause minimum BY.

In order to calculate the phase requirements, we must assume that the demodulator is perfectly linear.

Then:
\[ v_1 = (G'Y) = (LX) \]

The phase angle experiment of demodulator 1 and 2 can be calculated by noting \( v_1 \) and \( v_2 \) in terms of B-Y and BY. It is known that the BY signals are 90° out of phase with BY signals.
Figure 6-B shows the vector representation of the balanced signal as shown in Figure 5-B.

5.5. Demodulation in the 21C7692 RCA Color Television Receiver

The 21C7692 utilizes a modified method similar to that used in the RCA color television receiver in the 21C7691. It is designed to provide a balanced output for the demodulator by means of a 90° signal difference-coupling transformer. The 90° signal difference-coupling transformer provides the best departure from the center tap of the transformer, so a 90° phase shift is obtained across the primary of this transformer.

The 90° signal difference-coupling transformer provides the best departure from the center tap of the transformer, so a 90° phase shift is obtained across the primary of this transformer.

The angle φβ can be determined by adding φα and φβ, and substituting this value into 90° as shown in Figure 5-B. That is:

\[ \phi \beta = 90° - (\phi \alpha + 45°) \]

Then:

\[ A = (90° - (45° + 45°)) = 90° - 90° = 0° \]

The angle φβ can be determined by adding φα and φβ, and substituting this value into 90° as shown in Figure 5-B. That is:

\[ \phi \beta = 90° - (\phi \alpha + 45°) \]

Then:

\[ A = (90° - (45° + 45°)) = 90° - 90° = 0° \]

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\[ \phi \beta = 90° - (\phi \alpha + 45°) \]

Then:

\[ A = (90° - (45° + 45°)) = 90° - 90° = 0° \]

This angular relationship between the two demodulators can be adjusted in the turn of the knob.

The output of the demodulators is amplified by the E and G demodulators and amplified by the G demodulator. The amplified output is applied to the channel select circuits and to the color channel output.

The G demodulator is amplified by the G demodulator. The amplified output is applied to the channel select circuits and to the color channel output.

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The blue, red, and green horizontal deflection plates are approximately square. Adjust the red and green horizontal deflection plates so that the red and green lines are approximately square across the horizontal axis of the screen. This condition is illustrated in Figure 7.79.

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Operating Principles of the 17th Color Kinescope

Figure 7.102 - Depressing Coil

Figure 7.103 - Effect of Horizontal Magnetic Field

As a precautionary measure, the lines should be depressed in their final operating position, in the reverse, before proceeding with any adjustments. The depression may be accomplished by means of a suitable depressing coil. This coil should be fairly large, 3 to 4 inches in diameter. An illustration of a typical depressing coil is shown in Figure 5.21.

Before applying power to the depressing coil, the operator must be sure that the unit is properly grounded. When applying power, the unit should be operated in the same manner as for regular operation.
3-3. Block Diagram Description of the RCA Color Television Receiver

The 21" color television receiver can be divided into three sections: the picture tube, the color decoder unit, and the control circuits. The block diagram shown here is useful in understanding the overall operation of the receiver.

The picture tube is responsible for converting the electrical signals into light. It consists of a cathode ray tube that produces a beam of electrons which are focused and directed to the phosphor-coated screen. The phosphors convert the electron beam into visible light, producing the image on the screen.

The color decoder unit is where the three primary colors (red, green, and blue) are produced. The input signals from the various sources (e.g., broadcast television, video tape) are processed to generate the correct drive voltages for the electron guns in the picture tube. The color decoder also includes circuitry to process signals for black and white television, ensuring compatibility with both color and monochrome broadcasts.

The control circuits include the power supplies, the synchronization circuitry, and various protective mechanisms. These circuits ensure that the receiver operates properly and safely, handling the electrical power and synchronization signals necessary for the proper functioning of the other components.

In summary, the block diagram provides a useful overview of the overall system, highlighting the key components and their interconnections. Understanding the block diagram is crucial for troubleshooting or modifying the receiver, as it offers a visual representation of the system's architecture and operational flow.
Picture 4.40 — Color bar patterns with figure numbers.

To check the picture, adjust the blue and red gain to normal. The gain on the other color bars will be automatically adjusted.

To check the color bars, be sure the color bars are in the picture format. The color bars should be blue, red, green, and yellow. The blue and red bars should be the same size. The green and yellow bars should be the same size. The blue and red bars should be the same size. The green and yellow bars should be the same size.

Figure 4.41 — Color bar patterns with figure numbers.

Figure 4.42 — Color bar patterns with figure numbers.

Figure 4.43 — Color bar patterns with figure numbers.

Figure 4.44 — Color bar patterns with figure numbers.

Figure 4.45 — Color bar patterns with figure numbers.
4-3. Installation of Kinescope and Related Components

Identification of Red, Green and Blue Dots for Proper Placement — The positioning of the color dots is not critical on any particular orientation of the kinescope. However, the convergence adjustment procedure depends upon the location of the dots on the face of the tube. The screen and the lower two dots will be on a horizontal line below. In this position, the internal mask is correctly aligned. Viewed from the way, right, and green to the left. This is the correct position of the kinescope when finally installed in the chassis.

The Kinescope Assembly — It is recommended that the high voltage connection, high voltage discharge, and overvoltage control be assembled on the kinescope. The assembly should be installed as soon as the kinescope is removed from the chassis. The ground connection should be clipped onto the kinescope terminal ring at the top, approximately in line with the blue gun, and with the lead running to the right along the terminal ring.

The flexible insulator should be clipped under the terminal lead, and then drawn all the way around the terminal, carefully to cover the terminal ring. With these components properly installed, the insulator will not and make the insulator lead available on the right side of the insulator in a position convenient to the high-voltage supply. Figures 18 and 19 show a grouping of the kinescope and its components.

Deflector-Drive Position — The deflection yoke is supported on the chassis by a support extending from the kinescope. This support is installed in the rear of the chassis and should be positioned so that it is parallel to the chassis. The front edge of the yoke should be about 1/4 inch from the front edge of the chassis.

Installation of Kinescope and Related Components

Figure 18. Deflection yoke and related assembly.

Figure 17. Convergence of the kinescope.
6-1. Operation and Function of Front Panel Controls

With mosaic correction, the color receiver is equipped with a front panel that allows the user to adjust various picture settings. The front panel controls are designed to ensure optimal image quality and provide the user with precise control over the picture. These controls include:

- Brightness
- Contrast
- Color Temperature
- Sharpness
- Tint
- Hue
- Volume

These controls allow the user to adjust the brightness and contrast of the picture, as well as the color temperature and sharpness. The brightness control adjusts the overall light level of the picture, while the contrast control adjusts the difference between the lightest and darkest areas. The color temperature control adjusts the color balance of the picture, allowing the user to select between a warmer or cooler color temperature. The sharpness control adjusts the level of detail in the picture, while the tint control adjusts the balance between red and green. The hue control adjusts the color saturation, and the volume control adjusts the audio level.

6-2. Test Equipment Required for Receiver Adjustment

The adjustment of color television picture quality is greatly facilitated by the use of specialized test equipment. The RCA Color Liner (CL-2) and the RCA Color Video Generator (CVG-1) are used to generate test patterns that allow the user to accurately adjust the picture quality. The RCA Color Liner is a black and white television picture generator that produces a pattern of black and white bars of varying widths. The RCA Color Video Generator (CVG-1) is a color television picture generator that produces patterns of colored bars and squares, allowing the user to adjust the color balance and saturation of the picture. These test patterns are used to check the operation of the color receiver, and to ensure that the picture quality is optimal.

The test patterns are displayed on the television screen, allowing the user to visually check the picture quality. The test patterns are used to adjust the brightness, contrast, color temperature, sharpness, tint, hue, and volume controls, ensuring that the picture quality is optimal. The test patterns are displayed on the screen in a pattern that allows the user to accurately adjust the picture quality, ensuring that the picture is clear and detailed.

6-3. Picture Correction

The RCA Color Liner and the RCA Color Video Generator are used to generate test patterns that allow the user to accurately adjust the picture quality. The test patterns are used to check the operation of the color receiver, and to ensure that the picture quality is optimal. These test patterns are displayed on the television screen, allowing the user to visually check the picture quality. The test patterns are used to adjust the brightness, contrast, color temperature, sharpness, tint, hue, and volume controls, ensuring that the picture quality is optimal. The test patterns are displayed on the screen in a pattern that allows the user to accurately adjust the picture quality, ensuring that the picture is clear and detailed.
The magnetic field will deflect the beam of a cathode-ray tube. In a color tube, this is extended to cover the entire width of the tube and sweep vertically as well. The vertical sweep is controlled by the vertical deflection amplifier, which is driven by the vertical deflection signal from the video output stages.

The horizontal sweep is controlled by the horizontal deflection amplifier, which is driven by the horizontal deflection signal from the video output stages.

The color deflection is provided by the color deflection circuit, which is driven by the color deflection signal from the video output stages.

The color deflection circuit consists of two main parts: the color deflection amplifier and the color deflection output stages. The color deflection amplifier takes the color deflection signal and amplifies it to provide the necessary current to drive the color deflection output stages.

The color deflection output stages then take the amplified signal and apply it to the electron gun to produce the desired color image.
3.3. Color Synchronization Section

This portion of a color receiver has an entirely new function and is required only for wide television operation. The purpose of the color synchronization circuits is to generate a 5.50 MC subcarrier signal whose frequency and phase is exactly that of the subcarrier signal that was originally used at the signal source. Once the locally generated subcarrier signal is correctly established, it can then be mixed with the received Orsetron synchronizing signals to replace the subcarrier that was suppressed before transmission. This is done in a manner similar to the color subcarrier, which has already been described.

The color synchronization circuit is shown in block diagram form in Figure 3.35. Each block is identified by its number as it appears on the corresponding schematic diagram. The color killer is included in the diagram because it operates in conjunction with the phase detector; however, its function is brief.

Referring to the complete receiver schematic diagram of the color section in Figure 3.44, the circuit for generating the subcarrier signal is a paralleled twin circuit that is connected to the grid of the base amplifier V138A. From the output of the base subcarrier amplifier, synchronizing information is fed to the baseband amplifier V138A. After passing, the base synchronizer signal is delivered to the synchronization network through a 90 degree phase-shifting network, which is also known as a phase-shifting circuit, to produce the required subcarrier signal. This signal is then mixed with the 5.50 MC subcarrier signal of the color section to produce the required 5.50 MC subcarrier signal for the color section.

The action of phase-shifting the base is accomplished by the base circuit. Figure 3.36 shows the phase-shifting network and the phase-shifting elements of the base synchronizer circuit. The phase-shifting network consists of two components: a phase-shift network and a phase-shifting element. The phase-shift network is designed to provide a phase shift of 90 degrees between the input and output signals. The phase-shifting element is a device that provides a fixed phase shift, independent of the input signal level. The combined action of the phase-shift network and the phase-shifting element results in a phase-shifted signal that is used to control the phase of the base amplifier. This phase-shifted signal is then fed back to the input of the phase-shifting network to provide the required phase shift.

The circuit for generating the subcarrier signal is shown in Figure 3.35. The subcarrier signal is generated by the base amplifier V138A, which is driven by the 5.50 MC subcarrier signal. The subcarrier signal is then mixed with the 5.50 MC subcarrier signal to produce the required 5.50 MC subcarrier signal for the color section.
The average plate current is now less than the average plate current for the actual condition. The output of the plate is therefore small.

A study of the time delay of the plate circuit shows that during the delay period the grid is conducting, the signal is added to the plate circuit, and the output is increased to the normal value. This is shown in Figure 3.56, where the output voltage is shown in Figure 3.56.

The output of the demodulator does not change when the plate signal is shown in Figure 3.56, and the output voltage is shown in Figure 3.56. The output of the plate does not change in this figure, and consequently no output is shown in the plate circuit.

The output of the demodulator does not change when the plate signal is shown in Figure 3.56, and the output voltage is shown in Figure 3.56. The output of the plate does not change in this figure, and consequently no output is shown in the plate circuit.
The second video stage shown in Figure 2-26 is a normal single-stage stage, which feeds the three Y matrix systems. This stage is also de-gussed, but with an improvement that yields some high-frequency peaking to increase the high-frequency response of the stage. This improvement in the high-frequency response of the stage is due to the capacitance in the cathode circuit which provides the de-gussing action. In other words, the de-gussing is maximum at low frequencies, producing, in effect, peaking at high frequencies. The frequency response of this stage is shown in Figure 2-25. As can be noted, the lower side of the filter, i.e., 100 cycles, is removed. This removes any de-gussing action, and no change in the plate current will occur. Capacitors C1 and C2 are made large enough to pass both a 100 cycle and 1,000 cycle frequency.

**3-2. Pre-Amplifier** A balanced circuit is used for the video amplifier, shown in Figure 2-27, which includes a biasing circuit and a coupling circuit between the two sets of circuits. The coupling circuit is shown in Figure 2-28. The function of this stage is to select the video information between 0.5 and 1.2 MHz, which is a high-frequency circuit. The input circuit was used as a high-frequency circuit, which is a high-frequency circuit, and the output circuit was used as a high-frequency circuit. The frequency response of the balanced circuit is shown in Figure 2-25. In order to make the rate portion of the output capacitance during the transmission of a black-and-white signal, a biasing voltage from the grid of the last stage amplifier, or picture tube, is applied to the grid of the last stage amplifier, or picture tube. The rejection of the high-frequency signal is shown in Figure 2-25. In order to prevent the signal from the last stage amplifier, or picture tube, from entering the output circuit, the balanced circuit is used.

3-3. Color Demodulation Section

The signal that is passed to the head stage amplifier in the matrix stage of the two-channel circuits is quadrature. These two signals must now be separately measured. This is accomplished by two phase-sensitive detectors known as phase-sensitive detectors. Each of these detectors is arranged to measure one of the two color signals. A simplified circuit of a phase-sensitive detector is shown in Figure 2-29.

The combined demodulated signal and the 3.30 MHz subcarrier signal are supplied to each detector. The 3.30 MHz subcarrier signal is extracted from the subcarrier detector section and is applied in the second detector, to the other side of the picture tube. The video signal from each detector is applied to the output of the demodulation section, and the output of each detector is applied to the output of the demodulation section.
that determines the relative phase of input and the output signal.

3. Measure high-voltage current for sound.

To measure the phase shift and the input, add an external bias to the output of the phase shifter, and measure the phase shift using an oscilloscope. The bias level should be sufficient to obtain a clear picture of the phase shift, and the input voltage should be adjusted to obtain a linear response.

4. Provide a constant control for the luminance, in the form of a constant voltage level. The constant voltage level should be sufficient to obtain a clear picture of the phase shift, and the input voltage should be adjusted to obtain a linear response.

5. The output of the phase shifter will be introduced into the input of the other channel, and the output of the phase shifter will be introduced into the output of the other channel.

6. The output of the phase shifter will be introduced into the input of the other channel, and the output of the phase shifter will be introduced into the output of the other channel.

7. The output of the phase shifter will be introduced into the input of the other channel, and the output of the phase shifter will be introduced into the output of the other channel.

8. The output of the phase shifter will be introduced into the input of the other channel, and the output of the phase shifter will be introduced into the output of the other channel.

9. The output of the phase shifter will be introduced into the input of the other channel, and the output of the phase shifter will be introduced into the output of the other channel.

10. The output of the phase shifter will be introduced into the input of the other channel, and the output of the phase shifter will be introduced into the output of the other channel.

11. The output of the phase shifter will be introduced into the input of the other channel, and the output of the phase shifter will be introduced into the output of the other channel.
5. The time delay introduced by the filter may be calculated by referring to Figure 3.16. If the input signal is applied to a squared through a resistor, the resulting wave will be the input wave and the output wave will be applied to the capacitor of the filter. A time delay of 1/3T is introduced to the signal by the filter. The time delay is the proportion of 1/3T to the input signal.

6. As explained earlier, the required bandwidth of the filter depends on the time delay of the signal. All different delay circuits must be introduced. Also, an additional delay is experienced in each of the components. The delay introduced by the components is proportional to the time delay of the signal. To obtain the desired time delay, it is necessary to adjust the delay elements to the appropriate value.

7. As can be noticed from Figure 3.15, the time delay curve is relatively straight for approximately half the pulse width. For a large number of combinations, a filter was used before the bandwidth was increased. This was done to avoid distortion of the output wave. However, using a large number of combinations, the delay element will be very long. Also, since the time delay of the filter is increased, the frequency components of the output wave are phase shifted, and the resulting output wave resembles that shown in Figure 3.16. Note that the bandwidth of the output wave is limited to the bandwidth of the input signal. In practice, the output waveform will be limited to the bandwidth of the input signal.
An examination of the last IF stage response curve will show that sound is attenuated in the last IF stage. The first picture IF grid injection attenuates the sound frequency sufficiently to give the desired level of 0.1% for sound to picture carriers at this point. This attenuation provides the necessary isolation between the sound carrier and the picture carrier thereby eliminating any possibility of a GAIN feed-through to the picture. The degree of attenuation is controlled by a variable control in the stereo IF grid circuit. This adjustment is made during the receiver alignment.

Following the first IF amplifier is a feed-through circuit similar to the type found in mono black-and-white receivers. There are two injection stages in this feed-through circuit. The first picture IF grid is now at the desired level of 0.1%. The second stage, the second and fourth picture IF stages are single-biased stages. These circuits are also biased and tuned in black-and-white receivers. Bicolor sets, and the coupling between stages, eliminate coupling capacitance and hence reduce the af level to a point below that of the video picture by reducing the coupling efficiency and hence increasing the video picture distortion. If the coupling capacitors were carried over to the phono input, the video picture distortion would be much more severe as the video picture distortion would be much more severe.

The degree of attenuation is controlled by a variable control in the stereo IF grid circuit. This adjustment is made during the receiver alignment.

A typical low-pass filter is shown in Figure 5-11. The filter has an amplitude response as shown in Figure 5-11, and a time delay of a few microseconds as shown in Figure 5-11. Note that the filter introduces a definite amount of time delay in the signal. The time delay is roughly proportional to L. A filter designed for a narrow bandwidth, L and C must be large. In such a filter, the time delay will be greater than in a filter with a wide bandwidth, since L will be greater. The

Figure 5-10 - Time Delay Response

The second and third picture IF stages are single-biased stages. These circuits are also biased and tuned in black-and-white receivers. Bicolor sets, and the coupling between stages, eliminate coupling capacitance and hence reduce the af level to a point below that of the video picture by reducing the coupling efficiency and hence increasing the video picture distortion. If the coupling capacitors were carried over to the phono input, the video picture distortion would be much more severe as the video picture distortion would be much more severe. The second stage, the second and fourth picture IF stages are single-biased stages. These circuits are also biased and tuned in black-and-white receivers. Bicolor sets, and the coupling between stages, eliminate coupling capacitance and hence reduce the af level to a point below that of the video picture by reducing the coupling efficiency and hence increasing the video picture distortion. If the coupling capacitors were carried over to the phono input, the video picture distortion would be much more severe as the video picture distortion would be much more severe. The degree of attenuation is controlled by a variable control in the stereo IF grid circuit. This adjustment is made during the receiver alignment.

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color signal of approximately 350 Kc. Color signal modulating signal shown in Figure 5.7, we see that the amplitude of the low-cathode circuit is roughly 30 percent higher than that of the upper cathode signal. Interpretation of this type of results is a sketch of color variations. And, for example, might be represented with some greater detail. To avoid repetition errors of this type, pad alignment must be maintained.

Figure 5.3A is a complete schematic diagram of the RF unit. Provision is made for 12-stage VHF sections and 20-stage IF coverage. The operation of this triode-type tube for VHF and IF is shown in block diagram form in Figure 5.4. As can be seen from the schematic diagram, the basic difference in operation between VHF and IF is that the input transistor is charged from a single-ended transformer of VHF in a d-c bias type at VHF, and the IF amplifier stage, V1, is excited at IF.

This is the RF amplifier, as described by the AGC system. Following the system, color, B; color UV and VIF, is the basic IF amplifier stage made up of a grounded-emitter amplifier. A drive-preamplifier output stage is connected with this amplifier. The plate circuit of this preamplifier contains the primary of a bandpass filter, which feeds the main IF section. The RF output is in the 40 Mc range.

The oscillator V2 is a modified Colpitts type using a 6AU7 tube, operating at the fundamental frequency for the VHF and IF stages.

**RF Section:** The circuit of the picture IF section of a color receiver requires somewhat more care in its circuit design. Some of the circuit requirements are more necessary for color. Although none of the circuits of the IF section, shown in the component diagram, are new, the many color arrangements are related to accomplish specific goals that will be described.

In order to produce a color picture along with the accompanying sound, there must be a fundamental base of information that is passed by the IF system. This is the photo-signal at 350 Mc, or converted color video signal at 350 Mc, or converted color UV signal at 420 Mc, and the visible color visible at 420 Mc. The visible information prior to IF modulation is shown in Figure 5.4. There are no noticeable components of a color signal. As previously mentioned, the brightness or luminance information shown in Figure 5.4, and color or chrominance information shown in Figure 5.5, are the basis for the color information in the video detector. Above each block is the appropriate suppression name for that stage. The sum of these individual components is represented by the overall response curves shown in Figure 5.5. Autonomous gain control is accomplished by providing bias for the first, second, and third IF amplifiers from the AGC system.
widespread performance and uniform flat response on all channels: essential for good performance in color television. Figure 8.5 shows the possible response curves for the RF lineages. The desired condition is shown in FIGURE 8.6. The slope shown would probably be preferable (less black-out and white-out) but for color, the substrates are disposed to such an extent as to cause color distortion. An RF curve having the response of FIGURE 8.6 will have low coloration and poor color transitions (change from one color to another). High color coherence with poor color transitions will result for the condition shown at (c), and poor color transitions for a condition shown at (b). A color transition works on the lower of an edge of an edge, giving rise to relatively high color frequencies. This change in color is very much dependent on the higher color video frequencies. Poor color transitions in the case of the invented RF circuits result from a shifting of the pass-band in the region of the color subcarrier. For example, if we consider the color signal amplifiers at the upper and lower substrates of the
10. Physical Aspects of Color

To this point we have learned some of the basic properties of color; what it is, and what it means to us, that the color fundamentals of physics, optics, and chemistry are necessary to understand. But what about the role of the color as a human experience? What does color mean to us as we experience it in our everyday lives?

An important aspect of color is its perception by the human eye. The eye is sensitive to a wide range of wavelengths, but it is not equally sensitive to all of them. The human eye is most sensitive to light in the green part of the spectrum, which is why green is often associated with life and growth.

Another important aspect of color is its effect on the brain. Colors can evoke different emotions and can have different meanings in different cultures. For example, red is often associated with passion and danger, while blue is often associated with calmness and serenity.

In this lesson, we will explore the physical aspects of color, including how light interacts with the eye and how the brain interprets color. We will also consider the cultural and emotional implications of color.

[Image of a diagram showing the absorption of various wavelengths by the eye and the brain.]
Lesson 2

2.1. Requirements of the Color Television Signal

One of the primary requirements of a color television system is to provide high definition black-and-white pictures with the standard black-and-white signal without any modifications to the receiver. This means that, first, a color television must provide a flat 6 MHz black-and-white signal with the same amplitude modulations, phase and timing characteristics as does any ordinary standard black-and-white television. Secondly, the chrominance information, which includes the blue and extreme variables of color, must be transmitted within the standard 4.5 MHz television channel and must not interfere with the black-and-white signal (the brightness variable of color).

At first glance, this seems to be a difficult task to accomplish since the 6 MHz channel is approximately three times wide. However, it will be shown in this section that it is possible to transmit the chrominance information within the standard 4.5 MHz television channel.

In developing the color television signal, a method which is not generally used for color television transmission will first be discussed. This will lead into development of the present system of high definition television transmission. It is felt that treating the subject in this manner will give the reader a better understanding of the technique involved.

Figure 2.1. - The Optical System Used in the NBC Color Test Signal Transmitter.
Chrominance Transmission Within the 6 Mc Television Channel

Figure 2-11 illustrates the free television signal simulation within the standard set up of picture elements of a television channel. Each of these elements is taken up by the black-and-white signal with only a small band of the frequency range and the main carrier, which operates at high frequency end. The black-and-white signal (6.0 Mc./sec.) of the channel location at first glance a would seem impossible to transmit chrominance information within this space without causing serious conflict with the signal already present. However, this is not the case.

The reason that chrominance signal is available in this space is that it is a combination of signals. Both the Y signal and the R-Y signal are transmitted simultaneously. The R-Y signal contains the color information that is necessary to reproduce the colors accurately. The Y signal contains the luminance information that allows the receiver to reproduce the brightness of the image. By combining these two signals, the receiver can create the full color image.

The chrominance signal is transmitted at a frequency of 3.579 Mc./sec., which is a subcarrier frequency. This frequency is chosen because it is far enough from the audio frequencies to avoid interference, but close enough to the video frequencies to allow for efficient transmission.

Chrominance signals are transmitted using a process called quadrature modulation. This process involves shifting the chrominance signal by 90 degrees, which results in two signals that are 90 degrees out of phase. These two signals are then combined and transmitted over the same frequency channel as the luminance signal.

At the receiver, the chrominance signal is demodulated and recombined with the luminance signal to produce the full color image. This process is known as color correction and it is performed by the color correction circuits in the receiver.

In summary, the chrominance signal is transmitted at a frequency of 3.579 Mc./sec. It contains the color information that is necessary to reproduce the colors accurately. The signal is transmitted using a process called quadrature modulation, which results in two signals that are 90 degrees out of phase. These two signals are combined and transmitted over the same frequency channel as the luminance signal. At the receiver, the chrominance signal is demodulated and recombined with the luminance signal to produce the full color image.
1-6. Color Standardization

To those associated with the science of color it is a well-known fact that no two people see color exactly the same. Human eyes are so different between people as fingerprints, i.e., each one is different in color interpretation and in its sensitivity to light intensity and color. Otherwise, the world would be in chaos trying to figure out whether the sky was blue or green, or a "pure" pink or the slightest orange. The slight differences in color interpretation is of great concern, however, to people who deal with the science of color. The feelings of one individual might be based on his own interpretation of color, and would do another scientist no good unless he had exactly the same optical characteristics. For this reason, the International Commission of Illumination (CIE) in the late 1920s and 1930s, adopted a standard set of primary colors, and this standard is used in the CIE Colorimetric System. These curves are represented by the eye all white lights of their respective colors, and represent the amounts of these monochromatic light sources that will produce 100% saturation of all visible hues. With these curves a format can be developed for any color that will tell the full story of that color in optical, standardized terms.

One purpose in bringing up the subject of fundamental color mixture curves is to point out that four of these curves include a "color map" or chromaticity diagram can be developed. This will provide us with a plotting ground for placing some of the color phenomena relating to color television. The fundamental color mixture curves are as follows: white, red, blue, and green. White is represented in Figure 1-32, and is a mixture of red and blue, and green represented as a mixture of red and blue, and green and blue, respectively. Figure 1-32 contains two maps having a wavelength of 6,000 micrometers which is a very close to the normal region that a certain number of colors in a complementary form, having a wavelength of 500 millimeters.

Any point within the chromaticity diagram represents a hue and color saturation of that hue. If two points are plotted, the connecting line between will indicate all of the colors that can be produced by combination of the two hues at the points. This connecting line is called the general or range of two colors. If three points are plotted that do not lie on a straight line (an arc), then a triangle in some cases includes a white. If three colors can produce white, by variation of amounts they can produce all other hues, even white is a product of all hues.
FIG. 1. Three Skelton RED-EO TAPE Mobile Units. Control room bus is at left foreground, and the recording unit directly behind. The power and equipment storage bus is at right.
Panasonic

ooh, you gotta see it!
C'est à partir de ce Centre que les courants d'image reçus sont amplifiés et envoyés par câble à l'émetteur de la Tour Eiffel. L'antenne de la Tour Eiffel vient d'être améliorée récemment. Installée dès 1937, sa réalisation fait honneur aux ingénieurs français.
Fig. 4. View of the studio showing lighting arrangements
apparatus known as a mixer, the function of which it is to transmit to the various controls and to the transmitter one or other of the chosen scenes (direct pick-up or film transmissions) or gradual superposition of the two. In this manner some very interesting transitions can be obtained.

Distribution

The distribution lines, 10 in number, at the output of the mixer, are cycles; the power then modulates a push-pull H.F. stage comprising two water-cooled valves of 3 kW, is working on a quartz-controlled 8-metre wave.

The D.C. high tension (8,000 V.) is furnished by a mercury arc rectifier, and the auxiliary supplies by several groups of rotary generators. The total power consumption reaches 40 kWs, while the maximum power furnished to the feeder is from 6 to 8 kWs. This low efficiency is due to...
en assez confortablement, quelles que
direction qu'il donne à la tête de sa
visière à prendre des positions qui, pour
être moins incommodes, comme
employée dans les studios anglais ou
le cinématographe fait pour ainsi dire corps
dans un modèle de caméra tout-récent,
(figures 7), les possibilités du visi-
ueur beaucoup plus à fond ; un tel visœur
mélange d’images, opérateur
appelle « régie », dont nous repar-
vie avec le tube de prise de vues
aujourd’hui plus de lux sont néces-
scope et l’orthicon se contentent de
mage-orthicon, on peut descendre à
détenir une image au clair de lune.
utilisables : sont variées ; il faut
un spectre de raies, comme les
...
Caméra de studio de la C.D.C. (Photo G. ROUQUET).
ENSEMBLE DES CANAUX FRANÇAIS (BANDE I)

PARIS 461 LIGNÉS

819 LIGNES CANAUX DIRECTS 1 et 2

819 LIGNES CANAUX INVERSES 1 et 2
Fig. 1. — Raccord de Télévision de la Tour Eiffel avant l'ouvr. 36 Kw. utiles sur 8 m.
ont déjà assisté à des démonstrations; mais nous entendons dire que la réception n’est encore que du domaine du labora-

Fig. 13.

Fig. 14.
vision se développera en France, et la réception qui, bien entendu, est soulignée que les esprits chagrins et pessimistes (on sait pourquoi) veulent bien la laisser croire.

J'ai renoncé, pour ma part, à avoir
vision se développera en France, et la réception qui, bien entendu, est au
plus vite que les esprits chagrinés et morisés.

J'ai renoncé, pour ma part, à avoir
Apparition de la « mire au cheval » avec la Renommée, statue de Coysevox.
La caméra 180 lignes à disque «double spirale», mise au point par R. Bartiecleny pour les émissions haute définition de décembre 1955.
FIG. 206. — Tambour à miroirs de grand diamètre utilisé en Angleterre
Color TV's Alphabet Soup

- Or, how NTSC Begat SECAM, PAL and Their Descendants

John Pinckney

2008 Early Television Convention
Hilliard, Ohio U.S.A.

© 2008 FUBAR Broadcasting Corporation
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**NTSC-J** is identical to **NTSC-M** except black level and blanking levels are identical at 0 IRE.
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<td></td>
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<tr>
<td>Audio Carrier</td>
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<td></td>
</tr>
</tbody>
</table>
Conception

He Started It
Mr. Swinton’s Modest Proposal
DISCLOSURE TO PATENT DEPARTMENT

COPYRIGHT OF AMERICAN CAGLIARI CORPORATION

1. In the present transmission using a disc antenna as required, the disc contains at least a large number of small particles of silver distributed on the disc, these being in turn suspended in insulation as follows:

<table>
<thead>
<tr>
<th>Case 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Coat the supporting insulating material with a continuous film of metallic silver.</td>
</tr>
</tbody>
</table>

2. Divide the insulating material into separate parts by curvilinear marks:
   (a) By mechanical means.
   (b) By chemical means.

3. Apply the separate parts directly to the insulating material. (Use case 1 metallic silver)

4. Apply or produce by means of a brush or silver powder or white, conductive tree or dust, the silver by evaporation is a process from the use of a vacuum which may be produced by means of metallic silver by means of a process.

5. This is obtained in accordance with 1,2,3, and 4.

<table>
<thead>
<tr>
<th>Case 2</th>
</tr>
</thead>
</table>
   | 6. The parts may be applied directly avoiding separation by mechanical means by evaporation, suspension or spraying from a source. The separate silver particles may be applied to or in the manner which would support...

7. The same result can be achieved by any of the known means.

<table>
<thead>
<tr>
<th>Case 3</th>
</tr>
</thead>
</table>
   | 8. Either a similar process or similar process is applicable to similar methods. In the process of applying the silver coating to the plate, the silver will then be deposited which experiment shows to be very satisfactory. It is to be noted that different conditions are to be considered.

IN THE PREPARATION OF THE SILVER COATING

The process of applying the silver coating:

<table>
<thead>
<tr>
<th>Case 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. The process of applying the silver coating is:</td>
</tr>
</tbody>
</table>

10/01

11/01
DISCLOSURE TO PATENT DEPARTMENT

METHOD OF MAKING California CONSTRUCTION

6. To the present transmitting pole, & metal cathode is required.
   The cathode consists of a large number of small particles of silver
   insulated from each other by a space filled in turn saturated with
   solution of the metal.

6.1. The method of depositing metal is as follows:
   a. Coat the supporting insulating material with a continuous film
      of metallic silver.
   b. Divide into separate parts &
   c. Use water as the medium.
   d. Apply the separate parts directly to the supporting insulating material.
   e. Add metallic silver directly to the insulating material.

7. Apply the resulting film described in the supporting insulating material.

This is used in the manufacture of silver films at the correct temperature.
In the case of this method, the film may be etched in a stream of water to
etch the film.

6. The etching may be applied directly without exposure to chemical or
   mechanical means by evaporation, electrolysis, or by steam. The
   separate silver particles should be applied to or in a manner which would
   result.

6.1. Silver conductive can be applied by any of the common means,
   eg. spraying, brushing, coating, etc. The film is directly onto
   the insulating material without use of metallic silver. If a
   thin film of silver is applied to the supporting insulating
   material, the film will lose its metallic properties, a suspension of the same
   in a liquid, drying. The resulting silver will form in small droplets.

Signature of Patent Examiner by

[Signature]

Date of Patent

[Date]
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<td>1967</td>
<td>5563</td>
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1948 CROSLEY
MODEL: CC SERIAL #CC56945
CURB WEIGHT: 1403 LBS.
GAS TANK: 6.5 GALS
ENGINE: 44 CU. IN. 156 LBS.
26.5 HP AT 5400 RPM (ACTUAL) - 10 HP (AMA)
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Ruth Lyons
The Woman Who Created Talk TV
By Michael Banks

She was an up-front, real woman who rose from humble beginnings. Her daily
live television show drew millions of viewers. She gave away cash. And her mere
mention of a product would turn it into a bestselling name.

This was not the Oprah Winfrey, but it’s a description of Ruth Lyons, a
pioneering broadcaster whose audience in 1950 eclipsed that of Winfrey’s today.
With a mix of sentimentality and erotic community she exhibited her way
through commercials and interviews with Hollywood stars. She ruled a broadcast
empire and a famous charity all the while maintaining that she was simply a
normal housewife and mother who happened to have a radio show. National
magazines labeled her “the most influential housewife in America.”

Her fame was such that throughout the 1940s and ’50s, tens of thousands
showed up for her remote broadcasts and her personal appearances. 100,000
people tried to get tickets for a 1957 event in her honor.

Ruth Lyons: The Woman Who Created Talk TV, is the first complete biography of
this pioneering broadcaster and rough businesswoman. It includes her life story
complete with heart-wrenching events that even she didn’t want the world to see.
Follow Ruth through her days as a child, growing up in Columbus, Kansas to
her shock on 20/20 in the death of her daughter. Find out who she was and
why she became the hardest working and most philanthropic in the business.

Written by Michael Banks, author of Country Fan Brothet and a Business Empire
That Transformed the Nation.

“She was such a brilliant woman. I don’t think I ever met anybody in
broadcasting who had the integrity that she had.” — Peter Nero

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RCA R-100 Phonograph Attachment

RCA's TRK-5, 9 and 12 had a connector to allow a phonograph attachment to be plugged in. This one was introduced at the 1939 World's Fair.