



RADIO SERVICE NEWS

PUBLISHED . IN . THE . INTEREST . OF . RADIO . SERVICE . SALES . ENGINEERS

VOLUME IX, No. 2

"RADIO WILL WIN THE WAR"

DECEMBER, 1943

TELEVISION SHOWN AS BOON TO PROGRESS OF POSTWAR ERA

LUMINESCENT MATERIAL DEVELOPED BY RCA TO OPEN VAST NEW FIELD

Benefits May Extend to Home, Health, Science, And Industrial Areas



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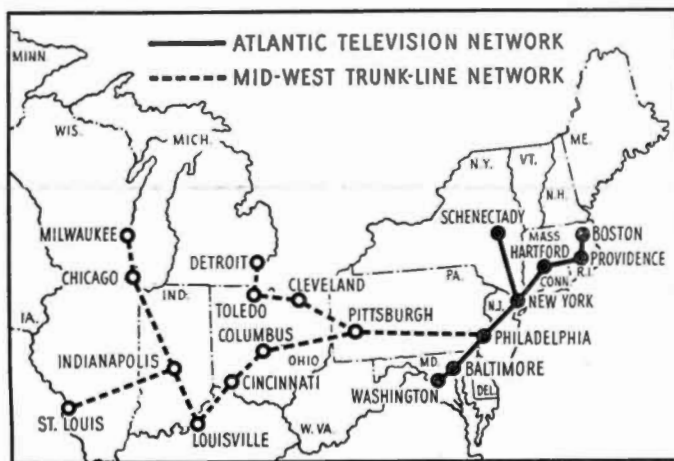
One dark night in mediaeval Italy, a weird blue glow started a sequence of experiments which led to electronictellevision, fluorescent lighting and a score of other useful services catering to the human eye. The glow was observed by Vicenzio Casciarolo, a Bolognese alchemist, who, in 1603, observed light emanating from some white barite rocks which had been accidentally heated with charcoal in his forge. Casciarolo's material had the amazing facility of absorbing daylight and then emitting a feeble blue light during the night. Similar materials, though vastly improved, are now called phosphors, or luminescent materials, and are produced in hyper-clean laboratories or special factories for use in war and peace.

Development and use of phosphors languished for more than three centuries until electronic television research, pioneered principally by RCA, devised highly efficient luminescent materials capable of glowing in practically any conceivable color. Prior to the advent of television, phosphors had had only minor application in radioactive watch dials, x-ray fuoro-scope screens, and theatrical "black magic", each of which required negligible amounts of material.

Television By-Product

Television research on phosphors yielded at least one product which may be likened to the tail which wagged the dog. The new luminescent material became the keystone of the tremendous luminescent lighting industry which dwarfed television within a year after its inception. The particular phosphor is a beryllium-containing

HERE IS U. S. TELEVISION MAP OF THE FUTURE



Assuming no radical change in broadcasting standards or allocations, these are the post-war television network developments outlined before a recent joint meeting of the American Television Society and the Advertising Club of New York by Thomas F. Joyce, Manager of the Radio, Phonograph and Television Department of RCA. The solid lines indicate the initial television network, with expansion shown by the broken lines.

silicate which exceeds the tungsten filament in efficiency of light production and may be made to emit almost any color in the major portion of the rainbow spectrum. It found immediate application as the screen which converts electron energy into a visible image in television, but its main use is the principal constituent in the light-producing coatings of white fuorescent lamps.

Phosphors are synthesized as clear, tiny crystals measuring about one ten-thousandth of an inch in size. These crystals gleam like miniature diamonds when viewed under a microscope. Phosphors are unique in being able to do the following:

1. Instantaneously transform invisible radiations, such as cathode rays (swiftly-moving electrons) or ultraviolet, into visible light.

(Cont. on page 2, col. 1)

\$200 RECEIVERS HELD AS KEY TO INDUSTRY'S DEVELOPMENT BY RCA

Company Executive Outlines Steps to Make Programs Readily Available to U.S.

Within five years after commercial resumption of television, sight and sound programs, broadcast by a network and individual stations in 157 key cities, will be available to 60 percent of the people of the United States if the radio industry can produce a television home receiver priced at approximately \$200.

This was forecast by Thomas F. Joyce, Manager of the Radio, Phonograph and Television Department of the RCA Victor Division of Radio Corporation of America, speaking (Wed., Nov. 10) at a joint meeting of the American Television Society and the Advertising Club of New York.

"Such a receiver, I believe, is possible," he said, "based on 1940 labor and material costs, and assuming no excise taxes. Of course, the postwar price would be increased by the factor of inflation and excise taxes."

Practical Analysis

In a clear-cut analysis of postwar television markets, marked by a strict adherence to practicalities and known facts, Mr. Joyce declared that the number one problem of the postwar television industry was an acceptable low cost radio television receiver. He cited an 11-city survey which showed that over 61 percent of men and women questioned said they would buy a good television receiver priced at \$200.

Within ten years after full commercialization of visual broadcasting, Mr. Joyce declared, television will be a billion dollar industry. This, he said, is based on the development of a low cost automatic rebroadcasting television transmitter to relay programs in areas outside the scope of the key network stations.

"Such a development will make it economically feasible to bring television service to practically every home in the United States," he said, adding that at that time

(Cont. on page 2, col. 4)

TRIO OF STARS SHINE ON "WHAT'S NEW?" BROADCAST



Don Ameche recently played host to two beautiful girls at RCA's "What's New?" show, heard regularly every Saturday at 7:00 P. M. (EWT) over the Blue Network. Dinah Shore, the nation's No. 1 songstress, is at the left; and Ruth Hussey, prominent screen star, is on the right.

PHOSPHORS BRIGHTEN FUTURE OF ELECTRONICS PROGRAM

RESEARCH REVEALS POWER OF LUMINESCENT IN YEARS TO COME

(Cont. from page 1, col. 3)

2. Store light, or "remember" information, for controllable time intervals lasting from less than a hundred-thousandth of a second to more than a day.

3. Convert electric power into white or colored light more efficiently than any other known practical means.

Some of the properties of phosphors have ranges which are astronomical in magnitude. For example a phosphor may be made to glow for several minutes after a fleeting excitation lasting less than one millionth of a second. The same phosphor will produce visible light under impingement of electrons accelerated by as little as six volts or as much as six million volts. Furthermore, some phosphors are so sensitive that electron beam currents smaller than one one-hundred-millionth of an ampere suffice to excite discernible luminescence, whereas the same materials, in coatings as thin as tissue paper, can withstand high voltage electron bombardment of intensity adequate to crack an underlying Pyrex glass disc.

Possess Unique Qualities

The aforementioned extraordinary qualities are not possessed by ordinary materials. Sugar, salt, window glass, quartz, diamond and other commonly known substances luminesce only faintly under cathode rays or ultraviolet. Such substances lack the delicate, though sturdily incorporated, arrangement of certain cooperative and electronically-active atoms present in phosphors.

TELEVISION PROSPECT NO. 1



Delightful, delectable and dee-velvely are three of the adjectives that first come to mind in any attempt to describe the talents of beautiful Rita Hayworth, popular screen favorite.

RCA LABORATORIES AT PRINCETON STRONGHOLD OF ELECTRONICS



R. H. Plumlee, physical chemist, and Mrs. W. F. Kaser, laboratory assistant, analyze and mix purified phosphor constituents. Compartments prevent cross-contamination.

100% Pure Plus

Oddly enough, the ingredients comprising phosphors must be painstakingly purged of all impurities in order that one or two useful "impurities" may be deliberately added. The chemicals used for the preparation of phosphors are purchased in the purest obtainable form and are then subjected to lengthy purifications carried to a state far beyond "chemically pure" or even "spectroscopically pure." In fact, a new term has been introduced into the scientific vocabulary, "luminescence-pure," meaning free of undesirable constituents to a degree which, numerically speaking exceeds 99.9999 per cent. Apropos of the detrimental effect which impurities may have on luminescent materials, it may be mentioned that a television phosphor of the zinc sulphide type loses 25 per cent of its pristine efficiency if as little as 0.0001 per cent of nickel is left in the material. On the favorable side of the ledger, however, the efficiency of the same phosphor may be increased 100 per cent by the addition of only 0.0001 per cent of silver.

Require Spotless Laboratories

It is obvious that successful phosphor research must be performed in spotless laboratories. In the chemico-physics rooms of RCA Laboratories at Princeton, N. J., the laboratory air is made dust-free by thick filters and large electrical precipitators which remove even submicroscopic particles. Laboratory personnel are required to change to clean white clothing before entering the inner rooms. Water, the essence of chemical operations, is redistilled four times in electronically-controlled Pyrex and quartz stills. Acids are redistilled in quartz and platinum stills. The laboratory construction and most of the equipment are of commensurably special design, since standard apparatus or methods are

(Cont. on page 4, col. 1)

NO. 156 TUBE TESTER

Although the No. 156 supplement does not include tubes listed on the original roll charts, it will give you an idea of the method of listing obsolete and interchangeable tubes and the cross reference to the official tube test data. Incidentally, an additional copy of this supplement may be obtained free upon request.

While the No. 156 series of tube testers has been discontinued, our Engineering Department is planning an excellent tube checker for post-war use. Moreover, we thought it would be of interest to let our readers know about some of the work that is going on.

In order to do a good job, we feel it is necessary to accumulate several of each type of tube in common use as receiving types or as special purpose types. Only by seeing this collection, which is still incomplete, can one appreciate the magnitude of the project which, so far, has been two years in the making. Tubes are gathered in from all manufacturers, especially if they are the sole source of any particular type. These are then numerically and alphabetically cataloged for future reference in calibrating tube tester models.

Behind all this, of course, lies the job of listing all tubes ever made regardless of their source and determining which ones are now obsolete. Obsolete tubes will not be shown on calibration charts but will be listed on an interchangeable tube chart permitting as wide a scope of tube testing as is possible.

In cases where there are several types of tubes with the same test, such as the metal, the glass and the GT type, all will be listed on an interchangeable chart indicating the latest designation common to all these tubes, which will then be used in tabulating data for a test.

60% OF U. S. POPULATION SEEN AS "TELEVISED" IN 5 YEARS OF EXPANSION

(Cont. from page 1, col. 4)

retail billing of television sales should be between six and seven hundred million dollars.

"This billing," the RCA executive stated, "together with replacement tubes for existing receivers, service, transmitter sales, advertising revenue, and other items, will make television the billion dollar industry that many have prophesied it will be."

His estimates on the probable postwar rate of market development for television, he explained, is based on a complete agreement on standards approved by the Federal Communications Commission, which would give the industry the "green light" to go ahead without any "ifs."

Mr. Joyce estimated that within two or three years after the full commercialization of television, about ten percent of the wired homes in the foregoing cities, or 741,000 families, representing a probable audience of seven million people would own television receivers.

"We can assume further," he continued, "that within three or four years after commercial resumption of television, Washington, D. C., Baltimore, Hartford, Providence, and Boston will have television transmitters. These cities, together with Philadelphia, New York, Schenectady and Albany, could be interconnected with a television network circuit about 600 miles long.

"This network circuit would make television broadcasting service available to 33,336,000 people, 1,379,039 wired homes, representing 36.62% of the total U. S. buying power."

By the end of the fifth year, he said, engineers should be able to develop the automatic transmitter for rebroadcasting television programs, thus blanketing areas of the country unreached by the stations in the 157 key cities.



T. F. Joyce, Manager, RCA Victor Radio, Phonograph and Television Dept.

REPLACEMENT PARTS SECTION—ANNOUNCEMENTS, TIPS, SUGGESTIONS

SALES AND SERVICE TIPS

You can win a handsome RCA Service Engineer's Pencil by sending tips to RCA RADIO SERVICE NEWS, Camden, New Jersey. All tips become the property of RCA to use at its discretion. Service Tips are our readers' ideas, not ours; while we believe they are worthwhile, we cannot be responsible for results.

SERVICING RECORD CHANGERS

Use of Radio Servicing Methods Makes Changer Servicing Easy

A simple, logical procedure has been developed through the years for efficient radio servicing. Servicemen have found that such a routine saves time and insures a good job. But automatic changer servicing has been approached by many servicemen by the "cut and try" method, with the result that these servicemen regard changer servicing as difficult. Too many servicemen, when servicing a mechanism, seem to forget the lessons radio servicing has taught; forget that common sense, systematic method always pay.

"Cut and Try" Doesn't Pay

It is no more possible to properly repair a changer without knowing "what goes on inside" than it is to properly repair a radio without understanding the signal path through the radio. If you remove parts or change adjustments of a radio without a thought as to their relation to other parts and adjustments, you've made yourself a long, hard job getting that radio to give proper performance. In the same way, removing a part from a

record changer without being absolutely certain it is at fault and without an understanding of its relation to the rest of the changer, may disturb several adjustments that will make your job many times more difficult.

Study the action of the changer—not everything at once, but action by action, step by step—just as you trace the signal through a radio. Reason out the cause of the failure by studying the effects on the natural sequence of events in the changer cycle, just as you reason from effect to cause in radio servicing. It is easy to study the action of a changer, for, unlike radio circuits, the operation of a changer can be observed visually without cathode ray or other equipment.

Trace Sequence of Actions

The automatic record changer should be serviced by following exactly the same logical procedure as for radio servicing: By questioning the owner, determine the complaint. By operating the changer, observe the action of the changer and verify the complaint. By carefully tracing the sequence of actions in the changer, determine the particular action at fault. By careful and repeated observation of the action at fault, and by comparison with the service notes, determine the particular part or adjustments needing attention.

Just as you operate the radio and trace the signal through it, operate the changer and follow each action in turn. Sometimes it is advantageous to operate the changer through its cycle by rotating the drive by hand so the actions may be studied under "slow motion" conditions, just as your oscilloscope slows down the high frequency signals so you can study them.

Just as the most complicated radio is merely a series of basic and simple electrical and radio circuits, so a seemingly complicated changer is a series of simple mechanical actions of springs, levers, cams, studs, and motors. In the same way as your Chanalyst is used to check one section of the radio at a time to determine the section at fault, so with a changer watch one mechanical action at a time until convinced you understand it and that it is operating normally.

Common Sense Is Best Tool

In short, using the systematic methods of good radio servicing when servicing record changer will result in a job well done, quickly and efficiently. As in radio servicing, the very best "tools" you can use in automatic record changer servicing are: logical procedure, careful observations, and good common sense.

STOCK AVAILABLE

We list below several stock numbers that are now available on which we heretofore have been out of stock:

RCA Stock No.	
5216	Coil (model C15-3, T10-1, D11, D22, etc.)
5901	Volume control (models R18, R51, R33)
12723	Capacitor (various models)
31048	Plug, phonograph
31721	Cone (HF8, U132, U134, etc.)
31848	Volume control (12Q4, 12QK)
33602	Speaker (model T60)
34615	Cone 8" (for RL 63 Speaker)
34773	Cone 12" (for RL 70 Speaker)
34865	Cone for Accordion type speaker
36320	Arm, pivot arm (for RP-152, RP153 record changer)
36618	Resistor, voltage divider (Q44)



W. R. Alken
Replacement Parts Section
Order Service Head

37243	Power transformer (MI-8302E, -H)
37681	Resistance Cord (15BP, 25BP series)
37997	Transformer, output (QU-51, QU55)
38457	Cable, pickup (RP151 (V225))

REFERENCE CHART ON RCA 12" CONE FOR RL70 TYPE SPEAKER

The reference chart below was prepared because we believe it may be of value to dealers and service men who may have stock of these cones on hand. In general these cones are interchangeable, differing only in weight of diaphragm and the design of the metal support bracket. Both type brackets can be mounted in the speaker yoke plate. The only difficulty encountered is the position of the voice coil leads and the necessity of increasing the length of one lead when using stock #34075 and #34773 in early Model RL70 Speakers.

Stk. No.	Diaphragm Wgt. Grams	Damping Ring	Metal Support Bracket	Remarks
11258	9	No	No	See Note #1
31275	11.3	No	Yes	See Note #2
34705	9	No	Yes	Use RCA 36145 Cone
34773	11.3	No	Yes	
35616	9	No	No	Use RCA 36145 Cone
36000	11.3	No	No	Use RCA 36145 Cone
36145	11.3	Yes	No	

NOTE #1. This cone is early style cone as used on first models RL70 Speakers. The cone has fiber suspension which mounts to the speaker cone housing. We are unable to replenish our stock on this type cone. For method of installing new type cone refer to information in November issue of the RCA RADIO SERVICE NEWS.

NOTE #2. This cone is also out for the duration. For information on servicing speakers using this cone refer to November issue of the RCA RADIO SERVICE NEWS.

GENERAL INFORMATION. All cones listed above, except 11258 are same size and have identical voice coil. It has been our practice to use the 9 gram diaphragm on Radio Phonograph combinations and the heavier 11.3 gram diaphragm on Radio Consoles. Stock 36145 cone will, as soon as stocks can be adjusted, be our standard cone for all applications. The damping ring has a tendency to attenuate the high frequency response and is especially helpful in reducing needle scratch. On late production diaphragms the weight of the diaphragm can be determined from the following numbers stamped near the apex of the cone: Cones stamped PT1 are 11.3 gram diaphragms and cones stamped PT2 are 9 gram diaphragms.

The Damping Ring is carried in stock as stock # RCA 70084. We do not recommend the general use of this ring on cones. However, if service men desire to cut the high frequency response of the cone on Radio-Phonograph combinations this ring can be installed. When installing, neatness and use of a minimum amount of cement is important; be sure old dust cap is removed and new paper cap installed.

Cone Accessories

RCA Stock	13867	Paper Dust Cap
RCA Stock	31825	Felt Dust Cap
RCA Stock	70084	Damping Ring; use with Paper Dust Cap
RCA Stock	36146	Metal Support Bracket

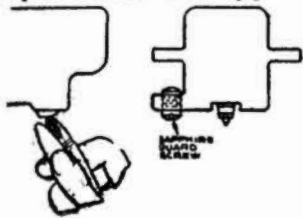
ALL OUT FOR VICTORY



A former vaudeville show girl, Kaye Grimm, has joined up as a war worker at the RCA Victor plant in Camden, New Jersey, helping to turn out radio, sound and electronic equipment for the armed services. Costumes like this one should help to step up production.

NEW SAPPHIRE NEEDLE STOCK NO. RCA 70050 FOR 38610 CRYSTALS NOW AVAILABLE FOR IMMEDIATE SHIPMENT

Replacement of Sapphire



Sapphire is held in armature with rubber cement (such as Goodrich "Plasticon"). Observe the following before attempting to remove. To remove sapphire grasp firmly with a pair of tweezers, hold the rubber armature with thumb nail and pull sapphire out with straight direct pull in line with needle. A rubber cement solvent such as naphtha may be used if

difficulty is experienced in trying to remove the sapphire.

CAUTION—Do not twist or try to remove by sidewise motion as this may damage the crystal or split the rubber armature. Before inserting the new sapphire dip in rubber cement, previously thinned with naphtha. After replacing sapphire clean the point thoroughly to remove all traces of cement.

REPLACEMENT PARTS FOR METERS USED IN RCA JR. VOLTOHMYST

Meter glass is supplied only complete with the case front. We have used four different meters. The case fronts are not interchangeable. The stock numbers assigned to these four different fronts are shown in instruction book 32041-5 covering the Junior Voltohmyst Type 165A.

1. Meter manufactured by "Simpson" code 243-s may be identified by the number 7090 in the lower right hand corner of the dial of the instrument. Simpson meters also have their name moulded in to the back case. This may be seen if the meter is removed from the instrument. Stock #43923 covers a complete replacement Simpson meter and stock #44288 covers replacement meter case front with glass.

2. Meters manufactured by "Dejur" code 243-D may be identified by the letter "D" or Z15-1102A on the lower right hand corner of the scale. The back of the case also has a "Dejur" trade mark moulded therein. Stock #45931 has been assigned to the complete replacement meter and Stock #45934 has been assigned to the meter case front with glass.

3. Meters manufactured by "Triplett" code 143 may be identified by the fact that the four corners of the instrument are not rounded but are on a 45 degree angle, making the meter eight sided, although the corners are of shorter length than the four sides proper. Stock #47146 has been assigned to the complete replacement "Triplett" meter and stock #47155 has been assigned to the meter case front with glass.

4. Meter manufactured by "Beede" code 243B may be identified by the fact that the face of the instrument which protrudes from the front of the voltohmyst panel are stepped. That is, that the sides come forward and the front of the case actually decreases in size.

Stock #47158 has been assigned to the complete replacement "Beede" meter and stock #47159 has been assigned to the meter case front with glass.

RCA STUDY PIONEERS LUMINESCENT FIELD FOR POSTWAR ERA

(Cont. from page 2, col. 2)

inadequate for the task of divorcing chemical elements from their inherent impurities.

Purification rubs nature the wrong way. There is a ceaseless natural tendency for all things to mingle and become chaotic. This inexorable mixing process is called entropy in scientific parlance. The relentless increase of entropy reputedly shares with the unvarying speed of light in a vacuum the distinction of being one of the two absolute properties in the relativistic scheme of things known to man.

Spectacular Climax

Crystallization, the final step in the synthesis of a phosphor, is relatively brief but spectacular. A quartz or platinum crucible, filled with the precisely compounded mixture of pure ingredients, is placed in an electric furnace operating at 2000-3000° F. At the elevated furnace temperature, the haphazard agglomeration of the various chemicals becomes mobile and, naturally, the different varieties of atoms commingle to a homogeneous mass on a molecular scale. After some minutes, the white hot crucible contents are withdrawn from the furnace and allowed to cool. As the cooling proceeds, the slithering atoms move more and more sluggishly until, at the crystallization temperature, the entire assemblage locks into perfect three-dimensional rows which are characteristic of a true crystal. The crystallization process is analogous to the manner in which trained soldiers snap out of the sprawling confusion of "at rest" into neat marching array.

(Concluded in next issue)

SIGNS OF THE TIMES?



This cartoon proves that even Government officials have a sense of humor. Yes, the artist responsible for this humorous reflection of the trend of the times is a member of the Field Service Branch of WPB's Radio and Radar Division. Truth is often stranger than fiction.

"WHAT'S NEW?" HEARD VIA SHORT WAVE

Our readers will be interested to know that "What's New?" is being short-waved in English to Latin America by the Coordinator of Inter-American Affairs. The show is being broadcast over Station KGEI at 10:05 P.M. on Mondays and Station KWID at 2:05 P.M. on Tuesdays.

A WARTIME SUBSTITUTE FOR 18 SUPER-CONTROL R-F PENTODES

Many RCA Distributors have a supply of 39/44's which can be used with receiver changes as an emergency replacement for a number of types currently not available. Although this substitution will result in a lower receiver sensitivity, it should help to keep many a set in operation during the war period.

Types for which 39/44 may be substituted with appropriate changes

Type No.	Space Limitations	Wiring Changes	Filament Change	Socket Change
6E7	—	—	—	Yes
6D6	—	—	—	Yes
6K7	Yes	Yes	—	Yes
6K7-G	—	—	—	Yes
6K7-GT	Yes	Yes	—	Yes
6S7	Yes	Yes	Yes*	Yes
6S7-G	—	—	Yes*	Yes
6SK7	Yes	Yes	—	Yes
6SK7-GT G	Yes	Yes	—	Yes
6SS7	Yes	Yes	Yes*	Yes
6U7-G	—	—	—	Yes
7A7	Yes	Yes	—	Yes
7B7	Yes	Yes	Yes*	Yes
12K7-GT G	Yes	Yes	Yes*	Yes
12SK7	Yes	Yes	Yes†	Yes
12SK7-GT G	Yes	Yes	Yes†	Yes
14A7 12B7	Yes	Yes	Yes†	Yes
78	—	—	—	Yes

* For parallel-heater operation where transformer can supply additional current drain, or with series-heater operation where 150 ma shunts may be added around the 150 ma tubes.

† For series-heater operation where it is feasible to add 150 ma shunts around the 150 ma tubes and a 21-ohm 5-watt resistor in series with the heater string.

‡ Socket replacement for the 39/44 which used a standard 5-pin base can be obtained from worn-out receivers.

REMOVE RESTRICTIONS ON RECORDING BLANKS UNDER L-265 CHANGE

Restrictions on the transfer of blank recording discs and cutting styli (recording needles) have been removed by the War Production Board through an amendment to Limitation Order L-265.

Discs and styli are used for home recording purposes and in connection with radio broadcasting and sound recording. It was felt by the WPB Radio and Radar Division that individual purchasers of discs and styli for home recording purposes should not be subjected to the continuance of the restrictive requirements of preference ratings at the ultimate consumer level.

Commercial users of such records and styli purchased them normally as operating supplies. Preference Rating Order P-133 as amended November 17 gives a priority rating of AA-1 and use of MRO symbol to persons engaged in the radio broadcasting business and a rating of AA-2 and use of MRO symbol to commercial sound recording.

A storm of protest within the radio and record industry was aroused when home recording blanks were classified by the WPB Radio and Radar Division as electronic equipment at the time Limitation Order L-265 was promulgated. Under this classification it was necessary for a consumer to turn in an old recording when purchasing a new home recording blank. This virtually abolished sales in this business.