CHARLES J. MERRIAM
WILLIAM A. MARSHALL
JEROME B. KLOSE
NORMAN M. SHAPIRO
BASIL P. MANN
CLYDE V. ERWIN, JR.
ALVIN D. SHULMAN
EDWARD M. O'TOOLE
ALLEN H. GERSTEIN
OWEN J. MURRAY
DONALD E. EGAN
NATE F. SCARPELLI

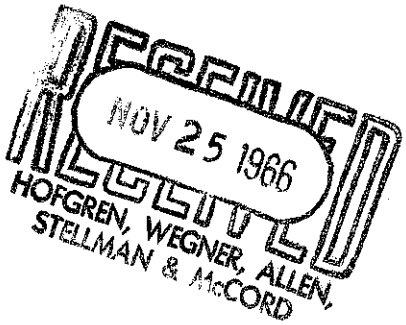
LAW OFFICES

MERRIAM, MARSHALL, SHAPIRO & KLOSE

THIRTY WEST MONROE STREET
CHICAGO, ILLINOIS 60603

TELEPHONE
FINANCIAL 6-5750

November 23, 1966



Mr. Richard S. Phillips
Hofgren, Wegner, Allen,
Stellman & McCord
Suite 2200
20 North Wacker Drive
Chicago, Illinois 60606

Re: University of Illinois Foundation
v. Blonder-Tongue Laboratories, Inc.
and Allied Radio Corporation
Civil Action No. 66 C 567

Dear Dick:

This will summarize the status of the production of documents occasioned by your subpoenas and requests.

1. The documents requested in your subpoena of October 28, 1966, to Mr. Earl W. Porter (employment agreements for Carrel, Isbell, and Mayes) have been collected. I have not had any copies made because I believe much of the material will be of no interest to you.

2. The photographs requested in your subpoena of October 28, 1966, to Dr. Mayes have been collected. Again, I have not attempted to have any copies made since I have no way of anticipating your wishes in respect of these documents.

3. The documents called for in your subpoena of November 14, 1966, to Dr. Mayes (i.e., reports, technical articles, and laboratory notebooks of Isbell, Carrel, and Mayes) have been collected. Because of the relatively large number of pages and because of the fact that I anticipate much of this will not be of any interest to you, I will await your inspection before having any copies made.

4. Referring to your letter of October 31, 1966, and the attached list of requested documents, the following documents have been gathered and have been given identifying numbers as given below:

B-4. Invention disclosures: documents 5254-5257, inclusive (Isbell) and documents 5287-5290, inclusive (Mayes and Carrel).

B-5a. Request by Professor Mayes: document 5316.

B-5b. None.

B-5c. Action taken by the Foundation: document A00389.

B-5d. Reports by Professor Mayes: none other than those produced in response to other requests.

B-5e. Technician who worked with Professor Mayes:

Ronald D. Grant
402 West Florida Avenue
Urbana, Illinois.

C-1. Meeting re: use of pictures, University name, etc., in advertising by JFD:

There are no records concerning this meeting. We are attempting to determine by inquiry who might have attended. This information will be conveyed if and when it is obtained.

C-2. Exhibit A of Mayes-JFD consulting agreement (B-24): no such document ever existed (see Mayes deposition).

C-3. Current Mayes-JFD consulting agreement: Dr. Mayes cannot locate his copy. Suggest you request a copy from JFD, if available.

C-4. Minutes of Foundation re: JFD license: documents A00382-A00386, inclusive.

C-5. Proposed ads: documents A00390-A00413.

C-6. Additional correspondence relating to advertising: documents A00357-A00381.

C-7. Releases of Mayes and Carrel inventions from UI to UIF: document 5302.

5. Evidence of infringement by Blonder-Tongue supplied to UIF by JFD (requested in Finkel deposition, page 51): documents A00414-A00421.

All of the documents identified above are available for inspection in our office at your convenience.

Sincerely yours,

Basil P. Mann

BPM/mto
cc:
Myron C. Cass, Esquire

Some reports pertinent thereto

B-2

TECHNICAL ARTICLES RELATING TO LOG-PERIODIC ANTENNA WORK AT UNIVERSITY OF ILLINOIS*

Balmain, K. G. and Dyson, J. D., "The Series Fed Log-Periodic Folded Dipole Array," Digest IEEE-PTG-AP International Symposium, 1963.

Carrel, R. L., "An Analysis of the Log-Periodic Dipole Antenna," Proceedings of the 10th Annual Symposium, U. S. A. F. Antenna Research and Development Program, October 1960.

Carrel, R. L., "The Design of Log-Periodic Dipole Antennas," I.R.E. International Convention Record, 1961.

Deschamps, G. A., "Impedance Properties of Complimentary Multi-terminal Planar Structures," I.R.E. Transactions on Antennas and Propagation, Dec. 1959.

Deschamps, G. A., and Duhamel, R. H., "Frequency-Independent Antennas," Antenna Engineering Handbook, 1960, Chpt. 18.

DuHamel, R. H. and Isbell, D. E., "Broadband Logarithmically Periodic Antenna Structures," I.R.E. National Convention Record, 1957.

Dyson, John D., "A Survey of the Very Wide Band and Frequency Independent-Antennas--1945 to the Present," Journal of Research of the National Bureau of Standards, Vol. 66D, No. 1, Jan.-Feb., 1962.

Dyson John D., "Frequency-Independent Antennas--Survey of Development," Electronics, April 20, 1962.

Greiser, J. W. and Mayes, P. E., "Vertically Polarized Log-Periodic Zig-zag Antennas," Proceedings National Electronics Conference, 1961.

Greiser, J. W. and Mayes, P. E., "The Bent Backfire Zigzag--a Vertically-Polarized Frequency-Independent Antenna," IEEE Transactions, Vol. AP-12, No. 3, May 1964, pp. 281-290.

Greiser, John W., "A New Class of Log-Periodic Antennas," Proc. IEEE, Vol. 52, No. 5, May 1964.

Hudock, E. and Mayes, P. E., "Near-Field Investigation of Uniform Periodic Monopole Arrays," IEEE Transactions, AP-13, No. 6, Nov. 1965, pp.840-855.

Isbell, D. E., "A Log-Periodic Reflector Feed," Proceedings of the I.R.E., June 1959.

Isbell, D. E., "Log-Periodic Dipole Arrays," I.R.E. Transactions on Antennas and Propagation, May 1960.

N.B.

*This list does not necessarily include all published articles relating to log-periodic antennas, but does include all that are presently (Nov. 21, 1966) considered pertinent to the litigation between the University of Illinois Foundation and Blonder-Tongue Laboratories.

Jordan, E. C., Deschamps, G. A., Dyson, J. D., and Mayes, P. E., "Developments in Broadband Antennas," IEEE Spectrum, April 1964.

Mayes, P. E., Isbell, D. E. and Carrel, R. L., "Antennas with Periodic and Pseudo-Frequency-Independent Performance," National Telemetering Conference Record, 1958.

Mayes, P. E. and Carrel, R. L., "Logarithmically Periodic Resonant-V Arrays," WESCON Record, 1961.

Mayes, P. E., Deschamps, G. A. and Patton, W. T., "Backward-Wave Radiation from Periodic Structures and Application to the Design of Frequency-Independent Antennas," Proceedings of the I.R.E., May 1961.

Mayes, P. E., "Broadband Backward-Wave Antennas," Microwave Journal, Jan. 1963.

Mayes, P. E., "Some Recent Results in Frequency-Independent Antenna Research," Intensive Refresher Seminar Notes, National Electronics Conference, Oct. 19, 1964.

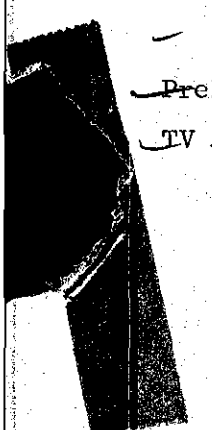
Mayes, P. E., "Balanced Backfire Zigzag Antennas," IEEE International Convention Record, 1964.

Rumsey, V. H., "Frequency Independent Antennas," I.R.E. National Convention Record, 1957.

Miscellaneous Abstracts Presented at the 7th Annual Symposium on USAF Antenna Research and Development, October 1957.

LABORATORY NOTEBOOKS (in Antenna Lab Files - one copy only)

Title	Approx. No. Pages	Researcher(s)	Approx. dates
Thin Linear Elements	250	Isbell	3/12/59-5/12/59
Thin Linear Elements	250	Isbell & Carrel	4/8/59-7/11/59
Thin Linear Lements	250	Carrel	6/12/59-6/16/59
LPV-1	500	Mayes & Carrel	6/15/59-7/29/59
LPV-2	300	Mayes & Carrel	7/27/59-8/19/59
LPV-3A	500	Mayes & Carrel	8/26/59-5/29/60
LPV-3B	100	Mayes & Carrel	12/28/59-1/12/60
LPV-3C,D	400	Mayes & Carrel	2/13/60-7/13/60
LPV-4	200	Mayes & Carrel	9/15/59-9/28/59
LPV-5,6	200	Mayes & Carrel	11/20/59-12/18/59
LPV-7	150	Mayes & Carrel	2/29/60-4/6-60
LPV-8,9	150	Mayes & Carrel	4/8/60-4/23/60
LPDA 20,21,22,23,24/LPV-10	200	Mayes & Carrel	4/1/60-7/22/60
LPDA 21/LPV-10 B,C	100	Mayes & Carrel	8/11/60-8/29/60
LPV-11 A,B,C	200	Mayes & Carrel	7/14/60-7/28/60
LPV-11 D,E	200	Mayes & Carrel	7/29/60-8/11/60
TV-1	200	Mayes & Carrel	1/20/60-2/11/60
Prelininary TV (TV 6&7,U1)	150	Mayes & Carrel	2/10/61-4/5/61
TV Antennas	150	Mayes & Carrel	2/10/61-3/4/61



COMPUTATION BOOK

NAME	Number
PAUL E. MAYES	1

Course .....

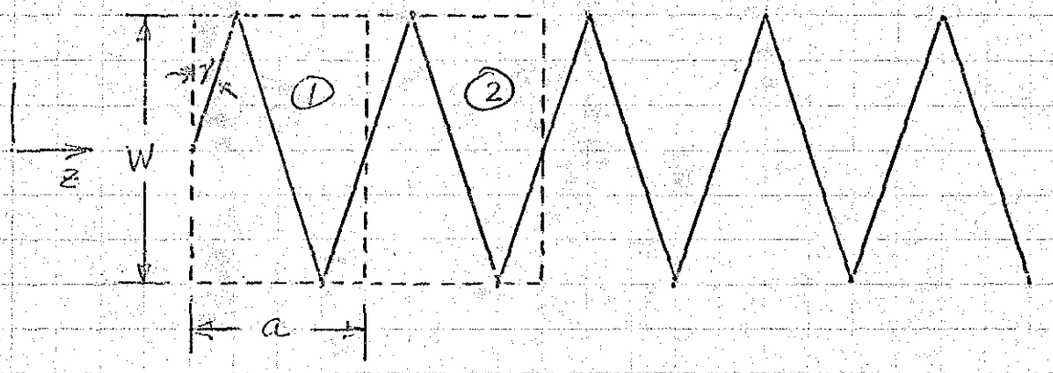
Used from NOV 15 1960, to ..... 19 .....

HARVARD COOPERATIVE SOCIETY
1400 Mass. Ave., Cambridge, Mass.
40 Mass. Ave., Cambridge, Mass.

November 15, 1960

The principles of backfire radiation from simply periodic structures were developed on Nov. 10 in preparation for a seminar presented before the Antenna Laboratory staff on Nov. 11. The original purpose was to explain the formation of an "active" region on the log-periodic antennas, the region for radiation in the direction observed, and the lack of end effect on many of these structures. The original model for investigation was the zig-zag wire although it was soon realized that the principles were in fact very general and could be applied to many other periodic and log periodic structures. The essential features of the original argument are reproduced below.

R. E. Collin
15 Nov 1960



Read and understood by John M. Kelly Son
17 Nov 1960

Assume current in the periodic zig-zag conductor is travelling wave with phase propagation along the wire given by the free-space phase constant $\beta_0 = \omega\sqrt{\mu_0\varepsilon_0}$.

(1) $$I = e^{-j\beta_0 s}$$

where s is the distance along the wire. Now treat the wire as a radiating structure using array theory where each "cell" (such as labeled ① and ② in figure above) is an element of the array. In determining

November 15, 1960

the directional characteristics of the radiated field, the phasing between elements is of principal concern. With the assumption made above about the current in the wire, the phase of the currents in cell ② lags that of the currents in cell ① by $\beta_0 S_c$ where S_c is the length of wire in one cell.

$$(2) \qquad S_c = \left[(2W)^2 + a^2\right]^{1/2} = 2W \sec\gamma$$

The angle γ shown in the figure on page 1 is given by

$$(3) \qquad \tan\gamma = \frac{a}{2W}$$

The phase delay from cell to cell is therefore

$$(4) \qquad \beta_0 S_c = \frac{2\pi}{\lambda_0} 2W \left[1 + \left(\frac{a}{2W}\right)^2\right]^{1/2}$$

$$= 4\pi \frac{W}{\lambda_0} \sec\gamma$$

This phase delay can be characterized by a phase constant β_s for the array; the phase delay from cell to cell is derived from the product of this phase constant and the length of each cell, "a",

$$\beta_s a = \beta_0 S_c$$

$$(5) \qquad \beta_s = \beta_0 \frac{S_c}{a} = \beta_0 \csc\gamma$$

The element phasing of the array is obtained by sampling periodically this "slow wave" phase function

$$(6) \qquad e^{-j\beta_s z}$$

where z is the distance along the axis of the zig-zag wire. The actual character of the radiated field, particularly the direction of radiation, is determined by the period of the sampling.

Rank and undecorated by Forbes W. Gleason
17 Nov 1960
K.S. Cavell
16 Nov 1960

November 15, 1960

A case of particular interest is that which produces backfire radiation (endfire in the direction ~~to~~ opposite to the phase progression of the current wave). From array theory cell ② should lead cell ① by a phase angle of $\beta_0 a$ in order to produce ~~maximum~~ fields in the backfire direction. We have computed the angle of lag in Eq. (4), the smallest angle of lead would be $2\pi - \beta_0 s_c$ so the backfire condition becomes

$$2\pi - \beta_0 s_c = \beta_0 a$$

$$\frac{s_c + a}{\lambda} = 1$$

$$(7) \qquad \frac{2W}{\lambda} = \frac{\cos\gamma}{1+\sin\gamma}$$

$$(8) \qquad \frac{a}{\lambda} = \frac{2W}{\lambda}\tan\gamma = \frac{\sin\gamma}{1+\sin\gamma}$$

These equations suggest the design of a bifilar zig-zag antenna using the backfire condition. Such an antenna should be superior to the ordinary zig-zag* ~~for~~ in several points.

(a) The bifilar ~~ta~~ antenna is a balanced structure, easily fed from a balanced line and having superior impedance ~~for~~ characteristics as compared with a single zig-zag fed against a ground plane.

(b) The backfire condition leads to a structure which is inherently a radiator rather than a wave guide. The current will therefore be attenuated by radiation as it moves away from the feed point. The end effect is thereby eliminated, if the structure is sufficiently long, and the resulting non-resonant performance yields broad-band impedance.

* See ~~end~~ page 5 for bibliography on zig-zag antennas.

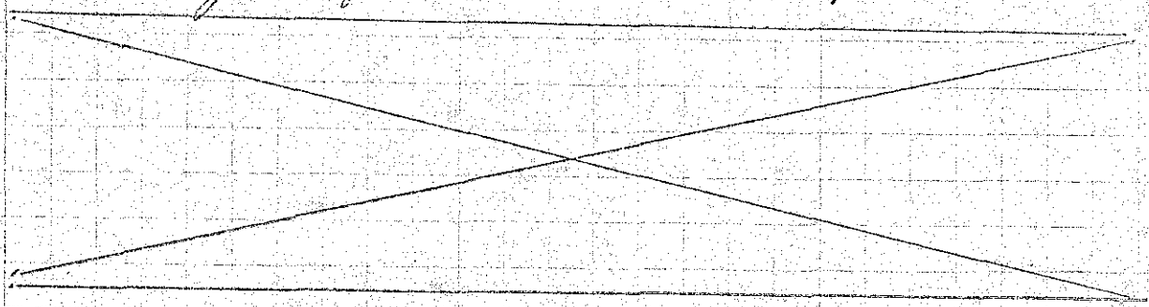
Use page 6 for a plot of (7) and (8)

Bifilar zig-zag antenna (backfire) by John W. Clayson 11 Jan 1961

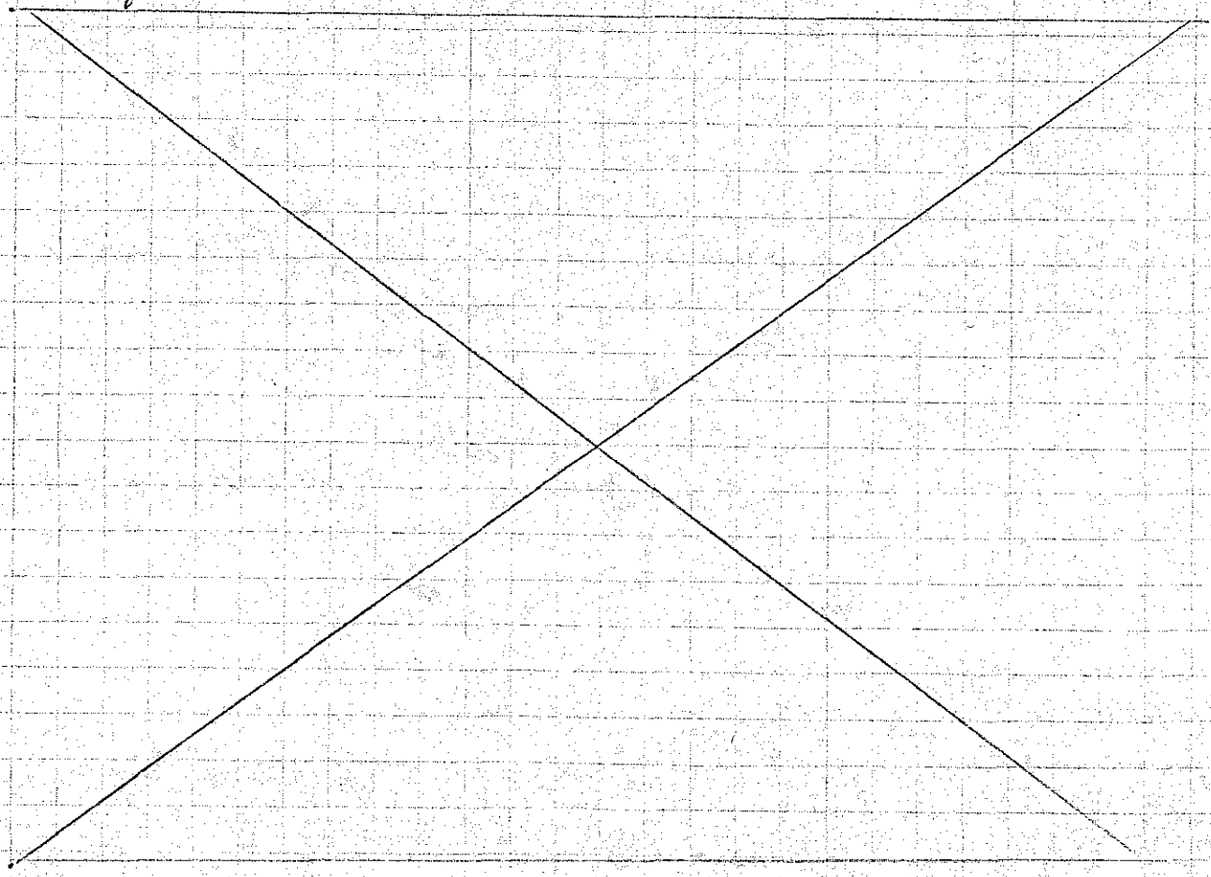
November 15, 1960

(c) The backfire condition is satisfied with smaller width structures than must be used with the cumming* zig-zag design.

These principles and advantages would apply equally well to the helix antenna. The backfire backfire helix should have advantages over the conventional Kraus** helix



It was suggested to W. J. Patton on Nov. 14 that a model of backfire zig-zag antenna be built and tested. ~~It was also decided to build and test a backfire helix antenna.~~



*See Reference 1, page 5. **See Reference 1, page 7.

Read and understood by [illegible] 17 Nov 1960

R. L. Carrel 18 Nov 1960

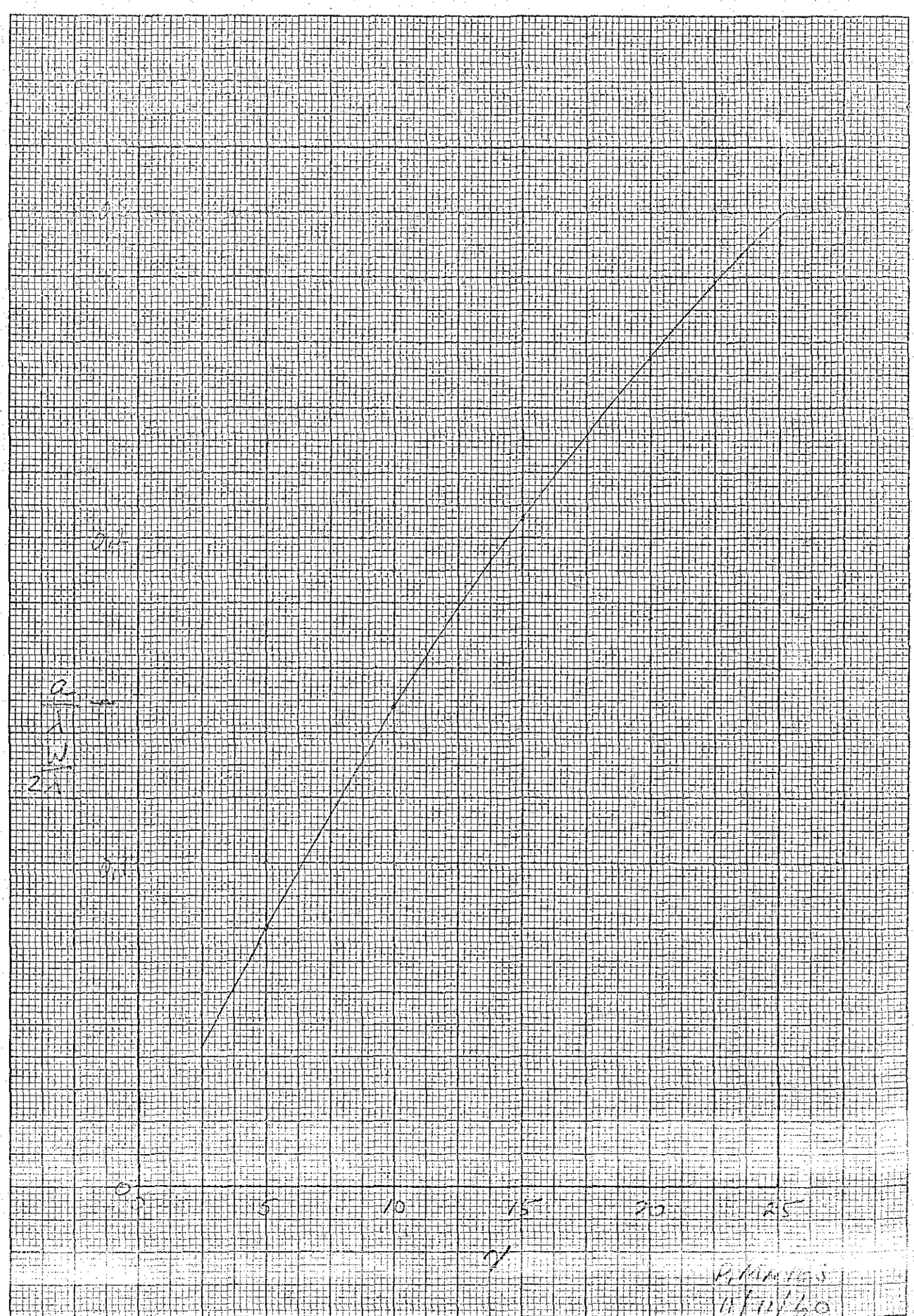
November 15, 1960

Bibliography on Zig-Zag Antennas

1. W. A. Cumming, "A non-resonant end-fire array for VHF and UHF," IRE Trans. on Antennas and Propagation, vol. AP-3, pp. 52-58, April, 1955.

2. D. K. Sengupta, "The radiation characteristics of a zig-zag antenna", IRE Trans. on Antennas and Propagation, vol. AP-6, pp. 191-194, April, 1958.

3. J. G. Wong and S. C. Loh, "Radiation field of an elliptical helical antenna", IRE Trans. on Antennas and Propagation, vol. AP-7, pp 46-52, January, 1959.



10 X 10 TO THE ½ INCH KEUFFEL & ESSER CO. 358-11 MADE IN U.S.A.

Nov. 17, 1960

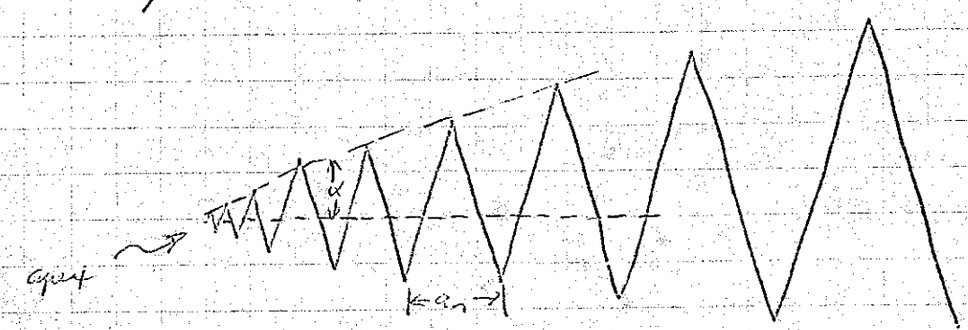
Bibliography on Helix Antennas

1. J. D. Kraus, "Antennas", McGraw-Hill, N.Y., 1950, Chapter 7. A number of references are given in this book.

November 17, 1960

Explanation of Operation of Log-Periodic Antennas

We make a zig-zag wire or any other periodic structure logarithmically periodic by applying a scale factor between adjacent cells. The structure is then linearly tapered and cell dimensions vary linearly with distance from the apex of the resulting converging structure. If we assume a constant phase velocity of the current wave on the 3rd wire, since the length of the wire increases linearly from cell to cell, the phase delay in each cell likewise increases linearly with distance from the apex. As long as the phase delay per cell is less than $2\pi - \beta a_n$ the wave associated with the cells as source elements is a guided wave with phase progression away from the apex.



Log-Periodic Zig-Zag Wire

When the phase delay per cell reaches $2\pi - \beta a_n$ end-fire radiation toward the feed point (back fire direction) will occur. It is in this region that low from the structure due to radiation begins. This region is then referred to as the "active region" of the structure. Beyond the active region (further from the apex) the phase delay per cell increases and the direction of maximum radiation should occur at some angle other than endfire. However, if the currents are sufficiently attenuated by

R. H. Carnell
16 Nov 1960

John M. Wilgson
17 Nov 1960

Rec'd and understood by

November 17, 1960

passing through the active region, ~~the~~ the radiation ~~from~~ in these off-axis directions will be small. If the structure expands rapidly (& fairly large) some current may be present beyond the first place where the end-fire condition is satisfied and the result will be a wider beamwidth. The diminishing of the currents by radiation in the active region makes it possible to cut-off the structure beyond the active region without affecting the radiating properties. It is the attenuation of the currents which makes the end-effect small. The outstanding question at present in using this approach to establish a theory of log-periodic and log-spiral antennas is the attenuation per cell experienced by the current on these structures.

We propose the following general principle to be observed in log-periodic and log-spiral antenna design for end-fire operation:

A slow-wave is established on a feed mechanism which is also capable of radiating. The feed-antenna composite structure is composed of cells scaled according to the log-periodic principles. The scaled structure should contain a region, where there are several cells in a wavelengths distance along the axis of the structure, where the phase delay from cell to cell approximately satisfies the condition on page 3 for end-fire radiation. The width of the structure at this point should be sufficiently great in terms of the wavelength to ensure that the current on the antenna is completely diminished by radiation, thereby eliminating the end effect.

Read and understood
by

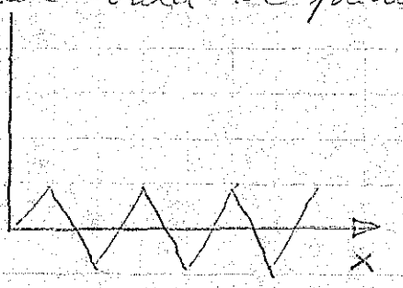
C.Z. Cornell
Mem. 1960

Colin Mallerson
17 November 1960

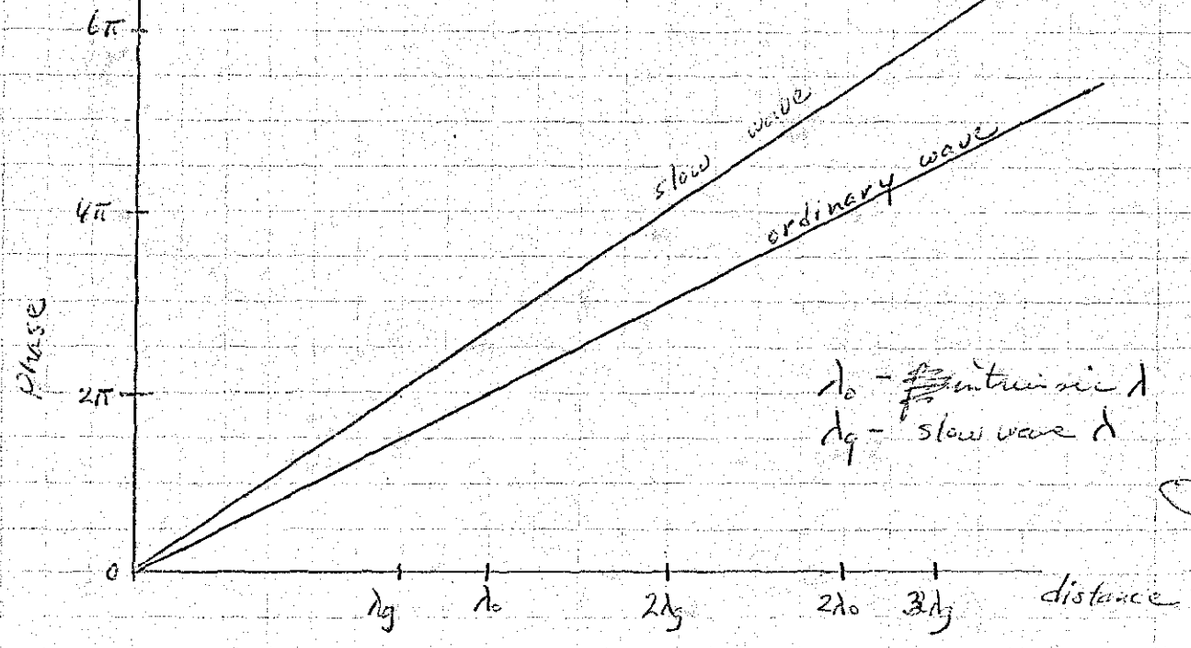
November 23, 1960

Classification of waves on periodic structures

Let us suppose a slow wave is propagating in the y-direction as shown below (the slow wave could be produced in any way).

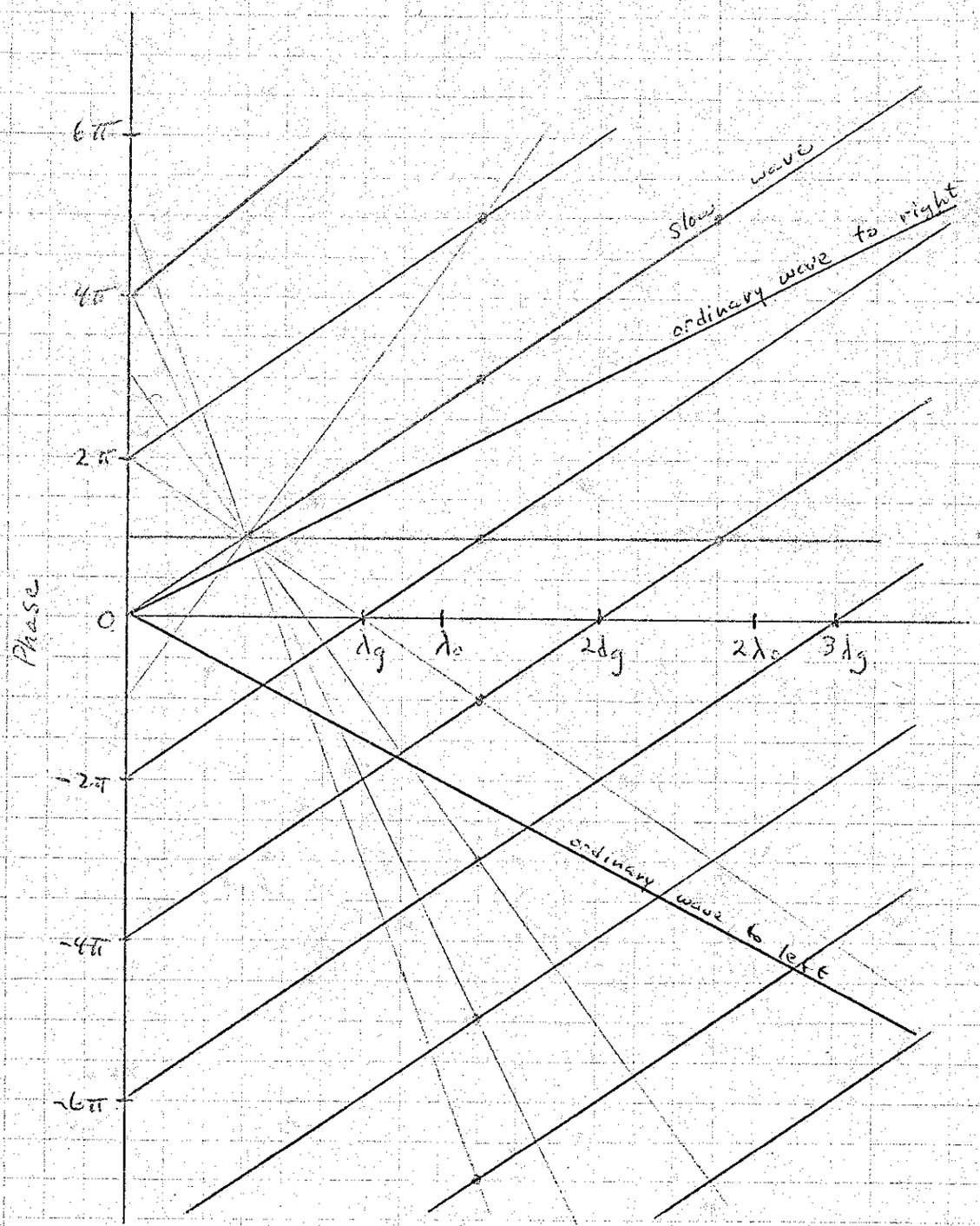


We wish to examine the type of wave produced by sampling the slow wave phase periodically. (In a zig-zag structure the cell dimensions determine the sampling period.). The figure below shows the phase of the slow wave (Floquet) and a wave traveling with the intrinsic velocity of the medium, (ordinary wave)



Due to the multiple-valued nature of phase the slow wave characteristic could equally well be represented by any other line having the same slope but displaced by ~~2nπ~~ $2n\pi$ radians along the phase axis as shown on the figure on page 12. The phases obtained by sampling with an arbitrary period are readily obtained from this diagram and several transition boundaries can be identified.

November 23, 1960



If the period of the sampling a is equal to the wavelength of the slow wave, $a = \lambda_g$, as shown in blue above, the phase change from cell to cell is zero, the broadside case. There is a multiplicity of other waves which also satisfy this condition as shown by the other blue lines above. Note that all slope between those of an ordinary wave to the right and an ordinary wave to the left represent a wave at an angle with respect to the array axis. The phase constant for all of these various waves is related

R. S. Cassell 12/1/60
Mr. Montecalvo
Read and understood by

to the sampling period by the formula

$$\beta_n = \beta_s - \frac{2\pi n}{a}$$

where β_s is the slow wave phase constant. The principal wave occurs for $n = 1$, i.e. this represents the wave with least phase shift between cells and we would expect it to be predominant in the field produced by such a sampling structure. All these waves can be classified according to the slope of the phase line. For slopes greater than that of the ordinary wave to the right, the result is a slow wave to the right. This corresponds to the "trapped" ("surface") wave. A slope equal to that of the ordinary wave represents an end-fire direction for the wave. For slopes between that of the ordinary wave to the right and an ordinary wave to the left the radiated wave will have a maximum at an angle with respect to the x-axis given by

$$\theta = \cos^{-1}\left(\frac{\beta_n}{\beta_0}\right)$$

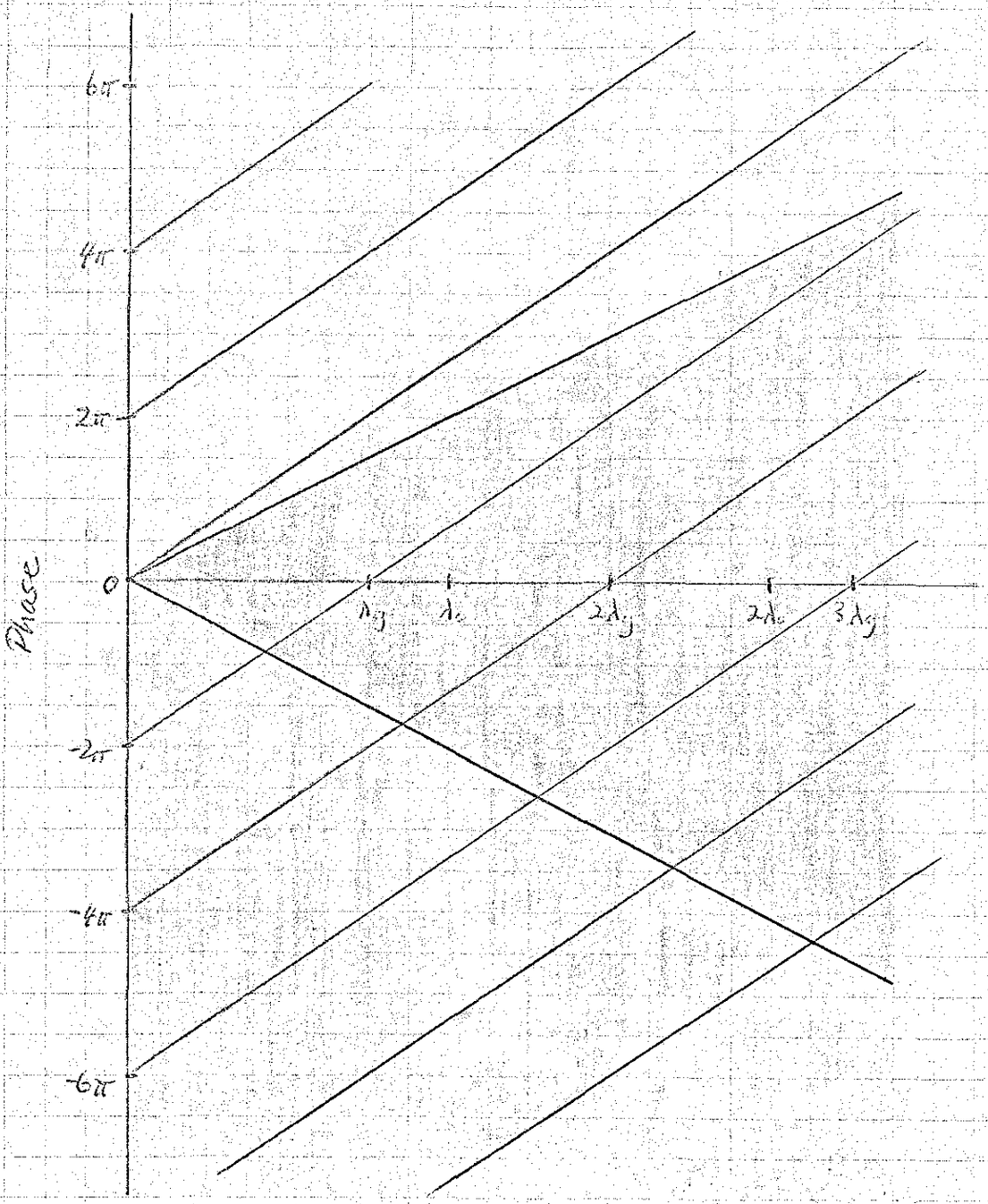
$$\left[\text{Note } \beta_0 = \frac{2\pi}{\lambda_0} \neq \beta_s \text{ above}\right]$$

For negative slopes greater than that for an ordinary wave to the left, the radiated wave again has a slow wave characteristic but in the backfire (as opposed to endfire) direction. As the phase change from cell to cell increases in this region we have the condition for increased directivity. Such increased directivity has been observed by Patton by darkening frequency on a periodic hi-fi zig-zag ~~slow~~ below that required to obtain the backward radiating wave. As frequency is increased above the backward wave cone the maximum of radiation scans as predicted by the above formulae. A plot showing classification of waves is given on page 14.

Read and understood by R. L. Carrel 12/11/60

John H. Kelley Stan. Univ. 23 November 1960

November 23, 1960



trapped or surface wave region

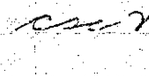
leaky or radiating wave region

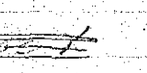
backward wave region

November 23, 1960

A linear scale which is calibrated in terms of the sampling period can be placed over the diagram on page 14. Vertical lines intersect the slow wave phase lines at points corresponding to the phase of the exterior field. The minimum slope line joining all these points gives the principal exterior ~~wave~~ wave. If the exterior wave phase line falls in the blue region, this corresponds to the trapped wave ~~case~~ case wherein conventional zig-zag, helix, Yagi and numerous other antennas operate. When the exterior phase line falls in the red region it corresponds to a leaky wave, a horizontal line is broadside. When the exterior phase line falls in the brown region the radiation field is backfire. As the slope increases in this direction the directive gain increases (supergain).

~~The~~ The foregoing considerations can be applied to a number of periodic structures.

(A) Zig-Zag – $\beta_s = \beta_0 \cos\chi$ 

(B) Helix – ~~$\beta_s = \beta_0 \cos\chi$~~ 

(C) Serpentine – 

(D) Slotted coaxial cylinder ~~with~~ loaded to slow wave (or other slow wave structure).

In order to produce primarily the principal mode in all these cases the sampling period should be considerably smaller than the wavelength λ_0.

Read and understood
by

R. L. Carrel
12/11/60

Alfred M. Wilson
12/12/60

November 23, 1960

Design of Periodic Antennas

The following conditions are particularly significant in the design of periodic antennas.

(A) Endfire $\beta_1 = \beta_0$

$$\beta_1 = \beta_s - \frac{2\pi}{a}$$

$$\frac{a}{\lambda_0} = \frac{1}{\frac{\beta_s}{\beta_0} - 1}$$

(B) Broadside $\beta_1 = 0$

$$\frac{a}{\lambda_0} = \frac{1}{\frac{\beta_s}{\beta_0}}$$

(C) Backfire $\beta_1 = -\beta_0$

$$\frac{a}{\lambda_0} = \frac{1}{\frac{\beta_s}{\beta_0} + 1}$$

(D) Supergain $\beta_1 = -k\beta_0 \qquad k > 1$

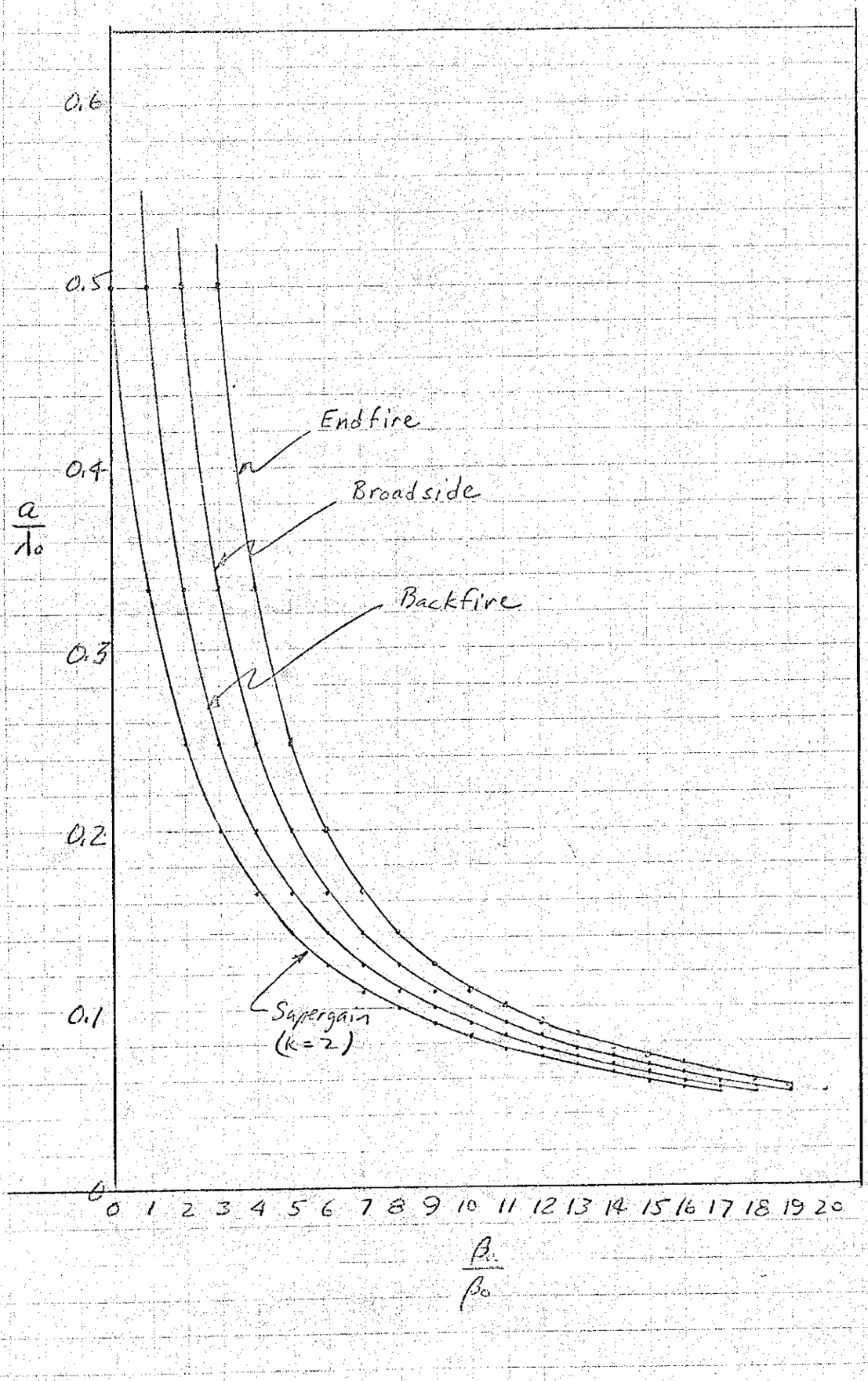
$$\frac{a}{\lambda_0} = \frac{1}{\frac{\beta_s}{\beta_0} + k}$$

Plots of these functions are given on page 17. and an enlargement of the important portion (where $a/\lambda_0 < 0.2$) is given on page 18.

R. F. Cornell 12/11/60

Read and understood by Glen McKelvey Jan 28 Nov 1960

November 23, 1960

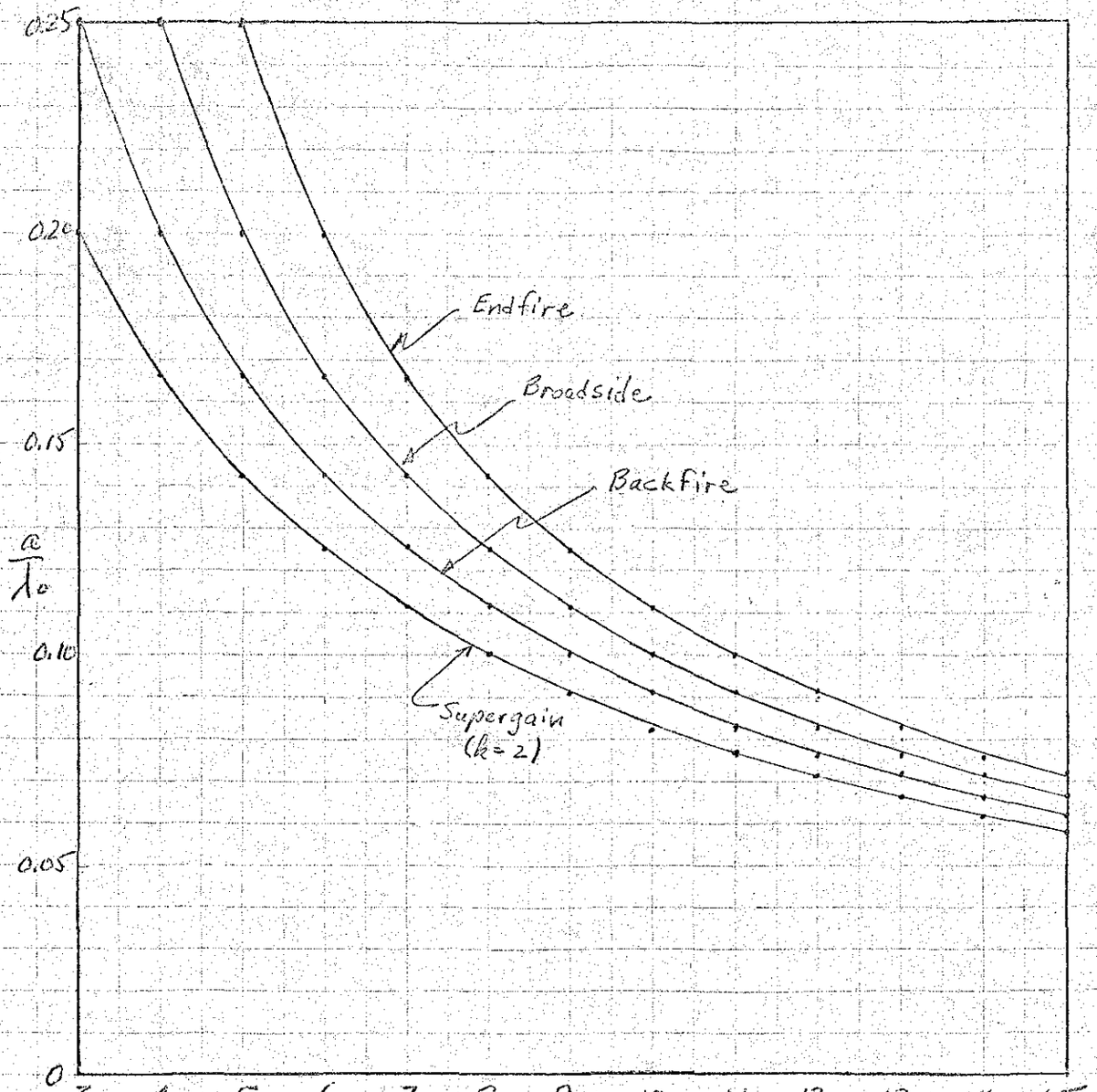


R. L. Carrel
12/1/60

Plotted by [illegible]
12 Dec 1960

Read and smoothed by

November 23, 1960



R. E. Cassell 12/1/60

Lee H. Ellison 28 Nov 1960

Read, noted, understood, Eq

November 25, 1960

Design of Slot Array with Closed Line Feed

Important practical applications for backward wave antennas call for low sidelobe designs. The basic radiating element in this case would be slots cut in a large conducting plane. Energy would be fed to this structure by means of a closed line (coaxial cable or waveguide) underneath the plane. In order to properly establish the backfire wave in the space above the plane a number of properly phased slots would be required in a free-space wavelength distance along the axis of the slot array. Previous experience indicates that this number of slots should be approximately 5. This fixes a/λ_0 on the figure on page 18 at a value of 0.2. The ratio of phase constant (β) of the feed line to that of free-space (β_0) must therefore be equal to 4 to achieve backfire radiation. Any number of possible geometric designs ~~suggest themselves~~ come to mind once this basic requirement is fixed. Since a slow-wave feed is required, it seems best to employ a TEM in the feed rather than attempt to slow down the ~~in~~ a waveguide which are inherently fast. Even the TEM mode feed must be heavily loaded to achieve the proper phase constant. To slow the wave by a factor of 4 requires a dielectric with ~~cap~~ capacitivity of 16 relative to free-space value. For this reason it seems best to investigate the use of disc-loaded, serrated, ~~zig~~ zig-zag, or helical center conductors as a method of achieved the desired slow wave characteristic for the feeder. Nevertheless a suggested design using dielectric loading in the feeder is shown on page 20 as a matter of record.

Antennas made according to these principles should find wide application in

(a) air-space vehicles and missiles

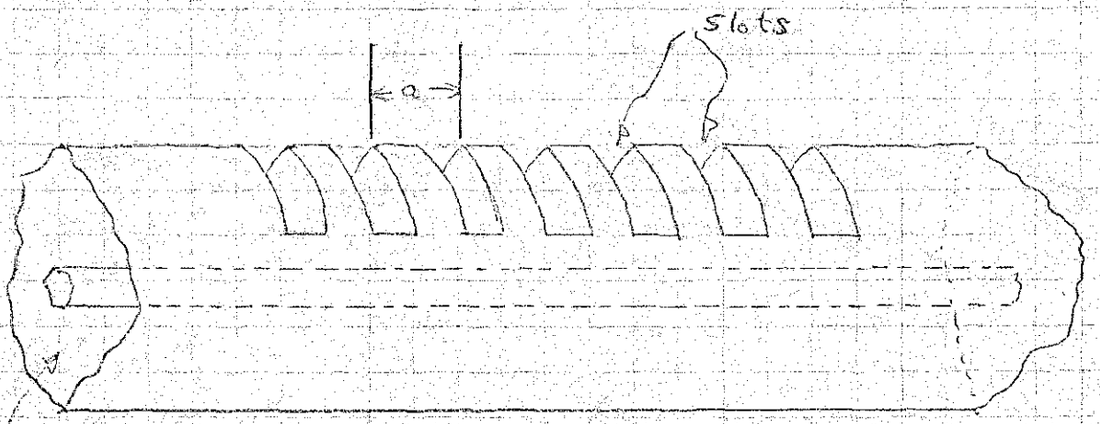
(b) hardened radar and communications sites

R. L. Carrel 12/11/60

Checked and understood by John W. Kelly Jr. 25 November 1960

November 25, 1960

A Backfire Slot Array (Simply Periodic Case)



dielectric loaded coaxial cable (phase velocity = $\frac{\omega}{\beta_a}$)

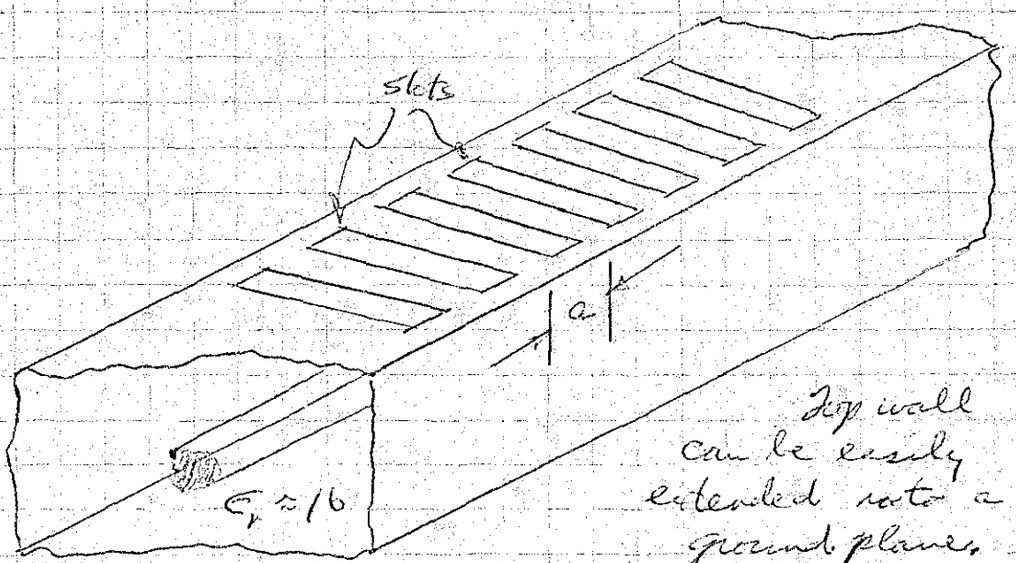
$[\epsilon_r = 16]$

$\frac{\beta_a}{\beta_0} \approx 4.0$

$\frac{a}{\lambda_0} \approx 0.2$

} Backfire condition

Circular Cylindrical Model



Top wall can be easily extended into a ground plane.

Square Cylindrical Model

In order to suppress higher modes in the feed guide, it may be necessary to make the slots width a small fraction of a free-space wavelength. This will limit the attenuation per cell and may make a long structure necessary to eliminate the end effect.

7 30, 1960

of Log-Periodic Dipole Arrays

+ has been observed and calculated by that the phase velocity in the transmission line (small end) region of a log-periodic dipole array, i.e. the region between the apex and the active region, ~~is~~ is approximately one-half its free-space value. This is approximate agreement with the value to be expected by virtue of the capacitive loading on the line due to the presence of the short dipole elements. We note that this feed-wave is not as slow as required for good operation according to the preceding design of a slot array. There is however, an important distinction between these two cases in the method of feed. In the case of the dipole array an additional π radians phase shift is added between elements by a twist in the feed line. It is proposed that the figure on page 22 shows how this additional frequency independent phasing makes it possible to increase the sampling rate in the dipole array so that the required number of cells per free space wavelength can be obtained even though the feed wave is not slowed by a factor of four. The figure on page 22 shows phase lines for a slow wave with phase velocity one-half free-space value. The solid line is the phase line for the backward wave. The sampling points to achieve this wave are labeled "S_1". It is readily seen that there are only 3 periods per free-space wavelength. This hardly seems to be enough for good operation. Now consider the possibility of sampling at twice the rate. The phases obtained at this intermediate sampling points S_2 are tabled in the figure. We note that the phases as obtained are all π radians removed from the desired location along the backward wave locus.

Wheeler Canal's calculations

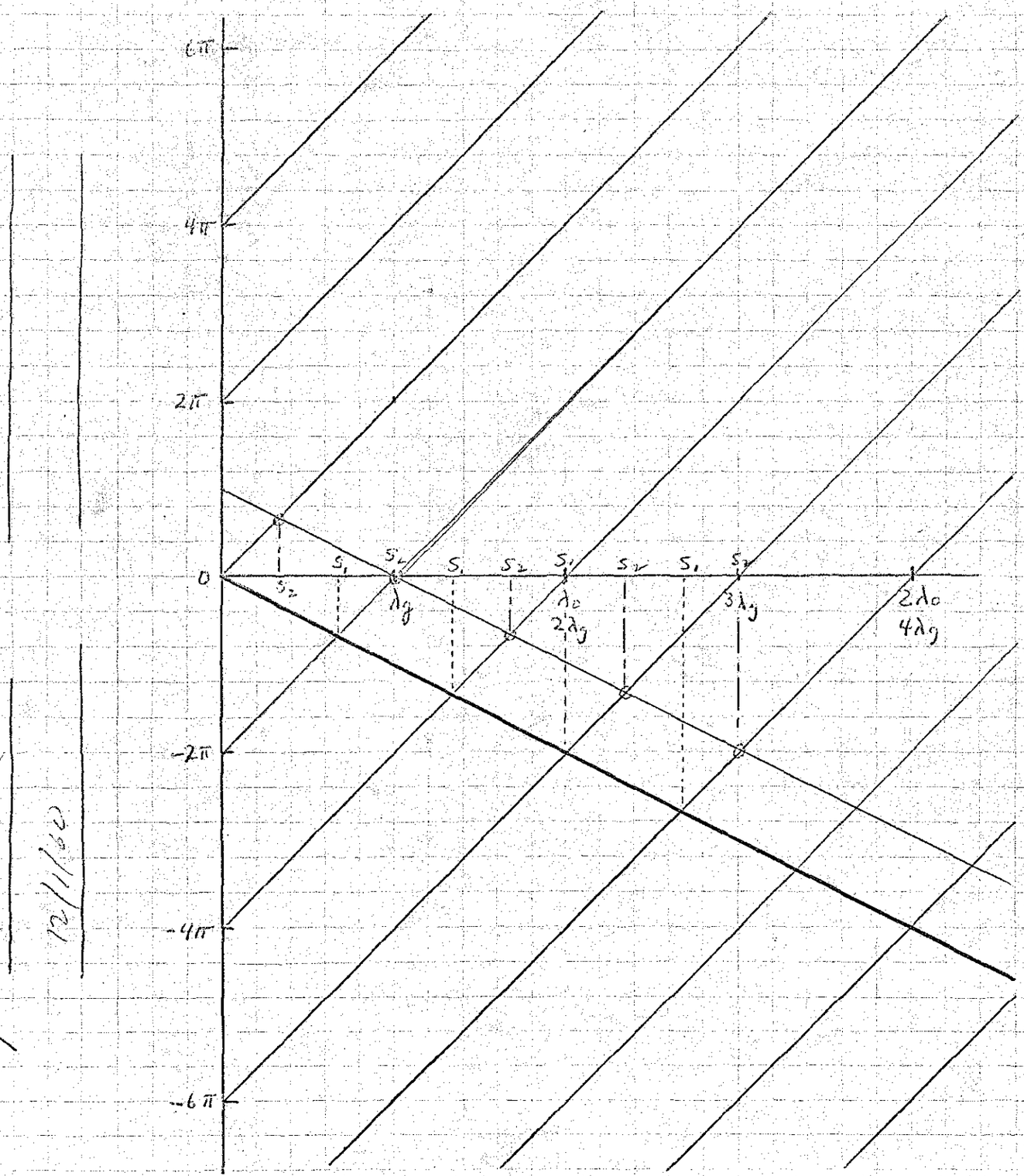
R. F. Canal 12/11/60

Read and understood by

2

November 30, 1960

Operation of Log-Periodic Dipole Arrays



R. L. Carrel

12/11/60

Revised and annotated key

November 30, 1960

Direction of Radiation of Zig-Zags and Helices

The direction of maximum radiation is given by

$$\cos\theta = \frac{\beta_1}{\beta_0}$$

where θ is the angle the beam maximum makes with the axis of the antenna. Now

$$\beta_1 = \beta_s - \frac{2\pi}{a}$$

For the zig-zag

$$\beta_s = \frac{\beta_0}{\sin\gamma}$$

Hence

$$\cos\theta = \frac{\beta_s}{\beta_0} - \frac{2\pi}{\beta_0 a} = \frac{\beta_s}{\beta_0} - \frac{\lambda}{a}$$

$$= \left(\frac{1}{\sin\gamma} - \frac{\lambda}{a}\right)$$

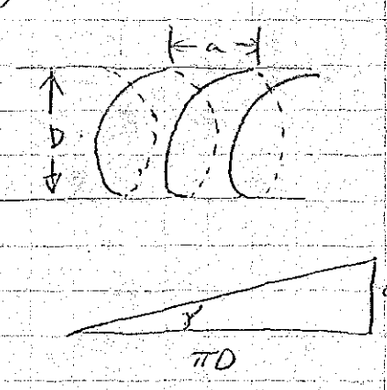
For the helix $\rho = D/2$, $z = \frac{a}{2\pi}\varphi$

$$ds^2 = d\rho^2 + \rho^2 d\varphi^2 + dz^2$$

$$= \left[\left(\frac{D}{2}\right)^2 + \left(\frac{a}{2\pi}\right)^2\right]^{1/2} d\varphi$$

$$s_c = 2\pi\left[\left(\frac{D}{2}\right)^2 + \left(\frac{a}{2\pi}\right)^2\right]^{1/2}$$

$$= \left\{(\pi D)^2 + a^2\right]^{1/2}$$



γ = pitch angle

$$\frac{\beta_s}{\beta_0} = \frac{s_c}{a} = \left[\left(\frac{\pi D}{a}\right)^2 + 1\right]^{1/2} = \frac{1}{\sin\gamma}$$

$$\cos\theta = \left\{\left[\left(\frac{\pi D}{a}\right)^2 + 1\right]^{1/2} - \frac{\lambda}{a}\right\}$$

$$= \left\{\frac{1}{\sin\gamma} - \frac{\lambda}{a}\right\}$$

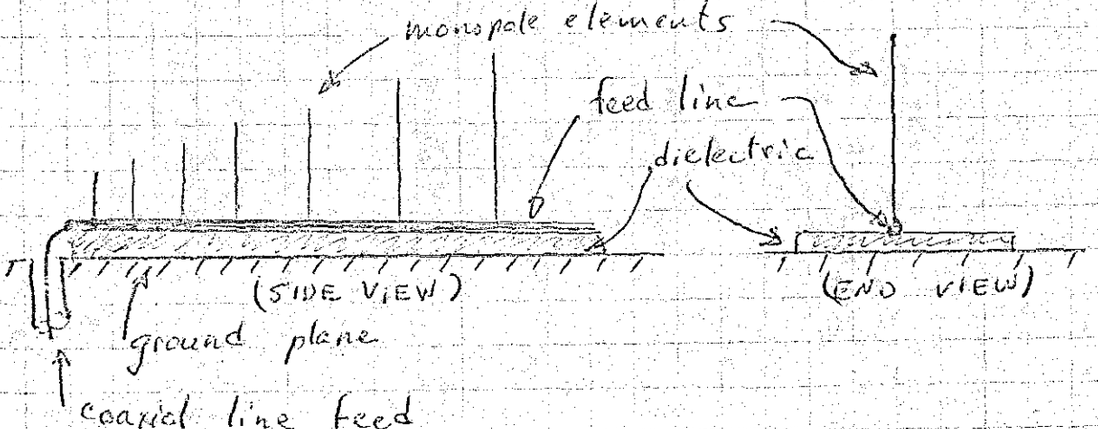
R. L. Carrel 12/1/60

Carrel and umlenstopf, Eng

December 1, 1960

Proposed LP Monopole Arrays

In a large number of applications, particularly in the HF band, it is desired to operate vertical monopole elements over ground. It is not possible to split the LP dipole array and use half of it over ground to make a monopole array because of the necessity of π radians added phase shift between elements. The extra phase shift is required because the capacitive loading of the dipole elements does not slow the feed wave sufficiently. If the foregoing conjectures are correct then the necessity for the added phasing between elements can be eliminated by using some additional loading on the feed line to produce the additional slowing of the feed wave. A simple method which is practical for small models would be to use dielectric in the feed line as shown below.



The principal question concerning this design would be the proper geometry and capacitivity of the dielectric which would yield the desired phase velocity.

Other methods which might be employed to slow the wave include inductive loading of the line, additional capacitive loading using shunt capacitors or line stubs, etc.

R. L. Carrel 12/1/60

Recommended for Technical Log

December 6, 1960

Nomenclature; Backward Wave Antennas

In electron-tube parlance a backward wave is one which has phase velocity and group velocity with opposite sign. Let us investigate these quantities for the $z_0 - z_{-1}$ and likin with the zero-order relation for β_0

$$\beta_0 = \frac{\beta}{\sin\gamma} \qquad \beta = \frac{\omega}{c}$$

The phase velocity is

$$v_{p_0} = \frac{\omega}{\beta_0} = c\,\frac{\beta}{\beta_0} = c\sin\gamma$$

and the group velocity is

$$v_{g_0} = \frac{d\omega}{d\beta} = c\,\frac{d\beta}{d\beta_0} = c\sin\gamma$$

For the fed wave therefore the phase and group velocities are the same.

Examining the first space harmonic

$$v_{p_1} = \frac{c}{\frac{\beta_1}{\beta}} \qquad \text{where} \quad \beta_1 = \beta_0 - \frac{2\pi}{a}$$

$$= \frac{\beta}{\sin\gamma} - \frac{2\pi}{a}$$

$$\frac{\beta_1}{\beta} = \frac{1}{\sin\gamma} - \frac{\lambda}{a}$$

$$\therefore v_{p_1} = \frac{c}{\frac{1}{\sin\gamma} - \frac{\lambda}{a}}$$

Whereas the group velocity is

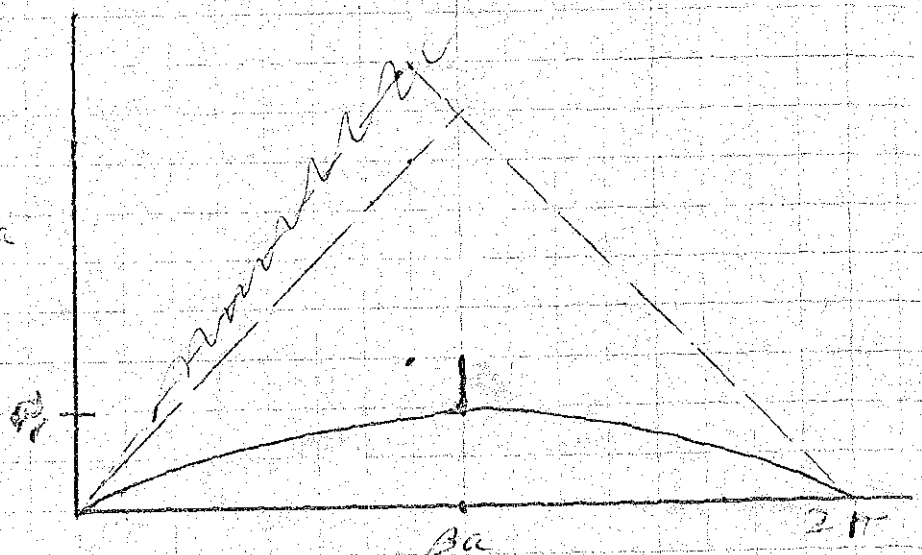
$$v_{g_1} = c\,\frac{d\beta}{d\beta_1} = c\sin\gamma$$

For the backfire condition and into the supergain region β_1 has opposite sign from β, i.e. $v_{p_1} < 0$. Hence in this region the phase and group velocities are in opposite directions and the radiating wave (phase constant $= \beta_1$) is a backward wave.

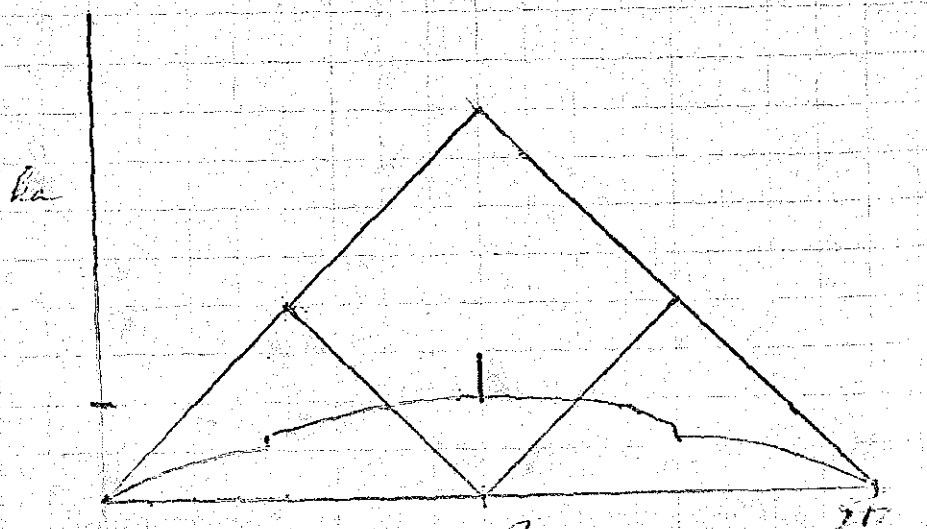
April 16, 1962

Tapered Broadside Radiating Structure

A periodically loaded line has an ω-β diagram similar to that shown below:



At frequencies above ω_1 the propagation constant is complex and the phase constant over some band of frequencies is fixed at π radians per cell. If n radiating elements are now introduced so that we have only one radiating element for every other cell of the structure the period of the structure is doubled. Assuming small deviation from the above (small loading effect due to additional elements) the ω-β diagram for the composite structure might appear as below.



The step-load ducti feeder loading now appears with twice again of the radiating structure with appropriate phase shift between elements ($360°$) to produce broadside radiation. Now would be the small-element effect added.

Received and numbered by

B-4

Secretary's Copy
Patent Case # 144

UNIVERSITY OF ILLINOIS

5254

DISCLOSURE OF INVENTION AND
LETTER OF TRANSMITTAL

To the University of Illinois
Patent Committee

Date: 20 May 1959

Entered herein and attached hereto is information concerning a potentially patentable invention for your consideration.

---

1. Descriptive Title of Invention

"Log Periodic Dipole Arrays"

2. Inventor

D. E. Isbell
Staff Member,
Antenna Research
Laboratory

University of Illinois
Electrical Engineering
Research Laboratory
Room 311F Ext. 570

3. Description of Invention

(a) Description: For a complete description of the invention please refer to Antenna Laboratory Technical Report No. 39, "Log Periodic Dipole Arrays," by D. E. Isbell, Contract No. AF 33(616) - 6079, Project No. 9-(13-6278) Task 40572 Wright Air Development Center, Electrical Engineering Research Laboratory, University of Illinois

(b) Earliest date and place invention was conceived; The antenna was conceived in September of 1958 at the University of Illinois Antenna Laboratory.

(c) Date and place of first sketch, drawing, and written description: The first recorded sketches and drawings were given on pp. 2-3 of Quarterly Engineering Report No 2 "Research Studies on Problems related to ECM Antennas," Contract No. AF 33(616)-6079 Electrical Engineering Department, University of Illinois.

5255

4. Disclosure

(a) Disclosure of Invention to others: The invention was disclosed to other members of the Antenna Laboratory during its initial development and was also disclosed to some visitors to our Laboratory.

(b) Date and place of completion of the first operating model or full scale device: The first operating model was made in the University of Illinois Antenna Laboratory in December of 1958.

(c) Present Location of Model: It is still located at the Antenna Laboratory.

(d) Date, place, description and results of first test or operation: The first results were described in Technical Report No. 59 mentioned above.

5. Support of the University

The development of this invention was supported entirely by the University of Illinois facilities, with the dates the same as above.

6. This invention was made while working on research sponsored by the Wright Air Development Center under Contract AF 33(616)-6079 entitled, "Research Studies on Problems Related to ECM Antennas."

Note: This invention is unclassified.

7. If decision of the Patent Committee is to recommend release of interests of the University in this invention, the following is recommended:

Release to inventor, with recognition of contractual obligations of the University to sponsoring agency.

Respectfully submitted, 5256

Inventor Date May 21, 1959

It is certified that the statements made herein are correct to the best of my knowledge and belief.

Department Head, or other Administrative Officer Date June 24/59

RECOMMENDATIONS

5257

It is my/our opinion and recommendation(s) that the potentially patentable invention described herein:

☐ Has little or no commercial value and should be released by the University to ☐ inventor(s) or ☐ sponsoring agency.

* ☑ Definite possibility of commercial value and retention by the University or University of Illinois Foundation for development, with partial distribution of any net income to the inventor(s).

☐ Other:

E. B. Jordan Date June 24/59
Department Head or other
Administrative Officer

_____ Date _____

_____ Date _____
Other Individuals who have
knowledge of this Invention

* a number of companies have already expressed interest.

B-5a

Mr. McCoy - CC Co

Referred by Board - subject to consideration by Univ. research Boards RZ Fs

HOT

Proposal for Construction and Test of Full-Scale

All-Channel Television & FM Receiving Antenna

Submitted by P. E. Mayes & R. L. Carrel

In the course of contract research for the Air Force an idea for a television receiving antenna has been conceived which is potentially patentable. Since this application is outside of the area of the sponsor's interests, it is deemed unwise to expend contract time and materials in the verification of the idea. It is proposed that, if money for materials and some technical services can be provided, the investigators named above will design, build, and test full-scale models of the antenna on their own time. If the design proves successful, patent applications will be submitted to the University of Illinois Foundation for their consideration. In return for their time, all models of test antennas constructed will become the property of the investigators.

5316

The costs of this program have been estimated as follows:

Aluminum tubing	150.00
Dielectric for spaces & streets	50.00
Miscellaneous hardware	50.00
Total materials	250.00
Heliarc welding, 40 hours @ 1.50	60.00
	$ 310.00

B - 5 - C

Excerpt from the monthly meeting of the Board of Directors of the University of Illinois Foundation, April 1, 1960:

Mayes and Carrel All-Channel TV and FM Receiving Antenna

It was moved by Mr. Campbell and seconded by Mr. Ator to request the University Board of Trustees to release the Paul Mayes and Robert Carrel All-Chanel TV and FM Receiving Antenna invention to the Foundation and, if the request is granted, to allocate Mr. Mayes and Mr. Carrel $385.00 to produce and test a full scale model of this device. Motion carried.

11-18-66
Z. Young

C - 4

Excerpt from minutes of U. of I. Foundation
Board of Directors Meeting, April 1, 1965

The JFD License

The Executive Director mentioned the licensing agreement with the JFD Electronics Corporation in Brooklyn, New York. He pointed out that the exclusive feature of the license was to have terminated but that, because of filing of an application in and the start of sales programs in those countries, Foundation attorneys recommended the date of the exclusive feature of the contract be extended to

Mr. Johnson moved that this be done. Mr. Williamson seconded; motion carried.

A00382

Excerpt from minutes of U. of I. Foundation
Board of Directors Meeting, March 5, 1964

Patent Discussions

Mr. Liay also reported that the JFD Electronics Corporation, licensed under antenna patents and patent applications, asks that its exclusive licensing agreement with the Foundation be extended for the life of the patent. The company now has an exclusive license for a period of beginning with the date when the first claim on any of the antenna inventions was allowed. This date is June 25, 1963 so that the exclusive feature of the agreement extends to

Patent counsel does not feel that it is wise to extend the exclusive feature of the contract with JFD beyond at this time but recommends that, previous to the expiration of the exclusive feature of the license, the Foundation give consideration to extending the exclusive feature of the license.

After discussion, Mr. Marsteller moved that the recommendation of patent counsel be approved, that the exclusive feature of the agreement not be extended at this time but that the Board express a willingness to consider extending the exclusive feature in 1966.

A00383

Excerpt from minutes of U. of I. Foundation
Board of Directors Meeting, September 6, 1962

Modification of JFD Agreement

The Executive Director reported recent conferences with officers of the JFD Electronics Corporation in Brooklyn, New York. He said that he and the Foundation's patent counsel, Charles E. Merriam, recommended a change in the licensing agreement between the Foundation and the JFD Company. The original agreement provides for an exclusive license for beginning at the time of the allowance of the first claim in the patent application. The recommendation was that the exclusitivity of the agreement be for from the allowance of the first claim (which is not involved in the present interference with Marconi Wireless Telegraph Company) or after the issuance of the patent, whichever period of time is longer. Mr. Watts moved that the proposed modification of the agreement be approved. Mr. Campbell seconded, motion carried.

A00384

The U. of I. Foundation
Executive Committee Action May 28, 1962

By telephone discussion and vote on May 28, the Executive Committee approved the licensing agreement between the Foundation and the JFD Electronic Corporation of Brooklyn, New York. The company is being licensed in connection with antenna patents and patent applications.

Excerpt from minutes of U. of I. Foundation
Board of Directors Meeting, May 3, 1962

Report on Patent

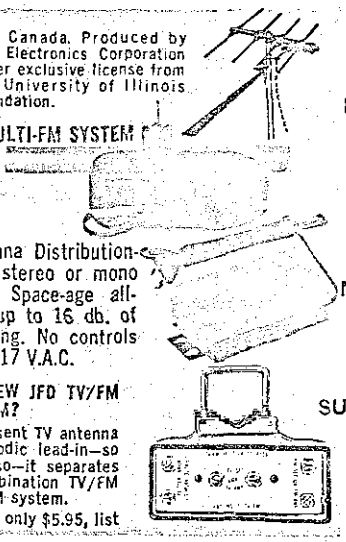
The Executive Director reported that on the following day he and the Foundation's patent attorneys would negotiate a licensing agreement with the J. F. D. Company in Brooklyn, New York. (Terms of the agreement were agreed to in the Friday meeting.) This was in connection with several patents and patent applications growing out of work in the University's Antenna Laboratory.

C-5

Licensed under one or more of U.S. patents 2,958,081; 2,985,879; 3,011,168; 3,108,280; 3,150,376 and additional patents pending in U.S.A. and Canada. Produced by JFD Electronics Corporation under exclusive license from the University of Illinois Foundation.

—AND FOR THE ULTIMATE IN MULTI-FM SYSTEM LISTENING . .

model FT-1 $34.95, list
Consists of transistorized Amplifier and Power Supply



Install the new JFD FM Antenna Distribution-Amplifier, FT-1, and feed two stereo or mono receivers with sparkling FM. Space-age all-transistor circuitry gives you up to 16 db. of amplification without overloading. No controls or adjustments. Uses standard 117 V.A.C.

HAVE YOU HEARD ABOUT THE NEW JFD TV/FM SIGNAL SEPARATOR MODEL SS-TVFM?

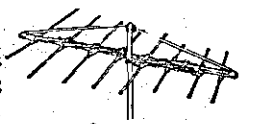
It electronically combines your present TV antenna lead-in with the JFD FM Log Periodic lead-in—so only one down-lead is needed. Also—it separates the TV/FM signal of the new combination TV/FM antennas for input to TV set and FM system.

only $5.95, list

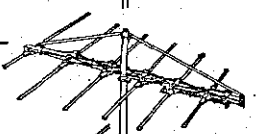
5 LPL-FM LOG-PERIODICS TO CHOOSE FROM—

FAR FRINGE —
Up to 175 miles
Model LPL-FM10
$49.95, list

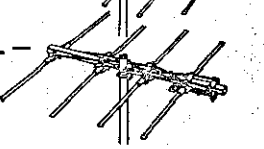
FRINGE —
Up to 150 miles
Model LPL-FM8
$39.95, list



NEAR FRINGE —
Up to 125 miles
Model LPL-FM6
$29.95, list



SUBURBAN-LOCAL —
Up to 75 miles
Model LPL-FM4
$19.95, list



Form No. 778 Litho in U. S. A. 1-65

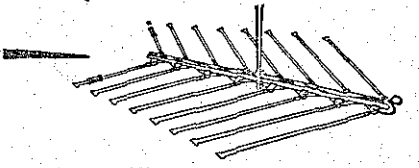
WE ALSO RECOMMEND

JFD LPV LOG-PERIODIC TV* ANTENNAS—

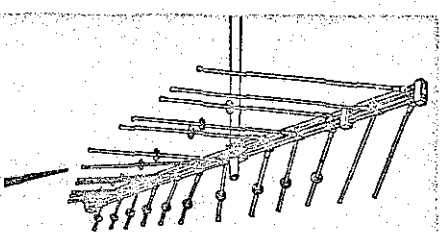
for the best picture in sight—color or black and white

If you are looking for better TV reception, we will gladly demonstrate the JFD Log-Periodic antenna designed to bring in the best possible picture in your location.

JFD LOG-PERIODIC LPV* for channels 2 to 13
Model LPV8, shown



JFD LOG-PERIODIC LPV-VU* for channels 2 to 83 and FM
Model LPV-VU12, shown



*These Log-Periodic TV antennas deliver good FM/FM stereo, as well as excellent TV reception. However, only the JFD Log-Periodic FM antenna described inside this folder uses the full-wave L-dipole for unsurpassed hi-fi performance.

A0C390

ANTENNA SPOIL YOUR FM LISTENING

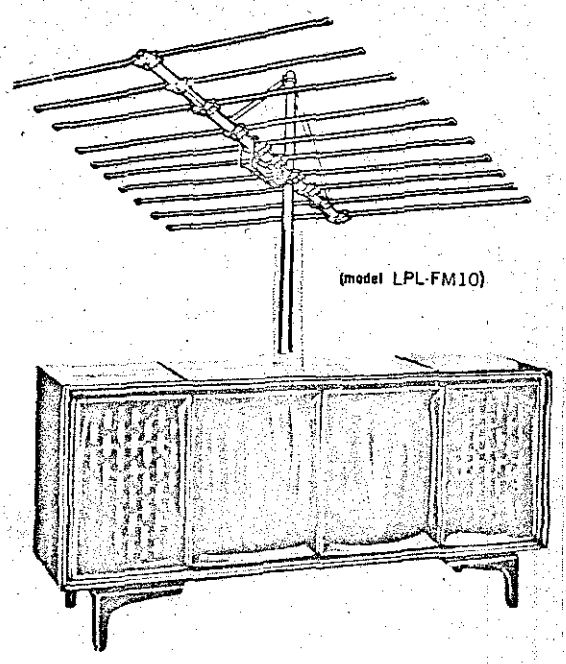
DON'T LET A "STEREO-DEAF"

41% MORE GAIN THAN THE BEST 10-ELEMENT FM YAGI!

Install the New STEREO-ENGINEERED

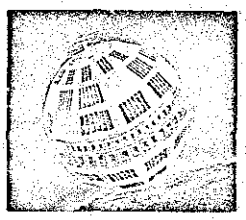
JFD FULL-WAVE L-DIPOLE *LOG PERIODIC*

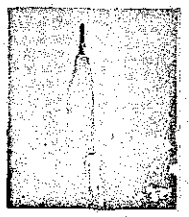
LPL-FM *ANTENNA*



(model LPL-FM10)

*The JFD Log-Periodic is derived from the remarkable antenna discovery of the Antenna Research Laboratories of the University of Illinois. Developed for the U.S. Air Force, the Log-Periodic is now used to track satellites and inter-planetary space-probes.





Delivers the *clean* gain, *directional* selectivity, and *wideband* response your system needs for fully separated, distortion-free FM stereo!

THE SECRET IS IN THE FULL-WAVE L-DIPOLE . . . No other FM antenna can work like the JFD. It is the first ever to use full-wave Log-Periodic L-dipole cells that perform with amazing frequency-independent efficiency over the 88 to 108 mc FM/FM stereo range.

CLEAN HIGH GAIN—Your tuner requires 500% more signal on stereo—than on monaural—for best FM Stereo reception. And the new JFD LPL-FM delivers this vital high gain. Its superior signal-to-noise ratio furnishes FM Stereo tuner circuits with all the voltage they need for clean textured, clearly separated stereo.

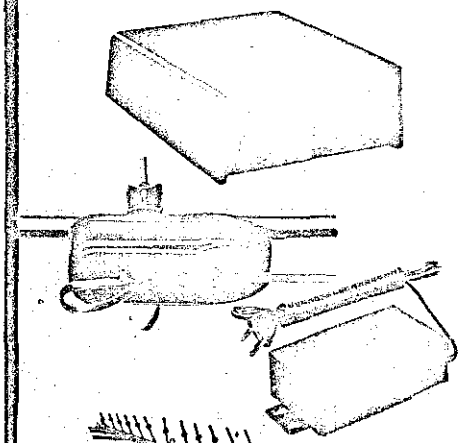
DIRECTIONAL SELECTIVITY — High front-to-back ratio (up to 26 db). Selects the direct-from-the station signals and rejects reflected ones — (particularly important because reflected signals "defocus" and distort desired stereo-effect).

WIDE-BAND RESPONSE — Frequency-independent Log-Periodic design makes the JFD LPL-FM equally receptive to all FM and FM stereo frequencies — (particularly important where weak or distant mono or stereo signals must be received with fidelity equal to that of local signals).

DON'T JUST BUY AN FM ANTENNA **ASK FOR A JFD LPL-FM ANTENNA**

AOC391

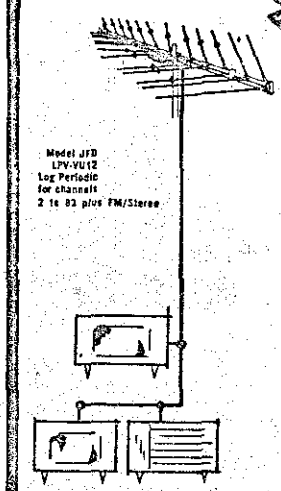
Rely on JFD accessories from antenna to TV set!...



UHF CONVERTER — Advanced all-transistor circuitry for highest reliability . . . finest performance. Exclusively illuminated slide rule fine-tuning. Beautiful "slim-line" styling.

model	description	list
CR2-J	2-Transistor and Diode	$39.95
CR1-J	1-Transistor and Diode	29.95

TELE-AMP ANTENNA AMPLIFIER— Strengthens any signal, clears up snow and interference. Completely transistorized. Mounts on any antenna crossarm. Feeds one or two sets.



SELECT A TELE-AMP MODEL TO FIT YOUR EXACT NEEDS

Tele-Amp Model VUT-3, 3-Transistor VHF/UHF TV—B/W & COLOR plus...F/M Stereo — **List Price $49.95**
Especially designed as companion to new JFD Model LPV-VU Antenna for a single system to deliver unprecendented power on all TV channels plus FM and FM Stereo.

Tele-Amp Model VN-2, 2-Nuvistor VHF TV, B/W & COLOR — **List Price $39.95**
Especially designed for metropolitan use to prevent strong local signals from ruining reception on desired channels. Shows true picture improvement where old fashioned pre-amps fail.

Tele-Amp Model VT-2, 2-Transistor — **List Price $39.95**
Two stages provide highest amplification. All solid-state reliability outlasts all other designs. Preferred by suburban TV viewers where there are only medium-strong local stations.

Tele-Amp Model VT-1, 1-Transistor VHF TV, B/W & COLOR Plus F/M Stereo — **List Price $34.95**

Tele-Amp Model VT-2-75, 2-Transistor VHF TV, 72 ohm coax cable B/W & COLOR, (Built-in FM Trap). — **List Price $44.95**

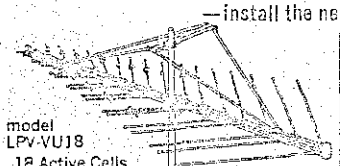
Tele-Amp model VUT-3TF, 3-Transistor UHF/VHF TV, B/W & COLOR, (Built-in FM Trap). — **List Price $49.95**
Preferred by suburban-fringe area TV viewers. Not recommended for use in strong signal areas.

Tele-Amp Model UHT-2, 2-Transistor UHF TV, B/W & COLOR — **List Price $44.95**
Clears up and brightens UHF stations. Solid-state reliability for years of trouble-free service.

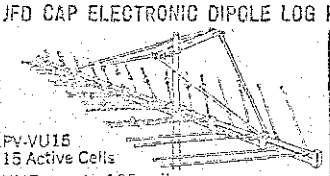
Tele-Amp Model FT-1, 1-Transistor FM & FM Stereo — **List Price $34.95**
Assures reception of 90% of all FM stations within 200 miles. Ideal for Stereo-multiplex. All solid-stage design requires no servicing, last for years.

IF YOU LIVE IN AN ALL-CHANNEL (2-83) VHF/UHF/FM STEREO LOCATION

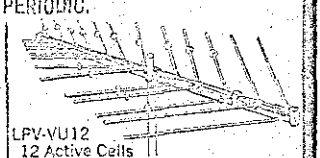
—install the new JFD CAP ELECTRONIC DIPOLE LOG PERIODIC.



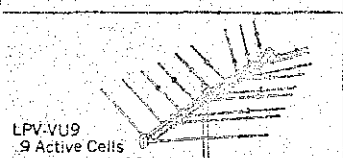
model LPV-VU18
18 Active Cells
VHF—up to 150 miles
UHF—up to 90 miles
FM—up to 75 miles
list $69.95



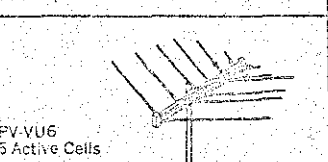
LPV-VU15
15 Active Cells
VHF—up to 125 miles
UHF—up to 90 miles
FM—up to 60 miles
list $59.95



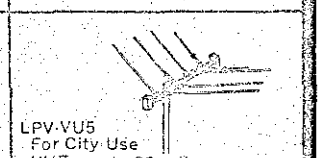
LPV-VU12
12 Active Cells
VHF—up to 110 miles
UHF—up to 50 miles
FM—up to 40 miles
list $49.95



LPV-VU9
9 Active Cells
VHF—up to 90 miles
UHF—up to 50 miles
FM—up to 40 miles
list $39.95



LPV-VU6
6 Active Cells
VHF—up to 65 miles
UHF—up to 40 miles
FM—up to 30 miles
list $27.50



LPV-VU5
For City Use
VHF—up to 30 miles
UHF—up to 20 miles
FM—up to 20 miles
list $17.50

LPV LOG PERIODIC TV ANTENNAS

JFD COLOR RECEPTION SPECIALIST

APPROVED FOR COLOR & BLACK & WHITE

A00392

All-New JFD® LPV Log-Periodic* Antennas for the finest COLOR and black/white TV pictures on channels 2 to 83

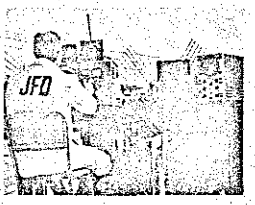
LICENSED UNDER ONE OR MORE OF U. S. PATENTS 2,958,081, 2,985,879, 3,011,168, 3,108,280 AND ADDITIONAL PATENTS PENDING IN U.S.A. AND CANADA. PRODUCED BY JFD ELECTRONICS CORPORATION UNDER EXCLUSIVE LICENSE FROM THE UNIVERSITY OF ILLINOIS FOUNDATION

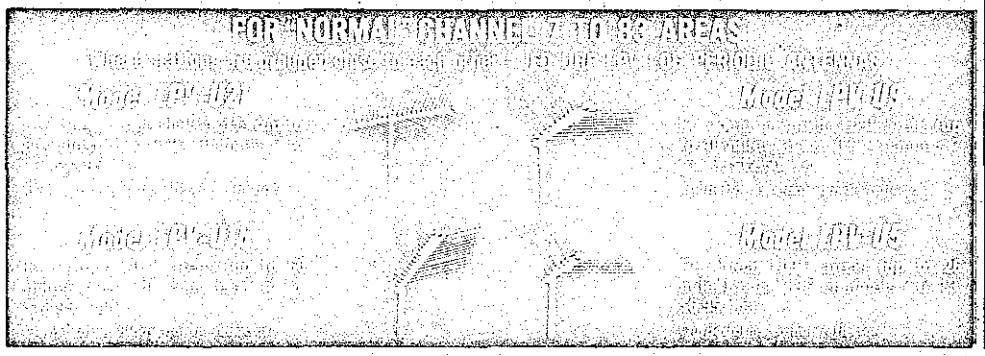
* the Log-Periodic is a totally new and different antenna adapted by JFD from the famous satellite tracking antenna design of the Antenna Research Laboratories of the University of Illinois

Wherever you live...whichever channels you want...JFD has the LPV Log-Periodic antenna you need for clearer, sharper pictures in glowing COLOR—or black and white.

JFD LPV Log-Periodics are more powerful because *all* its elements (not just some elements, as in other antennas) work on the channels *you* want.

Check below for the JFD Log-Periodic especially engineered for the channels you want.



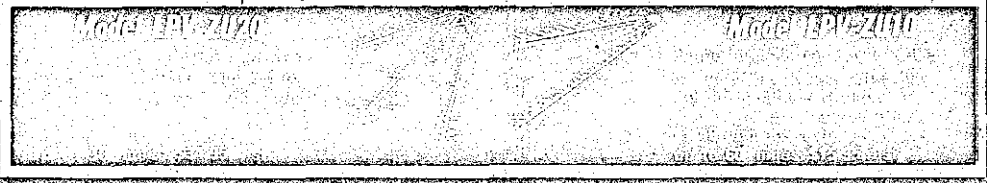


FOR "PROBLEM" CHANNEL 14 TO 83 AREAS

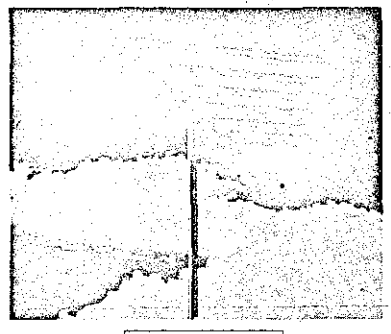
Where stations are not near each other--JFD UHF ZIG-A-LOG LOG PERIODIC TV ANTENNAS.

The new Zig-a-Log is based on one of science's newest approaches to microwave antenna design—the **vertically polarized Log-Periodic planar helical.**

As a result, the Zig-a-Log pulls in sharp pictures in weak signal areas . . . eliminates the need for a rotator in UHF areas where stations are located apart from each other.



-AND FOR THE BEST CHANNEL 2 TO 13 PICTURE IN SIGHT— COLOR, OR BLACK & WHITE— REPLACE YOUR OLD OBSOLETE VHF ANTENNA WITH THE—



LOG PERIODIC

JFD VHF LPV

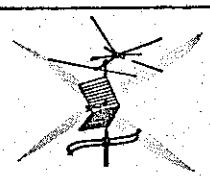
Developed from research performed at the University of Illinois Antenna Research Laboratories, and adapted for TV by JFD—the **VHF** Log Periodic LPV brings you the best possible reception on channels 2 to 13, plus FM. The secret of its power is its patented design—the same as that used in antennas to track satellites through space.

Six VHF LPV Log Periodics to choose from—suit any location needs.

model	range	list
LPV4L	up to 50 miles	$14.95
LPV6L	up to 75 miles	21.95
LPV8L	up to 100 miles	29.95
LPV11L	up to 125 miles	39.95
LPV14L	up to 150 miles	49.95
LPV17L	up to 175 miles	59.95

AOC393

Form 710 Rev. Litho in U.S.A. 9-65



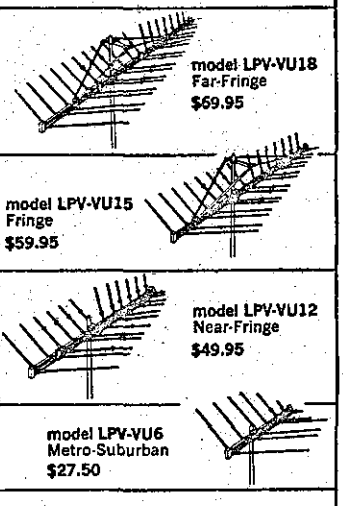
Why use three (VHF, UHF, FM) when one JFD LPV will do—perfectly?

INSTALL THE NEW...

JFD COLOR LPV Log Periodic

AOC 354

for brilliant 82-channel TV performance—COLOR or black & white, plus FM/Stereo



Now you can enjoy the best reception ever on any VHF, UHF or FM/Stereo station—from one antenna, using one down-lead—with the patented new JFD COLOR LPV Log Periodic.

Why cripple your reception with inefficient antenna "hodge-podges?" Choose a powerful space-age JFD LPV . . . see and hear the spectacular difference!

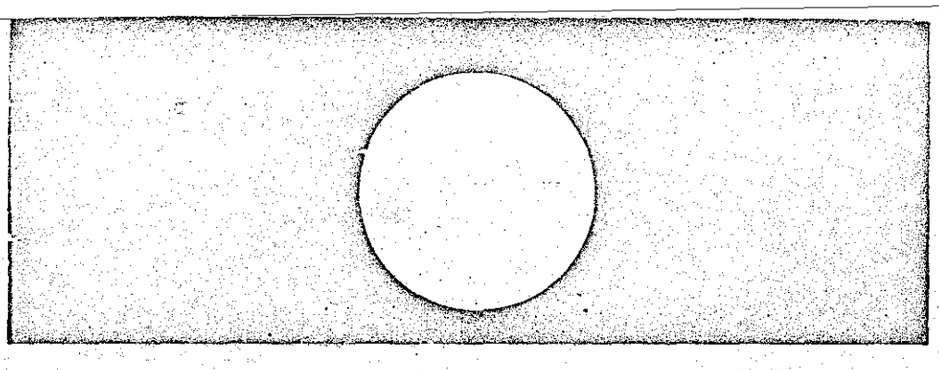
DON'T BE MISLED BY IMITATIONS—NO OTHER ANTENNA WORKS LIKE THE JFD LPV BECAUSE . . .

- Only the LPV is designed according to the **original** log periodic patented design of the University of Illinois Antenna Research Laboratories.
- Only the LPV combines **frequency-independent** design with **capacitor-coupled** electronic dipoles for . . .
- **Higher**, more **uniform** gain and **narrower** directivity on channels 2 to 83—and FM.

SEE YOUR JFD LPV DEALER TODAY!

JFD ELECTRONICS CORPORATION • 1462 62nd Street • Brooklyn, N. Y. 11219

world's largest manufacturer of TV & FM antennas

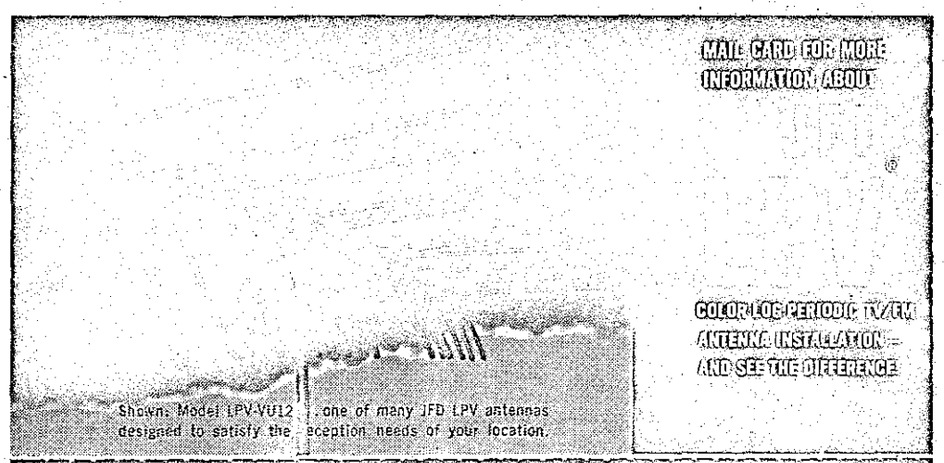


ARE YOU ENJOYING THE BEST COLOR PICTURES?

If you own a color TV or intend buying one soon, here's important news.

Color sets require a much stronger, clearer and more uniform signal from the antenna in order to perform at their best. If your antenna is old or outdated, chances are it is robbing you of the beautiful color reception you paid for when you bought your set.

The patented Log Periodic design of the JFD LPV antenna delivers pure, steady picture power for magnificent color reception wherever you live. Yet it costs no more than most other antennas.



TEAR OFF ALONG DOTTED LINE AND MAIL TODAY!

JFD

LPV

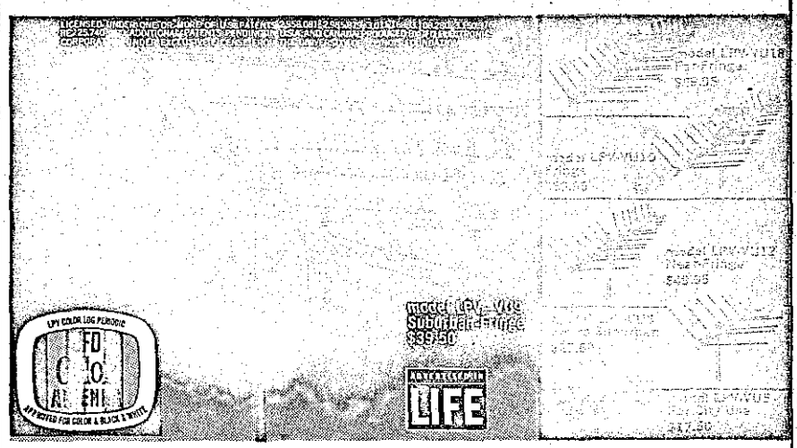
LIFE

A00395

for brilliant 82-channel TV performance—COLOR or black & white, plus FM/Stereo

INSTALL THE NEW...

JFD® LPV Color LOG PERIODIC TV ANTENNA



Now you can enjoy the best reception ever on any VHF, UHF or FM/Stereo station—from one antenna, using one down-lead—with the patented new JFD COLOR LPV Log Periodic.

Why cripple your reception with inefficient antenna "hodge-podges?" Choose a powerful space-age JFD LPV . . . see and hear the spectacular difference!

DON'T BE MISLED BY IMITATIONS—NO OTHER ANTENNA WORKS LIKE THE JFD LPV BECAUSE . . .

- Only the LPV is designed according to the original log periodic patented design of the University of Illinois Antenna Research Laboratories.
- Only the LPV combines frequency-independent design with capacitor-coupled electronic dipoles for . . .
- Higher, more uniform gain and narrower directivity on channels 2 to 83—and FM.

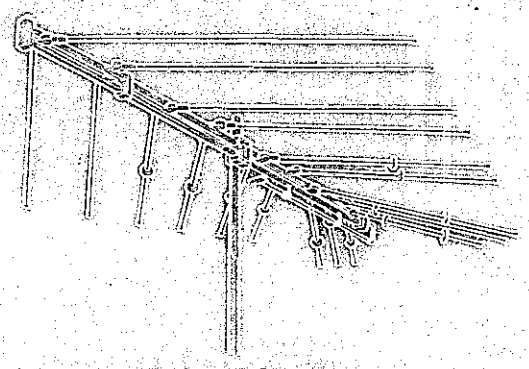
TEAR OFF ALONG DOTTED LINE AND MAIL TODAY!

PLACE 4 CENT STAMP HERE

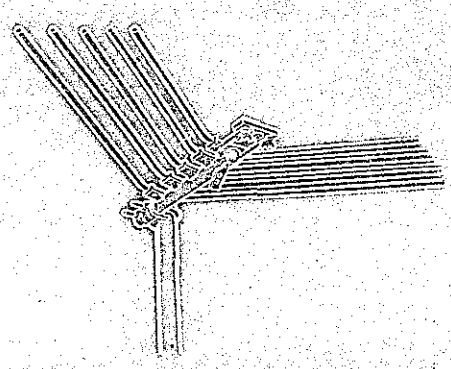
LPV LOG PERIODIC TV ANTENNAS
APPROVED FOR COLOR & BLACK & WHITE

A00395-A

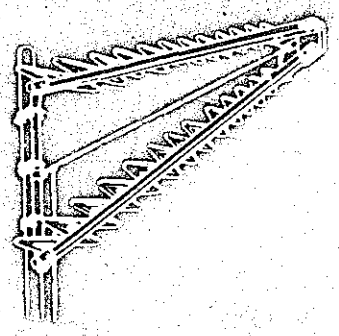
Get Your Share of the 600 Million Dollar UHF Market With...



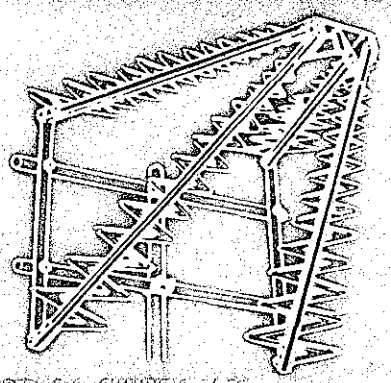
87 CHANNEL UHF VHF FM LPV LOG PERIODIC LPVAU8



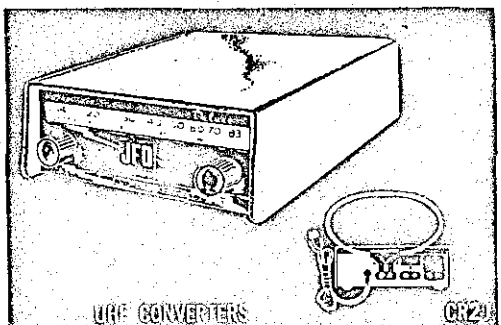
LPV UHF LOG PERIODIC CHANNELS 14-83 and 7-13 LPVAU6



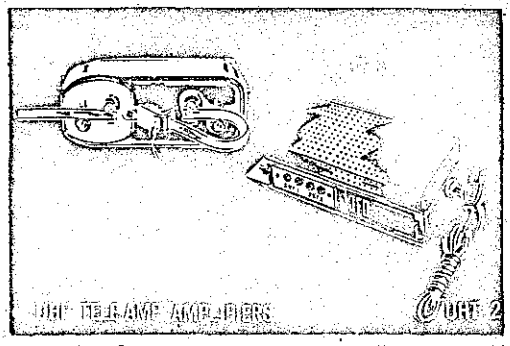
LPV UHF LOG PERIODIC CHANNELS 14-83 LPVZU-10



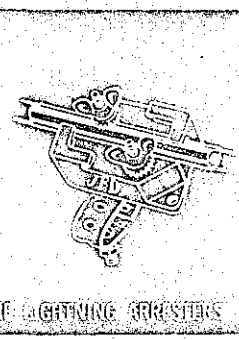
LPV UHF LOG PERIODIC CHANNELS 14-83 LPVZU20



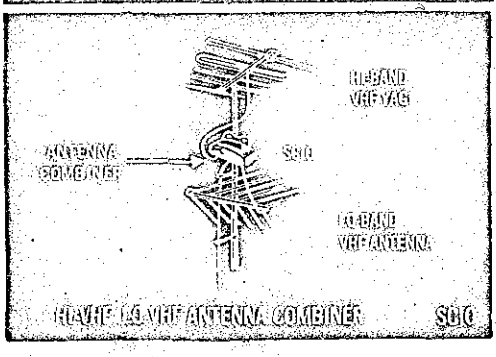
UHF CONVERTERS CPZU



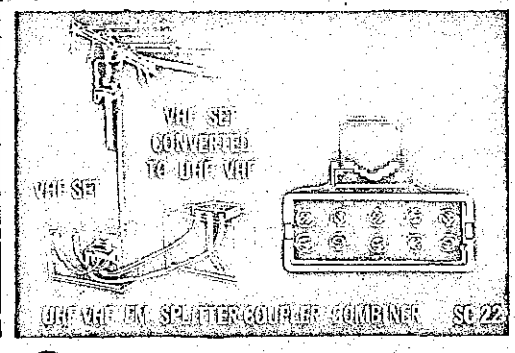
UHF TELE-AMP AMPLIFIERS UHT 2



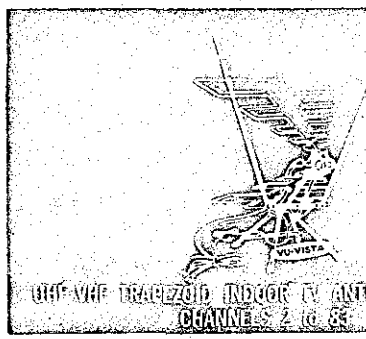
UHF LIGHTNING ARRESTERS AT-10



HI/VHF-LO/VHF ANTENNA COMBINER SBO



UHF/VHF FM SPLITTER-COUPLER/COMBINER SC-22



UHF/VHF TRAPEZOID INDOOR TV ANTENNA FOR CHANNELS 2 TO 83 LPT-83

* PATENTED

JFD® LPV Color Log Periodic Antennas,* Converters, Amplifiers & Splitter-Coupler/Combiners

A00396

—the brand that puts you in command of the UHF market!

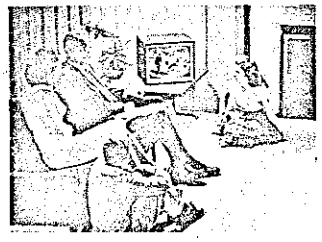
UHF (channels 14 to 83) —A Great New Profit Opportunity for

Alert servicemen and dealers will be the "attending" doctors at the birth of new UHF stations. Only those ready with the technical know how and the best antennas will reap the rewards of the coming boom in UHF.

Commercial Ultra-High Frequency telecasting became a permanent part of the American home entertainment scene on April 30, 1964. Federal law decreed that from that day forward TV manufacturers were required to equip all new sets with 82-channel tuners in compliance with the new FCC regulations.

Since that day, thousands of families, formerly unable to receive adequate VHF signals, have converted to UHF and are tuning in clear pictures and sound from neighboring UHF stations. Twenty million more will be joining them during the next five years. And 20,000,000 sets X $30.00 (average UHF conversion cost) = a new $600,000,000 market!

EVERY UHF VIEWER A PROSPECT



And that isn't all! Every viewer, whether he buys a new set or converts his present one, will require a new UHF antenna. Add this sizeable antenna market to the above conversion market and you come up with a UHF business potential in the billions of dollars.

The service-dealers who will profit most from this new opportunity will be those who:

1. Will be able to offer prospects and customers professional advice about their UHF conversion and reception.
2. Are ready to act decisively with the UHF converters and antennas that will create sales and clinch profits.

THE A, B, C's OF ALL-CHANNEL RECEPTION! One question that you will be asked to field regularly will be: "Do I need a new set to get the new channels 14 to 83?" The logical answer is: "No—if it is working satisfactorily, you can convert your VHF-only receiver in one of three ways:

1. Have a new complete 70 channel tuner installed in your set. This is best done with later model TV receivers, in the 1962, 1963 or 1964 category.
2. One channel strips (one for each UHF channel desired) can be installed on the strip-tuners inside the set. This would be applicable on those channels that are not being used in the particular area.
3. Place an all-70 channel converter (such as the JFD) on or close to your set.

You can expect questions such as this (and many more, as you will see later).

Alert service-dealers will be the "attending doctors" at the birth of each new UHF station. With their technical know-how, they will be in the position to dispel confusion among customers and prospects by explaining UHF tuning systems and antenna installations. Servicemen will find managers of new UHF stations very willing to cooperate in organizing advertising campaigns and in solving reception problems.

GET STARTED NOW WITH THIS "UHF PLAN FOR PROFITS"

History is repeating itself. Remember, the boom days of the early "Fifties" when the supply of TV sets and antenna installation accessories could barely keep up with demand? It is going to happen again (if it already hasn't) in your town.

When a new UHF channel goes on the air in your vicinity, it creates a ready-made opportunity for profits for the service-dealer who **is ready** for it. Don't wait for your area to go UHF before you start learning the ropes. Prepare now so that when UHF comes to town you can command a competitive edge. Study the plan that follows. It could form the basis of your service shop's blueprint for success in garnering new UHF business:

1. **Establish yourself as UHF Headquarters.**

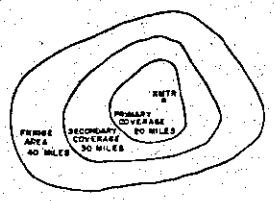
   Let the people **know** that you are a UHF expert who can help them enjoy the benefits of the new UHF programming. Offer your UHF conversion advisory services to local clubs and organizations. Use your store to demonstrate UHF converted sets. Affix window streamers and banners both inside and outside to tell the town **you** are the UHF conversion authority that set owners can consult with confidence.

2. **Learn all there is to know about UHF.**

   Don't forget to keep abreast of UHF developments. Keep educating yourself about the basic differences between VHF and UHF signal propagation and how to overcome them. For example, certain installation methods are critical when working with UHF. Losses caused by objects close to the lead-in are much higher at UHF than at VHF frequencies, and grow sharply in wet weather. Signal losses sometimes add up to 100 per cent more than in VHF.

UHF IS TRICKIER THAN VHF

UHF stations (at the low end of the spectrum), given sufficient power, approximate high band VHF signals in range—20 miles. Beyond this, however, UHF has its own characteristics, as you can gauge by the formalized station pattern below:



Station patterns indicate reception vs. distance.

UHF signals are more susceptible to absorption—beyond the 20 mile prime-signal area. Buildings, trees and other obstructions can cause significant signal loss.

They cannot be transmitted as far as VHF at the same level of power. Since the lowest UHF channel is more than twice as high in frequency as the highest VHF channel, UHF is more limited to line-of-sight distances. A ground-based UHF channel covers only about one-third the distance of an equivalent VHF channel. The FCC, however, allows UHF stations the use of approximately 300 per cent more power than a VHF station—1,000,000 watts instead of 300,000 watts. This helps equalize the distance covered by a UHF signal —up to 45 miles or so. Beyond that distance, UHF signals attenuate more swiftly than VHF.

The **near-fringe** UHF area lies 20 to 30 miles distant from the transmitter and requires antennas with higher gain. The **"fringe"** begins at 40 and ends at 50 miles. Here is where extraordinary consideration must be given to all factors such as terrain, transmitter height, etc. to obviate or minimize possible "ghosts" or "snow".

Beyond 50 miles, UHF reception must be classified as far-fringe; good reception depends on the use of the best antennas, optimum location and meticulous installation.

You will find a UHF field-strength meter and a JFD LPV-VU9 UHF Log Periodic antenna useful in "probing" for the best location at each installation. Most areas are not very critical, but occasionally a few feet will make a world of difference in signal reception. Don't create trouble for yourself by carelessly mounting the antenna in a dead spot!

Read further for specific antenna recommendations to cope with most reception demands.

3. **Advertise your service-shop.**

   Don't hide your light under a bushel. Coordinate your local newspaper advertising campaign with the opening of new UHF stations. Follow through with direct mail over your personal signature. Include a

service-dealers who are prepared for it!

special converter-antenna package offer that will entice inquiries.

Door knob hangers, window streamers, handbills and a host of other sales promotion aids are available from JFD Electronics Corporation to help you spread the word that you are the UHF expert in your town.

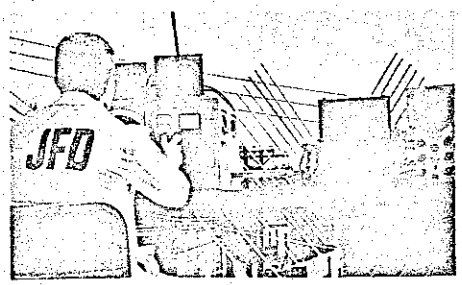
4. Demonstrate

Nothing sells like a convincing demonstration. Your store is an ideal place to show a UHF-converted set in operation. Demonstration of a UHF converter will help close sales during service calls. All it takes is a minute to connect a converter.

5. Be ready to satisfy demand with performance-proved UHF antennas and accessories.

LOOK TO JFD—WORLD LEADER IN UHF ANTENNA RESEARCH

Don't gamble your reputation and future in UHF. Rely on JFD—makers of today's largest and most advanced line of UHF antennas—to benefit from better profits, prestige and performance.



Our newly completed laboratory, located on a ten acre site in Interstate Research Park, in Champaign, Illinois (home of the University of Illinois) marks a milestone in antenna history. It is dramatic proof of JFD leadership in antenna technology. Its fully staffed and equipped engineering team, under the supervision of Dr. Paul E. Mayes, is blazing new trails in antenna design. This priceless know-how is built into each LPV-VU you sell.

JFD UHF and UHF/VHF antennas are adapted from the acclaimed Log Periodic antenna formula developed by the Antenna Research Laboratories of the University of Illinois. This totally new design principle—frequency independent operation—maintains the same high performance efficiency (so critically needed in UHF) regardless of channel tuned in.

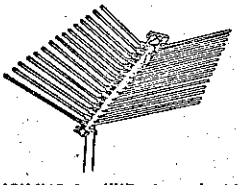
JFD makes available a complete selection of standard UHF bowtie-reflectors, corner reflectors, and yagis. For locations where perfect color or black/white pictures are a must, many technicians prefer the JFD Log Periodics available for UHF channels 14 to 83, or VHF-UHF channels 2 to 83. Is it any wonder that more JFD UHF LPV Log Periodics are being installed today than any other make?

WHICH ANTENNA TO INSTALL?

Unless you've installed a number of antennas in a particular area, and are well abreast of the various improved designs now available, you are most logically faced with this question.

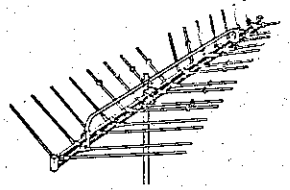
Several alternate antenna installations are applicable depending on (1) signal availability; (2) the stations involved and their geographic locations; (3) the type of receivers involved.

In UHF only locations, one of the JFD LPV-U or Zig-A-Log UHF Log Periodic antennas should deliver the necessary signal.



JFD model LPV-U15 for UHF channels 14 to 83 and VHF channels 7 to 13.

In VHF-UHF locations, you can add a new UHF antenna to the existing VHF antenna installation. But installer beware! Addition of a separate UHF antenna to a present VHF installation may cut the VHF signal being delivered to your set. Incoming signals from a VHF transmitter may be scattered by the UHF receiving antenna. Scattering produces less signal and multiple signals which cause ghosts. Install such antenna combinations with care.

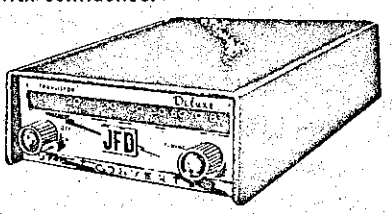


JFD model LPV-VU 15 for VHF-UHF channels 2 to 83 and FM/stereo.

One of the most logical antenna answers in all-channel areas is the new JFD LPV-VU channel 2 to 83 (and FM Stereo) Log Periodic. The LPV-VU simplifies and streamlines the installation. Most important, it requires only one down-lead to the set. The addition of a rotator should enable you to pick up all stations regardless of direction, now and in the future.

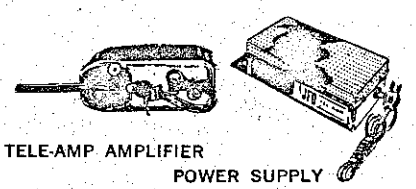
JFD ACCESSORIES ENHANCE UHF PERFORMANCE

You can also look to JFD for the UHF converters and antenna amplifiers you can install with confidence.



model CR2-J Two-transistor for extra amplification.
model CR1-J One-transistor for normal UHF reception.

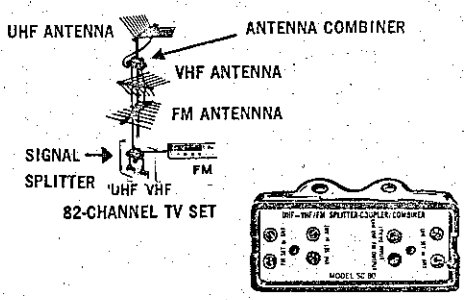
Distinctively styled and solid-state engineered JFD converters offer 10 db gain . . . instant operation . . . illuminated slide scale tuning . . . slim-line styling . . . miniaturized design. Trouble-free performance in less space than other converters.



TELE-AMP AMPLIFIER
POWER SUPPLY

model UHT-2 2-Transistor for UHF amplification.
model VUT-3 3-Transistor for VHF-UHF amplification.

JFD Tele-Amp all-transistor and nuvistor amplifiers offer the ultimate in reliability as well as in high gain and low noise. Poly-U sealed components plus area-space type printed circuitry lock out snow, ice, moisture, dust and other contaminants . . . OFT "Offset Free-Space Terminals" prevent signal leakage. These are some of the exclusive Tele-Amp features that insure reliability.



JFD model SC80 UHF/VHF/FM SPLITTER/COUPLER/COMBINER

And when it comes to the signal splitters and couplers needed to make an efficient antenna system, JFD Service-Savers fill the bill easily and economically.

The JFD Log Periodic Antenna Guide on back page four should be consulted for specific antenna recommendations to suit signal and station availabilities. Proof whether it's UHF, VHF, or VHF/UHF, JFD is the brand that puts you in command of the market!

JFD® LPV Color® LOG PERIODIC ANTENNA GUIDE

ADVERTISED IN LIFE

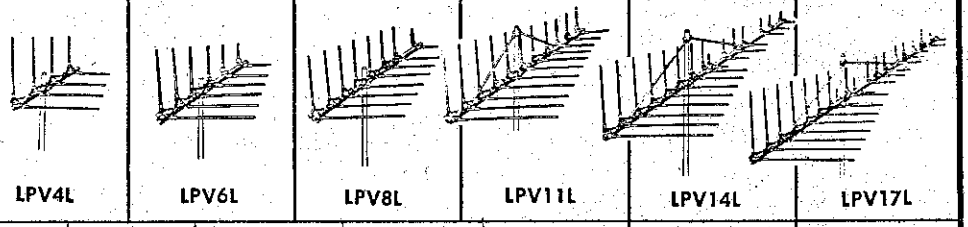
JFD Color ANTENNA

VHF channels 2-13

FOR VHF CHANNELS

up to 50 miles	up to 75 miles	up to 100 miles	up to 125 miles	up to 150 miles	up to 175 miles

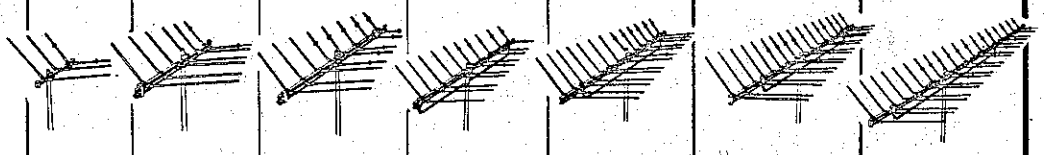
LPV-L COLOR Log Periodic for channels 2-13 plus FM



LPV4L | LPV6L | LPV8L | LPV11L | LPV14L | LPV17L

LPV TV COLOR Log Periodic for channels 2-13 plus FM

up to 50	up to 75	up to 100	up to 125	up to 150	up to 175	up to 200



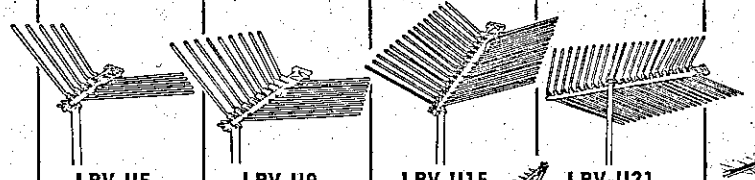
LPV-TV3 | LPV-TV5 | LPV-TV7 | LPV-TV10 | LPV-TV13 | LPV-TV16 | LPV-TV19

UHF channels 14 to 83

FOR UHF CHANNELS

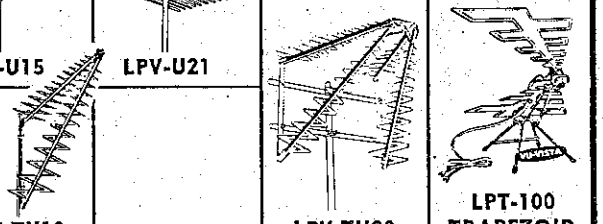
up to 25 miles	up to 40 miles	up to 60 miles	up to 80 miles	up to 90 miles	INDOOR UHF ANTENNA

LPV-U COLOR Log Periodic for channels 14 to 83 7-13



LPV-U5 | LPV-U9 | LPV-U15 | LPV-U21

LPV-ZU COLOR Log Periodic for channels 14 to 83



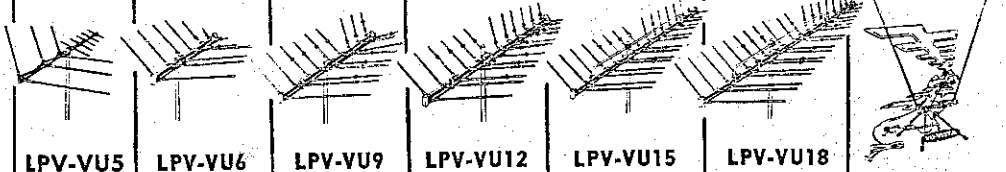
LPV-ZU10 | LPV-ZU20 | LPT-100 TRAPEZOID

VHF-UHF channels 2 to 83

FOR VHF/UHF TV & FM/STEREO

VHF—up to 30 miles UHF—up to 20 miles FM—up to 20 miles	VHF—up to 65 miles UHF—up to 40 miles FM—up to 30 miles	VHF—up to 90 miles UHF—up to 50 miles FM—up to 40 miles	VHF—up to 110 miles UHF—up to 50 miles FM—up to 40 miles	VHF—up to 125 miles UHF—up to 90 miles FM—up to 60 miles	VHF—up to 150 miles UHF—up to 90 miles FM—up to 75 miles	INDOOR VHF/UHF ANTENNA LPT-283 TRAPEZOID

LPV-VU COLOR Log Periodic for channels 2 to 83 & F/M Stereo



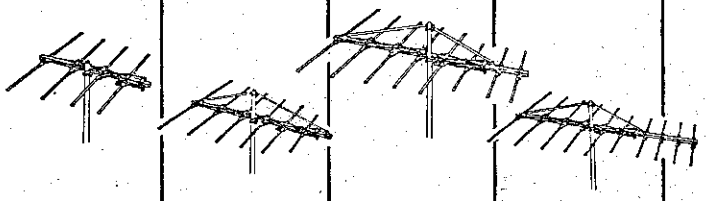
LPV-VU5 | LPV-VU6 | LPV-VU9 | LPV-VU12 | LPV-VU15 | LPV-VU18

FM/STEREO

FM/STEREO

up to 75 miles	up to 125 miles	up to 150 miles	up to 175 miles

LPL-FM COLOR Log Periodic for F/M Stereo frequencies 88-108 mc.



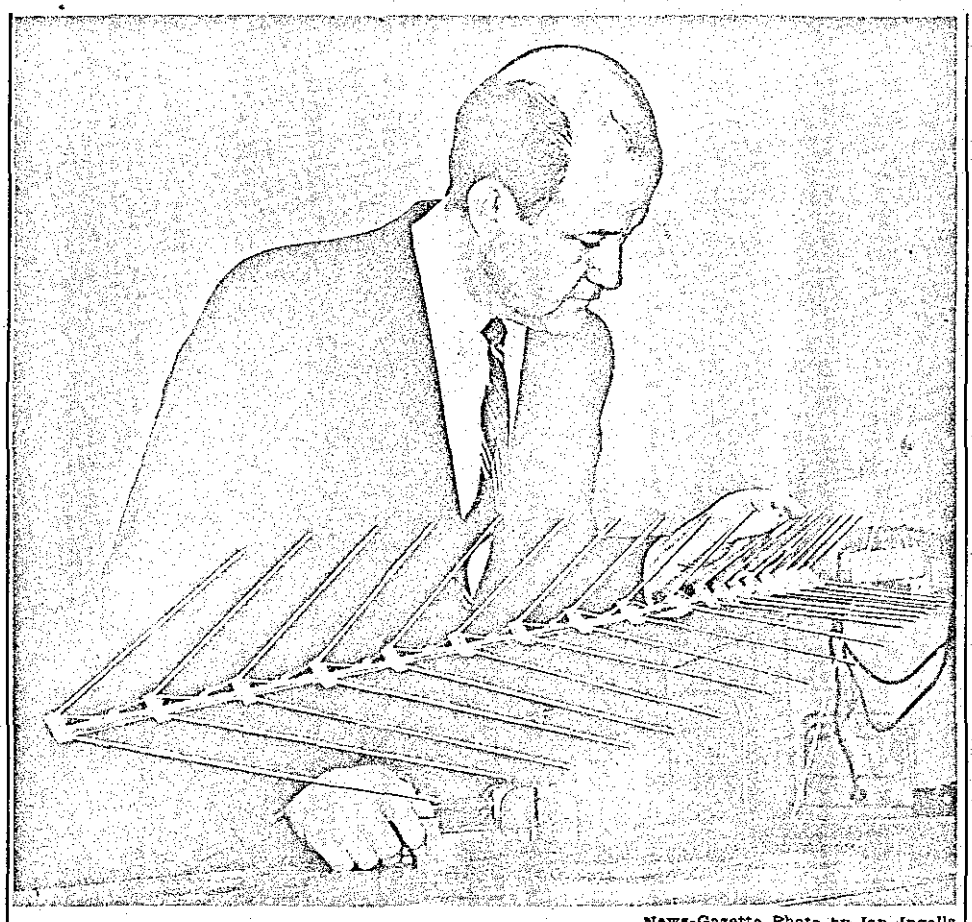
LPL-FM4 | LPL-FM6 | LPL-FM8 | LPL-FM10

A00399

JFD ELECTRONICS CORPORATION 15th Avenue at 62nd Street, Brooklyn, N. Y. 11219

FORM NO. 1010 LITHO IN USA

REPRINTED FROM The News-Gazette Champaign Illinois THURSDAY, JULY 23, 1964



News-Gazette Photo by Ian Ingalls

Dr. Paul E. Mayes inspects and checks out one of log-periodic family.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

UI's Mayes, Team Develop Better TV Antennas

By HANK HOKAMP
News-Gazette Staff Writer

Remember how you used to shake and pound your radios, trying to "get the darn things" playing again? That was then ... but how about now?

Yes, you've found a new culprit to cuss and perhaps shake . . . and to top things off, it's usually the most popular piece of furniture in the house ... the television set.

Thanks to the efforts of such men as Dr. Paul E. Mayes, professor of electrical engineering at the University of Illinois, and his associates, this situation may well become a rarity instead of commonplace.

"For many years no attempt was made to achieve a constant pattern regarding the development of VHF, UHF, VHF-UHF, and FM antennas," Dr. Mayes said. "Today there exisits a need for antennas which will cover a number of isolated frequency bands rather than covering continuously the entire spectrum between the lowest and highest frequencies of interest," he said.

Dr. Mayes and his colleagues have done just this .. developed a number of TV antennas which are presently being sold to the consumer public by electronic parts companies throughout the nation.

Another series of antennas, this time a family of four designed for FM Stereo radios, were released for production July 1. These antennas were developed by Mayes and Ron Grant, chief engineer at the JFD Antenna Laboratories located at 714 So. Randolph, C.

The JFD Electronics Corporation, Brooklyn, N.Y., manufactures these antennas and is licensed by the UI Foundation. JFD extends exclusive rights to the UI Foundation for its patented log - periodic - antenna concept.

Regarding the TV antennas developed by Mayes and his associates the largest log-periodic antenna in this family is the JFD Log-Periodic LPV antenna. This antenna can conquer the super fringe area up to 175 miles from a transmitter. It's considered to be the best for color and black and white reception regarding the capabilities of the "family."

The smallest LPV antenna reaches out to 50 miles from the transmitter. This is all one needs to attain local reception.

The second antenna in this family is the LPV-U, or the first UHF antenna design based upon the patented LPV formula by the laboratories at the UI. This antenna is used for high band performance on channels 14 to 83. Four models are now available and range up to 80 miles regarding reception.

No commercial antenna has had uniform high gain over the complete VHF television band. The log-periodic V, the third antenna available in this series, takes care of this unique situation. Out of various experiments led by Prof. V. H. Rumsey and Prof. J. D. Dyson, both members of the electrical engineering department at the UI, this log spiral antenna became available.

What is called the strongest antenna developed for UHF is the Zig-A-Log antenna, a new concept for local or long distance reception on channel 14 to 83.

This Zig-A-Log antenna is said to offer much less wind resistance, much less ice and snow loading area, and better directive gain.

Log-periodic or logarithmic antennas make-up a family that have a unique fundamental design. These designs have been developed by Mayes and his associates since 1954 at the UI and include the presence of a three-fold purpose.

These antennas have been and are presently being used for satellite tracking at missile range locations at points along the Atlantic and Pacific Oceans as well as at Cape Kennedy.

Secondly, the log-periodic antennas are used by communication networks of the Armed Forces. These new type designs can be made to cover any range of frequencies.

The third use of the antennas are found in commercial circles mentioned before. The TV log-periodic antennas have been developed since 1954 with the four FM Stereo antennas to be placed on the market in the near future.

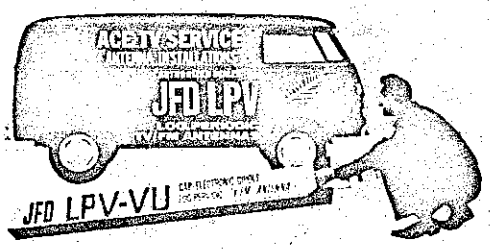
Where does this antenna research take place? Largely at the JFD Laboratories where 12 undergraduate, graduate and post-graduate students are engaged in this basic research in log-periodic type antennas for television, FM, amateur and military application.

The new JFD Antenna Laboratory is located in the Interstate Research Park northwest of Champaign with the construction scheduled to be completed by Sept. 1. Operations at the new laboratory will not begin until Oct. 1. The facilities will be used for the development of new antenna designs for all-channel VHF and UHF reception.

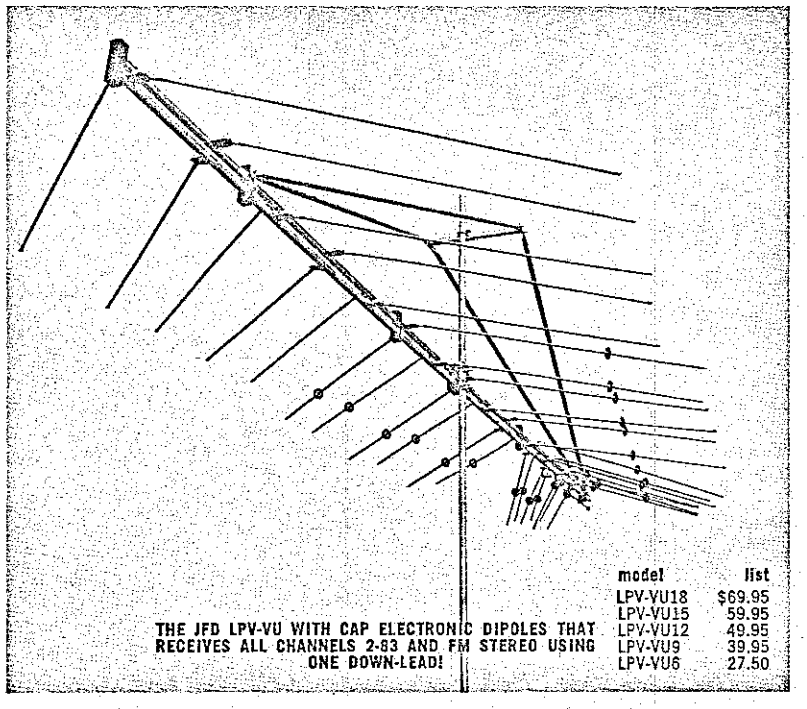
According to a survey paper recently published by Profs. E. C. Jordan, G. A. Deschamps, J. D. Dyson and Mayes, it was noted that some of the earliest broadband antennas were long wire types designed to operate in the high frequency or short-wave band or perhaps in the low frequency band. Among these antennas the well - known rhombic or equilateral parallelogrammed shaped antenna has held a high place since the days of radio. The log-periodic antenna is a revolutionary development in design.

Other information gathered during the survey was presented for the express purpose of providing the nonspecialist with a basic understanding of the remarkable advances which have taken place over the past decade in the field of broadband antennas.

Since the law now requires all TV sets to come from the factory with a UHF "hook-up", perhaps this need for antennas to cover a number of isolated frequency bands could open more interesting doors to interested parties such as Dr. Mayes and his associates.

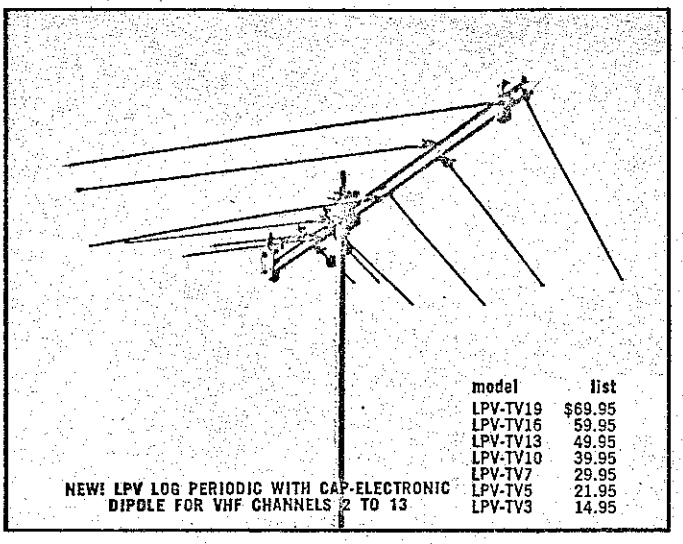


Don't Be 1/2 Set... With JFD LPV Log



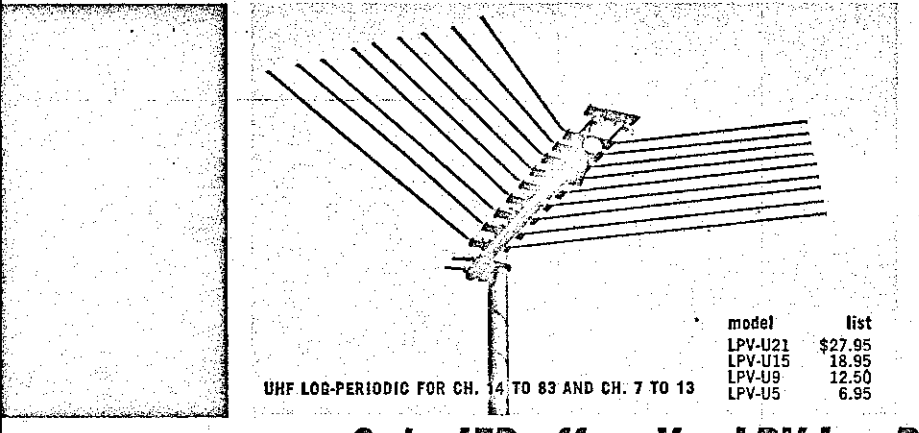
THE JFD LPV-VU WITH CAP ELECTRONIC DIPOLES THAT RECEIVES ALL CHANNELS 2-83 AND FM STEREO USING ONE DOWN-LEAD!

model	list
LPV-VU18	$69.95
LPV-VU15	59.95
LPV-VU12	49.95
LPV-VU9	39.95
LPV-VU6	27.50



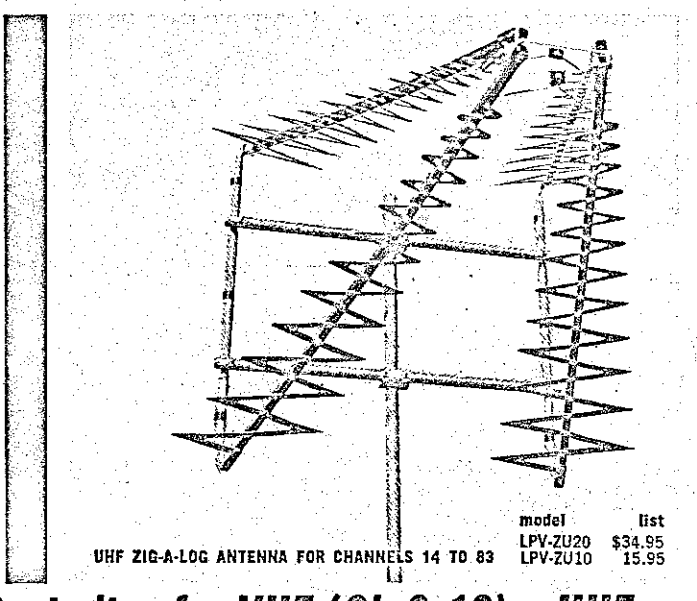
NEW! LPV LOG PERIODIC WITH CAP-ELECTRONIC DIPOLE FOR VHF CHANNELS 2 TO 13

model	list
LPV-TV19	$69.95
LPV-TV16	59.95
LPV-TV13	49.95
LPV-TV10	39.95
LPV-TV7	29.95
LPV-TV5	21.95
LPV-TV3	14.95



UHF LOG-PERIODIC FOR CH. 14 TO 83 AND CH. 7 TO 13

model	list
LPV-U21	$27.95
LPV-U15	18.95
LPV-U9	12.50
LPV-U5	6.95



UHF ZIG-A-LOG ANTENNA FOR CHANNELS 14 TO 83

model	list
LPV-ZU20	$34.95
LPV-ZU10	15.95

Only JFD offers You LPV Log Periodics for VHF (Ch.2-13)...UHF

GET THE LION'S SHARE OF ANTENNA BUSINESS (FLATTEN CATV COMPETITION, TOO) BY FEATURING THE JFD LPV-VU LOG PERIODIC! THIS NEW GENERATION OF LOG PERIODIC ANTENNAS DELIVERS WHAT VIEWERS WANT—MANY MORE STATIONS...VHF CHANNELS 2 TO 13...UHF CHANNELS 14 TO 83...FM/STEREO. GIVES THE CLEAN, UNIFORM SIGNAL SETS NEED ESPECIALLY FOR VIVID COLOR RECEPTION.

Only the LPV follows the patented frequency independent Log Periodic antenna formula developed by the Antenna Research Laboratories of the University of Illinois. This new log periodic cellular concept provides you with a combination of gain, bandwidth, directivity and impedance match never before possible with conventional antenna designs.

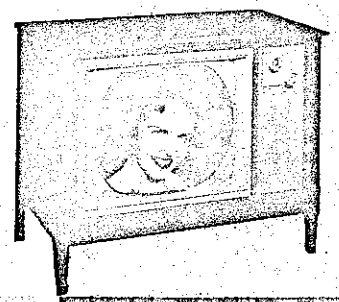
You can actually see the difference in truer color purity, in greater contrast, in finer detail—not on just some of the channels but all of the channels! Small wonder more JFD Log Periodics were installed in the last 12 months than any other brand.

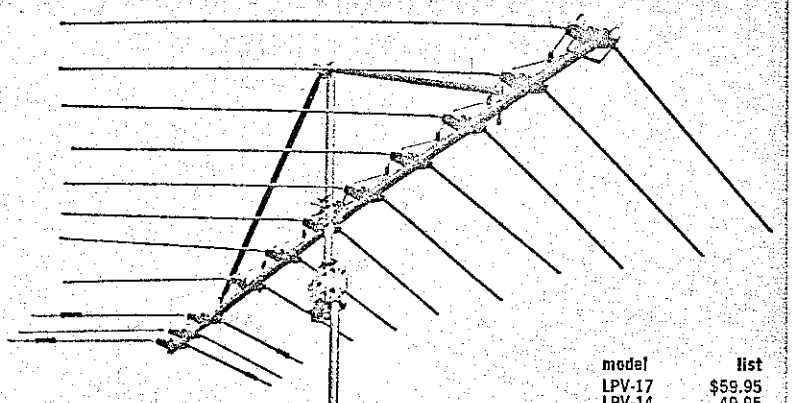
PREFERRED BY MORE N. Y. WORLD'S FAIR PAVILIONS . . . New York World's Fair exhibitors demand flawless color reception. That's why the House of Good Taste, Masonic Pavilion, Formica House, Eastman Kodak Exhibit, New York City Exhibit, House of Japan and other Fair showplaces chose the JFD LPV. This exclusive preference is pre-selling millions of Fairgoers—opening the door for more LPV sales by you.

WHY THE LOG PERIODIC IS THE MOST DRAMATIC BREAK WITH ANTENNA TRADITION SINCE DR. YAGI INVENTED THE YAGI . . . Up until the JFD Log Periodic, it was not possible to devise a truly broadband antenna except by "compromise" design that had to give up vital gain to get wider bandwidth . . . or had to degrade directivity for better impedance. Burdensome parasitics were piled on to try to compensate for gain "suck-outs", ghost-prone polar patterns, and inadequate bandwidth. This pyramided performance complications resulting in signal-sapping standing waves and impedance matches—and yet were only effective at the band edges.

Through the use of the revolutionary new logarithmic periodic formula, the entire frequency range is covered with dipole

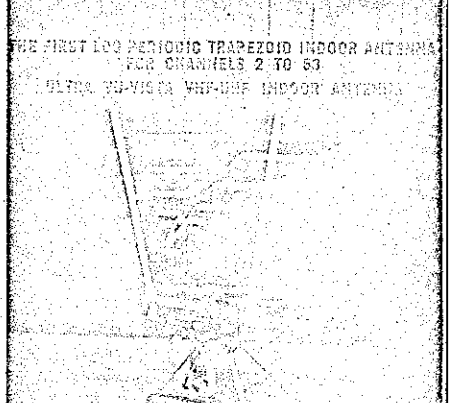
Be All Set—
Periodic TV & FM Antennas

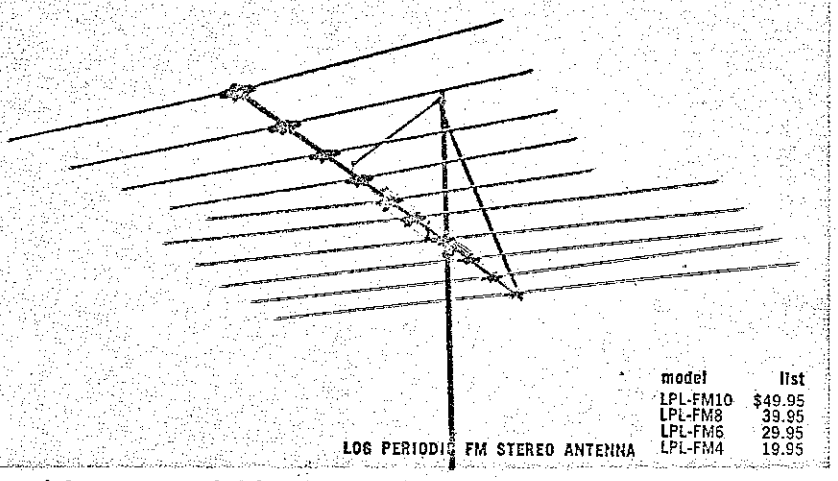




THE FAMOUS LPV FEATURING ADVANCED NEW LOG-PERIODIC PARAMETERS!
FOR VHF CHANNELS 2 TO 13 AND FM STEREO

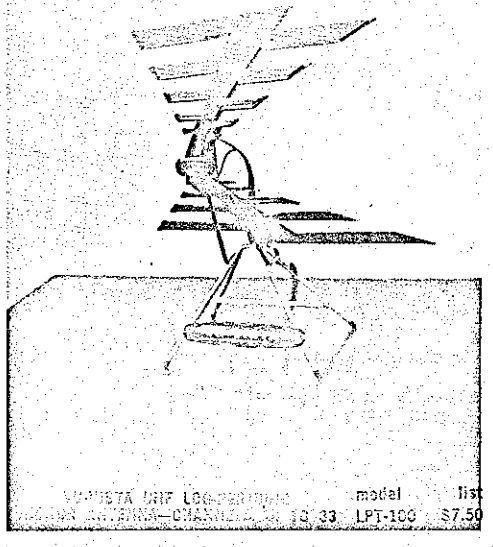
model	list
LPV-17	$59.95
LPV-14	49.95
LPV-11	39.95
LPV-8	29.95
LPV-6	21.95
LPV-4	14.95





LOG PERIODIC FM STEREO ANTENNA

model	list
LPL-FM10	$49.95
LPL-FM8	39.95
LPL-FM6	29.95
LPL-FM4	19.95



model	list
LPT-100	$7.50

(Ch. 14-83)...FM/Stereo...VHF/UHF/FM-CO OR & Black/White

groups (cells) of overlapping resonances. These harmonically resonant V-dipoles result in a frequency-independent performance. The LPV's inherently high gain, sharp directivity, 300 ohm impedance match and flat response are virtually constant across the entire band.

AND ONLY THE JFD LPV HAS IT! . . . The JFD LPV is the product of the world's largest and newest antenna laboratories. Here, in the JFD Champaign, Illinois R & D Research Center, a team of scientists and engineers, under the direction of Dr. Paul E. Mayes, are revolutionizing the state of the antenna art.

MECHANICALLY SUPERIOR! . . . COMPARE CONSTRUCTION! . . . Life-time stainless-steel take-off terminals that can never corrode, "tank-turret" element brackets, tough heavy-wall Implex A acrylic insulators, twin U-bolts with 6 inch mast grip span; supple, permanently riveted aluminum drive line rod; electrically conductive gold alodizing; plus a host of other exclusive mechanical improvements.

FIGHT CATV WITH THE JFD LPV! Keep CATV out of your area with JFD Log Periodics (such as the 82-channel LPV-VU) which provide viewers with more channels—sharper reception—richer color—plus FM stereo. Don't install inferior antennas that open the door to CATV. Install the best to get the best performance—the LPV!

ADVERTISED IN LOOK, SUNSET . . . COMPARE ADVERTISING AND PROMOTION! . . . A versatile selection of indoor and outdoor sales helps . . . advertisements in LOOK, SUNSET and other national and local consumer publications . . . in newspapers . . . on television . . . sell your best prospects.

Now is the time and your JFD distributor is the place to stock up and step up into big-league LPV Log Periodic profits.

SEE WHY AT THE MOMENT OF TRUTH THE PICTURE IS THE PROOF THE JFD LPV LOG PERIODIC WORKS BEST!

JFD ELECTRONICS CORPORATION
15th Avenue at 62nd Street, Brooklyn, N. Y. 11219
JFD Electronics-Southern Inc., Oxford, North Carolina
JFD International, 64-14 Woodside Ave., Woodside 77, N. Y.
JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada

Congress DIDN'T GO FAR ENOUGH!

PUBLIC LAW 88-520, 78 STAT. 750

H. R. 8

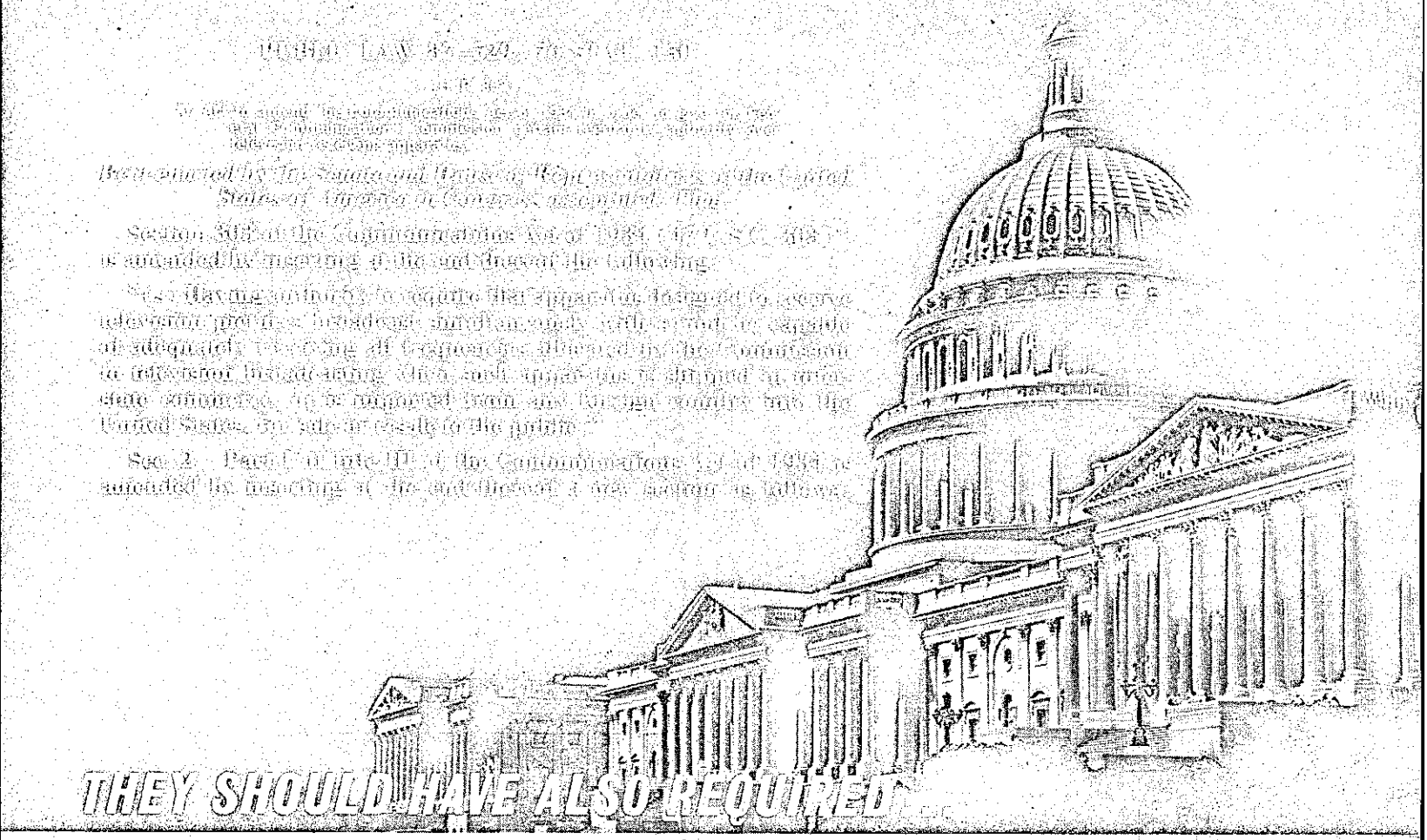
To amend the Communications Act of 1934 to require that all apparatus shipped in interstate commerce or imported from any foreign country into the United States for sale to the public be capable of adequately receiving all frequencies allocated by the Commission to television broadcasting, and for such apparatus to be tuned or readily adjustable to receive any of such frequencies without external adjustment.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That

Section 303 of the Communications Act of 1934 (47 U.S.C. 303) is amended by inserting at the end thereof the following:

"(s) Having authority to require that apparatus designed to receive television broadcasts shall be equipped with suitable facilities to adequately receive all frequencies allocated by the Commission to television broadcasting, and to require that such apparatus be tuned or readily adjustable without external adjustment to receive any of such frequencies."

Sec. 2. Part I of title III of the Communications Act of 1934 is amended by inserting at the end thereof a new section as follows:



THEY SHOULD HAVE ALSO REQUIRED . . .

"—that all 82-channel television receivers* must use an 82-channel television antenna."

Of course, you can't take the law into your own hands—but you *can* take advantage of today's ready-made opportunities to sell an 82-channel antenna with each 82-channel TV set.

Our Antenna Research Laboratories in Champaign, Illinois knew what they were doing when they teamed the acclaimed Log Periodic concept of the University of Illinois Antenna Research Laboratories with our new antenna design advance—the capacitor-coupled electronic dipole. Proof is the fact that the JFD LPV-VU is America's No. 1 82-channel TV/FM antenna!

Who says you can't have everything you want in a TV antenna—VHF?... UHF?... FM Stereo?—with a *single* down-lead to boot!

MOST EFFICIENT PERFORMANCE EVER ON VHF, UHF, FM/STEREO FROM *ONE* ANTENNA USING *ONE* DOWN-LEAD!

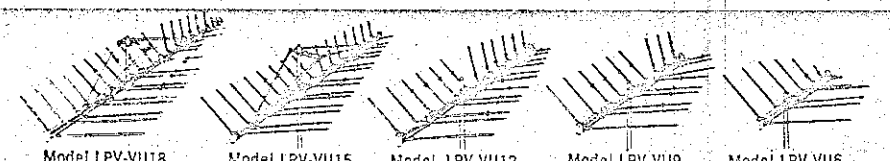
- *Cap-electronic* dipole design makes more elements resonate on channels 7 to 13 with a corresponding increase in gain.
- *Higher mode* operation in UHF band achieves higher gain on channels 14 to 83—and FM stereo.
- *Narrower* beamwidths . . . higher front-to-back ratios step up ghost rejection . . . intensify color.
- *Patented frequency independent* design maintains peak performance characteristics regardless of channel or band tuned.
- Includes 3-way splitter so single down-lead can be tied into individual VHF, UHF and FM system inputs.

REMEMBER – AN 82-CHANNEL TV SET IS NOT AN 82-CHANNEL TV RECEIVER UNLESS IT HAS AN 82-CHANNEL TV *ANTENNA*!

*Lest we forget—every *color* set is also an *82-channel* set requiring a color-perfect antenna. In fact, many color TV shows are broadcast on UHF channels.

JFD

SEE YOUR DISTRIBUTOR OR WRITE FOR BROCHURE 806



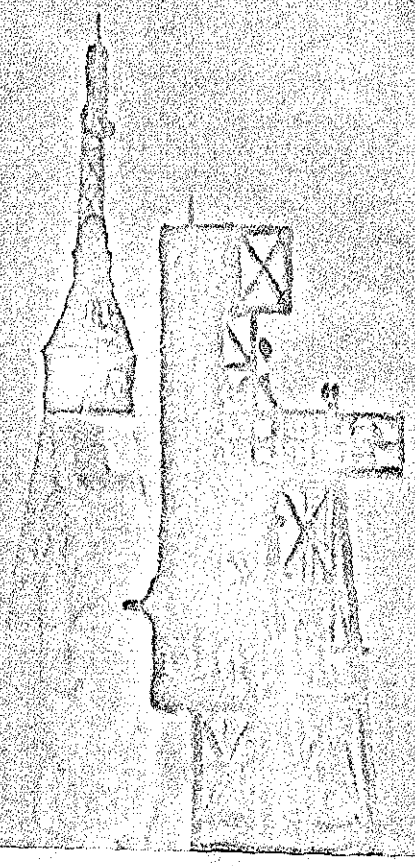
Model LPV-VU18 Model LPV-VU15 Model LPV-VU12 Model LPV-VU9 Model LPV-VU6

JFD LPV-VU LOG PERIODICS for channels 2 to 83 and FM/Stereo.

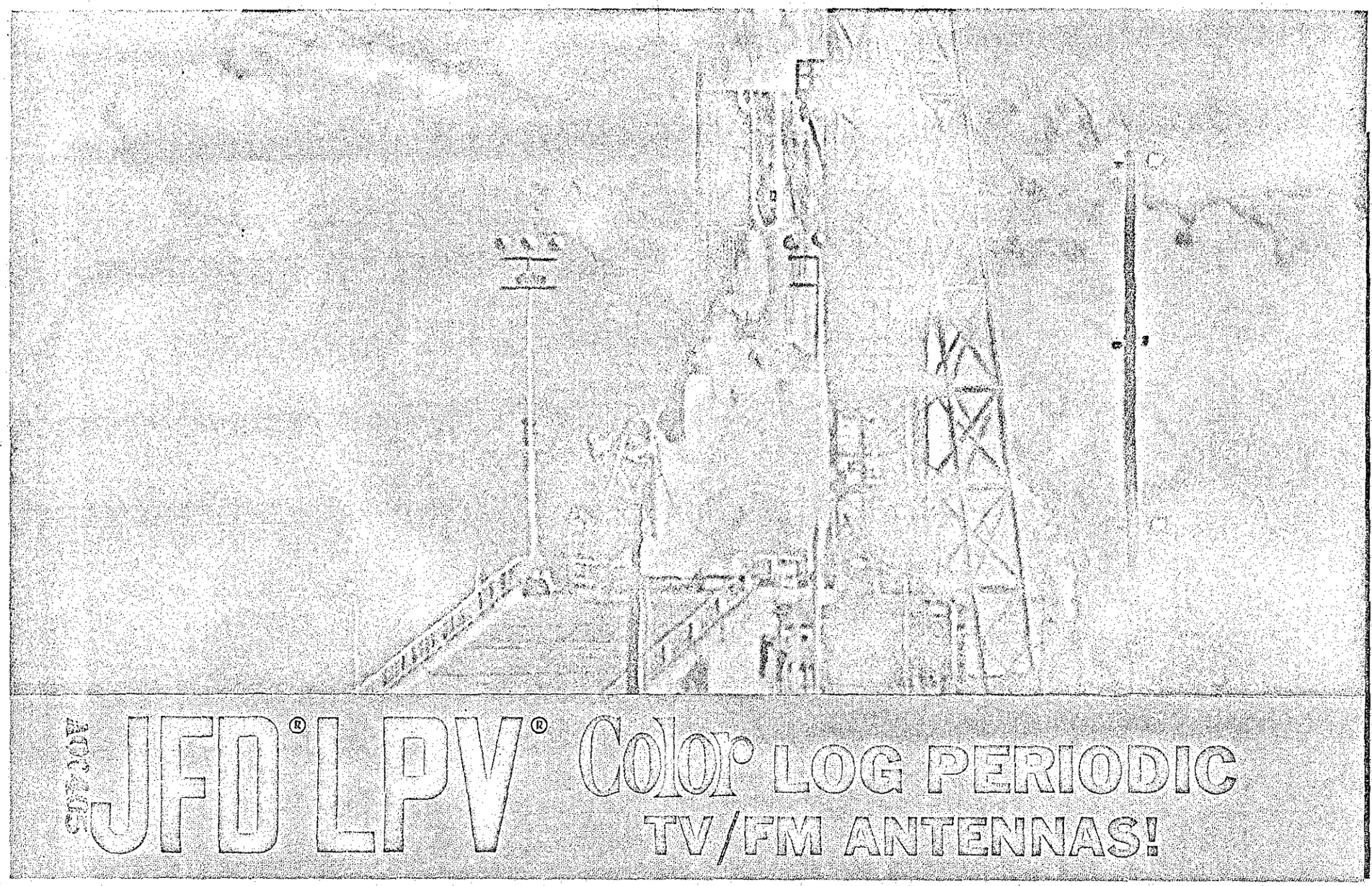
JFD ELECTRONICS CORPORATION
15th Ave. at 62nd Street, Brooklyn, N.Y. 11219
JFD Electronics-Southern Inc.
Oxford, North Carolina
JFD International
64-14 Woodside Ave., Woodside 77, N.Y.
JFD Canada, Ltd.,
51 McCormeck Street, Toronto, Ontario, Canada

ADVERTISED IN

LIFE®



ADCAO4


JFD® LPV® Color LOG PERIODIC
TV/FM ANTENNAS!

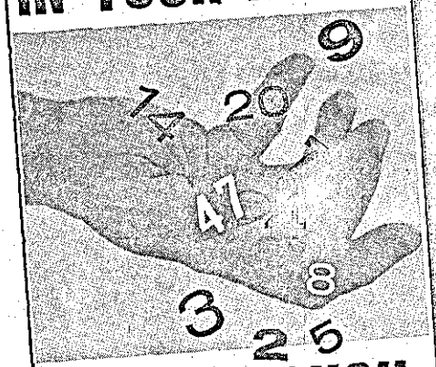
JFD®

PUTS LIFE®

INTO YOUR TV

AOC406

ARE YOU LETTING THE TV CHANNELS IN YOUR AREA

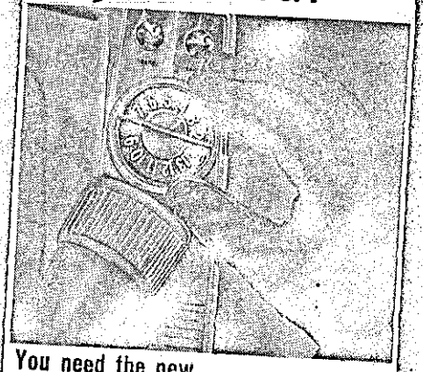


SLIP THROUGH YOUR FINGERS?

You need the new

JFD® LPV COLOR

You are being robbed if you are not getting all the TV stations available in your area!



You need the new

JFD® LPV COLOR

ANTENNA SALES!

Starting October 29 LIFE starts selling JFD LPV Log Periodic TV antennas to 20,000,000 prospects!

It's the greatest antenna promotion

in LIFE's history...

in JFD history...

in the industry's history...

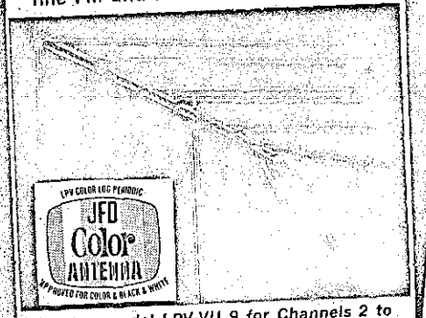
A0007

COLOR LOG PERIODIC TV/FM ANTENNA

Are you getting all of the channels now on the air in your area?

Install the new TV antenna discovery, the JFD LPV Color Log Periodic and enjoy amazingly bright, clear pictures on all the UHF and VHF stations around you — in brilliant COLOR and black and white.

The secret? All of the LPV's elements (not just some as in other ordinary antennas) work together for maximum picture power on channels 2 to 83. And only the patented JFD space-age log periodic design delivers such fine all-channel performance — plus fine FM and FM stereo.



shown: model LPV-VU 9 for Channels 2 to 83 and FM/Stereo. (One of many JFD LPV antennas now available from your local dealer.) Developed from research performed at the University of Illinois Antenna Research Laboratories.

Write for descriptive folders 730

Dept. 10

JFD ELECTRONICS CORPORATION
15th Avenue at 62nd Street
Brooklyn, N.Y. 11219
WORLD'S LARGEST MANUFACTURER OF TV & FM ANTENNAS

LOG PERIODIC TV/FM ANTENNA

Install the new JFD LPV Color Log Periodic TV/FM antenna and enjoy all the VHF and UHF stations your 82-channel TV set can deliver!

shown: model LPV-VU 9 for Channels 2 to 83 and FM/Stereo. (One of many JFD LPV antennas now available from your local dealer.) Developed from research performed at the University of Illinois Antenna Research Laboratories.

Don't let an old-fashioned antenna shortchange your enjoyment of all the TV stations within range of your 82-channel set. Replace it with a powerful new JFD LPV Color Log Periodic. All of the LPV's elements (not just some as in other ordinary antennas) work together for maximum picture on channels 2 to 83 — in brilliant COLOR and black and white. Patented space-age log periodic design is the reason. GET THE PICTURE YOU WANT WITH THE JFD LPV!

Write for descriptive folder 730

JFD ELECTRONICS CORPORATION
Dept. 100, 15th Avenue at 62nd Street
Brooklyn, N. Y. 11219
WORLD'S LARGEST MANUFACTURER OF TV & FM ANTENNAS

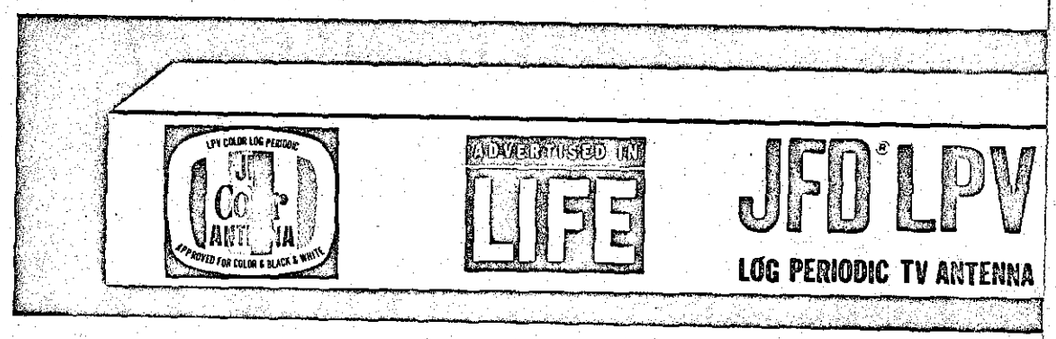
– ALL THROUGH THE BUSY TV SELLING SEASONS OF '65 and '66...

OCTOBER 29, 1965
NOVEMBER 12, 1965
DECEMBER 24, 1965
FEBRUARY 11, 1966
MARCH 18, 1966

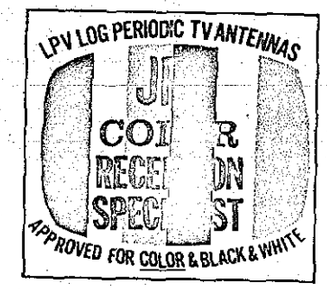
More TV viewers this year than ever before will be reading about and asking about today's most wanted TV antenna—the JFD *Color* LPV Log Periodic.

Consistent and compelling advertising in LIFE will help you convert the color TV boom into record-high TV antenna sales and profits.

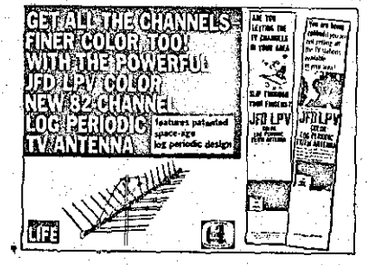
All you need do to *cash* in is to *tie* in! Use the LIFE merchandising helps shown here to promote your services as an expert JFD LPV antenna installer. Run your own newspaper, radio and TV advertising. Tell the world that your store is headquarters for the TV antenna America knows best—the JFD *Color* LPV.



MILLIONS OF LIFE READERS WILL BE LOOKING FOR THE JFD SEAL THAT ASSURES BEST COLOR AND BLACK & WHITE RECEPTION!
Each JFD LPV antenna carton will display this seal of assurance that guarantees better pictures—color or black and white.

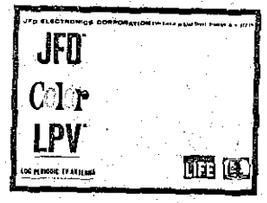


IDENTIFY YOURSELF AS THE JFD COLOR RECEPTION SPECIALIST ADVERTISED IN LIFE BY FEATURING THIS FULL COLOR WINDOW SEAL
Form 986 Size: 17" x 22" (Shown Reduced)



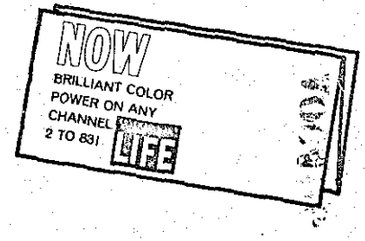
AOCA68

GIANT LIFE-LPV COLOR STREAMERS TO STOP AND



COLOR-FULL SHIPPING LABELS!
Catches the eye. Sells

VINYL POCKET PROTECTOR!
A "must" for busy



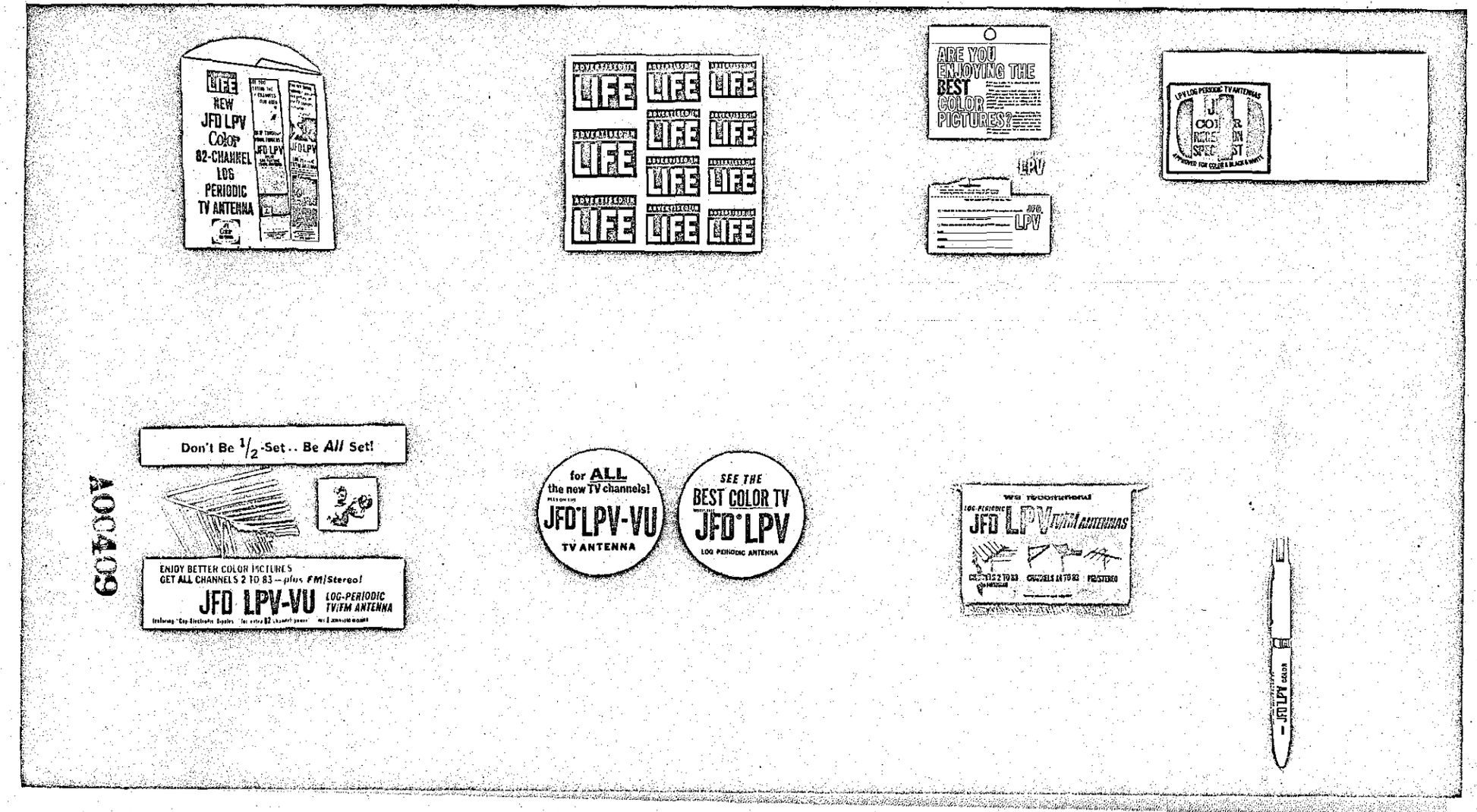
LIFE SELF-MAILERS FOR *DIRECT* ACTION!
Whether you mail them or hand them out to your prospects, these attractive

SEE TRAFFIC!
Puts your store on the map—as the local source for the Color LPV antennas advertised in LIFE.
Form: 988 Size: 26½" x 39"

the JFD LPV as the best color antenna buy.
Form: 1006
Size: 3⅞" x 5¼"

salesmen and countermen. A terrific JFD LPV silent salesman.
Form: 1007
Size: 5½" x 3½"

folders go right to the point—that you are the JFD LPV Color Reception Specialist who can get them *better* TV pictures—especially in color!
Form: 989 Size: 3" x 5½" (folded)

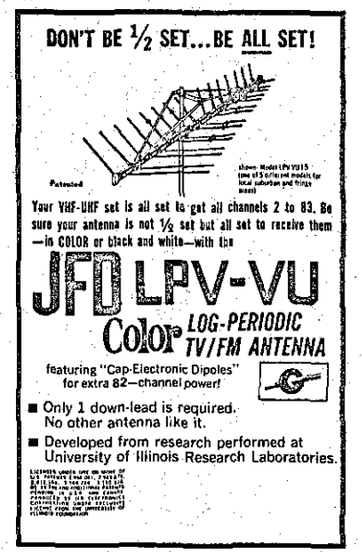


A0409

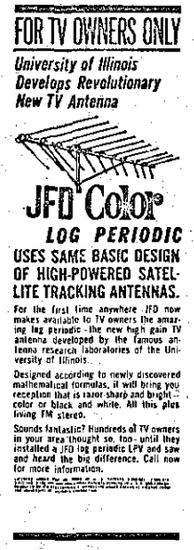
PLUS NEW LPV®

NEWSPAPER MATS

No better way to cash in on JFD advertising in LIFE then with these hard-hitting newspaper advertising mats. Choose the size that suits you best. The ads shown here are only a few of a complete selection available on request.



M346 2 Cols. x 84 lines = 168 lines



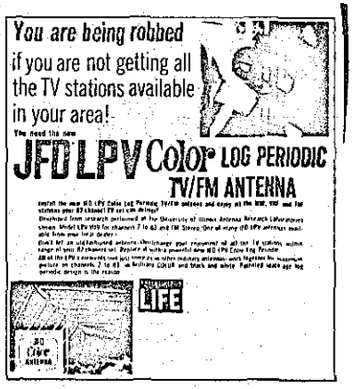
M296 1 Col. x 84 lines = 84 lines

M301 1 Col. x 70 lines = 70 lines

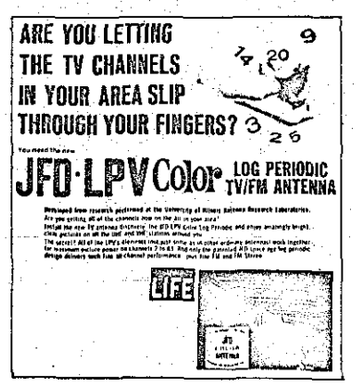
M377 2 Cols. x 112 lines = 224 lines

M297 1 Col. x 42 lines = 42 lines

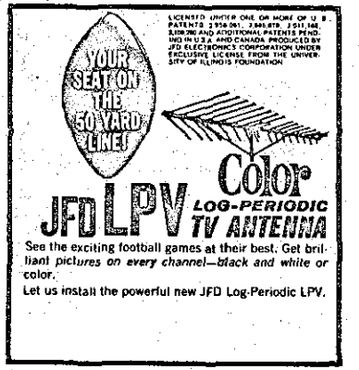
AOC411



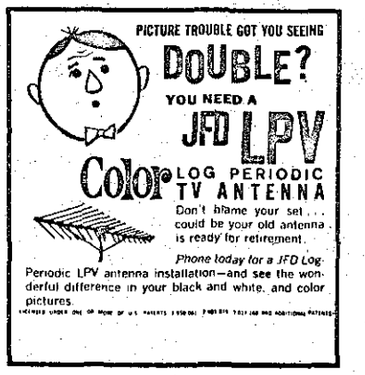
M378 3 Cols. x 84 lines = 252 lines



M379 3 Cols. x84 lines = 252 lines



M303 2 Cols. x 56 lines = 112 lines



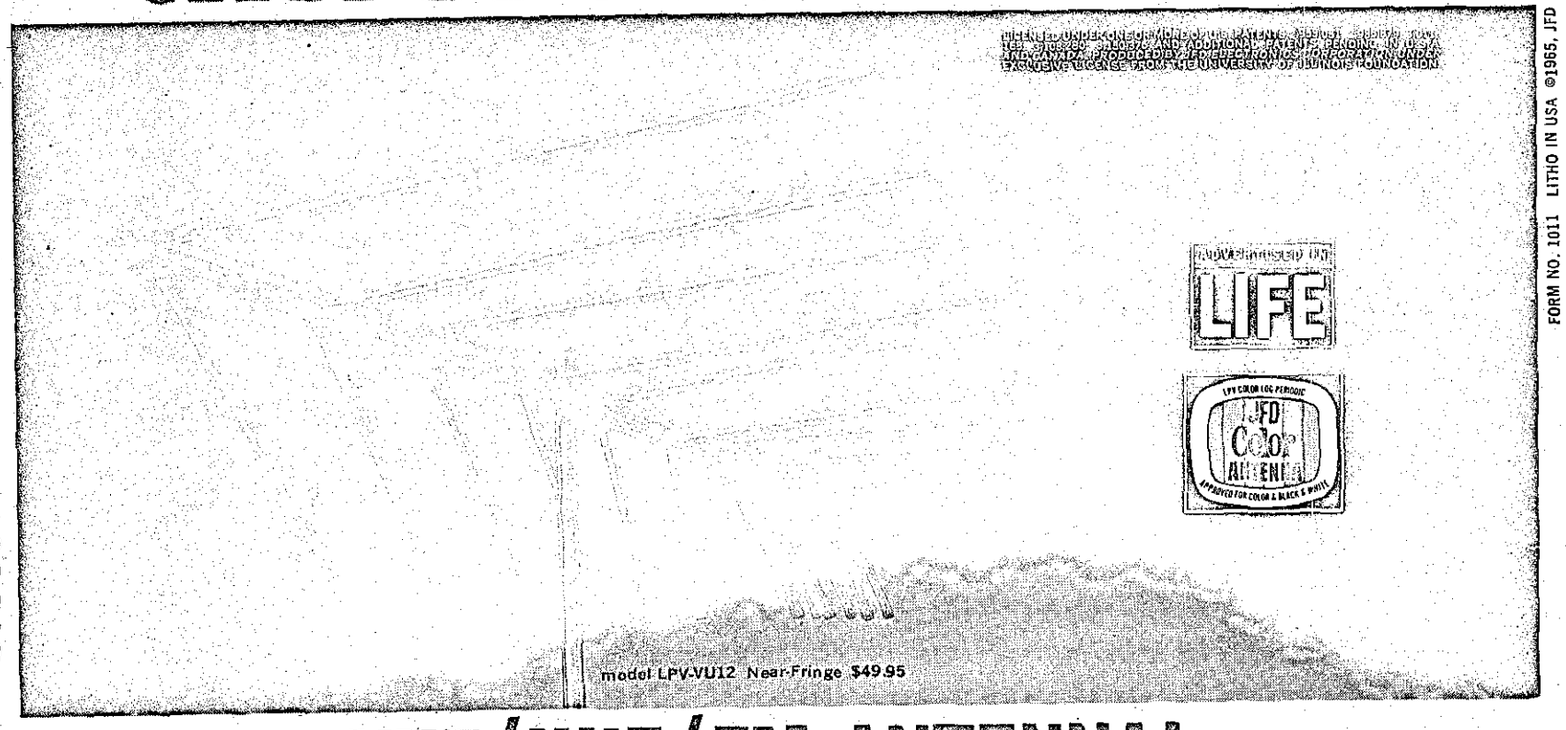
M304 2 Cols. x 56 lines = 112 lines

JFD ELECTRONICS CORPORATION • 1462 62nd Street • Brooklyn, N. Y. 11219

world's largest manufacturer of TV & FM antennas

Form 996 litho in U.S.A.

america's no. 1



AOC412

FORM NO. 1011 LITHO IN USA ©1965, JFD

VHF/UHF/FM ANTENNA!

Because it delivers best 82-channel TV performance—COLOR or black/white—

plus FM/Stereo—using only a single downlead!

No other antenna works like the 82-channel JFD LPV-VU Color Log Periodic...

■ **Only** the JFD LPV-VU is designed according to the patented **log periodic** design of the **University of Illinois Antenna Research Laboratories.**

■ **Only** the JFD LPV-VU utilizes **capacitor-coupled Cap-Electronic** dipoles for **higher** mode operation that achieves **higher** gain, **narrower** beamwidths on VHF channels 7 to 13 and UHF channels 14 to 83. (Our competition's copies of the JFD LPV-VU use only **fundamental** mode which resonate as simple dipoles with consequently limited gain.

■ **Only** the JFD LPV-VU offers true **frequency-independent** performance that insures brilliant **color** on any channel.

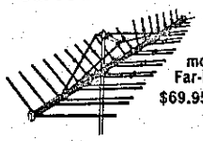
JFD®
LPV®-VU
Color
LOG PERIODIC

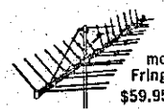
You **bet** you can have everything you want in **one** antenna—VHF, UHF, FM—with a **single** down-lead, too! Start teaming up JFD 82-channel **LPV-VU** Color Log Periodics with all the 82-channel TV sets in your area—see the difference in profits and performance. Call your distributor or write for brochure 806.

32 million readers of LIFE will be seeing spectacular JFD LPV Color Log Periodic advertisements all season long. This unprecedented LIFE campaign will be preselling JFD LPV antennas for **you!**

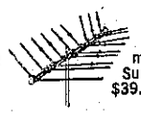
Full-color television commercials will show millions more why the LPV's patented space-log periodic design works best on **any** channel—**color** & black/white.

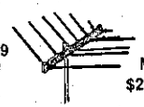
5 GREAT MODELS TO CHOOSE FROM


model LPV-VU18
Far-Fringe
$69.95


model LPV-VU15
Fringe
$59.95


model LPV-VU12
Near-Fringe
$49.95


model LPV-VU9
Suburban-Fringe
$39.50


model LPV-VU6
Metro-Suburban
$27.50

JFD ELECTRONICS CORPORATION 15th Avenue at 62nd Street, Brooklyn, N. Y. 11219

AOC413

At Work in the New Frontiers of Electronics

JFD ELECTRONICS CORPORATION

15th Avenue at 62nd Street, Brooklyn N. Y. 11219 • Phone 212 DE 1-1000 • TWX-NY25040

August 12, 1964

University of Illinois Foundation
University of Illinois
Champaign, Illinois

Attention: Mr. James Colvin

Re: Copy Clearance for
LPV Antennas

Dear Jim:

A few weeks ago, when Sam Smith was in town, I met with him at Mr. Faber's office and amongst the things we discussed was the question of clearance of copy material used in our selling campaign on LPV antennas.

At that meeting I proposed to Sam a plan whereby we could save a lot of time and avoid problems in preparing our advertisements and catalog brochures and also avoid the risk of having you object to the phrases and copy content therein. I suggested that we submit to you a list of statements that we have used in all of our past literature referencing the University of Illinois and the University of Illinois Antenna Laboratories and have you review them and agree in advance on this series of legends that we may be free to include in any advertising or catalog work on LPV antennas made by us under the license.

Once we have these authorized legends, we will thereafter work our ads and literature around them so that we can expect a submitted proof to clear without any problem or delay. I believe that within the scope of the approved legends, we will be able to still retain enough of a variety so as not to make our literature or ads stereotyped or repetitive.

A00357

JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada

JFD Electronics-Southern, Inc., Oxford, North Carolina 27565
JFD International, 64-14 Woodside Ave., Woodside, New York 11377

JFD ELECTRONICS CORPORATION
15th Avenue at 62nd Street, Brooklyn N. Y. 11219 • Phone 212 DE 1-1000 • TWX-NY25040

Mr. James Colvin (Cont.)

We have four (4) areas in which we have prepared material:

1. World's Fair Literature
2. Catalog and Price List Literature
3. Commercials, Magazines, Trade Papers
4. JFD Product Literature

We would like you to review the phrases used in the first and second categories as follows:

1. World's Fair Literature

Developed by the University of Illinois Antenna Research Laboratories.

Produced by JFD Electronics Corporation under Exclusive License from the University of Illinois Foundation.

The JFD LPV is designed according to the patented Log-Periodic geometric formula of the famous Antenna Research Laboratories of the University of Illinois.

Only JFD is licensed exclusively by the University of Illinois Foundation to make the patented Log-Periodic LPV (and all other Log-Periodic type TV and FM antennas.)

No other so-called Log-Periodic antenna can work like the JFD LPV because only JFD ~~does~~ the original patented Log Periodic formula of the Antenna Research Laboratories of the University of Illinois.

A00358

is authorized to use

JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada
JFD Electronics-Southern, Inc., Oxford, North Carolina 27565
JFD International, 64-14 Woodside Ave., Woodside, New York 11377

At Work in the New Frontiers of Electronics

JFD ELECTRONICS CORPORATION

15th Avenue at 62nd Street, Brooklyn N. Y. 11219 • Phone 212 DE 1-1000 • TWX-NY25040

Mr. James Colvin (Cont.)

2. Catalogs and Price List Literature

Formulated according to the patented geometrically derived logarithmic-periodic scale of the Antenna Research Laboratories of the University of Illinois.

Developed at the University of Illinois Antenna Research Lab.

Developed by the University of Illinois Antenna Research Lab.

This new concept has been related to TV-FM antennas exclusively for JFD by ~~Prof.~~ Paul E. Mayes, ~~of the Antenna Research Laboratory, University of Illinois~~.

Our advertising department is reviewing the remaining literature and some time next week I will send you the information on the third category to be followed shortly thereafter by the last.

Would you please review the above phrases and indicate which we can continue to use in the preparation of our advertising material.

Time is always important to us Jim, and we would like to avoid any delay in getting clearance from you on the above material.

Sincerely,

Ed Finkel

Ed Finkel

EF/ss

A00359

JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada

JFD Electronics-Southern, Inc., Oxford, North Carolina 27565
JFD International, 64-14 Woodside Ave., Woodside, New York 11377

August 21, 1964

Mr. Ed Finkel
JFD Electronics Corporation
15th Avenue at 62nd Street
Brooklyn, New York 11219

Dear Ed:

Greetings!

I got back to the office a couple of days ago and have talked with various people here about your letter of August 12 concerning JFD advertising copy.

I have been involved in preparation of ad copy both with companies and with agencies and I know the need for promptness in looking at any piece of copy. So I have complete sympathy for your position. However, to approve slogans in advance is not entirely satisfactory because the context in which the statement is made as well as the way in which it is displayed has much to do with whether the statement itself would be proper so far as the University is concerned.

We have no objection to the following statements in connection with the World's Fair literature:

"Developed by the University of Illinois Antenna Research Laboratories."

"Produced by JFD Electronics Corporation under Exclusive License from the University of Illinois Foundation."

"The JFD LPV is designed according to the patented Log-Periodic geometric formula of the famous Antenna Research Laboratories of the University of Illinois."

We have no objection to these statements under catalog literature:

"Formulated according to the patented geometrically derived logarithmic-periodic scale of the Antenna Research Laboratories of the University of Illinois."

"Developed at the University of Illinois Antenna Research Lab."

"Developed by the University of Illinois Antenna Research Lab."

However, any one of these statements could be objectionable if they appeared in 72-point type at the top of your advertising or if it represented any instruments beyond University of Illinois products.

As to the two other statements in World's Fair literature, our people feel that the fourth item should be expurgated to eliminate the words:

". . . and all other Log-Periodic type TV and FM antennas."

So far as the fifth item is concerned we would want you to rephrase it to read as follows:

"No other so-called Log-Periodic antenna can work like the JFD LPV because only JFD is authorized to use the original patented Log Periodic formula of the Antenna Research Laboratories of the University of Illinois."

In the fourth item under catalogs we should like you to have it read:

"This new concept has been related to TV-FM antennas exclusively for JFD by Dr. Paul E. Mayes."

I hope this is in some way helpful to your program. I am obliged to say that under article 10 of the agreement we feel you still must submit complete advertising copy and lay-out because only in that way can we get the full picture of the material being used. I see no reason why we can not call you as soon as we get the material so that your Advertising Department should not be slowed appreciably.

Remember, we really want to help in any way we can but we must be careful as to the way in which the University of Illinois name is used. This does not relate only to you but to all licensees in the Foundation program.

Cordially yours,

James C. Colvin
Executive Director

JCC:pw
cc: Mr. Samuel B. Smith

At Work in the New Frontiers of Electronics

JFD ELECTRONICS CORPORATION

15th Avenue at 62nd Street, Brooklyn, N. Y. 11219 • Phone 212 DE 1-1000 • TWX-NY25040

September 10, 1964

University of Illinois Foundation
224 Illini Union
Urbana, Illinois 61803

Att: Mr. James C. Colvin
Executive Director

Dear Mr. Colvin:

I am enclosing photostat of our LPL-FM brochure for your review.

Please bear in mind that the technical data shown has not been finalized.

I would appreciate your return of this material at your earliest convenience.

Cordially,
JFD ELECTRONICS CORPORATION

James Sarayiotes

James Sarayiotes,
Advertising Manager

JS:rs
encl
via airmail

A00362

At Work in the New Frontiers of Electronics

JFD ELECTRONICS CORPORATION

35th Avenue at 62nd Street, Brooklyn N. Y. 11219 • Phone 212 DE 1-1000 • TWX-NY25040

September 14, 1964

University of Illinois Foundation
University of Illinois
Champaign, Illinois

Attention: Mr. James Colvin

Re: Copy Clearance for LPV Antennas

Dear Jim:

Following up my letter of August 12, 1964, listed below are the phrases used in our commercials, magazines and trade papers.

I would appreciate your reviewing them and clearing these so they can be used in any future ads we will prepare.

Commercials, Magazines and Trade Papers

1 Developed from Research Performed at the Antenna Laboratires of the University of Illinois

2 Developed from Research Performed at the University of Illinois Antenna Laboratories.

3 Adapted from the Famous Satellite Tracking Antenna Design of the Antenna Research Laboratories of the University of Illinois.

4 JFD ELECTRONICS ANTENNA LABORATORY EMPLOYS INDUSTRY'S HIDDEN RESOURCE -- Forms Alliance with the University of Illinois; New Laboratory Established under the Direction of Professor Paul E. Mayes, an Antenna Authority.

A00363

JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada
JFD Electronics-Southern, Inc., Oxford, North Carolina 27565
JFD International, 64-14 Woodside Ave., Woodside, New York 11377

JFD ELECTRONICS CORPORATION
15th Avenue at 62nd Street, Brooklyn N. Y. 11219 • Phone 212 DE 1-1000 • TWX-NY25040

Mr. James Colvin (Cont.)

Commercials, Magazines and Trade Papers

In fact, the LPV was developed by some of the same scientists at the Antenna Research Laboratory of the University of Illinois who designed the conical spiral antenna used in the Transit Satellite.

For more than 8 years, a group of antenna scientists at the Antenna Research Laboratory of the University of Illinois has been experimenting with vhf and uhf antennas that have no theoretical limitations on bandwidth - are frequency-independent.

Please try to get your answer to me on the above as soon as possible.

Trade ads are always under tight schedules and we would not like to miss any deadlines now that we are coming into our season.

Sincerely,

Ed Finkel

EF/ss
cc-S. Faber
S. Smith

A0C364

September 15, 1964

Mr. James Sarayiotes
Advertising Manager
JFD Electronics Corporation
15th Avenue at 62nd Street
Brooklyn, New York 11219

Dear Mr. Sarayiotes:

This confirms what I said to you by telephone this morning: that the Foundation approves the copy and layout for the LPL-FM brochure.

With all good wishes,

Cordially yours,

James C. Colvin
Executive Director

JCC:wp

Enc.

A00365

CHARLES J. MERRIAM
SAMUEL B. SMITH
JEROME B. KLOSE
NORMAN M. SHAPIRO
WILLIAM A. MARSHALL
BASIL P. MANN
CLYDE V. ERWIN, JR.
ALVIN D. SHULMAN
R. JONATHAN PETERS
ALLEN H. GERSTEIN
OWEN J. MURRAY
EDWARD M. O'TOOLE
DONALD E. EGAN *

*VA. & D. C. BARS

LAW OFFICES
MERRIAM, SMITH & MARSHALL
THIRTY WEST MONROE STREET
CHICAGO, ILLINOIS 60603

TELEPHONE
FINANCIAL 6-5750

September 15, 1964

Mr. James C. Colvin
Executive Director
University of Illinois Foundation
224 Illini Union
Urbana, Illinois

Re: Copy Clearance for LPV Antennas
JFD Electronics Corp.

Dear Jim:

The copy of Ed Finkel's September 14 letter to you on the above subject reached me today. I do not know whether you expect me to give any opinions on this but, in view of the urgency which Finkel appears to put upon the matter, I am writing you a few comments.

These comments relate to the last two proposals at the bottom of page 1. It may well be that the antenna design is one that follows the Satellite Tracking Antenna but I have not been so informed.

I question the last proposal on page 1 because to me it seems that Finkel is asking the University of Illinois effectively to represent a joint venture with JFD. This does not seem to me to be a proper thing and, furthermore, the relationship between Finkel and the University is by way of the Foundation.

The first item on page 2 again concerns the antenna used in the Transit Satellite. This statement may be true enough, but I think it could carry some wrong implications.

The second proposal on page 2 seems quite satisfactory as far as accuracy is concerned and it should not in any way affect either the University or the Foundation adversely.

I would appreciate being kept allerted to the nature of the response you make and feel should be made to Finkel.

Sincerely,

Samuel B. Smith

SBS/fh

UNIVERSITY OF ILLINOIS

September 21, 1964

TO: James Colvin

FROM: P. E. Mayes

RE: Copy Clearance for LPV Antennas

First three paragraphs - ok.

Fourth paragraph - have requested that title of Professor not be used in connection with my name. They have changed it to Dr. on other material when asked to do so. I have no objection to the use of my name in the advertising and I do not see how the University can object as long as it is divorced from references to a University affiliation.

Fifth paragraph - not quite accurate. It would be better to say, ("In fact, the LPV concept was developed at the Antenna Research Laboratories of the University of Illinois which has given birth to such other space-age designs as the spiral antenna used on the Transit Satellite.")

Sixth paragraph - ok.

September 25, 1964

Mr. Ed Finkel
JFD Electronics Corporation
15th Avenue at 62nd Street
Brooklyn, New York 11219

Dear Ed:

I regret that I have not answered your September 14 letter sooner.

Under "Commercials, Magazines and Trade Papers" we approve the first three paragraphs. These are as follows:

> "Developed from Research Performed at the Antenna Laboratories of the University of Illinois."
>
> "Developed from Research Performed at the University of Illinois Antenna Laboratories."
>
> "Adapted from the Famous Satellite Tracking Antenna Design of the Antenna Research Laboratories of the University of Illinois."

We object to the fourth paragraph because, although you have been working in cooperation with the University, I think this slogan gives the wrong impression. The paragraph I refer to is the following:

> "JFD ELECTRONICS ANTENNA LABORATORY EMPLOYS INDUSTRY'S HIDDEN RESOURCE -- Forms alliance with the University of Illinois; New Laboratory Established under the Direction of Professor Paul E. Mayes, an Antenna Authority."

So far as the next paragraph is concerned the one which begins: "In fact, the LPV . . ." we do not believe this is quite accurate and would like to have you change it as follows:

> "In fact, the LPV concept was developed at the Antenna Research Laboratories of the University of Illinois which has given birth to such other space-age designs as the spiral antenna used on the Transit Satellite."

A00369

The next paragraph is perfectly satisfactory. It reads:

"For more than 8 years, a group of antenna scientists at the Antenna Research Laboratory of the University of Illinois has been experimenting with vhf and uhf antennas that have no theoretical limitations on bandwidth - are frequency-independent."

With all good wishes,

Cordially yours,

James C. Colvin
Executive Director

JCC:pw

cc: Professor Paul Mayes
Mr. Samuel B. Smith

A00370

At Work in the New Frontiers of Electronics

JFD ELECTRONICS CORPORATION

15th Avenue at 62nd Street, Brooklyn N. Y. 11219 • Phone 212 DE 1-1000 • TWX-NY25040

October 5, 1964

Answered by J.C.C. Oct. 14

University of Illinois Foundation
University of Illinois
Champaign, Illinois

Attention: Mr. James Colvin

Re: Copy Clearance for
LPV Antennas

Dear Jim:

Here is a listing of the phrases used in the last category, JFD Product literature.

4. JFD PRODUCT LITERATURE

Brings the acknowledged Log-Periodic design of the Antenna Research Laboratories of the University of Illinois to a new peak of performance.

The Log-Periodic concept is the result of five years of intensive electronic studies at the Antenna Research Laboratories of the University of Illinois and JFD. Located in Champaign, Illinois (home of the University of Illinois), the vast new JFD research center is the largest and most complete of its kind.

Adapted from the Antenna Research Laboratories of the University of Illinois.

The first UHF antenna design based on the patented Log-Periodic LPV formula of the Antenna Research Laboratories of the University of Illinois.

LPV...a design from the Antenna Research Laboratories of the University of Illinois.

A00371

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JFD International, 64-14 Woodside Ave., Woodside, New York 11377

JFD ELECTRONICS CORPORATION
15th Avenue at 62nd Street, Brooklyn N. Y. 11219 • Phone 212 DE 1-1000 • TWX-NY25040

October 5, 1964

Mr. James Colvin (Cont.)

4. JFD PRODUCTS LITERATURE (Cont.)

See Maps

The first TV/FM antenna based on the geometrically-derived Logarithmic-Periodic scale developed by the Antenna Research Laboratories of the University of Illinois for satellite telemetry.

Hold

Soon! From the Antenna Research Laboratory of a Leading University a mathematical dream becomes an engineering reality.

OK

Designed according to the revoluntionary new log periodic antenna formula of the Antenna Research Laboratories of the University of Illinois.

Hold

The first UHF antenna adapted from the patented Log-Periodic LPV formula of the Antenna Research Laboratories of the University of Illinois.

OK

Developed by the University of Illinois Antenna Laboratory-now serving in Satellite Telemetry-Adopted to TV by JFD.

See Maps

Significant New Principles Developed for Satellite Tracking, Space Telemetry and Military Communications by University of Illinois Antenna Research Laboratory lead to new High-Gain All-Channel Antenna "Comparable to a Yagi Array" across the entire band.

See Smith

Conceived by the University of Illinois*....
Proved-Out in Air Force Satellite Tracking....
Licensed and Developed for Home Use by JFD Electronics....

A00372

JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada
JFD Electronics-Southern, Inc., Oxford, North Carolina 27565
JFD International, 64-14 Woodside Ave., Woodside, New York 11377

At Work in the New Frontiers of Electronics

JFD ELECTRONICS CORPORATION

15th Avenue at 62nd Street, Brooklyn N. Y. 11219 • Phone 212 DE 1-1000 • TWX-NY25040

Mr. James Colvin (Cont.)

4. JFD PRODUCTS LITERATURE (Cont.)

Created by the Antenna Research Laboratories of the University of Illinois*-
Principles Utilized in Air Force Satellite Tracking and Telemetry-
Exclusive from JFD Electronics-

Again, would you please review them and let me know which we may continue to use for the future.

I take this opportunity to thank you for your patience and cooperation in resolving this problem.

Sincerely,

Ed Finkel

Ed Finkel

EF/ss
cc-S. Faber
S. Smith

A00373

JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada

JFD Electronics-Southern, Inc., Oxford, North Carolina 27565
JFD International, 64-14 Woodside Ave., Woodside, New York 11377

October 14, 1964

Mr. Ed Finkel
JFD Electronics Corporation
15th Avenue at 62nd Street
Brooklyn, New York 11219

Dear Ed:

I meant to answer your October 5 letter before this but I wanted to check the statements with both Professors Jordan and Mayes and they have been very much involved in an Electrical Engineering meeting this week which kept me from getting together with them.

I am sending you the combined opinion of Mr. Jordan, Mr. Mayes and Mr. Samuel B. Smith, in which I concur.

Page 1 of your letter, paragraph 1 is satisfactory.

We ask that you eliminate paragraph 2. I think it can be rephrased but Mr. Jordan objects to it because it indicates that the entire research program was designed for the benefit of JFD. Why don't you try this one over again?

Paragraph 3. Would you please change it to read, "Adapted from research results of the Antenna Laboratory of the University of Illinois."

Paragraph 4. This is troublesome because of the use of the word "patented" and Mr. Smith tells me there are legal reasons why this should not be used.

Paragraph 5. We should like you to change it to read, "LPV -- is designed from the Antenna Research Laboratory of the University of Illinois." The reason we suggest this is that, originally worded, it implies that the Foundation is in the manufacturing business.

Page 2, paragraph 1. We should like to have it changed to read, "The first TV/FM antenna based on the geometrically-derived Logarithmic-Periodic scale developed by the Antenna Research Laboratories of the University of Illinois and used in satellite telemetry."

Paragraph 2. We ask you not to use this one. It is good advertising copy. I think it could be rewritten and modified.

Paragraph 3 is satisfactory.

Paragraph 4 is untrue. The Log-Periodic LPV formula is not patented. Patents are issued only on the structure which was based upon the principle covered by the formula. This paragraph seems objectionable from a legal standpoint. Why don't you rewrite it and resubmit?

Paragraph 5 is satisfactory.

Paragraph 6. We should like to have rewritten as follows: "Significant New Principles Developed by the University. . . . .etc."

Paragraph 7 is not true. It wasn't the University which conceived the idea but the people in the Antenna Laboratory. You may want to resubmit a paragraph similar to this.

Page 3. The paragraph on this page is satisfactory.

Best regards!

Cordially yours,

James C. Colvin
Executive Director

JCC:pw

cc: Mr. Samuel B. Smith

At Work in the New Frontiers of Electronics

JFD ELECTRONICS CORPORATION

15th Avenue at 62nd Street, Brooklyn N. Y. 11219 • Phone 212 DE 1-1000 • TWX-NY25040

January 18, 1965

University of Illinois Foundation
224 Illini Union
Urbana, Illinois 61803

Att : Mr. James Colvin

Dear Mr. Colvin:

I would appreciate your reviewing the attached copy which we intend to use in some trade advertising.

Please return to us with your comments so we can proceed without delay.

Cordially,

JFD ELECTRONICS CORPORATION

James Sarayiotes,
Advertising Manager

JS;ab
Encl.

A00376

JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada

JFD Electronics-Southern, Inc., Oxford, North Carolina 27565
JFD International, 64-14 Woodside Ave., Woodside, New York 11377

January 22, 1965

Mr. James Sarayiotes
Advertising Manager
JFD Electronics Corporation
15th Avenue at 62nd Street
Brooklyn, New York

Dear Mr. Sarayiotes:

We have two comments to make on your latest advertising copy.

On page 3 under the caption "AND ONLY THE JFD LPV HAS IT" Professor Mayes says this:

> "The Champaign lab of JFD has had very little to do with the LPV. We recently did a modification to make it conform more closely to log-periodic concepts, but the changes were quite small. On the other hand the LPT, LPV-U, LPV-VU, LPL series have all been completely developed in Champaign. Until we have an opportunity to completely redesign the parasitic sections of the LPV, I would prefer not to take the responsibilities or credit for the LPV series."

On page 4 the first paragraph, Mr. Mayes says that the insulators are very sturdy but should not be called non-breakable. He says he has seen them broken. I suggest you merely say something like "virtually non-breakable" but I think it should be slightly qualified.

These are the only objections.

For your information, Mr. Mayes says that the Yagi invention really should be referred to as the Yagi-Uda. He comments that Mr. Yagi did not invent the Yagi antenna, that the first article describing this invention was written by Mr. S. Uda. This is merely for your information and not expressed as a criticism. It does not concern the Foundation.

We thank you for submitting the copy and it is correct except for the two points I mentioned.

Sincerely yours,

James G. Colvin
Executive Director

A00377

JFD

February 18, 1965

Mr. Edward Finkel
JFD Electronics Corporation
15th Avenue at 62nd Street
Brooklyn, New York 11219

Dear Ed:

Enclosed are three copies of the press release which was sent out on February 12, 1965.

Mr. Saroyiotes sent us over 250 addresses and we mailed releases to almost all of them.

I assume that it will not be necessary to return the cards with the addresses on them.

Please let me know if we can be of any further assistance.

Very truly yours,

Louis D. Licy
Field Director

LDL:gd
Enclosures--3

A00378

June 22, 1965

Mr. Ed Finkel
JFD Electronics Corporation
15th Avenue at 62nd Street
Brooklyn, New York

Dear Ed:

Paul Mayes has brought me a copy of the manuscript you send him recently. I approve of it in behalf of the Foundation with some minor changes.

In the long article which relates the history of the LPV Log Periodic Antenna, on page three there is a statement which says that the University laboratory had been working on a certain problem for more than ten years. Paul Mayes says this should read more than eight years. At the top of page five your copy says that the Helix Antennas were developed in cooperation with the University of Illinois. University regulations forbid this and the copy should be changed in some such manner as I have written in to indicate that JFD developed having taken note of the work done at the University. I am not sure whether the fish skelton was developed here or by JFD but it should read that it was developed by one or the other but not that it was done as a joint effort. In a short article entitled "JFD Laboratories Pioneer New Technology," we object to the use of the "joint effort" statement. You might say something like, "using the University of Illinois' discovery," and so forth. But, again, we cannot permit the use of the phrase "joint effort."

Aside from that, as I say, we give you formal approval of the copy.

With all good wishes,

Cordially yours,

James C. Colvin
Executive Director

JCC:pw
Copy sent back to JFD

A00379

At Work in the New Frontiers of Electronics

JFD ELECTRONICS CORPORATION

15th Avenue at 62nd Street, Brooklyn N. Y. 11219 • Phone 212 DE 1-1000 • TWX-NY25040

January 13, 1966

University of Illinois Foundation
University of Illinois
Champaign, Illinois

Attention: Mr. James Colvin

Re: New Literature

Dear Jim:

I am enclosing herewith samples of recent literature on LPV type antennas covered under our agreement.

For the most part, I think you will find that we have continued to paraphrase old statements that have already been approved by you.

However, I would like you to look these over and if you have any comments, I will be glad to receive them.

1. Blue stuffer
2. White Stuffer
3. Ad, "Why use three (VHF, UHF, FM) when one JFD LPV will do - perfectly.
4. Door hanger
5. 4 page booklet
6. 4 page booklet re: Congress ad, etc.
7. Life ad
8. America's No. 1

Sincerely,

Ed Finkel

Ed Finkel

EF/ss
encl.

A00380

JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada

JFD Electronics-Southern, Inc., Oxford, North Carolina 27565
JFD International, 64-14 Woodside Ave., Woodside, New York 11377

January 19, 1966

Mr. Ed Finkel
JFD Electronics Corporation
15th Avenue at 62nd Street
Brooklyn, New York 11219

Dear Ed:

I have examined all of the promotional material you sent and see no objection to it so far as the Foundation and University are concerned.

You seem to be making a great deal of progress in the Sales Department, for which I am glad.

I am sorry it has been so long since I have had a chat with you and hope to see you before long.

Best wishes for 1966.

Cordially yours,

James C. Colvin

JCC:ph

A00381

5302

May 25, 1960

Mr. James C. Colvin
University of Illinois Foundation
224 Illini Union

Dear Mr. Colvin:

In meeting of May 17, 1960, the Board of Trustees voted to release the rights of the University in the following inventions to the Foundation with the stipulation that they recognize the contractual rights of the sponsoring agency:

ALL CHANNEL TV AND FM RECEIVING ANTENNA developed by Robert L. Carrel and Paul E. Mayes.

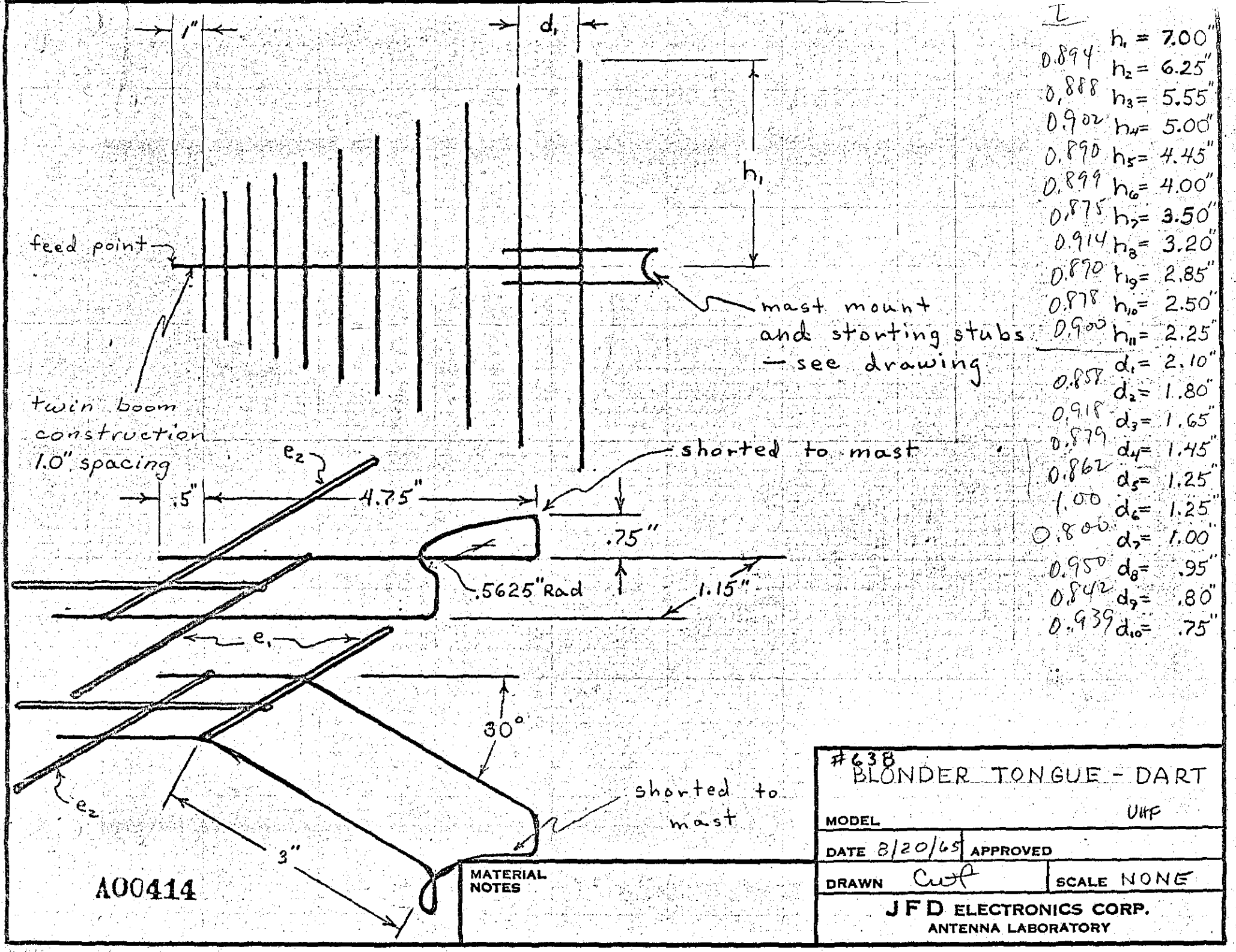
NEW CIRCULARLY POLARIZED OMNIDIRECTIONAL ANTENNA developed by Paul Mayes and John D. Dyson.

LOG-PERIODIC RESONANT-V ARRAYS developed by Paul E. Mayes and Robert L. Carrel.

The United States Air Force sponsored the research under which all three of the above inventions were developed; therefore, we should appreciate your recognizing their rights.

R. E. Gentry

AP



L		
0.894	h_1 =	7.00"
	h_2 =	6.25"
0.888	h_3 =	5.55"
0.902	h_4 =	5.00"
0.890	h_5 =	4.45"
0.899	h_6 =	4.00"
0.875	h_7 =	3.50"
0.914	h_8 =	3.20"
0.870	h_9 =	2.85"
0.878	h_{10} =	2.50"
0.900	h_{11} =	2.25"
	d_1 =	2.10"
0.858	d_2 =	1.80"
0.918	d_3 =	1.65"
0.879	d_4 =	1.45"
0.862	d_5 =	1.25"
1.00	d_6 =	1.25"
0.800	d_7 =	1.00"
0.950	d_8 =	.95"
0.842	d_9 =	.80"
0.939	d_{10} =	.75"

A00414

MATERIAL NOTES

#638 BLONDER TONGUE - DART

MODEL UHF

DATE 8/20/65 APPROVED

DRAWN Cuf SCALE NONE

JFD ELECTRONICS CORP.
ANTENNA LABORATORY

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. ULTRAVEL NO. 4904