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CABLE ADDRESS
RICHEY

PATENT AND
TRADEMARK LAW

LLOYD L. EVANS
OF COUNSEL

F. O. RICHEY (1878-1964)

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DONALD W. FARRINGTON
JOHN F. PEARNE
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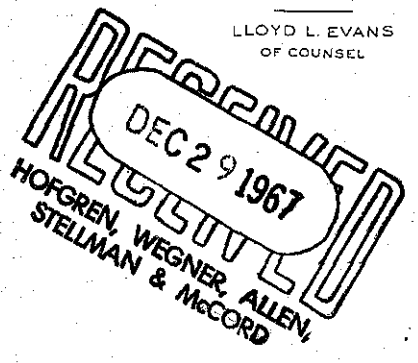
WILLIAM A. GAIL
RICHARD H. DICKINSON, JR.
THOMAS P. SCHILLER
LYNN L. AUGSPURGER

December 28, 1967



Robert H. Rines, Esq.
Hofgren, Wegner, Allen, Stellman & McCord
20 North Wacker Drive
Chicago, Illinois 60606

Re: Log Periodic Patent Litigation

Dear Bob:

Between now and the New Years week end, I shall complete the job of duplicating all of the documentary exhibits of plaintiff (The Finney Company, in our case) identified in the course of the Finkel deposition, despite the fact that, individually, many of them contain nothing of special interest. My reason for identifying every piece of advertising and sales promotion literature of JFD that I could get my hands on and that pertained to its so-called "log-periodic antennas" is to support the argument that the commercial success of those antennas was not attributable solely (if at all) to the merits of the Isbell invention, but was the result, at least in large part, of a tremendous advertising and promotion compaign that sought to capitalize on the glamour of the circumstances under which the Isbell work was done.

During our telephone conversation this morning, Dick Phillips said that you were particularly interested in our Exhibits 10 through 30. I would think that you would be equally interested in Exhibits 4 through 9 and 31 through 38 (note that there were no Exhibits 20 through 29). All of the above-mentioned exhibits through 38 contain a patent notice reading substantially identically and as follows:

"U.S. PATENT NUMBERS 2,958,081-2,985,879-3,011,168-
ADDITIONAL PATENTS PENDING."

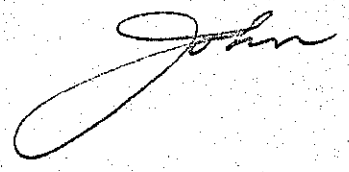
Accordingly, I am enclosing herewith a copy of each of those exhibits in a Xerox form from which additional copies can be prepared as needed.

A word of explanation may be helpful to an understanding of why those exhibits include a number of substantial duplicates. My purpose was to identify as a separate exhibit each individual piece of literature containing a false patent notice, on the assumption that a finding of false marking would produce a penalty computed by multiplying the $500 statutory fine by the number of separate items distributed with the false patent marking. Thus, for example, our PX-J19 is a booklet reproducing advertising mats available to JFD distributors. Because each of the advertising mats was a separately distributed item, each of them that contained the false patent notice was individually identified as a separate exhibit.

With the hope that nothing unexpected will interfere and that I can get transportation, I am planning to fly to Chicago during the late afternoon of New Years Day and will go to the Union League Club where I shall stay during the balance of your trial. I shall appreciate your leaving a message for me at the Union League Club as to where I can contact you after I arrive there.

Between now and my arrival I shall be concentrating on organizing information in my possession with which you might not yet be acquainted and which might be helpful to your case. In the meantime, best of luck.

Sincerely,



JFP:jh
Enclosures

cc: Richard S. Phillips, Esq.

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

THE UNIVERSITY OF ILLINOIS FOUNDATION,	)	
	)	
Plaintiff and	)	
Counterclaim Defendant,	)	
	)	
- v -	)	
	)	
BLONDER-TONGUE LABORATORIES, INC.,	)	Civil Action
	)	
Defendant and	)	No. 66 C 567
Counterclaimant,	)	
	)	
- v -	)	
	)	
JFD ELECTRONICS CORPORATION,	)	
	)	
Counterclaim Defendant.	)	

EXHIBITS IDENTIFIED DURING THE DEPOSITION
OF EDWARD FINKEL
TAKEN SEPTEMBER 8, 1967,
IN THE FINNEY COMPANY v. JFD ELECTRONICS CORPORATION
AND THE UNIVERSITY OF ILLINOIS FOUNDATION,
65 C 220, 65 C 671 (Cons.) USDC ND Ill., ED

no question about it—

the JFD LPV $\frac{L_{(n+1)}}{L_n}=\tau$ IS A WINNER

"6 db BETTER THAN THE BEST!"

If you are installing JFD Log Periodic LPV's, no doubt you will agree with this report from R. L. Monroe, a leading TV antenna service-dealer of Charleston, West Virginia—a problem reception area.

"It beats all, it beats everything that I have ever seen. Not only that, but this antenna is better than 6 db better than the best that I have installed. It pulled in a consistently clear picture from Columbus, over 130 miles away.

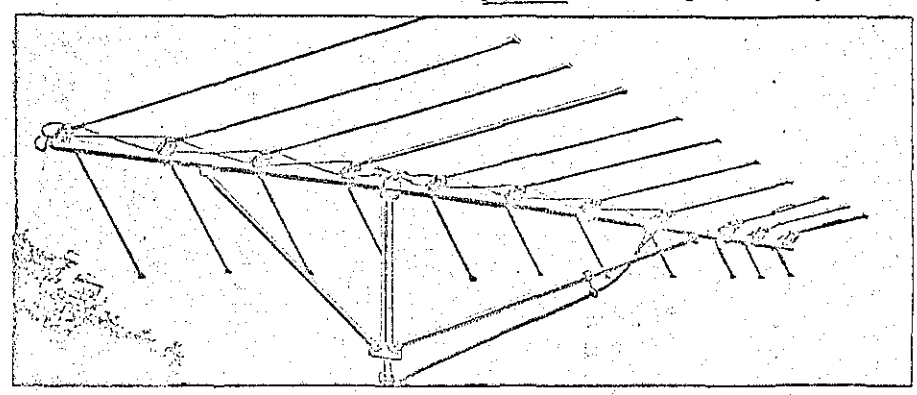
**** *** **** "It's just great on color —turns browns into real reds, faded bluish greens into brilliant greens, and completely eliminates the chronic ghost problems we have been suffering from in this area."*

****I have been in this business since 1948, which is a considerable time, particularly in the valley, and have yet to see any antenna, even near to this log periodic antenna in performance of the things I have wanted."*

Why the JFD Log Periodic LPV Outperforms Every TV Antenna Ever Made!

The log-periodic LPV blows the whistle on cumbersome antennas with their "Chinese puzzle" combinations of collectors, directors and reflectors. Now a single precisely-engineered antenna—the first based on a geometrically-derived *logarithmic* scale—actually *tunes* itself to the desired channel for unprecedented performance in crisp black and white or stunning color—plus FM STEREO. Is it any wonder that never before have so many installers and technicians so quickly acclaimed a TV antenna?

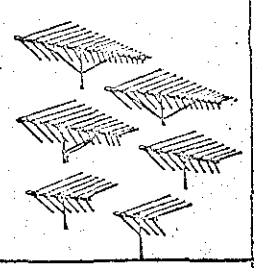
We would like to tell you more about the LPV, and how its *frequency independent* characteristics, have broken through distance, ghost and interference barriers to bring clear, steady pictures into previously "impossible" areas. Write today for your log periodic LPV Sales Kit. Better yet, call your JFD distributor and try one with our money-back guarantee of a better picture. You will prove it to yourself.



Developed by the University of Illinois Antenna Laboratory—Now Serving in Satellite Telemetry—Adopted to TV by JFD! THE LOG PERIODIC LPV ENDS THE ERA OF ANTENNA COMPROMISE! FOR THE FIRST TIME ONE SCIENTIFICALLY FORMULATED ANTENNA CONFIGURATION SATISFIES ANY LOCATION DEMAND:

Harmonically resonant V-element operate on the Log-Periodic Cellular Principle in the Fundamental and Third Harmonic Modes for unprecedented performance —in color—in black and white—plus FM STEREO

LPV17:	18 Active Cell and Director System—up to 175 miles	$59.95, list
LPV14:	15 Active Cell and Director System—up to 150 miles	$49.95, list
LPV11:	11 Active Cell and Director System—up to 125 miles	$39.95, list
LPV8:	7 Active Cell and Director System—up to 100 miles	$29.95, list
LPV6:	6 Active Cell System—up to 75 miles	$21.95, list
LPV4:	4 Active Cell System—up to 50 miles	$14.95, list



JFD ELECTRONICS CORPORATION

15th Avenue at 62nd Street, Brooklyn 19, N.Y.
JFD Electronics-Southern Inc., Oxford, North Carolina
JFD International, 15 Moore Street, New York, N.Y.
JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada
401-144 W. Hastings Street, Vancouver 3, B.C.

PX-J4

JFD AAA GOLD BOND ALODIZED LPV LOG-PERIODIC ANTENNAS

DEVELOPED BY THE UNIVERSITY OF ILLINOIS* ANTENNA RESEARCH LABORATORY, PROVED-OUT IN AIR FORCE SATELLITE TELEMETRY

—THIS HISTORIC NEW PRINCIPLE ENDS THE "ERA OF COMPROMISE" IN TV ANTENNA DESIGN

- IT COULD ONLY HAVE BEEN PRODUCED by such massed resources as those of a prominent university, the *military, and the country's leading antenna manufacturer.*
- BECAUSE ITS GAIN IS INDEPENDENT OF FREQUENCY, the end-fired log-periodic LPV functions with total efficiency across the entire band—**is comparable on any channel to a tuned Yagi cut to that channel.**
- ON VIRTUALLY EVERY COUNT IT OUTPERFORMS PREVIOUS WIDE-BAND ARRAYS: in gain, in directivity, in bandpass, in front-to-back ratio. Develops gain as high as 7 db on low band and 10 db on high band in the 11-element model. Shows flat response across all 12 channels — with greater gain on the high band, where it's needed most. Result: An all-channel, all-purpose antenna with unprecedented power, a decisive end to snow and ghosts, and the truest color reception yet—as well as vivid sharpness in black-and-white. And the basic log-periodic LPV principle can be adapted to any future UHF antenna needs.
- NOT A "CATCH-ALL COMPROMISE"—the log-periodic LPV signals a halt to the endless piling-on of narrow-band elements and trimmers. Derived from an antenna geometry that repeats the electrical properties of the antenna periodically with the logarithm of the frequency, it is essentially **frequency-independent.** (Actually, the basic log-periodic design is capable of receiving a range as broad as 54 to 890 mcs. or broader.)
- DEVELOPED TO MEET THE AIR FORCE'S RIGOROUS STANDARDS OF RELIABILITY, RUGGEDNESS, HIGH PERFORMANCE—built to uncompromising JFD specifications—of AAA† Gold Bond Alodized aircraft aluminum for **enduring** good looks. 100% PREASSEMBLED FLIP-QUICK CONSTRUCTION—with new JFD "tank-turret" aluminum brackets that align and double-lock elements instantly, permanently in place.
- RECEIVES FM, TOO—delivers drift-free, distortion-free FM stereo.

antenna with unprecedented power, a decisive end to snow and ghosts, and the truest color reception yet—as well as *vivid sharpness in black-and-white. And the basic log-periodic* LPV principle can be adapted to any future UHF antenna needs.

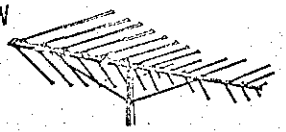
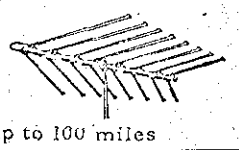
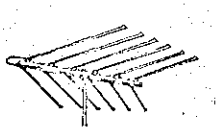
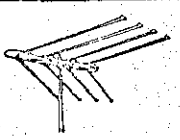
- MORE, FAR MORE, THAN JUST A "FRINGE" SOLUTION, the log-periodic LPV achieves superior reception in all multi-channel areas. It is the first true "universal" antenna. And it will open key profit opportunities to you in the months ahead—not only because it puts better reception within the reach of virtually every TV set-owner, but because it enables you for the first time **to meet all antenna needs with a single antenna line.**
- U. S. PATENT NUMBERS: 2,958,081 - 2,985,879 - 3,011,168 OTHER PATENTS PENDING

* produced exclusively by JFD Electronics under license from the University of Illinois Foundation.

LOG-PERIODIC LPV $\frac{L_{(n+1)}}{L_n} = \tau$

*Antenna Research Laboratory

Harmonically resonant V-elements operating on the Log-Periodic Cellular Principle in the Fundamental and Third Harmonic Modes:

FOR THE BEST PICTURE, COLOR AND BLACK & WHITE-USE THE BEST ANTENNA	MODEL	DESCRIPTION	LIST PRICE	STD. CTN.	Suggested Dealer Prices 1-4	5-11	12 & UP
NEW  up to 175 miles	LPV17	18 Active Cell and director system	59.95	1	35.97	32.37	29.98
NEW  up to 150 miles	LPV14	15 Active Cell and director system	49.95	1	29.97	26.97	24.98
NEW  up to 125 miles	LPV11	11 Active Cell and director system	39.95	1	23.97	21.57	19.98
NEW  up to 100 miles	LPV8	8 Active Cell and director system	29.95	1	17.97	16.17	14.98
NEW  up to 75 miles	LPV6	6 Active Cell system	21.95	1	13.17	11.85	10.98
NEW  up to 50 miles	LPV4	4 Active Cell system	14.95	1	8.97	8.07	7.48

WESTERN UNION
TELEGRAM

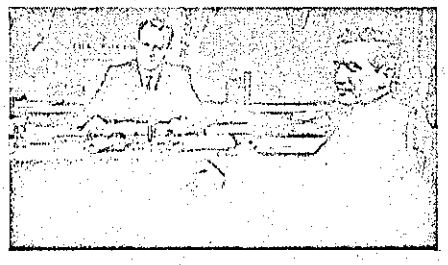
SYN269 SY WA219 DL PD WASHINGTON DC 2 1137A EDT
JFD ELECTRONICS CORP, ATTN EDWARD FINKEL
6101 SIXTEENTH AVE BROOKLYN NY

REGARDING YOUR INQUIRY CONCERNING NEW ANTENNA BEING USED BY AIR FORCE. DEVELOPMENT WAS BY UNIVERSITY OF ILLINOIS, ANTENNA RESEARCH LABORATORY. REPORTS SAY IT IS MOST SENSITIVE BROADBAND ANTENNA EVER DEVELOPED. APPLICATIONS EXTEND INTO TV FIELD AS WELL AS MILITARY USE. RESEARCH PROVES IT TO BE THE FIRST FREQUENCY INDEPENDENT ANTENNA. OPERATING PRINCIPLE IS BASED ON THE LOG PERIODIC THEORY. PATENTS ARE PENDING.

JOSEPH NEIBAUER GP ENGINEERING SERVICES, RESEARCH DEPARTMENT.

FROM THIS BEGINNING...A NEW ULTIMATE IN TV ANTENNA DESIGN

It was in 1954 that word came out of Urbana, Illinois—the Antenna Research Laboratory of the University of Illinois had "broken through" the bandwidth problem with the log-periodic principle.



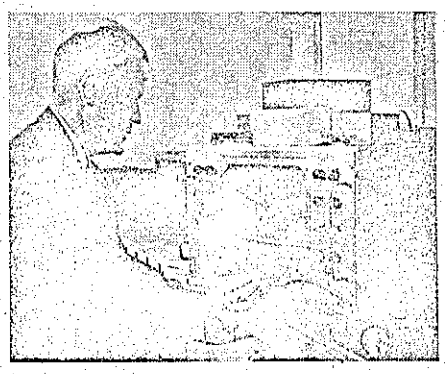
Professor Mayes and JFD's Ed Finkel discuss the LPV

The implications were profound: an antenna that would be essentially frequency-independent, that would set new standards in gain, in bandpass, in front-to-back ratio, that would have an "unidirectional pattern with a directivity comparable to a Yagi array" over bandwidths in excess of 20 to 1.

The Air Force began to apply this new concept to its critical outerspace telemetering needs—and, in 1961, JFD Electronics and the University began discussing home-television applications.

When JFD was granted the exclusive rights to develop, produce and market the TV antennas based on this principle, the resources of the world's largest antenna manufacturer were galvanized into action. A special force of engineers and researchers went to work. A succession of working models began to appear atop the 135-foot tower of the JFD Antenna Research and Development Center. Exhaustive tests were undertaken, modifications and refinements made, construction details explored.

Now, as a climax to some eight years of study and development, the first of the log-periodic V antennas is here—fulfilling every promise and presaging a revolution in TV antenna design and performance.



Professor Mayes at antenna research laboratory

University of Illinois Develops Space Age Antenna

The theoretical formulation and extensive research which led to the final development of the LPV antenna was a cooperative effort by several outstanding antenna scientists at the Antenna Research Laboratory of the University of Illinois.

Early recognition of the high caliber and originality of these scientists came from the Air Force which awarded several R & D contracts to the University.

Dr. V. H. Rumsey, who headed the Antenna Research Laboratory from 1954 to 1957, directed a large portion of its efforts towards the quest for frequency independence. Professor Rumsey suggested that a logarithmic spiral of infinite length might have characteristics independent of the frequency of operation. Further research by Professors R. H. DuHamel John D. Dyson, and D. E. Isbell established this theory and also led to the development of a series of finite size antennas which exhibited constant pattern and impedance characteristics independent of frequency over a wide range of frequencies.

The importance of this work soon became obvious with the massive effort devoted by the government to space communications and telemetry. The satellite "Transit" used a modified logarithmic spiral to communicate with our tracking stations from 50 to 400 mc.

In 1957 Professor DuHamel built the first planar Log-Periodic antenna. This was followed in 1959 by Isbell's uniplanar Log-Periodic dipole array. For the next two years, exhaustive tests at the Antenna Research Laboratory were aimed at establishing the properties of the Log-Periodic. It was during this period that Doctors Paul Mayes and R. L. Carrel made their many contributions to the understanding of these antennas and jointly hit upon the V configuration of the dipoles. Tests indicated that this extended the antenna's high directivity from the lowest frequencies covered to the highest.

Professor Mayes subsequently made some modifications in the LPV design so as to make it more suitable for UHF and VHF television coverage.

Revolution in the Air: JFD PRESENTS

Initially Developed by the Antenna Research Laboratories of the University of Illinois*, Proved-Out in Air

IT COULD ONLY HAVE BEEN PRODUCED by such massed resources as those of a prominent university, the military, and the country's leading antenna manufacturer.

BECAUSE ITS GAIN IS INDEPENDENT OF FREQUENCY, the backward-wave log-periodic LPV functions with high efficiency across the entire band. This end-fire array is comparable on any channel to a tuned Yagi cut to that channel.

ON VIRTUALLY EVERY COUNT, IT OUTPERFORMS PREVIOUS WIDE-BAND ARRAYS: in gain, in directivity, in bandwidth, in front-to-back ratio. It has gains as high as 14 db. in the 17-element model. It shows flat response across both TV bands—with greater gain on the high band, where it's needed most. Result: An all-channel, all-purpose antenna with unprecedented gain, a decisive end to snow and ghosts and the truest color reception yet—as well as vivid sharpness in black and white. The basic log-periodic LPV principle will be also adapted to all future UHF antenna needs.

MORE, FAR MORE, THAN JUST A "FRINGE" SOLUTION, the log-periodic LPV gives superior reception in all multi-channel areas. It is the first true "universal" TV antenna. It will open key profit opportunities to you in the months ahead—not only because it puts better reception within the reach of virtually every TV set-owner, but because it enables you for the first time to meet all antenna needs with a single antenna line.

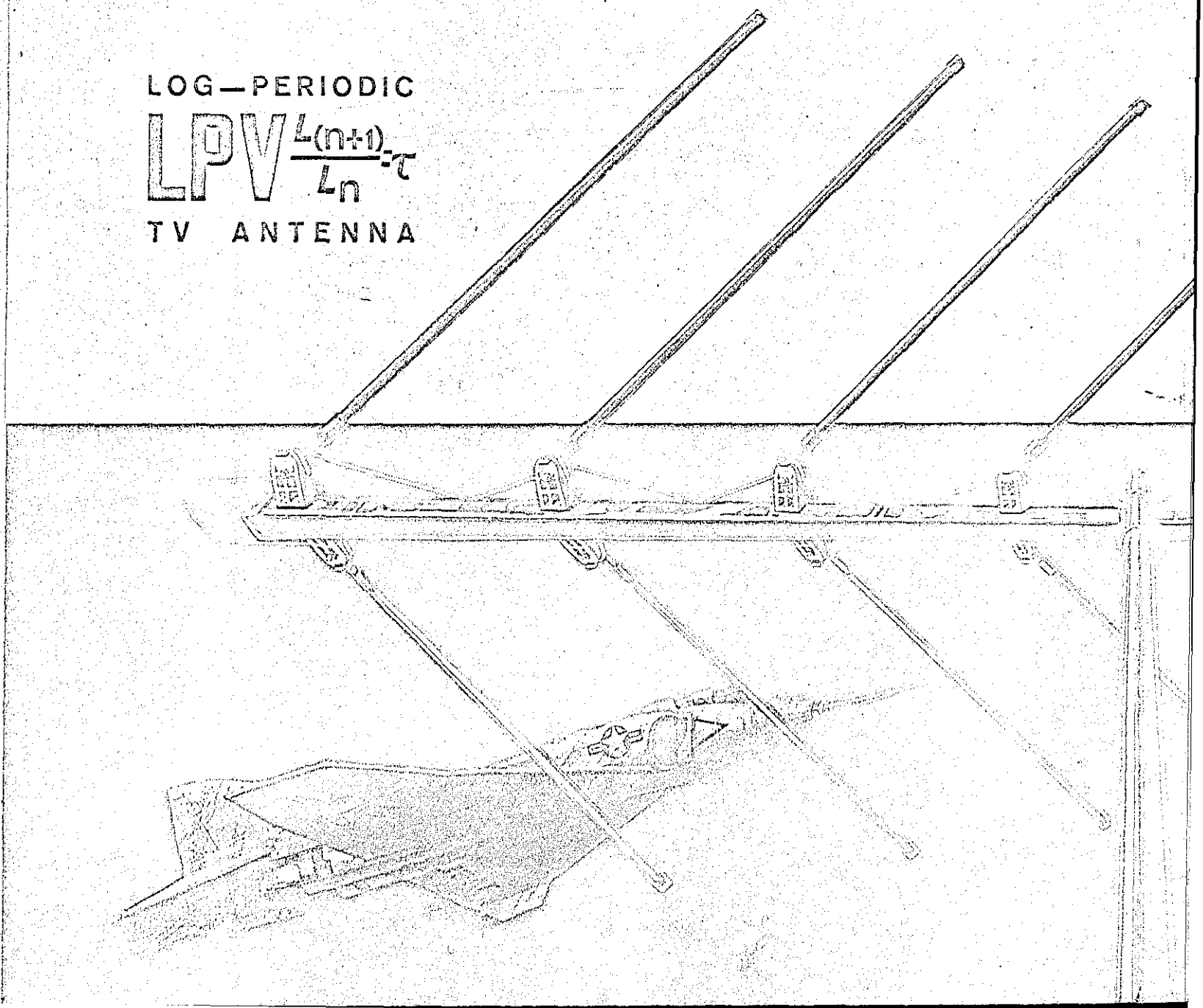
*PRODUCED EXCLUSIVELY BY JFD ELECTRONICS UNDER LICENSE TO THE UNIVERSITY OF ILLINOIS

U.S. PATENT NUMBERS 2,958,081—2,985,879—3,011,168 ADDITIONAL PATENTS PENDING

LOG—PERIODIC

LPV $\frac{L_{(n+1)}}{L_n} = \tau$

TV ANTENNA



THE LOG-PERIODIC LPV

Force Satellite Telemetry, Adapted to TV by JFD—Ending the "Era of Compromise" in TV Antenna Design

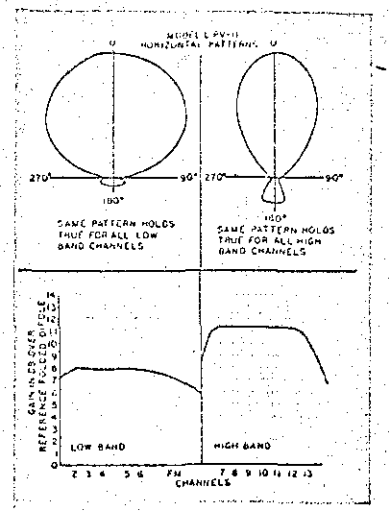
NOT A "CATCH-ALL COMPROMISE"—the log-periodic LPV signals a halt to the endless piling-on of narrow-band elements and parasitics. It is essentially frequency-independent since it is derived from an antenna geometry that repeats the electrical properties of the basic element, or cell, periodically; the periodicity being proportional to the logarithm of the frequency. (Actually, the basic log-periodic design is capable of flat response over a frequency range as broad as 20 to 1.)

BASED ON PRINCIPLES DESIGNED TO MEET RIGOROUS AIR FORCE PERFORMANCE STANDARDS—built to uncompromising JFD specifications—of AAA† Gold Bond Alodized aircraft aluminum for enduring good looks.

100% PREASSEMBLED FLIP-QUIK CONSTRUCTION—with new "tank-turret" aluminum brackets that align and double lock the elements instantly and permanently in place.

RECEIVES STEREO FM, TOO—delivers drift- and distortion-free FM stereo.

SEE THE LOG-PERIODIC LPV AT YOUR JFD DISTRIBUTOR—study the performance figures—try it—see for yourself how the LPV towers over all other broad-line antennas.



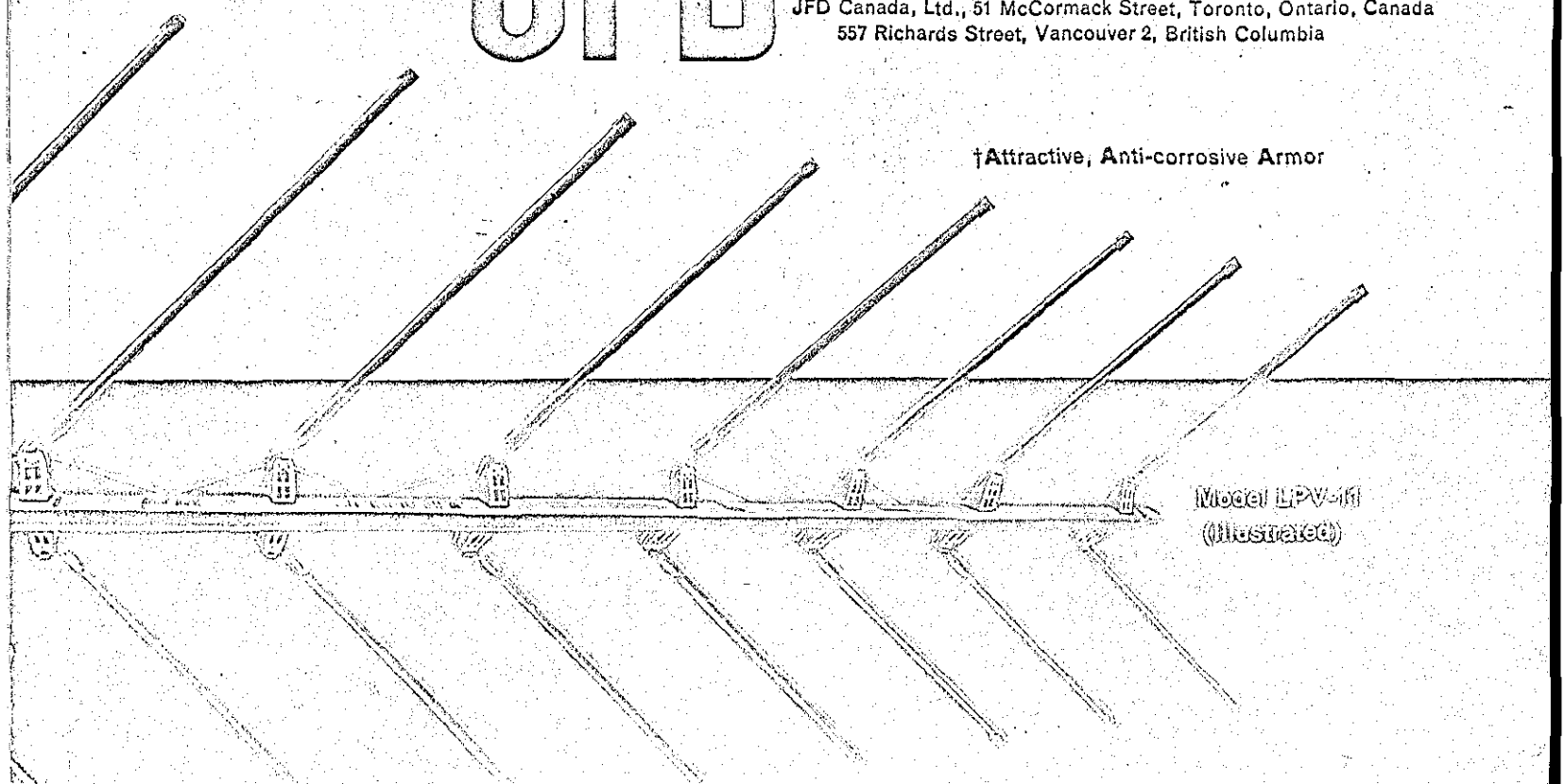
JFD

THE BRAND THAT PUTS YOU IN COMMAND OF THE MARKET

JFD ELECTRONICS CORPORATION
6101 Sixteenth Avenue, Brooklyn 4, N.Y.

JFD Electronics-Southern Inc., Oxford, North Carolina
JFD International, 15 Moore Street, New York, N.Y.
JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada
557 Richards Street, Vancouver 2, British Columbia

†Attractive, Anti-corrosive Armor



Model LPV-111 (Illustrated)

ONE BASIC CONFIGURATION SATISFIES ALL NEEDS

Harmonically resonant V-elements operating on the Log-Periodic Cellular Principle in the Fundamental and Third Harmonic Modes

LPV-4: 4 Active Cells—up to 50 miles

LPV-6: 6 Active Cells—up to 75 miles

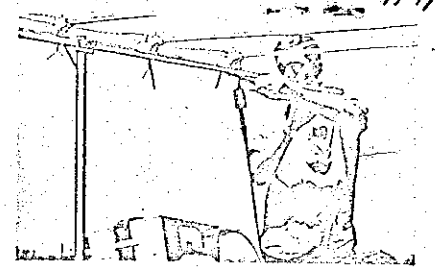
LPV-8: 7 Active Cells and 1 director—up to 100 miles

LPV-11: 9 Active Cells and 2 directors—up to 125 miles

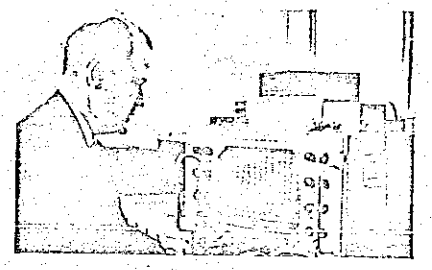
LPV-15: 13 Active Cells and 1 director—up to 150 miles

LPV-17: 15 Active Cells and 2 directors—up to 175 miles

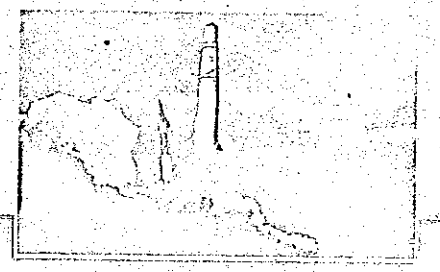
LPV $\frac{L_{(n+1)}}{L_n}\tau$ from the 135-foot tower at the Antenna Research Center of JFD Electronics . . .



LPV $\frac{L_{(n+1)}}{L_n}\tau$ from the Antenna Research Laboratory of the University of Illinois . . .



LPV $\frac{L_{(n+1)}}{L_n}\tau$ from the satellite tracking needs of the Air Force's Air Development Division . . .



BASED ON PRINCIPLES DESIGNED TO MEET RIGOROUS AIR FORCE PERFORMANCE STANDARDS . . . BUILT TO UNCOMPROMISING JFD SPECIFICATIONS

AAA* GOLD BOND ALODIZED satin gold finish protects against atmospheric corrosion, assures enduring good looks EXTRA-RUGGED IN EVERY DETAIL with new "tank-turret" aluminum brackets that align and double-lock elements permanently in place . . . 1" square aluminum crossarm . . . solid aluminum rod harness . . . sleeve-reinforced elements that prevent accidental bending, keep alignment true LIGHTEST IN WEIGHT PER DB. GAIN . . . least wind resistance of any antenna BEST FOR COLOR, BEST FOR BLACK-AND-WHITE—FM and Stereo, too!

*Attractive, Anti-corrosive Armor

JFD

JFD ELECTRONICS CORPORATION

15th Avenue at 62nd Street, Brooklyn 19, New York

JFD Electronics-Southern Inc., Oxford, North Carolina
JFD International, 15 Moore Street, New York, N.Y.
JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada
401-144 West Hastings Street, Vancouver 3, B.C., Canada

6 LOG-PERIODIC LPV's for every location—assure you custom fitted receptive power

$14.95 List	**LOCAL:** up to 50 miles from transmitter **LPV-4:** 4 active cells	$39.95 List	**FRINGE:** up to 125 miles from transmitter **LPV-11:** 11 active cell and director system
$21.95 List	**SUBURBAN:** up to 75 miles from transmitter **LPV-6:** 6 active cells	$49.95 List	**FAR FRINGE:** up to 150 miles from transmitter **LPV-14:** 15 active cell and director system
$29.95 List	**SUPER-SUBURBAN:** up to 100 miles from transmitter **LPV-8:** 8 active cell and director system	$59.95 List	**SUPER-FRINGE:** up to 175 miles from transmitter **LPV-17:** 18 active cell and director system

LOG-PERIODIC LPV NOW AT

JFD LPV $\frac{L_{(n+1)}}{L_n}\tau$ LPV $\frac{L_{(n+1)}}{L_n}\tau$

ELECTRONICS CORPORATION

FORM 421

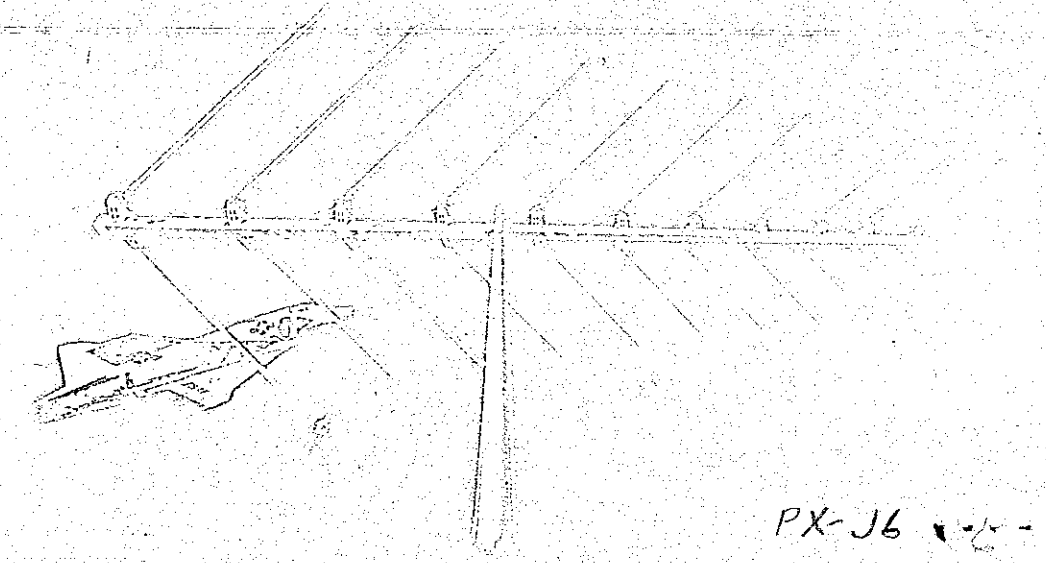
10/62 LITHO IN U.S.A.

LOG-PERIODIC

LPV $\frac{L_{(n+1)}}{L_n}\tau$

TV ANTENNA

The startling new antenna design principle that is revolutionizing television reception



PX-J6

NOW—FROM THE ANTENNA RESEARCH LABORATORIES OF THE UNIVERSITY OF ILLINOIS—

LPV $\frac{L_{(n+1)}}{L_n}\tau$ A DRAMATIC NEW FORMULA FOR STUDIO-SHARP TV RECEPTION—IN COLOR, BLACK-AND-WHITE, FM STEREO

JFD log-periodic LPV $\frac{L_{(n+1)}}{L_n}\tau$ TV antenna*

"Harmonically resonant V-elements operate on the Log-Periodic Cellular Principle in the Fundamental and Third Harmonic Modes"

LPV $\frac{L_{(n+1)}}{L_n}\tau$

ONLY SUCH MASSED RESOURCES as those of a prominent university, the Armed Forces, and the country's leading antenna manufacturer—JFD—could have produced this most spectacular of all antenna breakthroughs.

LPV $\frac{L_{(n+1)}}{L_n}\tau$

THE LOG-PERIODIC LPV MUST IMPROVE YOUR TELEVISION PERFORMANCE on virtually every count—because it outperforms previous antennas on virtually every count.

LPV $\frac{L_{(n+1)}}{L_n}\tau$

THE MOST SENSITIVE ALL-CHANNEL ANTENNA EVER MADE FOR TV, the log-periodic LPV masses unprecedented power, to pick out every detail with movie-screen sharpness.

LPV $\frac{L_{(n+1)}}{L_n}\tau$

FOCUSES WITH UNMATCHED PRECISION, to bring in the signal you're tuned to and no other—without noise, "snow" or "ghosts"—despite distance and terrain.

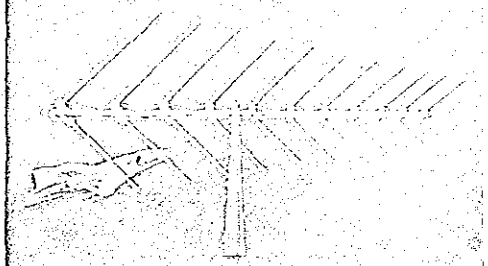
LPV $\frac{L_{(n+1)}}{L_n}\tau$

DELIVERS MAXIMUM EFFICIENCY ON EVERY CHANNEL . . . the truest color you've ever seen . . . plus FM Stereo!

LPV $\frac{L_{(n+1)}}{L_n}\tau$

WHATEVER YOUR SPECIAL PROBLEMS, WHEREVER YOU ARE LOCATED, WHATEVER THE CONDITION OF YOUR RECEIVER—you can look forward to fuller TV enjoyment on every channel . . probably far better reception than you realized was possible with your present set . . . with the log-periodic LPV. Call today—we'll be glad to show you.

*U.S. Patents 2,958,081-2,985,879-3,011,168. Additional Patents Pending. Produced exclusively by JFD Electronics under License to University of Illinois Foundation.



THE ANTENNA THAT ENDED THE ERA OF COMPROMISE

UP TO NOW "broad band" antennas —those designed to receive all channels—have been catch-all conglomerations of narrow-band elements, endlessly trimmed and modified to achieve maximum width without too great a loss of quality. Such piled-on compromises have necessarily been large, cumbersome and expensive. BUT NOW—IN THE LOG-PERIODIC LPV—there is no longer any need to sacrifice quality. The LPV is inherently frequency-independent. It derives from significant new principles that enable it to work with highest efficiency on all channels. You literally get all channels best—with maximum sharpness and clarity in color and black-and-white without "snow" or "ghosts."

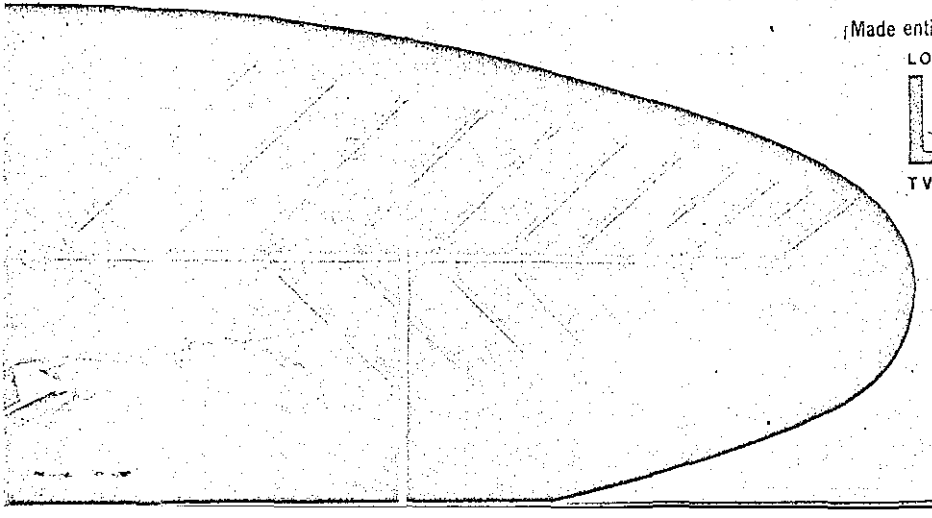
IF your antenna is more than three years old . . .
your neighbor's picture is better than yours . . .
your picture is weak, erratic, hurt by 'snow' or 'ghosts' . . .

THIS HISTORY-MAKING NEW ANTENNA MUST MEAN STRONGER, SHARPER, SURER TV RECEPTION

Developed by the Antenna Research Laboratories of the University of Illinois*—Proved-Out in Air Force Satellite Tracking and Telemetry—Exclusive from JFD!

The Big Breakthrough is here—the TV antenna that ends the "era of compromise" in antenna design. The JFD LOG-PERIODIC LPV antenna masses unprecedented power, to reach out for every picture detail. Focuses with unmatched precision, to bring in the signal you're tuned to and no other —without snow or ghosts. Studio-sharp picture on every channel . . . the truest COLOR you've ever seen . . . plus FM and stereo. Call today—let us show you.

*U.S. Patents 2,958,081—2,985,879—3,011,168. Additional Patents Pending.



Made entirely of gold alodized aircraft aluminum only by

LOG-PERIODIC
LPV $\frac{L_{(n+1)}}{L_n}=\tau$
TV ANTENNA

JFD
ELECTRONICS
CORPORATION

PX-J7

JFD

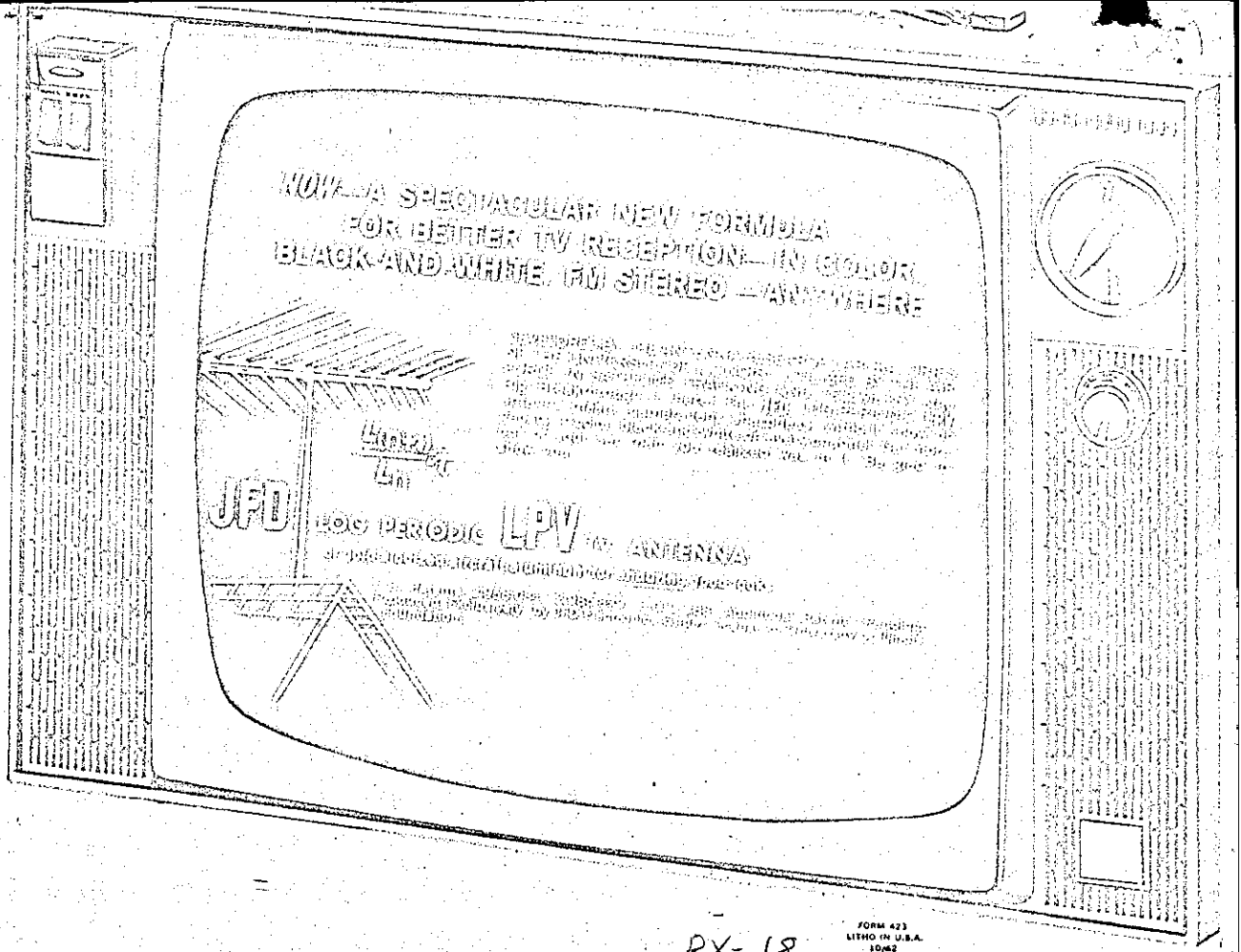
LOG-PERIODIC

LPV $\frac{L_{(n+1)}}{L_n} = \tau$

TV ANTENNA

means
new depth,
more detail
on
your
TV screen

RETURN REQUESTED



PX-J8

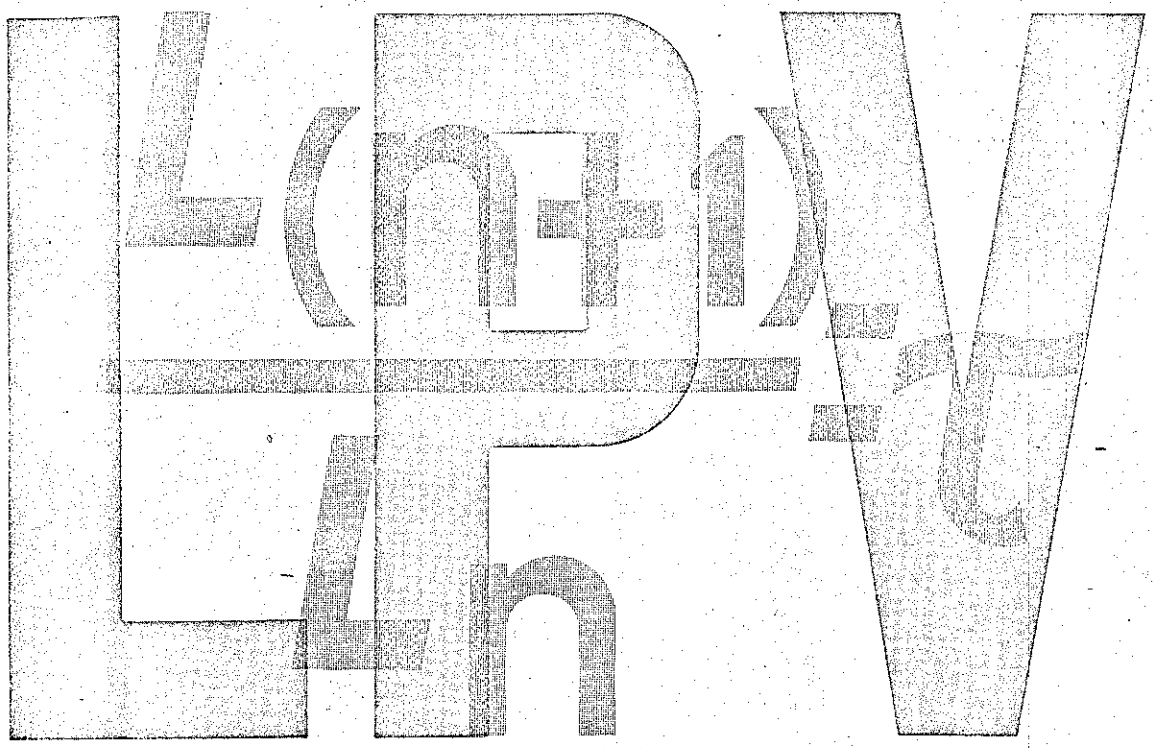
FORM 423
LITHO IN U.S.A.
10/62

$\frac{L_{(n+1)}}{L_n} = \tau$

means
more picture power,
new picture purity

RETURN REQUESTED

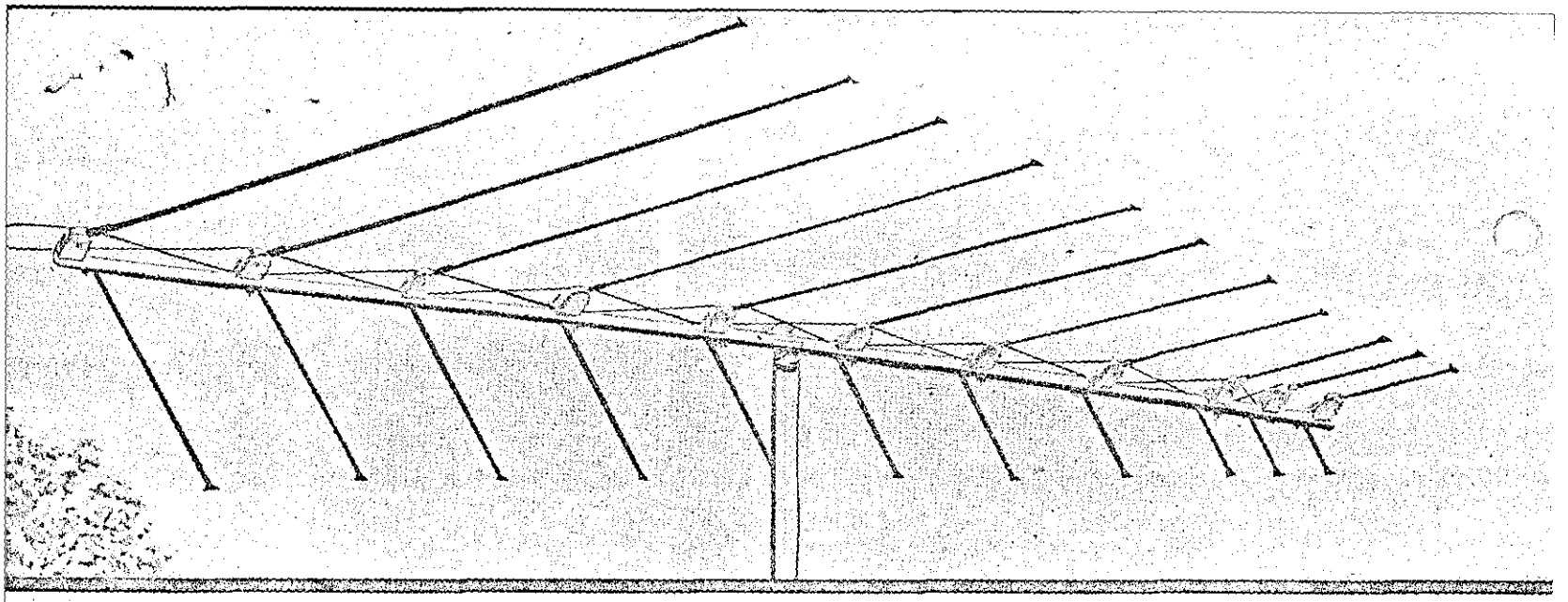
revolution in the air - JFD LOG-PERIODIC



TV ANTENNA

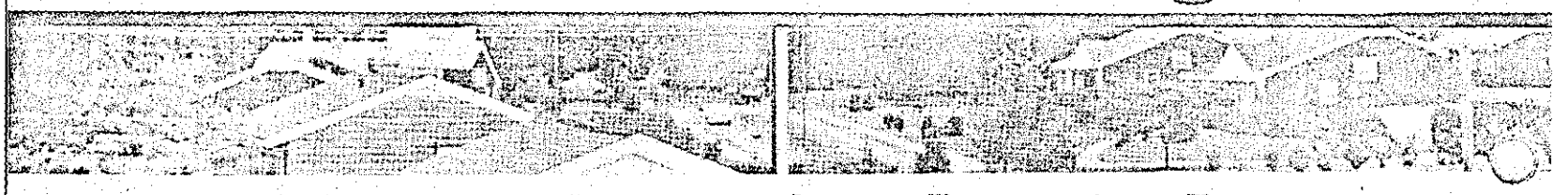
a dramatic new antenna development incorporating harmonically — resonant V — elements operating on the log — periodic cellular principle in the fundamental and third harmonic modes

PX-J9



THE JFD LOG-PERIODIC LPV:

a historic breakthrough in TV antenna design



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

PROFESSOR PAUL MAYES
Antenna Research Laboratory, University of Illinois.

Certain limitations have been inherent in TV antenna design for so long that they have become accepted as axiomatic. No commercial antenna devised up till now has been able to yield high gain *uniformly* over the complete VHF TV band. Therefore, it has been assumed that it is not possible to do so, except by a compromise design that gives up a little gain to get a little bandwidth. The gain curves of modern TV receiving antennas are studded with peaks and valleys that attest, only too well, to their dependence on frequency.

Most antennas for fringe area reception are based on the yagi design. However, while the yagi offers high gain and high front-to-back ratio, it cannot cover the entire VHF TV band from 54 to 216 mc. A simple yagi is most effective for a single channel, a spread of only six megacycles. Modified yagis, which contain dipoles cut for the center of the low and high bands and an array of various size parasitic elements for broadening the bandwidth, generally yield good gain at the high and low ends of each band and degenerate in the middle. This has been the fate, in fact, of any antenna burdened with a large number of parasitic elements. Such elements have secondary resources which make for signal-sapping standing waves and impedance mismatches between the antenna and the transmission line. Further, they are only effective at the band edges.

In their never-ending research for better TV antennas, the engineers at JFD Electronics Corporation's antenna laboratories have long sought some new principle that could overcome the disadvantages of compromise. The JFD flat-plane helix was a partial answer to this problem, but was effective only on the high band. The new concept underlying the design of the LPV is a genuine breakthrough for TV antennas and comes from the massive research effort of the U. S. Air Force for more effective antennas for many new applications such as space communications.

For more than eight years, a group of antenna scientists at the Antenna Research Laboratory of the University of Illinois has been experimenting with VHF and UHF antennas which have no theoretical limitations on bandwidth, and have been called frequency-independent antennas. For reliable communications, antennas are needed that are frequency independent over ranges in which the highest frequency is ten or more times the lowest. Various experiments led Professor V. H. Rumsey to suggest that an antenna shaped like the logarithmic spiral should be frequency independent. Professor J. D. Dyson directed an extensive laboratory investigation of these log-spiral antennas and out of this research came the sharply directional, yet broadband, conical spiral antenna now being used for satellite tracking and radio astronomy. One version of

this antenna is embossed on the Transit satellite, now in space.

Since the spiral is based on a logarithmic equation, it was thought that a planar antenna, whose element lengths were related to each other in the same manner, might also exhibit the same independence of frequency and uniform impedance offered by the conical spiral. Professor R. H. Du Hamel followed this line of reasoning and developed a linearly polarized antenna with pattern and impedance characteristics that did indeed have only small variations which repeat periodically with the logarithm of the received frequency. This is the basis for the *log-periodic* antenna. D. E. Isbell developed the very practical log-periodic dipole array using these ideas and Professor Paul Mayes and R. C. Carrel applied the principle of element V-ing to the log-periodic dipoles and developed an antenna basically suitable for television applications.

JFD antenna engineers who had early recognized the special advantages of the helix for television reception by incorporating such a design into the "satellite helix" and "star helix" antennas, worked in cooperation with the scientists at the University of Illinois to develop the final version of the *log-periodic V*, or LPV,

PROFESSOR MAYES and JFD Executive Vice President EDWARD FINKEL inspect the facilities at JFD's Antenna Research and Development Center

antenna for television. The LPV promises to revolutionize the TV antenna field. Although it is now designed to cover uniformly both the low and high VHF TV bands *and the FM band* in between, a frequency spread of four to one, this antenna type can easily be extended to include the UHF band as well. The unique thing about the LPV antenna is that within the TV band for which it is designed, its impedance, gain, reception pattern and front-to-back ratio are virtually constant across each band. The gain for each channel is as high as that furnished by a comparable sized single channel yagi.

LOG PERIODIC CONCEPT

Essentially, the LPV antenna incorporates two separate design concepts: (1) the log-periodic factor, which determines the size and spacing of the elements and, (2) the forward V shape of the elements, which permits multi-mode operation. Let us first consider the periodic function.

The basic planar log-periodic antenna is an array of dipoles in which the length of each element bears a fixed ratio to the length of the preceding element. This ratio is called the scale factor and is designated by the Greek symbol τ (tau). The spacing between adjacent dipoles may also be similarly fixed by a ratio, σ (sigma). These relationships are shown in Figure 2, where h denotes element length and d represents the spacing between dipoles. Each dipole is equal to an adjusted half-wavelength at a different frequency, making the dipole resonant to that frequency. The scaling factors σ and τ are so chosen that the desired frequency range is covered with elements of overlapping resonances. In this way, as the frequency changes, the function of the resonant dipole will be transferred smoothly from one to the next.

Typical values of tau and sigma are 0.9 and 0.085, respectively. These, in fact, are the actual values that were used in one of the many experimental models developed in the JFD laboratories. This is a seven element antenna, 92 inches long, with h_1, the half length of the longest element, at 56 inches. As might be imagined, the selection of tau and sigma is not like picking numbers out of a hat; they derive from many experimental models and tests which attempt to optimize the characteristics desired in a TV antenna. There is no simple equation into which numbers are dropped and the answer is forthcoming. The values

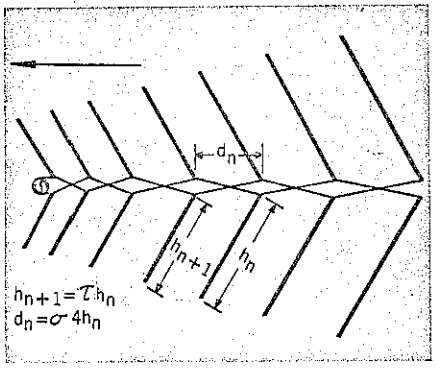


Figure 2

for tau and sigma given above and the actual ones used in the design of the LPV series by JFD engineers were selected from nomographs which themselves combine in a graphically useable form the results of many experiments and theoretical calculations.

It is important to understand that through the use of the logarithmic scaling factors in the design of the LPV, *the total antenna works together* for the reception of TV signals. Most conventional TV antennas consist of a group of individual elements resonant to different channel frequencies, which must then be manipulated so that they all give a reasonably good impedance and directional characteristic, like a team of wild horses that must be held together by force. In contrast, the JFD LPV is an integrated antenna with a total environmental design, all parts working together harmoniously.

Although the antenna is consistent in its action over the entire TV band, in the high end of the band there is an additional contribution made by harmonic mode reception. Because of this, it would be instructive to explain the action of the antenna on the low TV band first and then go on to its operation for the high band.

Fundamental Operation for The Low Band

The largest dipole of the LPV antenna corresponds in length to the half wavelength of the lowest TV frequency to be received. It therefore is resonant to the fundamental wave of this frequency. Similarly, many of the other dipoles more or less correspond to the half wavelengths of the other channels in the low TV band. Although one particular dipole, the one closest to the resonant length, absorbs the greatest amount of energy at any particular received frequency, the adjacent elements also absorb some signal energy. How much the adjacent dipoles absorb is shown in Figure 3, a curve representing the distribution of current at the terminals of each dipole of a nine element LPV antenna receiving a given frequency in the center of its band. Note that while maximum energy is absorbed by one dipole, number 5, two other elements, numbers 4 and 6, absorb 60 percent as much, and even elements 3 and 7 absorb substantial amounts of signal (30 percent).

The resonant or near resonant dipole together with those adjacent elements which contribute substantial signal energy at the received frequency and the crossed phasing harness constitute the active "cell" for that particular channel. As the frequency of reception increases, i.e., at channels 4, 5 and higher, the active region of the antenna moves toward the front or what would be the apex if the antenna were a true cone. For each channel, a different cell is formed.

Ordinarily, the elements adjacent to the resonant dipole in a conventional TV antenna are nowhere near as efficient in signal absorption as is true within the cell of an LPV antenna. This is because, as has been explained earlier, the LPV is not merely a collection of resonant dipoles, which present high impedance to frequencies other than their own. The tau and sigma used in the design of an LPV are the key to providing the wide active reception region for every channel. When these two factors are selected properly, the dipoles of the active cell present a low impedance at their terminals resulting in the high energy absorption. This low impedance results from the combination of element length and spacing determined by the log periodic de-

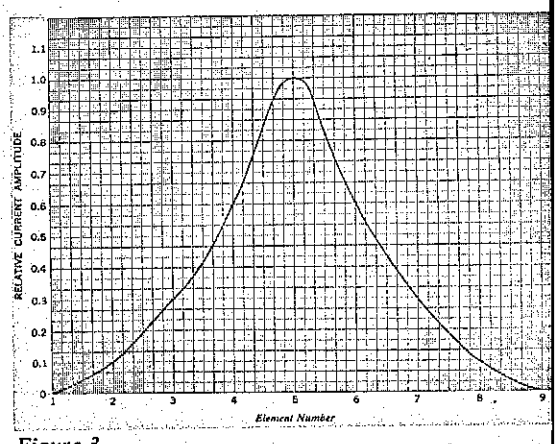
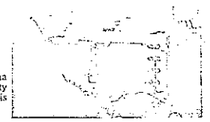


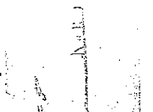
Figure 3

DEVELOPED BY THE UNIVERSITY OF ILLINOIS*

Professor Paul Mayes of the Antenna Research Laboratories of the University of Illinois



—PROVED-OUT IN AIR FORCE SATELLITE TELEMETRY—



EXCLUSIVE FROM JFD THE LOG-PERIODIC LPV $\frac{1-(n+1)\tau}{2n}\tau$ ENDS THE 'ERA OF COMPROMISE' IN TV ANTENNA DESIGN

*U.S. PATENTS 2,958,081 — 2,985,879 — 3,011,168. ADDITIONAL PATENTS PENDING. PRODUCED EXCLUSIVELY BY JFD ELECTRONICS UNDER LICENSE TO UNIVERSITY OF ILLINOIS FOUNDATION

IT COULD ONLY HAVE BEEN CREATED by such massed resources as those of a prominent university, the military, and the country's leading antenna manufacturer.

BECAUSE ITS GAIN IS INDEPENDENT OF FREQUENCY, the backward-wave LOG-PERIODIC LPV functions with highest efficiency across the entire TV band. Impedance, gain, reception pattern and front-to-back ratio virtually constant across each band. Performance on any channel comparable to a tuned Yagi cut to that channel.

OUTPERFORMS PREVIOUS WIDE-BAND ARRAYS ON VIRTUALLY EVERY COUNT:

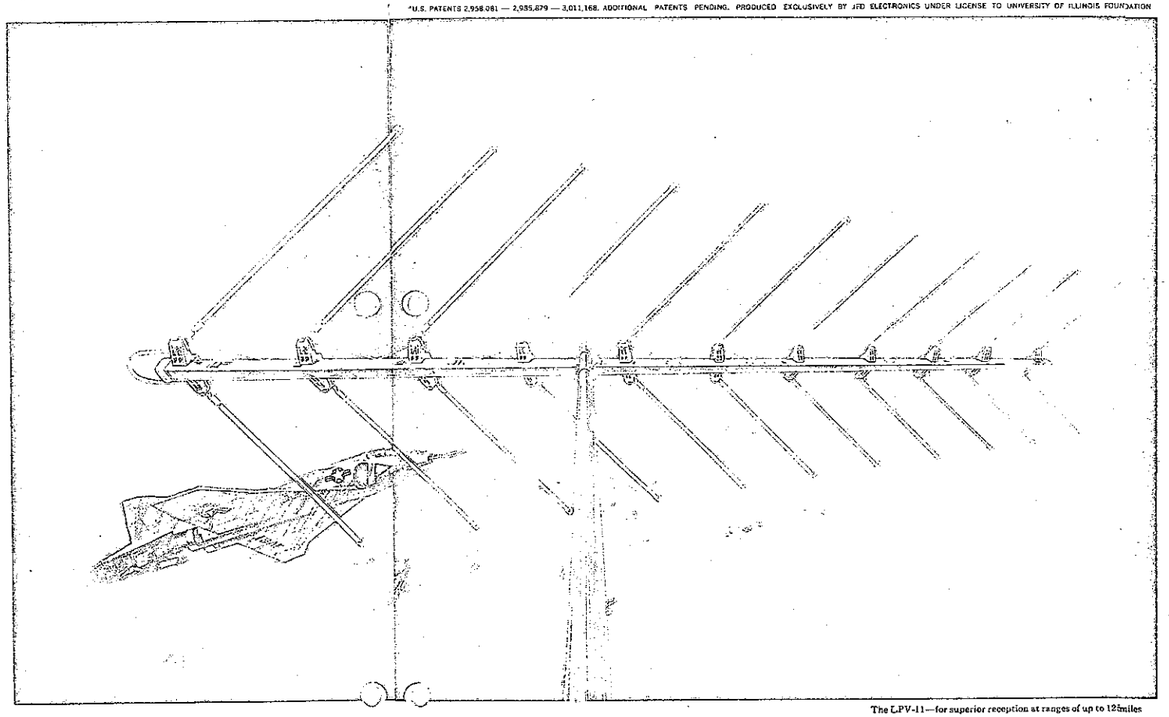
- HIGHEST GAIN — as high as 14 db. in the 17-element LPV!
- SHARPEST DIRECTIVITY — on high bands as well as low!
- HIGHEST FRONT-TO-BACK RATIO — 35 db. in the LPV-11!
- LOWEST VSWR — as low as 1.2 to 1 — with constant impedance across the full bandwidth!
- FLAT RESPONSE ACROSS BOTH VHF BANDS — with greater gain on the high band, where it's needed most (average increase of gain in high band as compared with low band: 3¼ db.)!
- BROADEST BANDWIDTH! — For brilliant color

This end-fire array is the most sensitive broad-band antenna ever made for TV. Here are unprecedented gain, a decisive end to snow and ghosts, the truest color yet (plus FM) — on all channels, from one uncluttered basic design!

MORE, FAR MORE THAN JUST A "FRINGE" SOLUTION, the LOG-PERIODIC LPV delivers superior reception in all multi-channel areas. It is the first true "universal" TV antenna. Makes better reception possible for practically every TV set-owner. And — for the first time — meets all antenna needs with a single antenna line!

UP TO NOW broad-band antennas have merely been piled-on conglomerations of narrow-band elements and parasitics, endlessly trimmed and modified to obtain maximum width without too great a quality loss. Such compromises are like teams of wild horses, each bent on pulling in its own direction. The assortments of parasitic elements lower the characteristic impedance of the antenna at the low end of each band, and make for signal-sapping standing waves and impedance mismatches.

BUT NOW — NO LONGER ANY NEED TO SACRIFICE QUALITY! Consisting of harmonically-resonant V-elements that operate on the log-periodic cellular principle in the fundamental and third harmonic modes, the LOG-PERIODIC LPV is essentially frequency-independent. It was designed not as a catch-all compromise, but as an integrated unit with a total environmental design, all parts working together harmoniously. It literally receives all channels "best" — with optimum sharpness, clarity, freedom from snow and ghosts.



The LPV-11—for superior reception at ranges of up to 125miles

BEST FOR COLOR — BEST FOR BLACK-AND-WHITE — PLUS FM AND STEREO!

For full fidelity — in black-and-white as well as color — the relative amplitudes of the various signals must be reproduced in the receiver just as they were originated at the transmitter. The JFD LOG-PERIODIC LPV is able to do this because it combines:

1. Sufficiently high gain to override set noise and provide a true, clear color picture.
2. Flat response. Gain variation of not more than 1 db. within 1.5 mc. below and .5 mc. above the color sub-carrier.
3. Narrow unidirectional polar pattern.
4. Close impedance match to help effect a low VSWR — to eliminate line reflections and transfer signal to downlead with maximum efficiency.

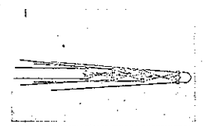
BASED ON PRINCIPLES DESIGNED TO MEET RIGOROUS AIR FORCE PERFORMANCE STANDARDS — BUILT TO UNCOMPROMISING JFD SPECIFICATIONS

Here's how the LPV tunes itself to each received frequency

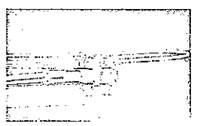
1. Log periodic concept used in space communications antennas is basis for the LPV
2. Logarithmic scaling factor relates one element to the next, and makes an integrated antenna that "tunes" itself to each received frequency
3. Multi-element "cells" form along antenna for each received channel: high signal energy from each of the many dipoles in the cell adds up to high gain on each channel on both high and low TV bands and FM band
4. On high TV band, large LPV dipoles are three times wavelength of TV frequencies, "tune" to the third harmonic giving added gain
5. Forward V-ing of dipoles and crossed phasing harness give high front-to-back-ratio and directional sensitivity. Addition of directors optimizes the LPV on the high TV band

RESULT: High gain, high front-to-back ratio, and sharp directivity continuously from the lowest to the highest TV channel and including the FM band. A BREAKTHROUGH IN TV ANTENNA DESIGN

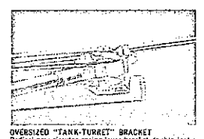
LPV CONSTRUCTION FEATURES



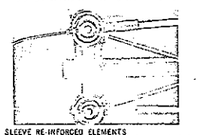
100% PREASSEMBLED FLIP QUICK CONSTRUCTION
Assembles in minutes.
Simply click elements into position.
No bolts or complex dipoles to fumble with.



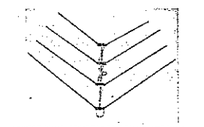
ONE INCH SQUARE ALUMINUM CROSS ARM
Extra heavy gauge aluminum-boom provides strength and durability never before available in TV antennas. Poly-plug ends keep out water—prevent wind whistle.



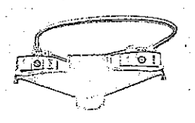
OVERSIZED "TANK-TURRET" BRACKET
Radical new circular spring lever bracket double-locks elements in place yet swings smoothly and effortlessly into position.



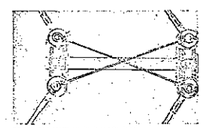
SLEEVE RE-INFORCED ELEMENTS
Heavy-wall sleeve reinforces every element at vital bracket connections. Prevent accidental bending . . . keep element alignment straight and true.



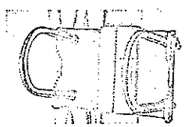
LOWEST WIND RESISTANCE OF ANY ANTENNA
The VEE-beamed presents least possible area to wind, ice or snow.



MASSIVE NEW WEATHER-PROOF INSULATOR
Designed to drain off water. Elevated center barrier prevents shorting of signal from possible rain, dirt or snow accumulation.



SOLID ALUMINUM ROD HARNESS
No troublesome matching harness because there is no impedance mismatch to correct. Log-Periodic design replaces crude harness with transposed high-Q phasing bars. Harness is made of widest-possible ½" o.d. solid aluminum rod cold welded to lugs for permanent performance.



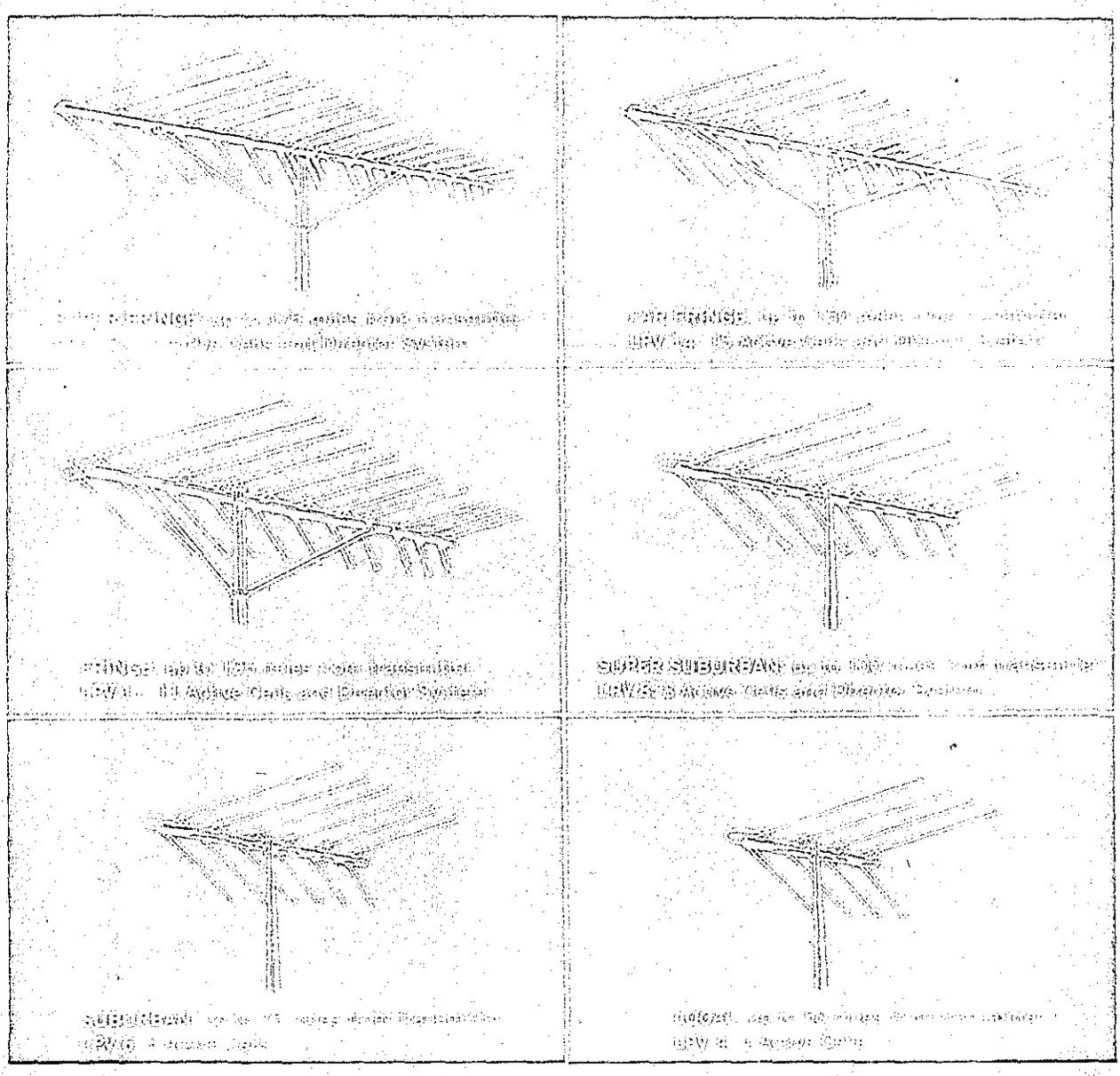
DOUBLE U-BOLT ASSEMBLY
Rugged oversized tandem U-bolt locks antenna to mast, increases structural strength.

a new high-gain all-channel antenna comparable to a yagi across the entire band

6 JFD log-periodic LPV $\frac{L_{(n+1)}}{L_n}\tau$ TV antenna

FOR CAMERA-LENS SHARPNESS IN EVERY LOCATION

harmonically-resonant V-elements operating on the log-periodic cellular principle in the fundamental and third harmonic modes—best for color, best for black and white.



AAA* GOLD BOND ALODIZED *satin gold finish* protects against atmospheric corrosion, assures enduring good looks **EXTRA-RUGGED IN EVERY DETAIL** with new "tank-turret" aluminum brackets that align and double-lock elements *permanently* in place . . . 1" square aluminum crossarm . . . solid aluminum rod harness . . . sleeve-reinforced elements that prevent accidental bending, keep alignment true **LIGHTEST IN WEIGHT PER DB. GAIN** . . . least wind resistance of any antenna **BEST FOR COLOR, BEST FOR BLACK-AND-WHITE**—FM and stereo, too!

*Attractive, Anti-corrosive Armor

Form No. 425A litho in U. S. A. 3/63

JFD

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15th Avenue at 62nd Street, Brooklyn 19, N.Y.

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JFD International, 15 Moore Street, New York, N.Y.
JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada
401-144 West Hastings Street, Vancouver 3, B.C., Canada

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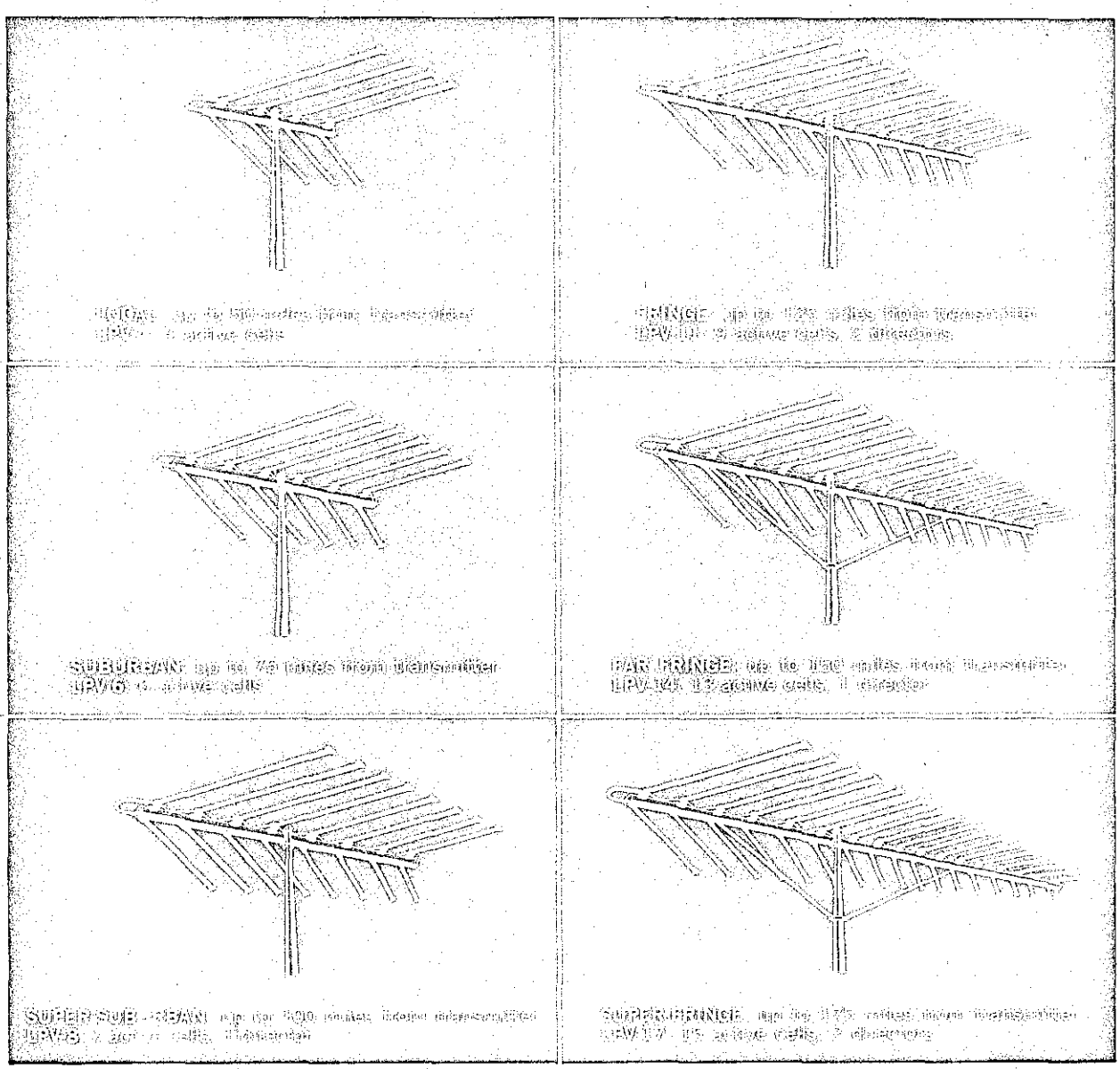
6 JFD log-periodic LPV $\frac{L_{(n+1)}}{L_n}=\tau$ TV antennas

FOR CAMERA-LENS SHARPNESS IN EVERY LOCATION

harmonically-resonant V-elements operating on the log-periodic cellular principle in the fundamental and third harmonic modes—best for color, best for black and white.



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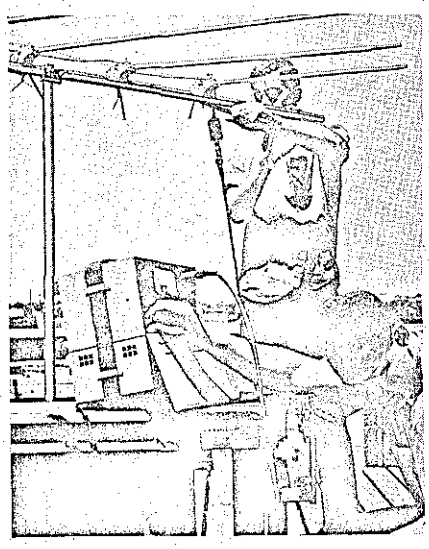
sign equations. This scientific approach is in marked contrast to the methods used hitherto.

Therefore, the JFD LPV antenna is so effective on the low TV band because: 1) there are a large number of elements working on every channel, and 2) the signal absorption efficiency of each dipole in the active cell is extremely high because of its low impedance at the received frequency. Another contributing factor is the high directionality of the LPV, but this will be gone into later.

High Band Operation

As the received frequency increases, that is, for channels 7 through 13. However, now the large elements at the rear of the antenna constitute 3/2-wavelength dipoles and resonate at the received frequency in the third harmonic mode. This contributes significant signal absorption at the higher VHF frequencies and increases antenna gain in these channels. The actual amount of gain realized by third harmonic operation is shown in Figure 4, the VHF gain curves for the JFD LPV-11, an eleven element antenna. From these curves we see that



JFD engineers testing frequency-independent characteristics of one of the many LPV prototypes

there is an average increase of 3¼ db in gain on the high VHF band versus the low band. The active region once again moves forward as the frequency increases.

Good TV reception requires that an antenna furnish higher gain on the high VHF band than on the low band. Propagation tests made by TV broadcast engineers indicate, and actual home TV reception has proven, that high TV band signals suffer greater signal loss with distance than do low band signals. Therefore, to receive high band stations satisfactorily, more gain is required of the antenna. This the JFD LPV antenna supplies as an inherent fact of its operation.

A close inspection of Figure 4 shows that the gain of the JFD LPV-11 (and this is typical of all antennas in the LPV series) is uniform across all channels on the low band, and higher but also uniform across all channels on the high VHF band, falling slightly at channel 13. This characteristic, of course, is because the antenna is frequency independent, but even more important relative to color TV reception, is the fact that it guarantees that all components of a composite transmitted color TV signal will be received intact. For full color fidelity, it is essential that the relative amplitudes of the various color signals be duplicated in the receiver as they were originated at the transmitter. Obviously this can only hold true if the antenna has a flat gain and phase response for the entire channel.

Constant Impedance

Of particular importance relative to gain, is the characteristic impedance of the antenna, and the closely allied factor, voltage standing wave ratio (VSWR). If the impedance of the antenna varies appreciably from that of the transmission line at any point in the band pass of the antenna, a mismatch will exist between the antenna and the downlead. Such a mismatch will decrease signal power to the set and introduce standing waves along the line leading to further signal reduction and ghosts. The LPV antenna is unique in that it maintains essentially constant impedance across the full bandwidth of the antenna. This could be attributed to the impedance balance maintained by the active region of the antenna, with relation to the complete antenna. For the active region, the impedance of the antenna is low, making for high transfer efficiency from the elements to the feedline. At the inactive regions, (inactive, that is, for that particular frequency) the impedance is high. The total impedance presented to the transmission line, however, is always relatively the same.

Voltage standing wave ratios for the LPV have been measured as low as 1.2 to 1. Such low VSWRs are typical of log-periodic antennas and derive from correct scaling of the cells and the constant impedance characteristics.

We see, therefore, that the LPV configuration does indeed maintain a nearly constant gain, impedance, and VSWR over its com-

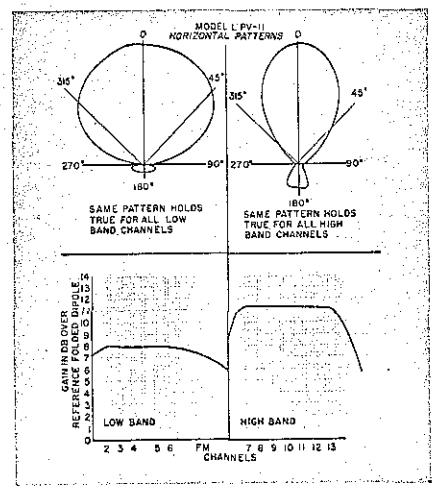


Figure 4

plete bandwidth. Rather than serving as a limited group of pigeonholes that accept discrete frequencies (or channels) with sharp cutoffs, the LPV antenna is like a continually moving belt, accepting smoothly any frequency that hops onto it. The fact that these reception characteristics can occur on an antenna as small as the LPV, the fact that a bandwidth spread of ten to one can occur at all, is due to the logarithmic relation of the elements.

Directivity, High Front-To-Back Ratio

As important as high gain and constant impedance are in fringe area reception, the antenna would be worthless without good directional sensitivity. Even in the heart of cities, good directional response is necessary to reject the ghost-causing interference signals that bounce from building to building. In fringe areas, interfering signals from adjacent channels and other sources, picked up by the antenna from the rear and sides, cause venetian blind effects, herringbones, fading, ghosts and other picture distortions.

Yagi antennas obtain good directivity and high front-to-back ratios by the use of parasitic elements—directors and reflectors for a sharp forward pattern. The LPV antenna obtains its sharp forward response pattern from its periodic structure and the V-ing of the elements.

Consider Figure 5, which is a simplified diagram of a four-cell LPV antenna, front-fed, and using a twisted phasing harness. (For purposes of this explanation we will consider the antenna as a signal transmitter, however, the same effect holds true in reception.) Note that because the elements of the adjacent dipoles are not fed in parallel, they are in phase opposition. This effectively cancels radiation to the rear. Furthermore, the length of the harness plus the air space between adjacent elements adds up to produce a 360 degree phase shift between the signals radiated from the first and second elements (or between any two adjacent elements) *in the forward direction*, i.e., in the direction of the feedline. A 360 degree phase shift actually puts both radiated waves in phase for additive signal strength.

In the reverse direction, that is, toward the rear of the antenna, the story is quite different. Now the fact that the harness is crossed, introduces a 180 degree phase shift *in the signal path between adjacent elements*, putting the radiation from them out of phase in the backward direction.

Naturally, because of the log periodic factor, the spacing between elements on the LPV antenna is not constant, and neither are the lengths of the various harness bars. These variations, however, conform to the variations in wavelength across the TV band so that within any active cell the spacing is correct to produce the required phase shift. In actual production, to optimize the phase shift effect, JFD engineers have changed the lengths of the elements slightly to make them either slightly inductive or capactive at the required signal frequency, introducing a phase lead or lag. Operating within the cell, and in combination with the phasing bars, this results in the required constant phase shift to produce a backward wave toward the feedline.

Additional directional sensitivity in the higher frequency band, where it is needed most, is obtained by V-ing the elements forward. A straight half wave dipole receiving a signal three times its resonant

frequency exhibits a radiation pattern like that shown in Figure 6a. Notice that its signal sensitivity is dissipated among three forward lobes. If the elements of this same dipole are directed forward into a V, the pattern becomes Figure 6b—in effect, the two side lobes are brought together and merged with the center lobe as the elements are brought toward each other. (The rearward lobes are drastically reduced by the methods described in the preceding paragraphs.) V-ing, therefore, increases the directional response and sensitivity of the dipole at the higher frequencies, where the elements are acting in the 3/2-wavelength mode.

The complete LPV TV antenna exhibits the reception patterns of Figure 7a for the low band, sharpening up to Figure 7b in the high band. It is interesting to note, that this highly directive pattern is maintained

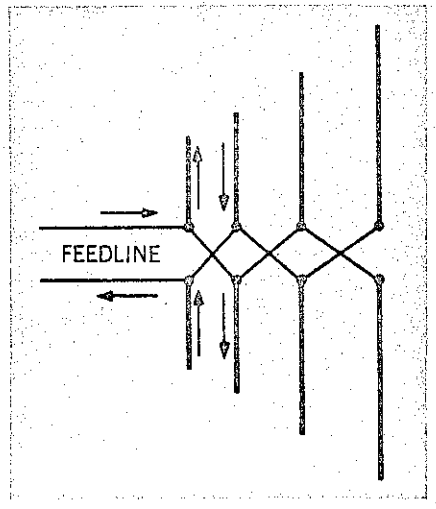


Figure 5

through the FM band too. In actual tests at the JFD antenna laboratories, the LPV-11 with 9 active cells and 2 directors, maintained a front-to-back ratio of 35 db, with a gain of 8 db across the low band and 11½ db across the highs. In comparison, a somewhat longer yagi antenna adjusted to provide a front-to-back ratio of 25 db at the middle of its band, fell to 15 db at the edges, and more important, provided a bandwidth of only 7 percent, at a gain equal to that of the LPV.

Although reflector elements are unusable for the LPV, director elements may still be used effectively to enhance the directional response for fringe and far fringe area reception. The directors must be so designed and spaced on the antenna that they do not interfere with the environment of the log periodic design. The spacing is determined experimentally for each of the antennas in the LPV series which is supplied with directors. The directors, themselves are of two types: 1) a single continuous element and 2) two colinear elements separated by an insulator. They are designed to "peak up" the response at the low and high ends respectively of the upper VHF TV band.

For City and Far Fringe

Since the frequency independence of the LPV antenna depends on the scaling of the elements, any number of intermediate cells may be narrowed without affecting the essential characteristics of the antenna. To narrow, or shorten an LPV antenna, a smaller value of tau is chosen from the design nomographs. If, for a fringe area model, a tau of 0.9 is used, then the second element from the rear will be nine tenths as long as the rearmost element. With a smaller tau, say 0.6 for example, the second element from the rear will be only six tenths as large as the rear element, and so on to the succeeding elements toward the front of the antenna. It is also apparent that the number of elements must decrease because the length of the frontmost dipole is fixed by the high frequency limit of the antenna. It is approximately a half wavelength at the high end of the VHF TV band. And since, with a smaller tau, the elements get shorter faster, the frontmost element length is arrived at sooner. Thus, the overall antenna is shorter—or narrower.

Narrowing the cells will, of course, reduce the gain, but the radiation pattern, high front-to-back ratio, and constant impedance will not be changed because these are functions of the adherence to the proper scaling factors and do not depend on the number of dipoles. When a shortened LPV antenna is used in a relatively strong signal area, narrower cells will contribute less signal to the downlead for any particular frequency, but the increased received signal strength will compensate for this. At the same time, it is no less important that suburban and city reception areas use an antenna with high front-to-back ratio and low VSWR. City viewers are bedevilled by ghosts caused by signal reflection from tall buildings and other obstructions between the transmitter and receiving antenna. The sharp directivity of the LPV assures direct signal pickup,

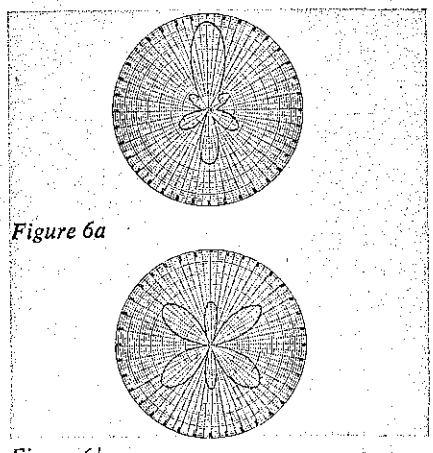


Figure 6a

Figure 6b

while the low VSWR makes for efficient transfer of this signal to the downlead.

There are six different models of the LPV antenna designed by JFD engineers for different reception areas. Each array can be described by the number of cells it contains. These models are as follows:

LPV-4:	Four active cells
LPV-6:	Six active cells
LPV-8:	Seven active cells and one director
LPV-11:	Nine active cells and two directors
LPV-14:	Thirteen active cells and one director
LPV-17:	Fifteen active cells and two directors

Each of these antennas has been specifically designed to guarantee the full advantages of the log periodic concept for different reception areas. The LPV-4 is recommended for viewers who live up to fifty miles from the transmitter. For reception up to 75 miles, the model LPV-6 is appropriate. The LPV-8 and LPV-11 are suggested for 100 and 125 mile reception, respectively. And for the farthest fringes, 150 and 175 miles from the transmitter, or for TV DXing, JFD engineers recommend the LPV-14 and LPV-17.

INNOVATIONS

This advanced series of TV antennas incorporates not only the latest electrical concepts, but also the most rugged mechanical features. The one inch square boom is constructed of extra heavy gauge aluminum for extreme strength and element stability under high winds and heavy ice and snow loading. Poly-plug ends keep out water and prevent wind whistle.

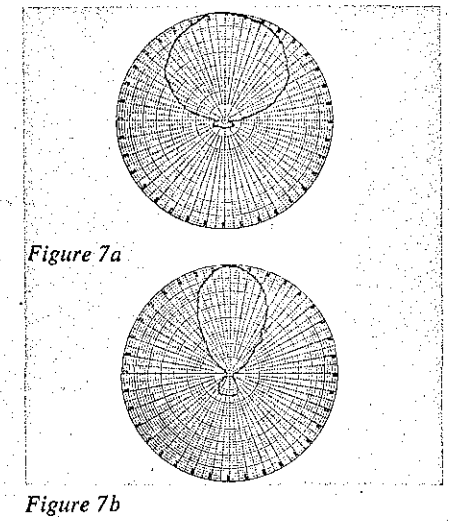


Figure 7a

Figure 7b

Because it is desirable to maintain the low impedance transfer of signal from the resonant elements to the feeder line, the transposed high-Q phasing bars are made of ⅛ inch solid aluminum rod, cold welded into permanent position. The high tensile strength aircraft-aluminum elements are maintained in the V position by circular spring lever brackets with double locks. Element alignment is kept true by the use of heavy wall exsert reinforcements at vital bracket connections. And finally, the entire antenna is gold alodized for protection against atmospheric corrosion.

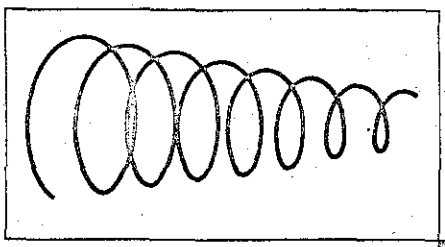
In summary, it is fitting to quote Dr. John Dyson, one of the pioneering scientists of the University of Illinois Antenna Research Laboratory, who did much of the early research on antennas. "The frequency-independent antennas have opened up a new era in wide-band antennas. The conception (of these antennas) . . . has produced advances in the state of the (antenna) art that now puts pressure on the electronics engineer to design equipment that will match the available antenna bandwidths."

The log-periodic V antenna developed by Dr. Paul Mayes and the JFD Electronics Corp. is a fitting match for today's most sensitive TV receiver tuners. More than that, it offers improved reception from any TV set, no matter how old and assures the owner that he is ready for color TV and any improvement in television for years to come.

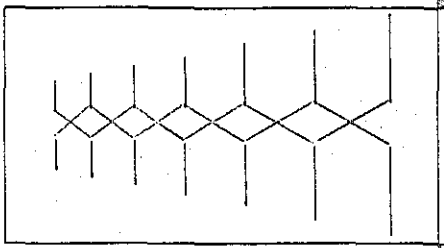
why the LPV makes all other antennas obsolete

how the Log Periodic LPV works

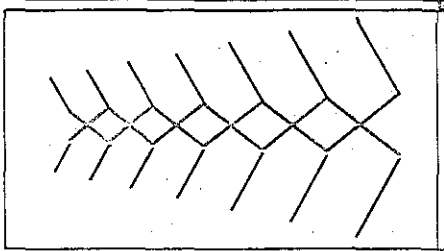
Developed to formula and not by chance—the one unique design and principle of the Log Periodic LPV solves all antenna needs...



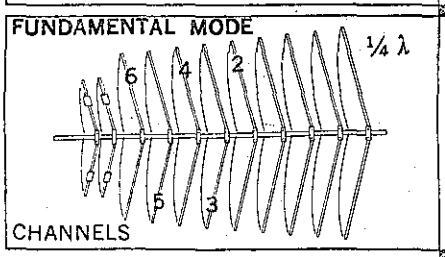
The JFD LPV antenna is a direct descendant out of the logarithmic conical spiral antenna used on the Transit satellite. This basic design is FREQUENCY INDEPENDENT —it works like a conical waveguide to yield almost constant gain, matched impedance and a unidirectional polar pattern across an extremely wide band of frequencies.



Dipole version of spiral antenna has elements whose length and spacing is determined by formula derived from conical spiral geometry, so that antenna acts like a spiral with parts of coils missing. A logarithmic scaling multiplier ties the dipoles together into active multi-element cells for each frequency. Crossed phasing harness inserts a 180 degree phase shift between dipoles that cancels signals from rear, reinforces signals from front.

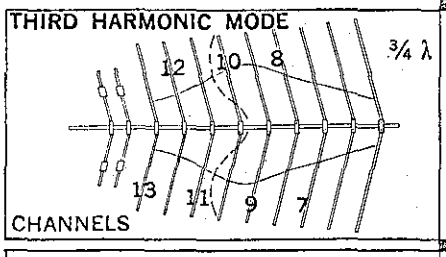


JFD's LPV antenna for TV and FM goes one step further—increases gain and front-to-back ratio while maintaining frequency independence. Forward V-ing of elements shrinks rear radiation lobes, narrows forward beam for sharp directivity, helping to eliminate ghosts and adjacent channel interference. Forward V also permits low band dipoles to contribute to high band gain by operating on the third harmonic mode.



For example: Operation of the JFD LPV-11 on the low band: The larger dipole cells resonate to the low band TV frequencies at their fundamental wavelength. Within each cell, one dipole absorbs the greatest amount of signal for any particular channel, adjacent dipoles pull in 60% more and the next two dipoles add 30% more signal. Many active dipoles working on each channel with constant impedance guarantee high gain.

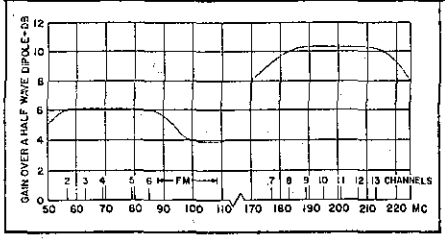
——— *indicates current distribution on fundamental mode*



On the high band: The third harmonic cell forms at the rear of antenna for channel 7 and as the frequency increases toward channel 13, the active region moves toward the apex of the antenna. It is this third harmonic operation which guarantees as much as 3¾ db. additional gain. Continuous and co-linear directors sharpen forward pattern and give peak performance across the entire VHF TV band.

– – – *indicates the current distribution for the third harmonic mode which will be received on all elements.*

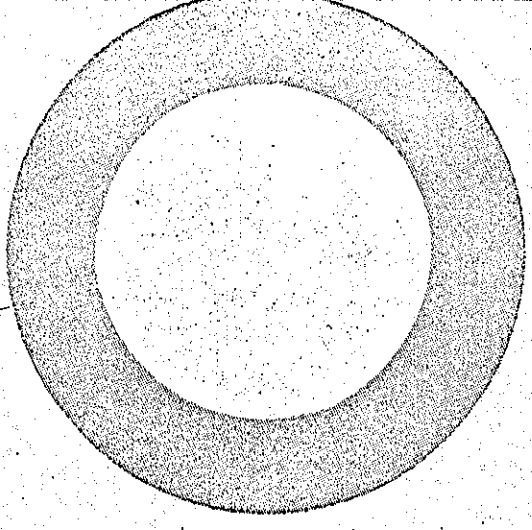
——— *indicates the active region for channel 10, i.e., the different efficiencies with which the elements of the LPV-11 act on channel 10.*

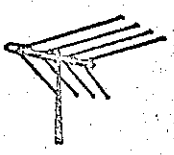


The actual gain curves measured for the LPV-11 in the JFD Antenna Research Laboratories confirm this fact: Within the band for which it is designed (the principle will also be adapted for UHF and other uses), the log-periodic LPV's impedance, polar patterns and front-to-back ratio are virtually constant—with gain for each channel as high as that furnished by a comparable-sized single-channel Yagi.

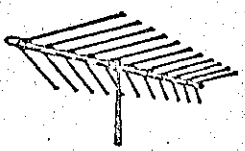
Each antenna in the LPV series consists of an array of resonant V-dipoles and crossed phasing bars, constituting a group of "cells." The size of each cell differs from the one before it by a Logarithmic factor. For any particular frequency, the active portion of the antenna centers on the resonant dipole (equal to one-half wavelength at that frequency), with the adjacent elements also absorbing significant signal energy. The resonances of adjacent cells overlap, so that as the frequency increases or decreases, it is transferred smoothly from one cell to the next.

In effect, the signal is passed along as the frequency increases—the active area moving toward the apex or small end—until, as the fundamental harmonic reaches one end, the other end approaches resonance in the third harmonic. Conventional wide-band antennas are like rows of compartments, one for each channel desired, with sharp cutoffs. The log-periodic antenna is like a continually moving belt that accepts smoothly any frequency that hops aboard.

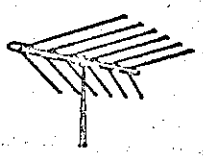




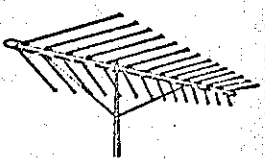
LOCAL: up to 50 miles from transmitter
LPV-4: 4 active cells



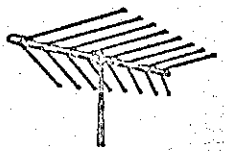
FRINGE: up to 125 miles from transmitter
LPV-11: 9 active cells, 2 directors



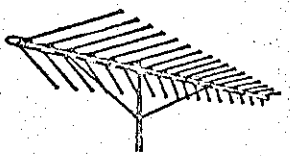
SUBURBAN: up to 75 miles from transmitter
LPV-6: 6 active cells



FAR FRINGE: up to 150 miles from transmitter
LPV-14: 13 active cells, 1 director



SUPER-SUBURBAN: up to 100 miles from transmitter
LPV-8: 7 active cells
1 director



SUPER-FRINGE: up to 175 miles from transmitter
LPV-17: 15 active cells, 2 directors

JFD

LOG—PERIODIC

LPV $\frac{L_{(n+1)}}{L_n} = \tau$

TV ANTENNA

(or Rabbit Ears for Fringers)

A

NEW KEY

to crisper,

clearer, sparkling

TV reception in color,

black-and-white,

FM STEREO anywhere

Years of study at the Antenna Research Laboratories of the University of Illinois* behind it! Principles utilized in Air Force satellite tracking and telemetry Exclusive from JFD Electronics!

DID YOU KNOW YOUR TV ANTENNA IS NOT DELIVERING THE POWER YOUR SET NEEDS FOR GOOD RECEPTION? See reverse side for details.

PX-J11

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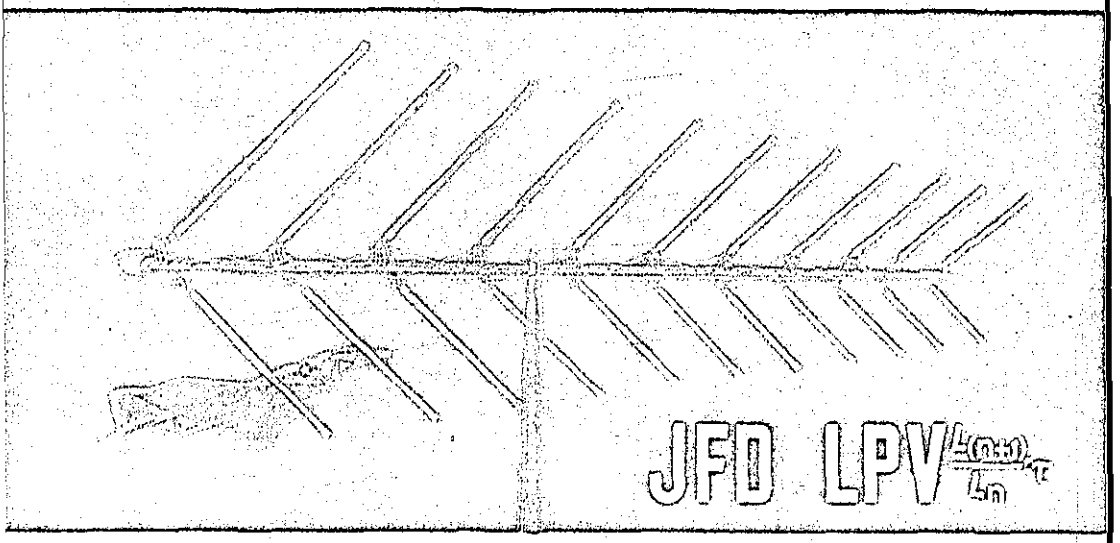

If sun, wind and storms have damaged your TV Antenna, it cannot deliver the full signal power your TV set needs for bright, sparkling performance.

Make your own 30 second visual check-up of your TV Antenna:

☐ **Your antenna design is depriving your set of picture power.**
Your old antenna design is delivering less than 50% of the signal your set needs for clear TV pictures. Since it was installed modern engineering has made possible many new electronic and mechanical advances in antenna design. Why deny yourself the brilliant and enjoyable reception a new up-to-date TV antenna can bring you and your family?*

☐ **Elements (rods) dull or darkened bent or missing**
This condition indicates that your antenna is functioning well below its maximum power (as does an 8 cylinder auto working on only 4 or 6 cylinders.)

☐ **Mast rusting or staining your roof**
If you neglect it, your entire antenna installation will become so corroded that it may eventually collapse and cause serious damage.

☐ **Your antenna transmission wire is dried or brittle**
It's time to replace the wire as well as the TV antenna whose weather-worn insulators and terminals lose needed signal power.

☐ **Your system is not protected against lightning or static damage**
Be sure your installation has a correctly grounded mast and JFD Underwriters Approved Lightning Arrester. Otherwise your fire insurance policy is void in case of home damage from lightning.

*For the best picture in sight, we recommend the JFD LOG-PERIODIC LPV ANTENNA. See other side for details. **CALL TODAY!**

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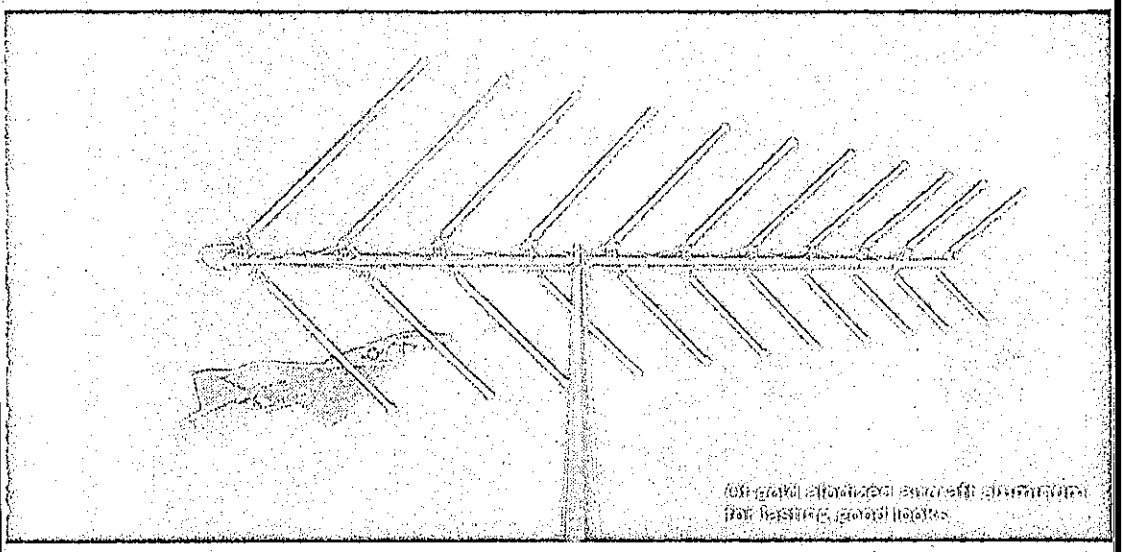
IF Your Antenna is More than Three Years Old...
Your Neighbors Get Better Reception than You Do...
Your Pictures Are Weak, Erratic, Hurt by Snow or Ghosts...

(7)



...THE JFD LOG-PERIODIC LPV MUST MEAN NEW DEPTH, MORE DETAIL ON YOUR TV SCREEN

This history-making new antenna pairs unprecedented power with unmatched directivity to bring in every picture detail. Gives you vivid, vibrant, studio-sharp reception—better reception than you thought possible with your present set. Developed by the Antenna Research Laboratories of the University of Illinois to meet rigorous Air Force space needs. Get full TV enjoyment in color, black-and-white, FM Stereo too—with the JFD LOG-PERIODIC LPV.

Call us for free check-up of your TV antenna

AUTHORIZED JFD DEALER

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ALL OUR WORK IS GUARANTEED!

THIS NEW JFD ANTENNA FORMULA

$L(n+1)$ means more picture power

L_n new picture purity

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

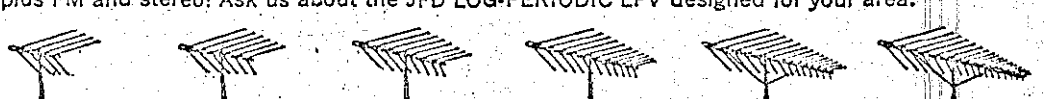
IT COULD ONLY HAVE BEEN PRODUCED BY SUCH MASSED RESOURCES as those of a prominent university, the Air Force, and the country's leading antenna manufacturer—JFD.

THE LOG-PERIODIC LPV MUST IMPROVE YOUR TELEVISION PERFORMANCE—on virtually every count—because it outperforms previous antennas on virtually every count.

BUILDS UP ENORMOUS POWER to bring in new depth, more detail—regardless of distance or terrain.

FOCUSES WITH PINPOINT PRECISION, to go after the signal you're tuned to and no other—without noise, snow or ghosts.

GET VIVID, VIBRANT PICTURES ON EVERY CHANNEL... the truest color you've ever seen... plus FM and stereo! Ask us about the JFD LOG-PERIODIC LPV designed for your area.



LOCAL: up to 50 miles from transmitter
LPV-4: 4 active cells

SUBURBAN: up to 75 miles from transmitter
LPV-6: 6 active cells

SUPER-SUBURBAN: up to 100 miles from transmitter
LPV-8: 7 active cells
1 director

FRINGE: up to 125 miles from transmitter
LPV-11: 9 active cells,
2 directors

FAR FRINGE: up to 150 miles from transmitter
LPV-14: 13 active cells,
1 director

SUPER-FRINGE: up to 175 miles from transmitter
LPV-17: 15 active cells,
2 directors

*U.S. Patents 2,958,081-2,985,879-3,011,168. Additional Patents Pending. Produced exclusively by JFD Electronics under License to University of Illinois Foundation.

THE LPV $\frac{L_{(n+1)}}{L_n}=\tau$ LOG-PERIODIC TV ANTENNA BY JFD IS THE BIGGEST ANTENNA STORY IN YEARS. TELL IT AND YOU'LL SELL IT. HERE'S HOW...

Virtually every TV set-owner—which means almost everybody—is interested in the better reception he can get with the log-periodic LPV. Make sure all the prospects in your area know about it. Use the promotion material pictured in this folder to plan a complete, continuing campaign.

1 Mailers to reach your customers and best prospects.

2 A newspaper ad campaign to cover your entire marketing area—bring everybody in.

3 TV slides and radio/TV scripts to convey the full excitement of the LPV story.

4 Doorknob hangers for "pinpoint" advertising in your immediate locality.

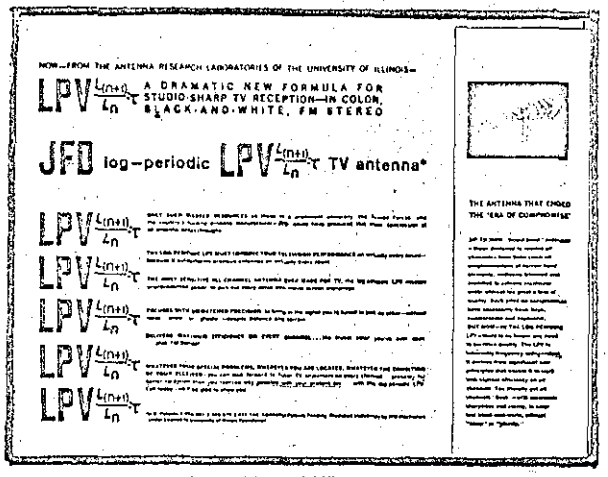
5 Streamer to "stop" street traffic, create impulse sales, help close the order.

Use the enclosed postcard to order additional selling kits—conveniently packaged in a handsome file folder-portfolio—now.

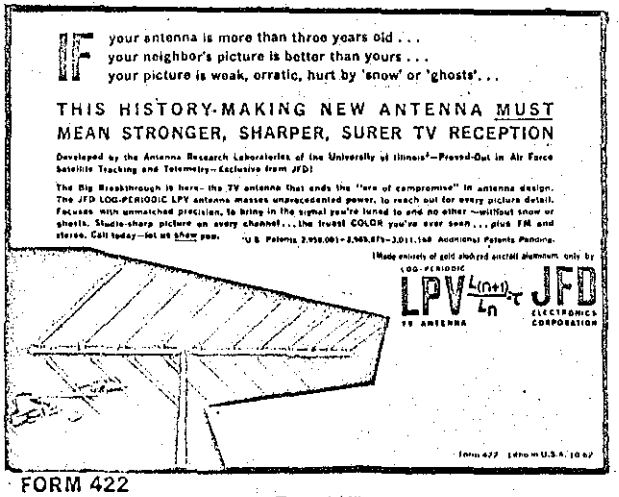
PX-J 13

LPV MAILERS TO SEEK OUT AND SELL OLD AND NEW TV VIEWERS!

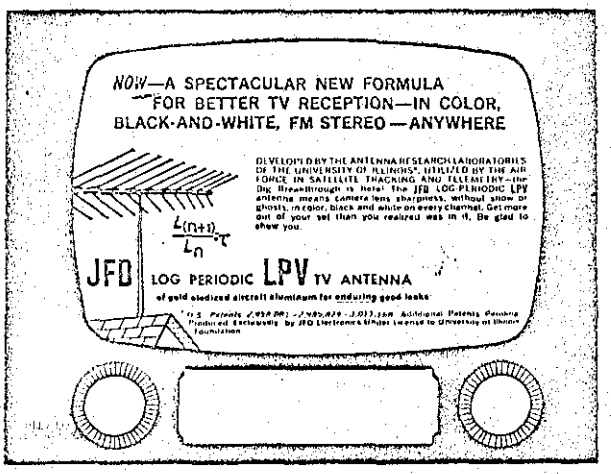
Send to your customer lists, phone book or street directory lists, association rolls, etc. (Possibly the board of elections, cleaning stores, liquor dealers, department stores or other businesses in your neighborhood have lists they may let you use.) For maximum impact, send all three—postcard, self-mailer, *postcard—to fringe prospects, local prospects, all prospects.*



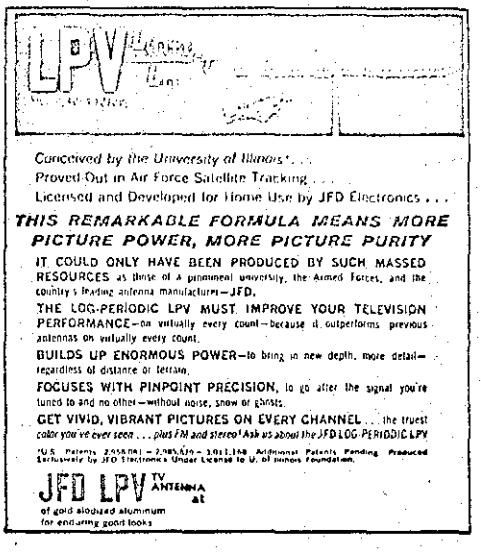
FORM 421 (folds to 5½ x 4¼")
4-page, 2-color consumer self-mailer/envelope stuffer



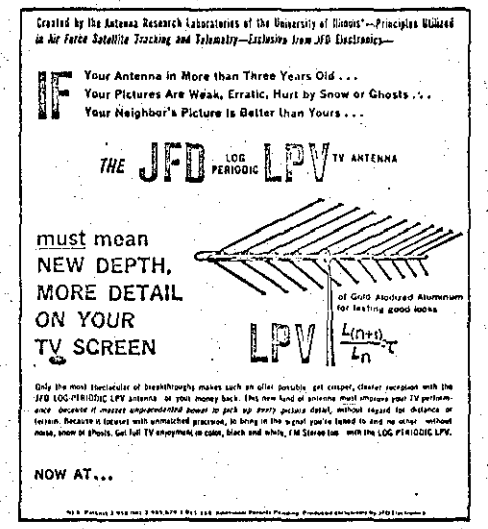
FORM 422
2-color jumbo postcard (7 x 5¼")



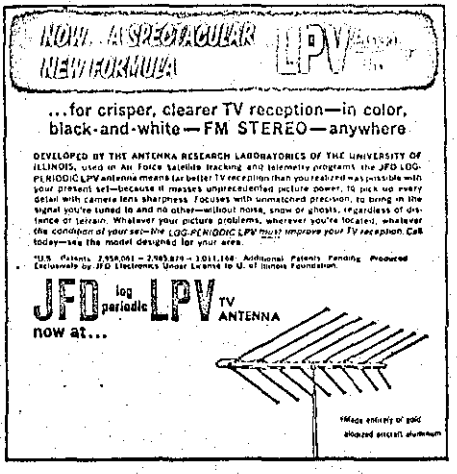
FORM 423
2-color jumbo postcard (7 x 5¼")



Mat No. 255
3 cols. x 84 lines=252 lines



Mat No. 256
3 cols. x87 lines=261 lines

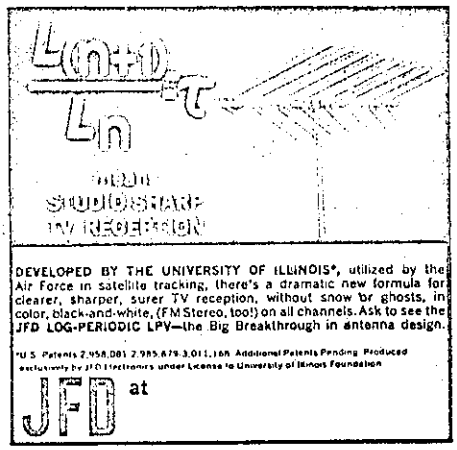


Mat No. 257
3 cols. x 74 lines=222 lines

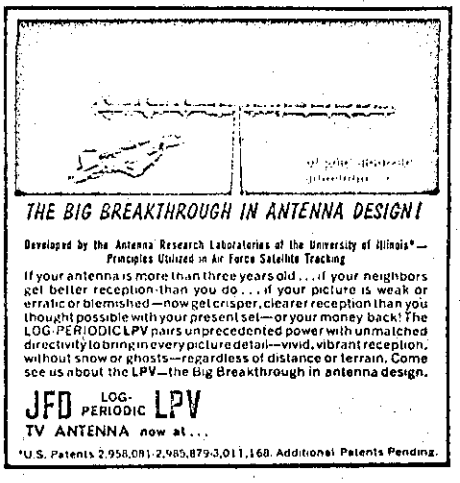
SHOWN ⅓ ACTUAL SIZE

LPV AD MATS TO MAKE EVERY TV OWNER REALIZE THERE'S SOMETHING NEW IN THE AIR!

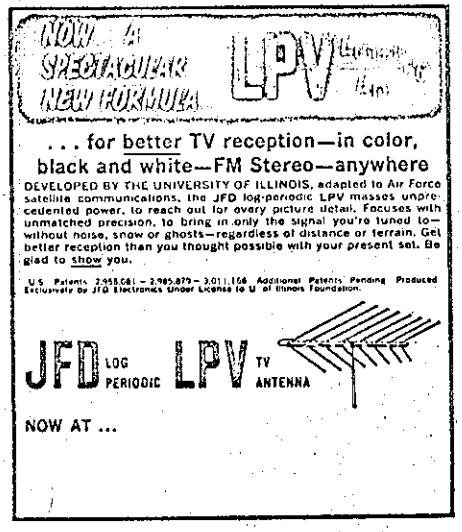
Consistency is the secret of effective advertising. Alternate these mats on a planned schedule to create a continuing campaign and a lasting impression. Your newspaper rep will be glad to help you with the details. (Mats shown one-third actual size.)



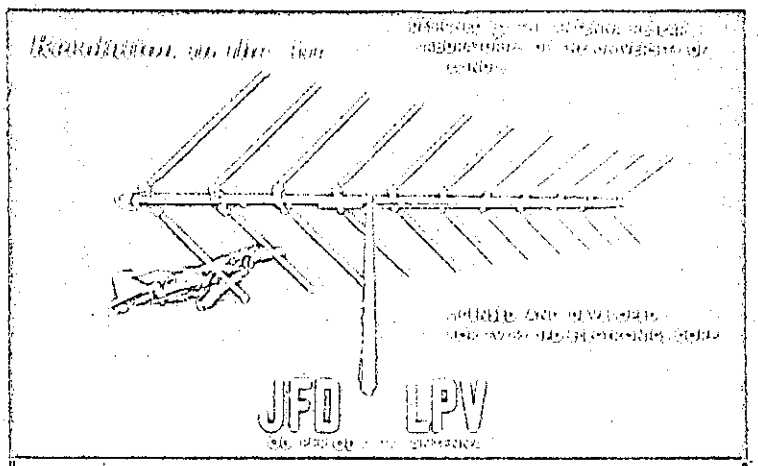
Mat No. 259
2 cols. x 50 lines=100 lines



Mat No. 260
2 cols. x 52 lines=104 lines



Mat No. 261
2 cols. x 57 lines=114 lines



whatever your picture problems.... whatever the condition of your set....

THIS SPECTACULAR BREAKTHROUGH IN ANTENNA DESIGN* GUARANTEES CRISPER, CLEARER, MORE SPARKLING RECEPTION IN COLOR, BLACK-AND-WHITE, FM STEREO—ANYWHERE

The Big Breakthrough is here! The JFD LOG-PERIODIC LPV television antenna means better reception on virtually every count, because it outperforms previous antennas on virtually every count. Masses unprecedented power—to pick up every picture detail, without regard for distance or terrain. Focuses with unmatched precision, to go after the signal you're tuned to and no other—without noise, snow or ghosts. Wherever you're located, whatever the condition of your receiver—the LOG-PERIODIC LPV must improve your TV reception, in color and black-and-white (FM Stereo, too) on every channel. Call now—see the model designed for your location.

THE ANTENNA THAT ENDED THE "ERA OF COMPROMISE"

UP TO NOW broad band* antennas those designed to receive all channels have simply been catch all conglomerations of narrow band elements, indirectly trimmed and matched to obtain maximum width without too great a quality loss. Result piled on compromises that were enormous compromise expensive BUT NOW NO LONGER ANY NEED TO SACRIFICE QUALITY. The log periodic LPV is inherently frequency-independent. You literally get all channels "best" with maximum sharpness, clarity, freedom from snow and ghosts.

JFD LOG PERIODIC LPV TV/FM ANTENNA NOW AT...

*U.S. Patents 2,958,081-2,985,879-3,011,168. Additional Patents Pending. Produced Exclusively by JFD Electronics Under License to University of Illinois Foundation.

Mat No. 254
4 cols. x 140 lines=560 lines

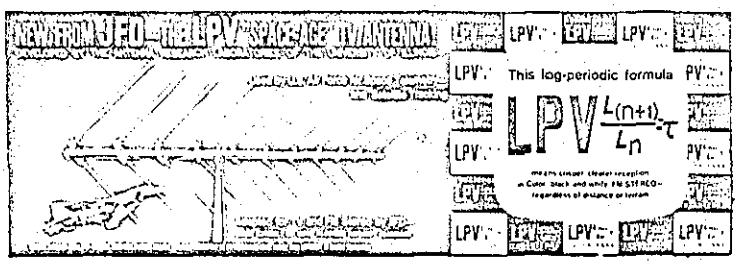
Mat No. 258
2 cols. x 85 lines=170 lines

SHOWN 1/3 ACTUAL SIZE

JFD ELECTRONICS CORPORATION 1462 62nd Street Brooklyn 19, N.Y.

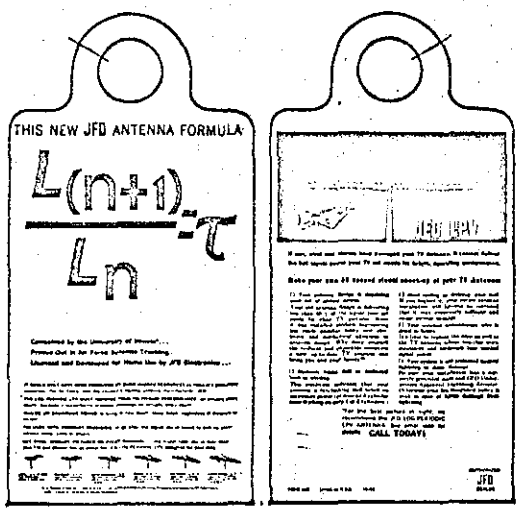
STOP and SELL YOUR ANTENNA PROSPECTS with these LPV SALE-SPARKERS!

Use this exciting material to remind your customers that they get the newest advances and the complete service at your store. The LPV is a dramatic entering wedge that can help you sell other items as well as antennas.

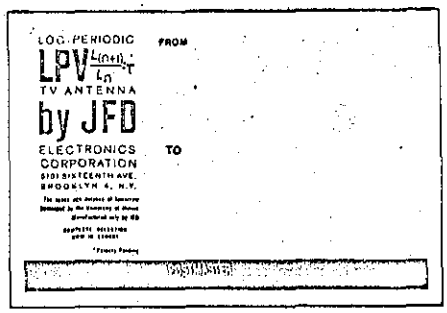


FORM 426
color streamer, 8½ x 22" for windows

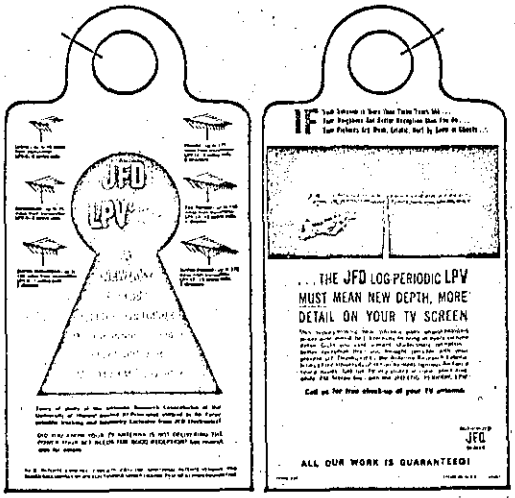
FORM 425 10-page color catalog



FORM 428
doorknob hanger for homes and autos

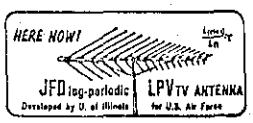


FORM 411
color shipping label



FORM 429
doorknob hanger for homes and autos

POSTAGE METER CUTS

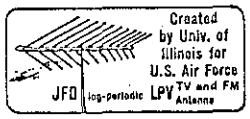


No. RLPV-1

No. DLPV-1

No. RLPV 2

No. DLPV-2



No. RLPV 3

RADIO AND TV COMMERCIALS

FORM 460 60 second radio script
FORM 460A 60 second radio script
FORM 461 20 second radio script
FORM 461A 35 mm. TV Slide
FORM 463 35 mn. TV slide

THE LOG-PERIODIC LPV WILL BE BACKED BY THE BIGGEST PROMOTION IN ANTENNA HISTORY. It will generate new attention to TV performance—new buying excitement. Tie in with this excitement to sell not only LPV's, but installation, color TV, service.

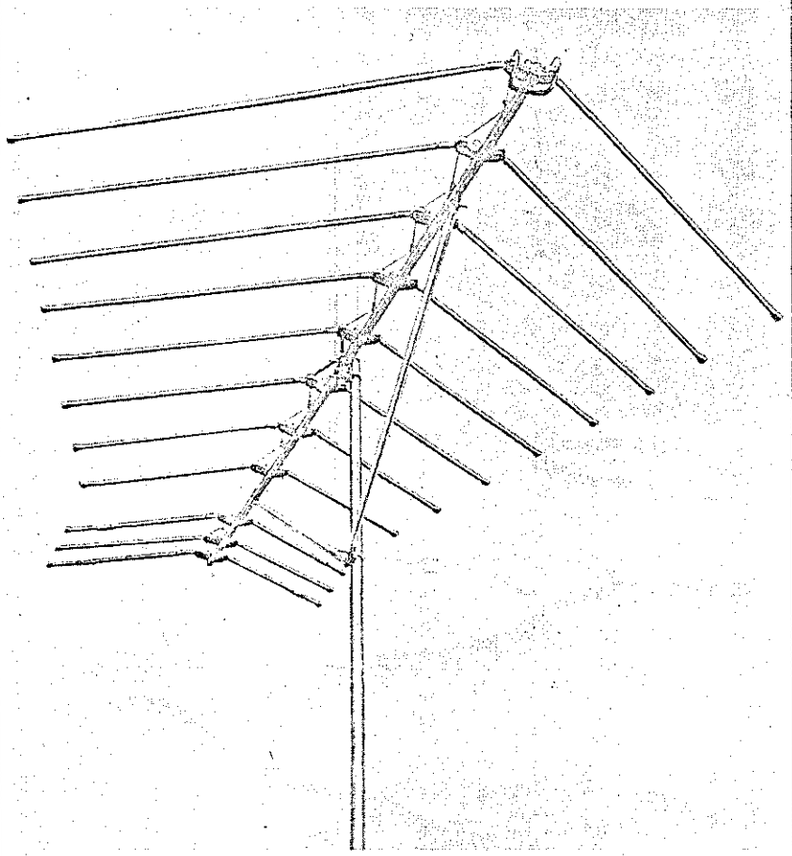
USE ENCLOSED POSTCARD TO ORDER YOUR PROMOTION MATERIALS

FORM 430 LITHO IN U.S.A. 10/62

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

LPV ...from the satellite tracking techniques of the U.S. Air Force

LPV ...a remarkable new space antenna formula now adapted by JFD for sharper and clearer reception in glowing COLOR or vivid Black and White TV — plus FM Stereo!



JFD LPV LOG-PERIODIC TV/FM ANTENNA

*U.S. PATENTS 2,956,081–2,985,879–3,011,168 – Additional Patents Pending.

$$\frac{L_{(n+1)}}{L_n} = \tau$$

The log-periodic antenna, as represented by this formula, was invented by the Antenna Research Laboratories of the University of Illinois. Using this basic log-periodic formula, JFD Electronics has developed the log-periodic LPV TV/FM antenna that works wonders in reception. Snowy, faded pictures suddenly come aglow with radiant detail . . . "ghosts" and interference vanish . . . shows from distant stations come in crisp and steady. And if you like FM Stereo you can hear it at its best with the same log-periodic LPV TV/FM antenna.

NO LAZY ELEMENTS—ENTIRE ANTENNA RESPONDS TO SELECTED CHANNEL. **All** antenna elements (not just some elements as in other antennas) respond to the channel you want—absorb maximum signal on every channel from 2 to 13, as well as on all FM Stereo frequencies. And the JFD log-periodic LPV is ruggedly built—wind-tested to 100 m.p.h. winds. Lustrous gold alodized aircraft aluminum keeps it looking and working like new. PRICED FROM $14.95 to $59.95

See your TV Dealer or Mail Coupon Now!

LOG-PERIODIC JFD LPV TV/FM ANTENNA

JFD Electronics Corporation, 1462—62nd St., Bklyn, 19, N. Y.
Please send me JFD report on log-periodic antenna.

NAME.....

ADDRESS.....

CITY.....STATE.....

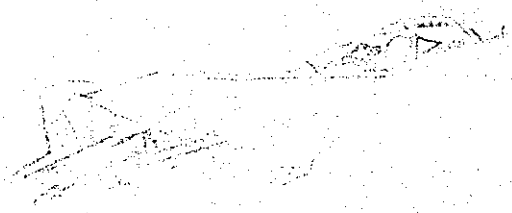
9/8/67
PXJ 16A hor'd. bits

IN STOCK!

ADVERTISED IN LOOK

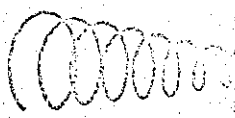
PX-J 16A

Form No. 571S litho in U.S.A. 5-63

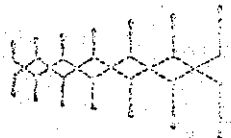


of the University of Illinois* Proved in Space Satellite Telemetry

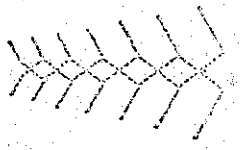
HOW THE LOG-PERIODIC LPV MAKES ALL OTHER ANTENNAS OBSOLETE



The JFD LPV antenna is a direct descendant out of the logarithmic conical spiral antenna used on the Transit satellite. This basic design is FREQUENCY INDEPENDENT—it works like a conical waveguide to yield almost constant gain, matched impedance and a unidirectional polar pattern across an extremely wide band of frequencies.



Dipole version of spiral antenna has elements whose length and spacing is determined by formula derived from conical spiral geometry, so that antenna acts like a spiral with parts of coils missing. A logarithmic scaling multiplier ties the dipoles together into *active multi-element cells for each frequency. Crossed phasing* harness inserts a 180 degree phase shift between dipoles that cancels signals from rear, reinforces signals from front.



JFD's LPV antenna for TV and *FM* goes one step further—increases gain and front-to-back ratio while maintaining frequency independence. Forward V-ing of elements shrinks rear radiation lobes, narrows forward beam for sharp directivity, helping to eliminate ghosts and adjacent channel interference. Forward V also permits low band dipoles to contribute to high band gain by operating on the third harmonic mode.

For example: Operation of the JFD LPV-11 on the low band: The larger dipole cells resonate to the low band TV frequencies at their fundamental wavelength. Within each cell, one dipole absorbs the greatest amount of signal for any particular channel, adjacent dipoles pull in 60% more and the next two dipoles add 30% more signal. Many active dipoles working on each channel with constant impedance guarantee high gain.

———— *indicates current distribution on fundamental mode.*

On the high band: The third harmonic cell forms at the rear of antenna for channel 7 and as the frequency increases toward channel 13, the active region moves toward the apex of the antenna. It is this third harmonic operation which guarantees as much as 3¾ db. additional gain. Continuous and co-linear directors *sharpen forward pattern and give peak performance across the* entire VHF TV band.

———— *indicates the current distribution for the third harmonic mode which will be received on all elements.*

- - - - - - *indicates the active region for channel 10, i.e., the different efficiencies with which the elements of the LPV-11 act on channel 10.*

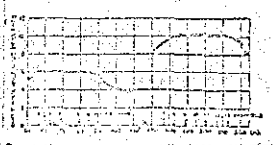
The actual gain curves measured for the LPV-11 in the JFD Antenna Research Laboratories confirm this fact: Within the band for which it is designed (the principle will also be adapted for UHF and other uses), the log-periodic LPV's impedance, polar patterns and front-to-back ratio are virtually constant—with gain for each channel as high as that furnished by a comparable-sized single-channel Yagi.

FUNDAMENTAL MODE

CHANNELS

THIRD HARMONIC MODE

CHANNELS



Each antenna in the LPV series consists of an array of resonant V-dipoles and crossed phasing bars, constituting a group of "cells." The size of each cell differs from the one before it by a Logarithmic factor. For any particular frequency, the active portion of the antenna centers on the resonant dipole (equal to one-half wavelength at that frequency), with the adjacent elements also absorbing significant signal energy. The resonances of adjacent cells overlap, so that as the frequency increases or decreases, it is transferred smoothly from one cell to the next.

In effect, the signal is passed along as the frequency increases—the active area moving toward the apex or small end—until, as the fundamental harmonic reaches one end, the other end approaches resonance in the third harmonic. Conventional wide-band antennas are like rows of compartments, one for each channel desired, with sharp cutoffs. The log-periodic antenna is like a continually moving belt that accepts smoothly any frequency that hops aboard.

SEE THE JFD LOG-PERIODIC LPV AT YOUR JFD DISTRIBUTOR NOW—AND BE THE FIRST ONE IN YOUR AREA TO INTRODUCE AND PROFIT FROM THIS NEW ERA IN TV RECEPTION.

THE BRAND THAT PUTS YOU IN COMMAND OF THE MARKET

JFD

JFD ELECTRONICS CORPORATION
15th Avenue at 62nd Street, Brooklyn 19, N.Y.

JFD Electronics-Southern Inc., Oxford, North Carolina
JFD International, 15 Moore Street, New York, N.Y.
JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada

PX-J17

MAGNETIC
electronic
servicedealer

VOL. 2, NO. 9 JANUARY, 1963

9/8/67
PX-J 18 for ref.
IHS

NEW!!

Technical Section Begins This Month . . .

- **The Battle of The Big Bottle**
  Page 14

- **Line Voltage Can Cost You Dollars**
  Page 17

PX-J 18

(*it ended the day JFD introduced the Log-Periodic LPV $\frac{L_{(n+1)}}{L_n}=\tau$ TV antenna)

Wave goodbye to all the Rube Goldberg contraptions with their "Chinese puzzle" combinations of collectors, directors, reflectors.

Now you can solve **any** reception problem with **one** compact, precisely-engineered antenna—the **first** TV antenna based on the geometrically-derived **logarithmic-periodic** scale developed by the Antenna Research Laboratories of the University of Illinois for the U.S. Air Force.

Because it is inherently frequency-independent, the JFD Log-Periodic LPV delivers **the same superb performance on every VHF channel**—performance comparable to that of a single channel Yagi. And delivers it not only in black-and-white, but in Color, and you get FM stereo too!

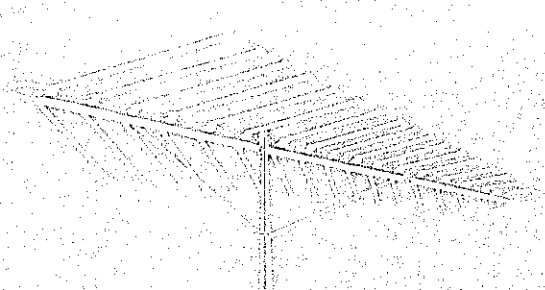
THE LOG-PERIODIC LPV ACTUALLY TUNES ITSELF TO EACH RECEIVED FREQUENCY—RESULTING IN:

- **HIGHEST** GAIN—as high as 14 db. in the LPV 17!
- **SHARPEST** DIRECTIVITY—on high bands as well as low!
- **HIGHEST** FRONT-TO-BACK RATIO—up to 35 db.
- **LOWEST** VSWR—as low as 1.2 to 1—with constant impedance across the full bandwidth!
- **FLAT** RESPONSE ACROSS BOTH VHF BANDS—with greater gain on the high band, where it's needed most (average increase of gain in high band over low band: 3¼ db.)!
- **BROADEST** BANDWIDTH—thanks to its unique frequency-independent characteristics!

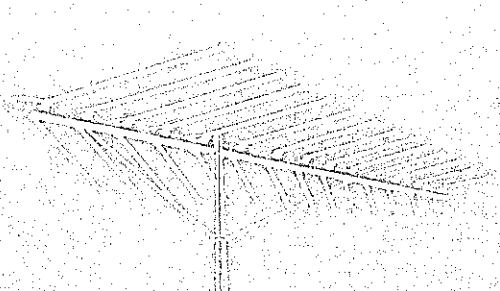
FOR THE FIRST TIME ONE SCIENTIFICALLY FORMULATED ANTENNA CONFIGURATION SATISFIES ANY LOCATION DEMAND:

Harmonically resonant V-elements operate on the Log-Periodic Cellular Principle in the Fundamental and Third Harmonic Modes for unprecedented performance —in color—in black and white—in FM STEREO

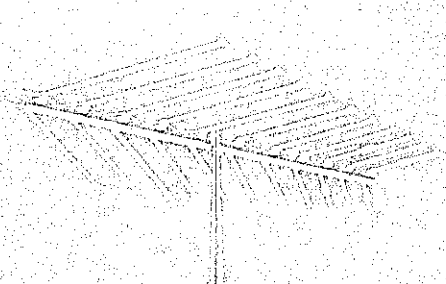
developed by the Famous Antenna Research Laboratories



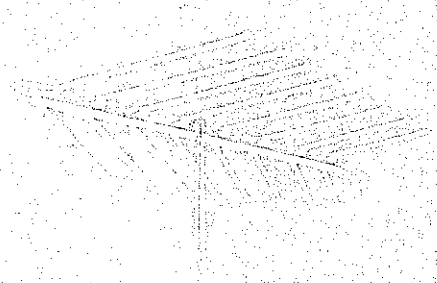
LPV-17: 15 Active Cells and Director System—up to 175 miles



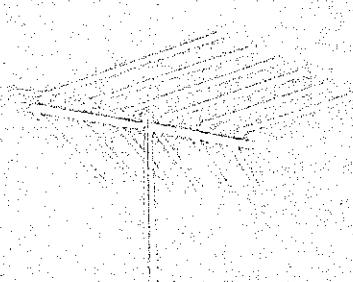
LPV-14: 13 Active Cells and Director System—up to 150 miles



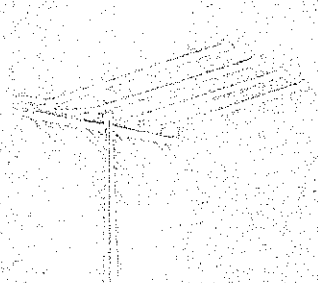
LPV-11: 9 Active Cells and Director System—up to 125 miles



LPV-8: 7 Active Cells and Director System—up to 100 miles



LPV-6: 6 Active Cells—up to 75 miles



LPV-4: 4 Active Cells—up to 50 miles

Designed for UV and FM Stereo by JFD

✓ ELIMINATES THE NEED FOR AREA-DESIGNED ANTENNAS

✓ 100% PREASSEMBLED "FLIP-QUIK" ASSEMBLY

✓ MASSIVE TANK TURRET BRACKETS THAT DOUBLE-LOCK ELEMENTS

✓ AAA† GOLD BOND ALODIZED TO KEEP THAT BRAND NEW LOOK

✓ EXTRA-RUGGED, DOUBLE-REINFORCED IN EVERY DETAIL

✓ LIGHTEST IN WEIGHT PER DB GAIN

✓ WIND-TUNNEL TESTED CONSTRUCTION

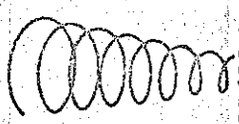
✓ LEAST SNOW AND ICE LOADING

†Attractive, Anti-corrosive Armor

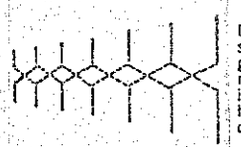
of the University of Illinois*

Proved in Space Satellite Telemetry

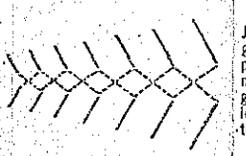
HOW THE LOG-PERIODIC LPV MAKES ALL OTHER ANTENNAS OBSOLETE



The JFD LPV antenna is a direct descendant out of the logarithmic conical spiral antenna used on the Transit satellite. This basic design is FREQUENCY INDEPENDENT—it works like a conical waveguide to yield almost constant gain, matched impedance and a unidirectional polar pattern across an extremely wide band of frequencies.



Dipole version of spiral antenna has elements whose length and spacing is determined by formula derived from conical spiral geometry, so that antenna acts like a spiral with parts of coils missing. A logarithmic scaling multiplier ties the dipoles together into active multi-element cells for each frequency. Crossed phasing harness inserts a 180 degree phase shift between dipoles that cancels signals from rear, reinforces signals from front.



JFD's LPV antenna for TV and FM goes one step further—increases gain and front-to-back ratio while maintaining frequency independence. Forward V-ing of elements shrinks rear radiation lobes, narrows forward beam for sharp directivity, helping to eliminate ghosts and adjacent channel interference. Forward V also permits low band dipoles to contribute to high band gain by operating on the third harmonic mode.

For example: Operation of the JFD LPV-11 on the low band: The larger dipole cells resonate to the low band TV frequencies at their fundamental wavelength. Within each cell, one dipole absorbs the greatest amount of signal for any particular channel, adjacent dipoles pull in 60% more and the next two dipoles add 30% more signal. Many active dipoles working on each channel with constant impedance guarantee high gain.

– – – – *indicates current distribution on fundamental mode.*

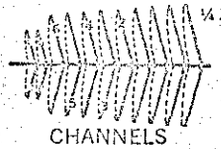
On the high band: The third harmonic cell forms at the rear of antenna for channel 7 and as the frequency increases toward channel 13, the active region moves toward the apex of the antenna. It is this third harmonic operation which guarantees as much as 3¼ db. additional gain. Continuous and co-linear directors sharpen forward pattern and give peak performance across the entire VHF TV band.

– – – – *indicates the current distribution for the third harmonic mode which will be received on all elements.*

. . . . . *indicates the active region for channel 10, i.e., the different efficiencies with which the elements of the LPV-11 act on channel 10.*

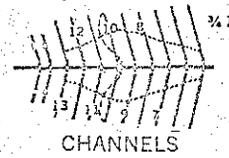
The actual gain curves measured for the LPV-11 in the JFD Antenna Research Laboratories confirm this fact: Within the band for which it is designed (the principle will also be adapted for UHF and other uses), the log-periodic LPV's impedance, polar patterns and front-to-back ratio are virtually constant—with gain for each channel as high as that furnished by a comparable-sized single-channel Yagi.

FUNDAMENTAL MODE

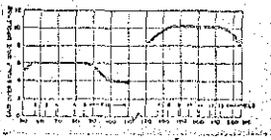


CHANNELS

THIRD HARMONIC MODE



CHANNELS



Each antenna in the LPV series consists of an array of resonant V-dipoles and crossed phasing bars, constituting a group of "cells." The size of each cell differs from the one before it by a Logarithmic factor. For any particular frequency, the active portion of the antenna centers on the resonant dipole (equal to one-half wavelength at that frequency), with the adjacent elements also absorbing significant signal energy. The resonances of adjacent cells overlap, so that as the frequency increases or decreases, it is transferred smoothly from one cell to the next.

In effect, the signal is passed along as the frequency increases—the active area moving toward the apex or small end—until, as the fundamental harmonic reaches one end, the other end approaches resonance in the third harmonic. Conventional wide-band antennas are like rows of compartments, one for each channel desired, with sharp cutoffs. The log-periodic antenna is like a continually moving belt that accepts smoothly any frequency that hops aboard.

Patent No. 2,985,879 – 3,001,195 Additional Patents Pending. Protected exclusively by JFD Electronics under Inventions of the University of Illinois Foundation*

SEE THE JFD LOG-PERIODIC LPV AT YOUR JFD DISTRIBUTOR NOW—AND BE THE FIRST ONE IN YOUR AREA TO INTRODUCE AND PROFIT FROM THIS NEW ERA IN TV RECEPTION.

JFD

THE BRAND THAT PUTS YOU IN COMMAND OF THE MARKET

JFD ELECTRONICS CORPORATION

15th Avenue at 62nd Street, Brooklyn 19, N.Y.

JFD Electronics-Southern Inc., Oxford, North Carolina
JFD International, 15 Moore Street, New York, N.Y.
JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada
401-144 W. Hastings Street, Vancouver 3, B.C.

PX-J19

JFD

log-periodic

LPV $\frac{L(n+1)=\tau}{Ln}$

TV antenna

8/8/67
PX-J 19 forms
1 HS

IT PAYS TO ADVERTISE JFD LPV ANTENNAS.
LPV AD MATS TO MAKE EVERY TV OWNER REALIZE THERE'S SOMETHING NEW IN THE AIR!

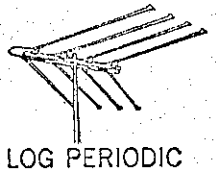
Consistency is the secret of effective advertising.
Alternate these mats on a planned schedule to create a continuing campaign and a lasting impression. Your newspaper rep will be glad to help you with the details.

Place ads so they appear on same page or page adjoining television program schedules.

ALL ADS SHOWN ACTUAL SIZE.

~~PX-30 through PX-37~~

Developed by the Antenna Research Laboratory of the University of Illinois... Adapted for TV by JFD Electronics Corp.



JFD LOG PERIODIC

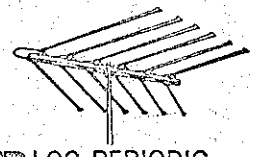
LPV $\frac{L_{(n+1)}}{L_n}\tau$

GIVES YOU BEST COLOR AND BLACK AND WHITE PICTURES

NAME

M287LP 1 col. x42 li.

Developed by the Antenna Research Laboratory of the University of Illinois... Adapted for TV by JFD Electronics Corp.



JFD LOG PERIODIC

LPV $\frac{L_{(n+1)}}{L_n}\tau$

GIVES YOU BEST COLOR AND BLACK AND WHITE PICTURES

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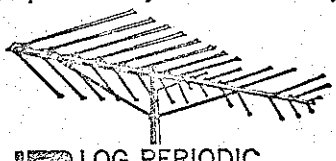


JFD LOG PERIODIC

LPV $\frac{L_{(n+1)}}{L_n}\tau$

GIVES YOU BEST COLOR AND BLACK AND WHITE PICTURES

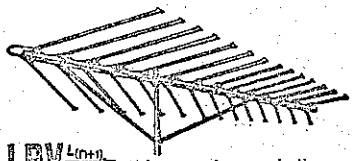
NAME

M283LP 1 col. x 42 li

Developed by the Antenna Research Laboratory of the University of Illinois... Used in Tracking Satellites... Adapted for TV by JFD Electronics Corp.

JFD LOG PERIODIC

LPV ANTENNA GUARANTEES YOU THE BEST PICTURES YOU HAVE EVER SEEN ON YOUR TV SCREEN.



LPV $\frac{L_{(n+1)}}{L_n}\tau$ this new log periodic antenna engineering formula discovered by the Antenna Research Laboratories of the University of Illinois guarantees clearer, sharper, surer reception in black and white or color TV—hi-fi FM stereo, too. Call now—see the JFD log periodic LPV designed to match your location's needs.

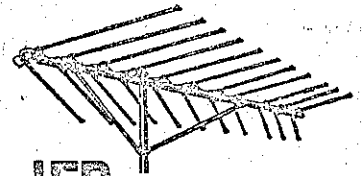
U.S. PATENTS 2,958,081-2,985,879-3,011,168

NAME

Mat No. 271 1 Col. X 70 lines = 70 lines

FOR TV OWNERS ONLY

University of Illinois Develops Revolutionary New TV Antenna



JFD *LOG PERIODIC* $\frac{L_{(n+1)}}{L_n}\tau$

USES SAME BASIC DESIGN OF HIGH-POWERED SATELLITE TRACKING ANTENNAS.

For the first time anywhere—JFD now makes available to TV owners the amazing log periodic—the new high gain TV antenna developed by the famous antenna research laboratories of the University of Illinois.

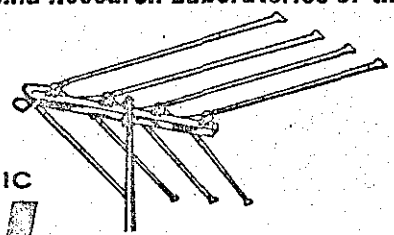
Designed according to newly discovered mathematical formulas, it will bring you reception that is razor-sharp and bright—color or black and white. All this plus living FM stereo.

Sounds fantastic? Hundreds of TV owners in your area thought so, too—until they installed a JFD log periodic LPV and saw and heard the big difference. Call now for more information.

U.S. PATENTS 2,958,081-2,985,879-3,011,168

M296 1 Col X 84 lines = 84 lines

Developed by the Antenna Research Laboratories of the University of Illinois. Adapted for TV by JFD Electronics Corp.



JFD LOG-PERIODIC **LPV** GIVES YOU BEST COLOR AND BLACK AND WHITE PICTURES — FM STEREO, TOO!

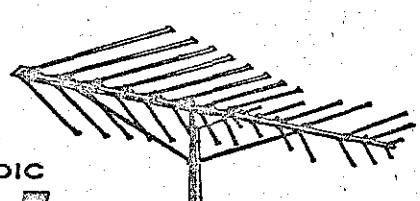
$\frac{L_{n+1}}{L_n}\tau$ this new log-periodic antenna engineering formula discovered by the Antenna Research Laboratories of the University of Illinois assures clearer, sharper, surer reception in black and white or color TV — hi-fi FM stereo, too. Call now — see the JFD log-periodic LPV designed to match your location's needs.

U. S. PATENTS 2,958,081 — 2,965,879 — 3,011,168

NAME

M285LP 2 cols. x 50 li. =100 lines

Developed by the Antenna Research Laboratories of the University of Illinois. Adapted for TV by JFD Electronics Corp.



JFD LOG-PERIODIC **LPV** GIVES YOU BEST COLOR AND BLACK AND WHITE PICTURES — FM STEREO, TOO!

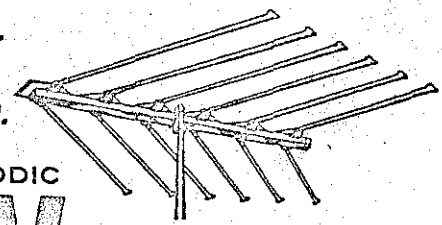
$\frac{L_{n+1}}{L_n}\tau$ this new log-periodic antenna engineering formula discovered by the Antenna Research Laboratories of the University of Illinois assures clearer, sharper, surer reception in black and white or color TV — hi-fi FM stereo, too. Call now — see the JFD log-periodic LPV designed to match your location's needs.

U. S. PATENTS 2,958,081 — 2,985,879 — 3,011,168

NAME

M284LP 2 cols. x 50 li. =100 lines

Developed by the Antenna Research Laboratories of the University of Illinois. Adapted for TV by JFD Electronics Corp.



JFD LOG-PERIODIC **LPV** GIVES YOU BEST COLOR AND BLACK AND WHITE PICTURES — FM STEREO, TOO!

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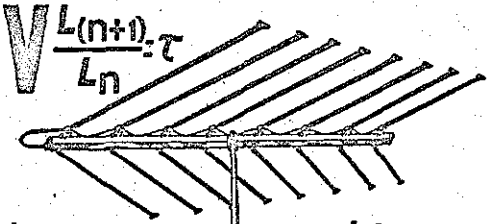
U. S. PATENTS 2,958,081 — 2,985,879 — 3,011,168

NAME

M286LP 2 cols. x 50 li. =100 lines

LPV $\frac{L_{(n+1)}}{L_n}\tau$



means *more picture power* *new picture purity*

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

THE BIG BREAKTHROUGH IN TV ANTENNAS IS HERE

IT COULD ONLY HAVE BEEN PRODUCED BY SUCH MASSED RESOURCES as those of a prominent university, the Armed Forces, and the country's leading antenna manufacturer.

THE LOG-PERIODIC LPV MUST IMPROVE YOUR TELEVISION PERFORMANCE—on virtually every count—because it outperforms previous antennas on virtually every count.

BUILDS UP ENORMOUS POWER to bring in new depth, more detail—regardless of distance or terrain.

FOCUSES WITH PINPOINT PRECISION, to go after the signal you're tuned to and no other—without noise, snow or ghosts.

GET VIVID, VIBRANT PICTURES ON EVERY CHANNEL . . . the truest color you've ever seen . . . plus FM and stereo! Ask us about the JFD LOG-PERIODIC LPV.

*U.S. Patents 2,958,081—2,985,879—3,011,168. Additional Patents Pending. Produced Exclusively by JFD Electronics Under License to U. of Illinois Foundation.

Of gold alodized aluminum

THE LOG-PERIODIC LPV by JFD

now at...

Mat No. 258
2 Cols. x 85 lines = 170 lines

PX-34

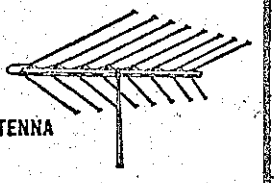
NOW... A SPECTACULAR NEW FORMULA... LPV

. . . for better TV reception—in color, black and white—FM Stereo—anywhere

DEVELOPED BY THE UNIVERSITY OF ILLINOIS, adapted to Air Force satellite communications, the JFD log-periodic LPV masses unprecedented power, to reach out for every picture detail. Focuses with unmatched precision, to bring in only the signal you're tuned to—without noise, snow or ghosts—regardless of distance or terrain. Get better reception than you thought possible with your present set. Be glad to show you.

*U.S. Patents 2,958,081 – 2,985,879 – 3,011,168. Additional Patents Pending. Produced Exclusively by JFD Electronics Under License to U. of Illinois Foundation.

JFD LOG PERIODIC LPV TV ANTENNA



NOW AT ...

Mat No. 261
2 Cols. x 57 lines = 114 lines

PX-37

NOW... A SPECTACULAR NEW FORMULA... LPV

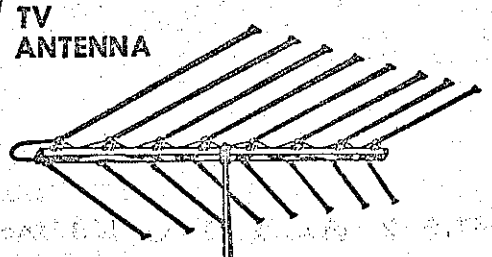
...for crisper, clearer TV reception—in color, black-and-white—FM STEREO—anywhere

DEVELOPED BY THE ANTENNA RESEARCH LABORATORIES OF THE UNIVERSITY OF ILLINOIS, used in Air Force satellite tracking and telemetry programs, the JFD LOG-PERIODIC LPV antenna means far better TV reception than you realized was possible with your present set—because it masses unprecedented picture power, to pick up every detail with camera-lens sharpness. Focuses with unmatched precision, to bring in the signal you're tuned to and no other—without noise, snow or ghosts, regardless of distance or terrain. Whatever your picture problems, wherever you're located, whatever the condition of your set—the LOG-PERIODIC LPV must improve your TV reception. Call today—see the model designed for your area.

*U.S. Patents 2,958,081 – 2,985,879 – 3,011,168. Additional Patents Pending. Produced Exclusively by JFD Electronics Under License to U. of Illinois Foundation.

JFD log periodic LPV TV ANTENNA

now at...



†Made entirely of gold alodized aircraft aluminum

Mat No. 257
3 Cols. x 74 lines = 222 lines

PX-33

NOW FROM JFD—THE LPV [illegible] TV ANTENNA

$\frac{L(n+1)}{Ln} = \tau$

means
STUDIO-SHARP
TV RECEPTION

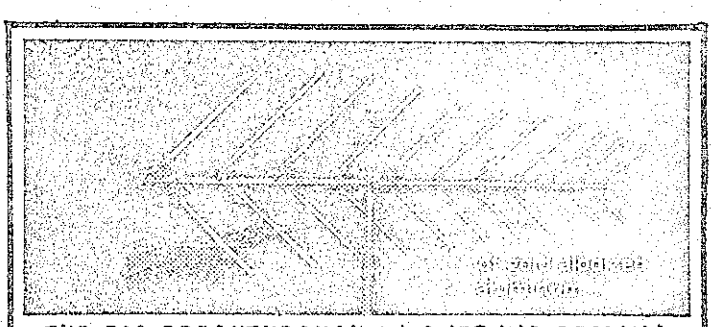
DEVELOPED BY THE UNIVERSITY OF ILLINOIS*, utilized by the Air Force in satellite tracking, there's a dramatic new formula for clearer, sharper, surer TV reception, without snow or ghosts, in color, black-and-white, (FM Stereo, too!) on all channels. Ask to see the **JFD LOG-PERIODIC LPV**—the Big Breakthrough in antenna design.

*U.S. Patents 2,958,081-2,985,879-3,011,168. Additional Patents Pending. Produced exclusively by JFD Electronics under License to University of Illinois Foundation.

JFD at

Mat No. 259
2 Cols. x 50 lines = 100 lines

PX-35



THE BIG BREAKTHROUGH IN ANTENNA DESIGN!

Developed by the Antenna Research Laboratories of the University of Illinois*—Principles Utilized in Air Force Satellite Tracking

If your antenna is more than three years old . . . if your neighbors get better reception than you do . . . if your picture is weak or erratic or blemished—now get crisper, clearer reception than you thought possible with your present set—or your money back! The LOG-PERIODIC **LPV** pairs unprecedented power with unmatched directivity to bring in every picture detail—vivid, vibrant reception, without snow or ghosts—regardless of distance or terrain. Come see us about the **LPV**—the Big Breakthrough in antenna design.

JFD LOG-PERIODIC **LPV**
TV ANTENNA now at . . .

*U.S. Patents 2,958,081-2,985,879-3,011,168. Additional Patents Pending.

Mat No. 260
2 Cols. x 52 lines = 104 lines

PX-36

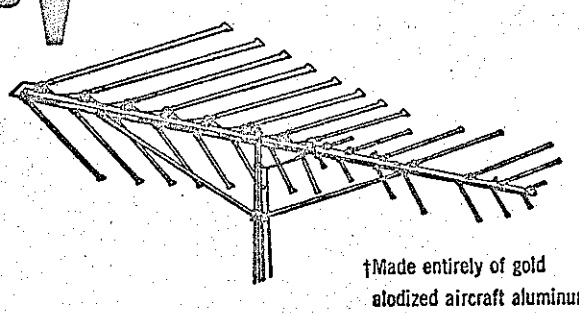
NOW . . . A SPECTACULAR NEW FORMULA . . . **LPV** $\frac{L(n+1)}{Ln} = \tau$

. . . for crisper, clearer TV reception—in color, black-and-white—FM STEREO—anywhere

DEVELOPED BY THE ANTENNA RESEARCH LABORATORIES OF THE UNIVERSITY OF ILLINOIS, used in Air Force satellite tracking and telemetry programs, the **JFD** LOG-PERIODIC **LPV** antenna means far better TV reception than you realized was possible with your present set—because it masses unprecedented picture power, to pick up every detail with camera-lens sharpness. Focuses with unmatched precision, to bring in the signal you're tuned to and no other—without noise, snow or ghosts, regardless of distance or terrain. Whatever your picture problems, wherever you're located, whatever the condition of your set—the LOG-PERIODIC **LPV** must improve your TV reception. Call today—see the model designed for your area.

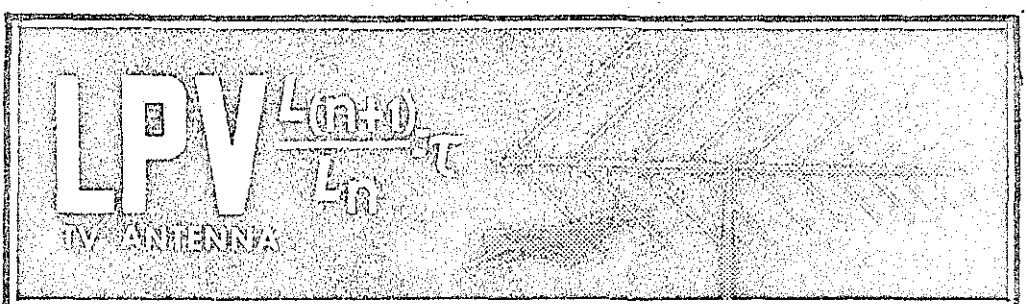
*U.S. Patents 2,958,081 – 2,985,879 – 3,011,168. Additional Patents Pending. Produced Exclusively by JFD Electronics Under License to U. of Illinois Foundation.

JFD log periodic **LPV** **TV ANTENNA**
now at . . .



†Made entirely of gold alodized aircraft aluminum

Mat No. 273
3 Cols. x 74 lines = 222 lines



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

THIS REMARKABLE FORMULA MEANS MORE PICTURE POWER, MORE PICTURE PURITY

IT COULD ONLY HAVE BEEN PRODUCED BY SUCH MASSED RESOURCES as those of a prominent university, the Armed Forces, and the country's leading antenna manufacturer—**JFD.**

THE LOG-PERIODIC LPV MUST IMPROVE YOUR TELEVISION PERFORMANCE—on virtually every count—because it outperforms previous antennas on virtually every count.

BUILDS UP ENORMOUS POWER—to bring in new depth, more detail—regardless of distance or terrain.

FOCUSES WITH PINPOINT PRECISION, to go after the signal you're tuned to and no other—without noise, snow or ghosts.

GET VIVID, VIBRANT PICTURES ON EVERY CHANNEL . . . the truest color you've ever seen . . . plus FM and stereo! Ask us about the **JFD** LOG-PERIODIC **LPV.**

*U.S. Patents 2,958,081 – 2,985,879 – 3,011,168. Additional Patents Pending. **Produced** Exclusively by JFD Electronics Under License to U. of Illinois Foundation.

JFD LPV TV ANTENNA at

of gold alodized aluminum
for enduring good looks

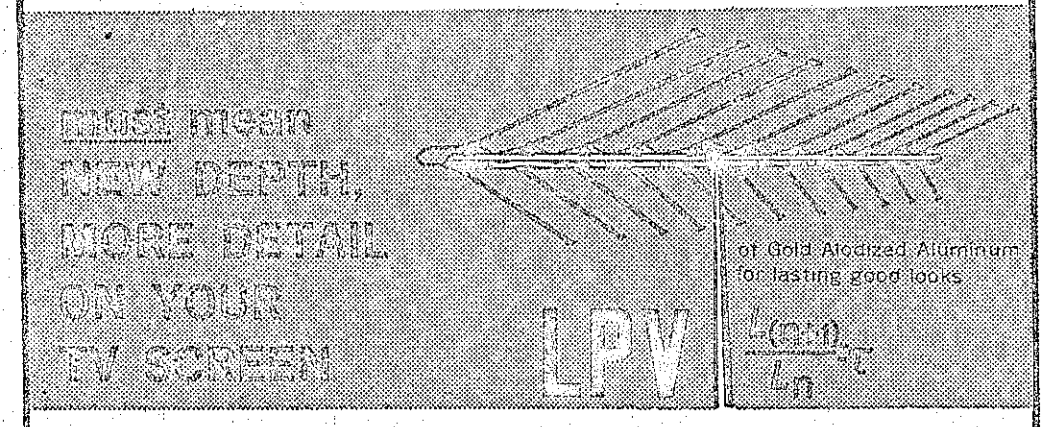
Mat No. 255
3 Cols. x 84 lines = 252 lines

PX-31

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

IF Your Antenna in More than Three Years Old . . .
Your Pictures Are Weak, Erratic, Hurt by Snow or Ghosts . . .
Your Neighbor's Picture is Better than Yours . . .

THE JFD LOG PERIODIC LPV TV ANTENNA



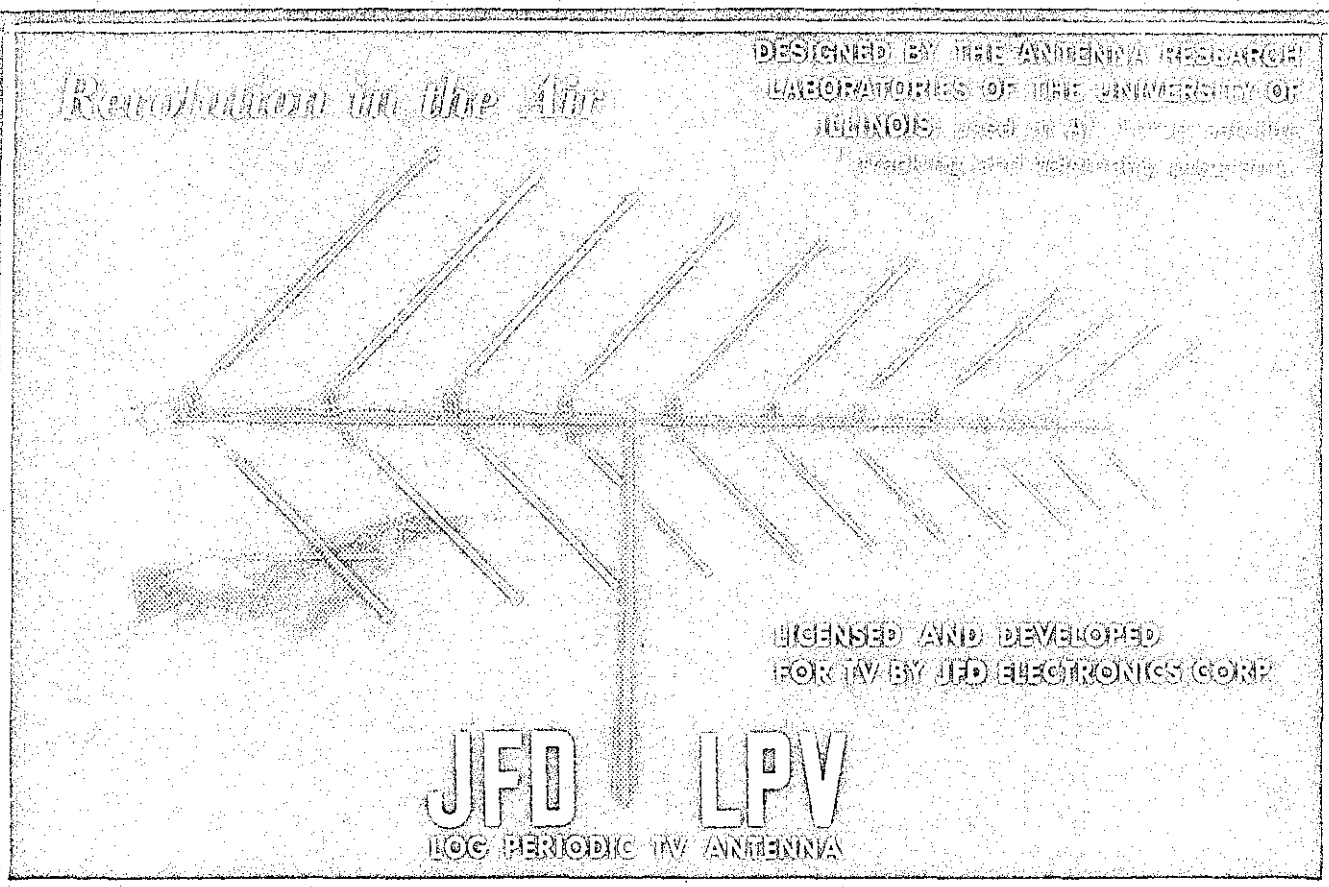
Only the most spectacular of breakthroughs makes such an offer possible: get crisper, clearer reception with the JFD LOG-PERIODIC LPV antenna—or your money back. This new kind of antenna must improve your TV performance—because it masses unprecedented power to pick up every picture detail, without regard for distance or terrain. Because it focuses with unmatched precision, to bring in the signal you're tuned to and no other—without noise, snow or ghosts. Get full TV enjoyment in color, black-and-white, FM Stereo too—with the LOG-PERIODIC LPV.

NOW AT...

*U.S. Patents 2,958,081-2,985,879-3,011,168. Additional Patents Pending. Produced exclusively by JFD Electronics

Mat No. 256
3 Cols. x 87 lines = 251 lines

PX-32



whatever your picture problems.... whatever the condition of your set....

THIS SPECTACULAR BREAKTHROUGH IN ANTENNA DESIGN* GUARANTEES CRISPER, CLEARER, MORE SPARKLING RECEPTION IN COLOR, BLACK-AND-WHITE, FM STEREO—ANYWHERE

The Big Breakthrough is here! The **JFD** LOG-PERIODIC **LPV** television antenna means better reception on virtually every count, because it outperforms previous antennas on virtually every count. Masses unprecedented power—to pick up every picture detail, without regard for distance or terrain. Focuses with unmatched precision, to go after the signal you're tuned to and no other—without noise, snow or ghosts. Wherever you're located, whatever the condition of your receiver—the LOG-PERIODIC **LPV** must improve your TV reception, in color and black-and-white (FM Stereo, too) on every channel. Call now—see the model designed for your location.

JFD LOG PERIODIC LPV TV/FM ANTENNA NOW AT...

THE ANTENNA THAT ENDED THE "ERA OF COMPROMISE"

UP TO NOW "broad-band" antennas—those designed to receive all channels—have simply been catch-all conglomerations of narrow-band elements, endlessly trimmed and modified to obtain maximum width without too great a quality loss. Result: piled-on compromises that were enormous, cumbersome, expensive. BUT NOW—NO LONGER ANY NEED TO SACRIFICE QUALITY. The log-periodic LPV is inherently frequency-independent. You literally get all channels "best"—with maximum sharpness, clarity, freedom from snow and ghosts.

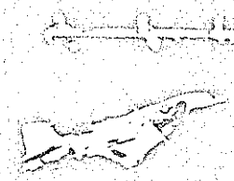
*U.S. Patents 2,958,081—2,985,879—3,011,168. Additional Patents Pending. Produced Exclusively by JFD Electronics Under License to University of Illinois Foundation.

Mat No. 254
4 Cols. x 140 lines = 560 lines

PX-30

LPV $\frac{L_{(n+1)}}{L_n} = \tau$

TV ANTENNA



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

THIS REMARKABLE FORMULA MEANS MORE PICTURE POWER, MORE PICTURE PURITY

IT COULD ONLY HAVE BEEN PRODUCED BY SUCH MASSED RESOURCES as those of a prominent university, the Armed Forces, and the country's leading antenna manufacturer—**JFD.**

THE LOG-PERIODIC LPV MUST IMPROVE YOUR TELEVISION PERFORMANCE—on virtually every count—because it outperforms previous antennas on virtually every count.

BUILDS UP ENORMOUS POWER—to bring in new depth, more detail—regardless of distance or terrain.

FOCUSES WITH PINPOINT PRECISION, to go after the signal you're tuned to and no other—without noise, snow or ghosts.

GET VIVID, VIBRANT PICTURES ON EVERY CHANNEL . . . the truest color you've ever seen . . . plus FM and stereo! Ask us about the **JFD** LOG-PERIODIC **LPV**

*U.S. Patents 2,958,081 – 2,985,879 – 3,011,168. Additional Patents Pending. Produced Exclusively by JFD Electronics Under License to U. of Illinois Foundation.

JFD LPV TV ANTENNA at

of gold alodized aluminum
for enduring good looks

Mat No. 255
3 cols. x 84 lines=252 lines

9/8/67
PJ 31 forwd.
1113

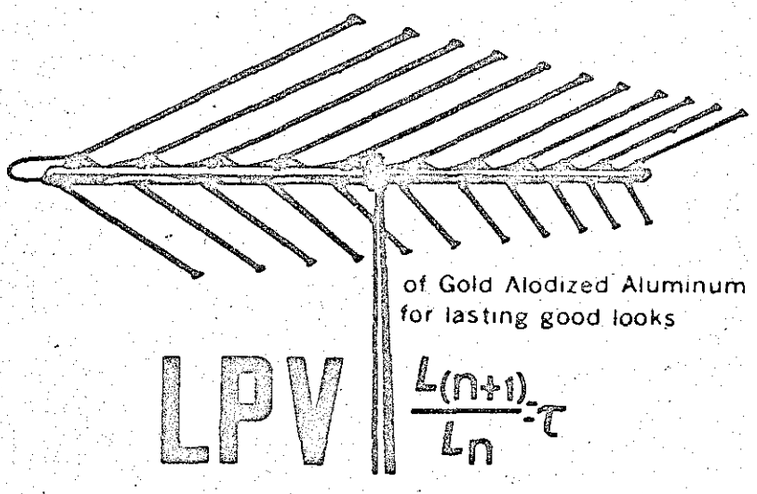
PX-J31

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

IF Your Antenna in More than Three Years Old . . .
Your Pictures Are Weak, Erratic, Hurt by Snow or Ghosts . . .
Your Neighbor's Picture is Better than Yours . . .

THE JFD LOG PERIODIC LPV TV ANTENNA

must mean
NEW DEPTH,
MORE DETAIL
ON YOUR
TV SCREEN



of Gold Alodized Aluminum
for lasting good looks

LPV $\frac{L_{(n+1)}}{L_n} = \tau$

Only the most spectacular of breakthroughs makes such an offer possible: get crisper, clearer reception with the JFD LOG-PERIODIC LPV antenna or your money back. This new kind of antenna must improve your TV performance because it masses unprecedented power to pick up every picture detail, without regard for distance or terrain. Because it focuses with unmatched precision, to bring in the signal you're tuned to and no other—without noise, snow or ghosts. Get full TV enjoyment in color, black-and-white, FM Stereo too—with the LOG-PERIODIC LPV.

NOW AT...

*U S Patents 2,958,081 2,985,879 3,011,168 Additional Patents Pending Produced exclusively by JFD Electronics

Mat No. 256
3 cols. x 87 lines = 261 lines

9/8/61
P+J. 3x favid

PX-J32

NOW...A SPECTACULAR NEW FORMULA...

LPV

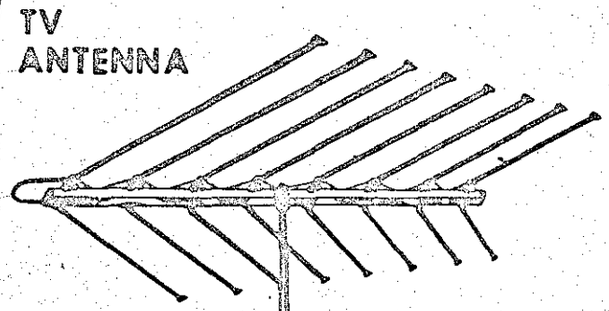
...for crisper, clearer TV reception—in color, black-and-white—FM STEREO—anywhere

DEVELOPED BY THE ANTENNA RESEARCH LABORATORIES OF THE UNIVERSITY OF ILLINOIS, used in Air Force satellite tracking and telemetry programs, the **JFD** LOG-PERIODIC **LPV** antenna means far better TV reception than you realized was possible with your present set—because it masses unprecedented picture power, to pick up every detail with camera-lens sharpness. Focuses with unmatched precision, to bring in the signal you're tuned to and no other—without noise, snow or ghosts, regardless of distance or terrain. Whatever your picture problems, wherever you're located, whatever the condition of your set—the LOG-PERIODIC **LPV** must improve your TV reception. Call today—see the model designed for your area.

*U.S. Patents 2,958,081 – 2,985,879 – 3,011,168. Additional Patents Pending. Produced Exclusively by JFD Electronics Under License to U. of Illinois Foundation.

JFD log periodic **LPV** TV ANTENNA

now at...



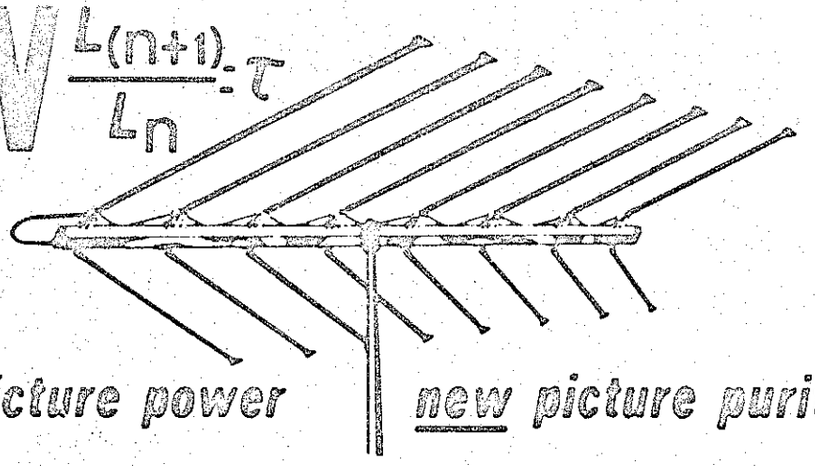
†Made entirely of gold alodized aircraft aluminum

Mat No. 257
3 cols. x 74 lines=222 lines

9/6/67
PX-J33 for ad
ltr

PX-J33

LPV $\frac{L_{(n+1)}}{L_n} = \tau$



means
more picture power | *new picture purity*

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

THE BIG BREAKTHROUGH IN TV ANTENNAS IS HERE

IT COULD ONLY HAVE BEEN PRODUCED BY SUCH MASSED RESOURCES as those of a prominent university, the Armed Forces, and the country's leading antenna manufacturer.

THE LOG-PERIODIC LPV MUST IMPROVE YOUR TELEVISION PERFORMANCE on virtually every count because it outperforms previous antennas on virtually every count.

BUILDS UP ENORMOUS POWER to bring in new depth, more detail regardless of distance or terrain.

FOCUSES WITH PINPOINT PRECISION, to go after the signal you're tuned to and no other without noise, snow or ghosts.

GET VIVID, VIBRANT PICTURES ON EVERY CHANNEL . . . the truest color you've ever seen . . . plus FM and stereo! Ask us about the **JFD** LOG PERIODIC **LPV.**

U.S. Patents: 2,958,081 2,985,879 3,011,168. Additional Patents Pending. Produced Exclusively by JFD Electronics Under License to U. of Illinois Foundation.

Of gold alodized aluminum

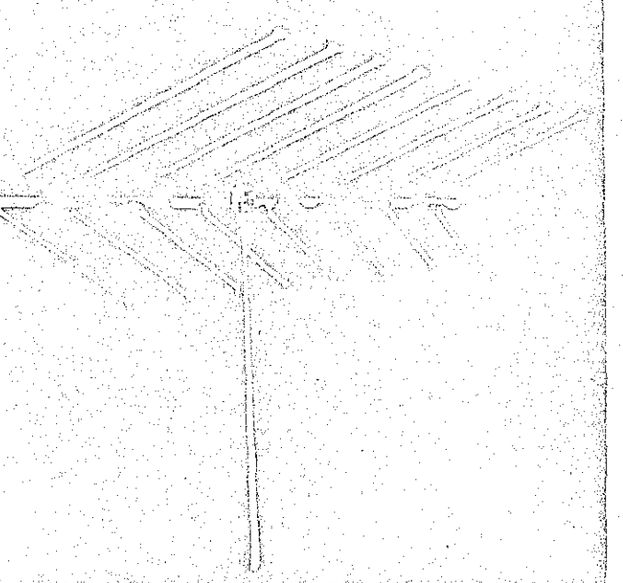
THE LOG-PERIODIC
LPV by JFD now at...

9/8/67 RJ 34 lines

Mat No. 258
2 cols. x 85 lines = 170 lines

PX-J34

$$\frac{L(n+1)}{Ln} = \tau$$



means
STUDIO-SHARP
TV RECEPTION

DEVELOPED BY THE UNIVERSITY OF ILLINOIS*, utilized by the Air Force in satellite tracking, there's a dramatic new formula for clearer, sharper, surer TV reception, without snow or ghosts, in color, black-and-white, (FM Stereo, too!) on all channels. Ask to see the **JFD LOG-PERIODIC LPV**—the Big Breakthrough in antenna design.

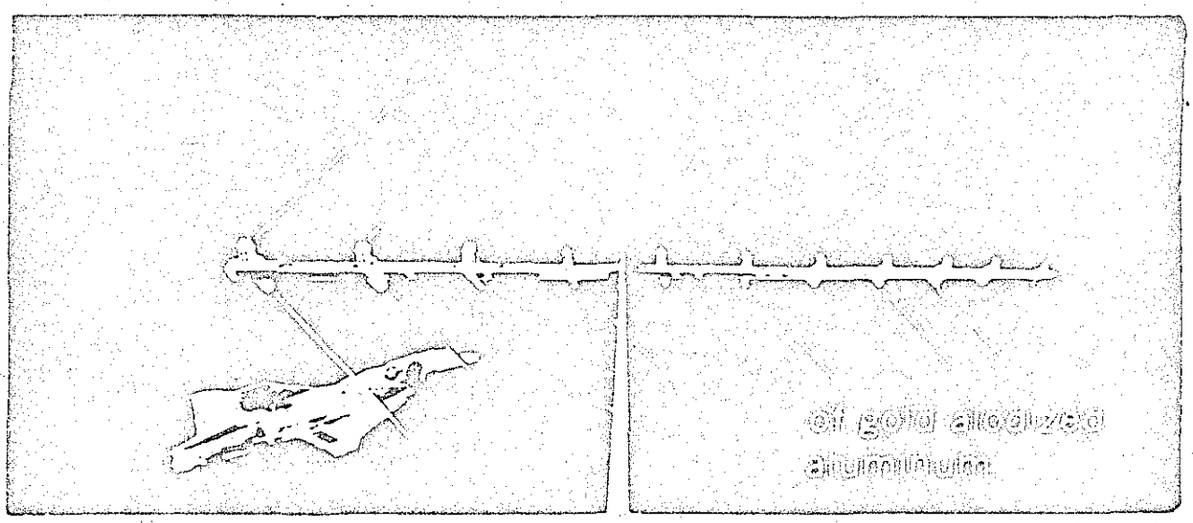
*U.S. Patents 2,958,081-2,985,879-3,011,168. Additional Patents Pending. Produced exclusively by JFD Electronics under License to University of Illinois Foundation

JFD at

Mat No. 259
2 cols. x 50 lines = 100 lines

9/16/67
PXJ 35 for ad. 11th

PX-J35



THE BIG BREAKTHROUGH IN ANTENNA DESIGN!

Developed by the Antenna Research Laboratories of the University of Illinois*— Principles Utilized in Air Force Satellite Tracking

If your antenna is more than three years old . . . if your neighbors get better reception than you do . . . if your picture is weak or erratic or blemished—now get crisper, clearer reception than you thought possible with your present set—or your money back! The LOG-PERIODIC **LPV** pairs unprecedented power with unmatched directivity to bring in every picture detail—vivid, vibrant reception, without snow or ghosts—regardless of distance or terrain. Come see us about the **LPV**—the Big Breakthrough in antenna design.

JFD LOG-PERIODIC LPV
TV ANTENNA now at . . .

*U.S. Patents 2,958,081-2,985,879-3,011,168. Additional Patents Pending.

Mat No. 260
2 cols. x 52 lines= 104 lines

9/6/67 PJ 36 final 104

PX-J36

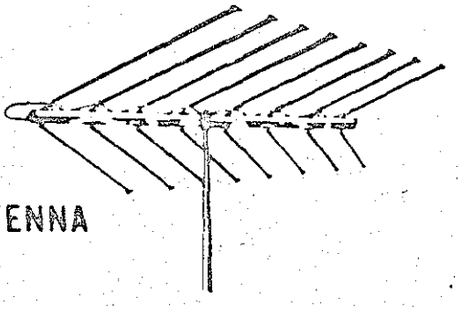
NOW...A SPECTACULAR NEW FORMULA... LPV

. . . for better TV reception—in color, black and white—FM Stereo—anywhere

DEVELOPED BY THE UNIVERSITY OF ILLINOIS, adapted to Air Force satellite communications, the JFD log-periodic LPV masses unprecedented power, to reach out for every picture detail. Focuses with unmatched precision, to bring in only the signal you're tuned to—without noise, snow or ghosts—regardless of distance or terrain. Get better reception than you thought possible with your present set. Be glad to show you.

U S Patents 2,958,081 – 2,985,879 – 3,011,168 Additional Patents Pending Produced Exclusively by JFD Electronics Under License to U of Illinois Foundation

JFD LOG PERIODIC LPV TV ANTENNA



NOW AT ...

Mat No. 261
2 cols. x 57 lines = 114 lines

9/6/67 PXJ 37 for 105

PX-J37

NOW... A SPECTACULAR NEW FORMULA...

LPV Log Periodic

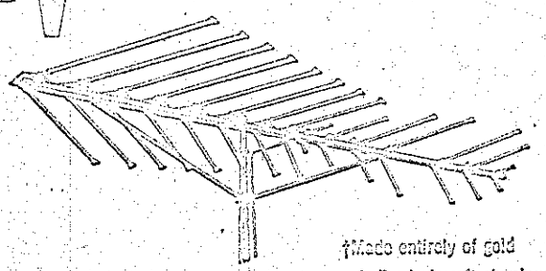
...for crisper, clearer TV reception—in color, black-and-white—FM STEREO—anywhere

DEVELOPED BY THE ANTENNA RESEARCH LABORATORIES OF THE UNIVERSITY OF ILLINOIS, used in Air Force satellite tracking and telemetry programs, the JFD LOG-PERIODIC LPV antenna means far better TV reception than you realized was possible with your present set—because it masses unprecedented picture power, to pick up every detail with camera-lens sharpness. Focuses with unmatched precision, to bring in the signal you're tuned to and no other—without noise, snow or ghosts, regardless of distance or terrain. Whatever your picture problems, wherever you're located, whatever the condition of your set—the LOG-PERIODIC LPV must improve your TV reception. Call today—see the model designed for your area.

*U.S. Patents 2,958,081 – 2,985,879 – 3,011,168. Additional Patents Pending. Produced Exclusively by JFD Electronics Under License to U. of Illinois Foundation.

JFD log periodic LPV TV ANTENNA

now at...

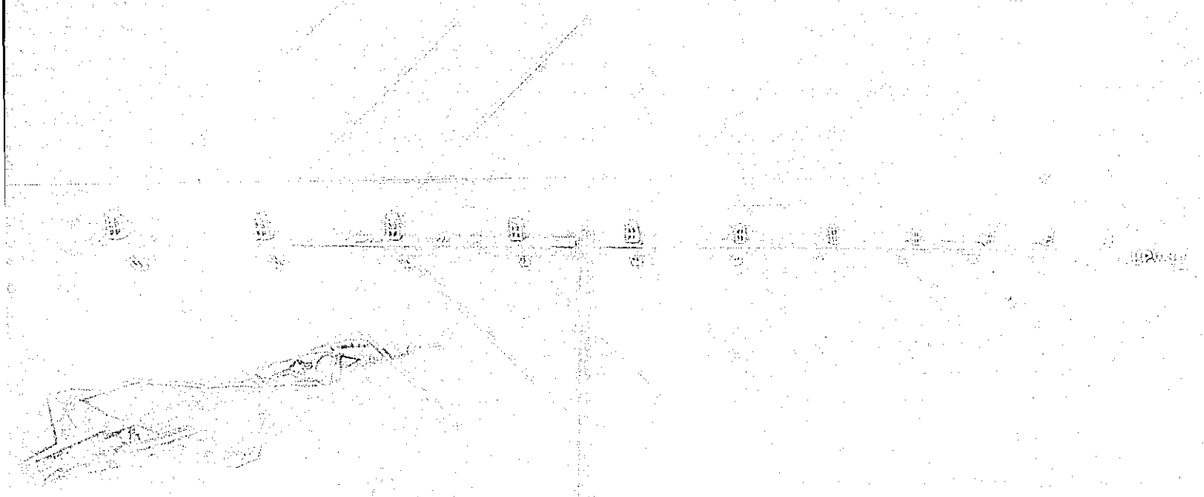


†Made entirely of gold aledized aircraft aluminum

Mat No. 273

3 Cols. x 74 lines = 222 lines

PX-J38



of the University of Illinois* Proved in Space Satellite Telemetry

HOW THE LOG-PERIODIC LPV MAKES ALL OTHER ANTENNAS OBSOLETE

The JFD LPV antenna is a direct descendant out of the logarithmic conical spiral antenna used on the Transit satellite. This basic design is FREQUENCY INDEPENDENT—it works like a conical waveguide to yield almost constant gain, matched impedance and a unidirectional polar pattern across an extremely wide band of frequencies.

Dipole version of spiral antenna has elements whose length and spacing is determined by formula derived from conical spiral geometry, so that antenna acts like a spiral with parts of coils missing. A logarithmic scaling multiplier ties the dipoles together into active multi-element cells for each frequency. Crossed phasing harness inserts a 180 degree phase shift between dipoles that cancels signals from rear, reinforces signals from front.

JFD's LPV antenna for TV and FM goes one step further—increases gain and front-to-back ratio while maintaining frequency independence. Forward V-ing of elements shrinks rear radiation lobes, narrows forward beam for sharp directivity, helping to eliminate ghosts and adjacent channel interference. Forward V also permits low band dipoles to contribute to high band gain by operating on the third harmonic mode.

For example: Operation of the JFD LPV-11 on the low band: The larger dipole cells resonate to the low band TV frequencies at their fundamental wavelength. Within each cell, one dipole absorbs the greatest amount of signal for any particular channel, adjacent dipoles pull in 60% more and the next two dipoles add 30% more signal. Many active dipoles working on each channel with constant impedance guarantee high gain.
– – – – *indicates current distribution on fundamental mode.*

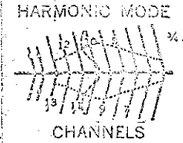
On the high band: The third harmonic cell forms at the rear of antenna for channel 7 and as the frequency increases toward channel 13, the active region moves toward the apex of the antenna. It is this third harmonic operation which guarantees as much as 3¾ db. additional gain. Continuous and co-linear directors sharpen forward pattern and give peak performance across the entire VHF TV band.
– – – – *indicates the current distribution for the third harmonic mode which will be received on all elements.*
– – – – *indicates the active region for channel 10, i.e., the different efficiencies with which the elements of the LPV-11 act on channel 10.*

The actual gain curves measured for the LPV-11 in the JFD Antenna Research Laboratories confirm this fact: Within the band for which it is designed (the principle will also be adapted for UHF and other uses), the log-periodic LPV's impedance, polar patterns and front-to-back ratio are virtually constant—with gain for each channel as high as that furnished by a comparable-sized single-channel Yagi.

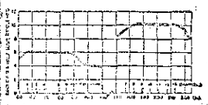
FUNDAMENTAL MODE

CHANNELS

THIRD HARMONIC MODE



CHANNELS



Each antenna in the LPV series consists of an array of resonant V-dipoles and crossed phasing bars, constituting a group of "cells." The size of each cell differs from the one before it by a Logarithmic factor. For any particular frequency, the active portion of the antenna centers on the resonant dipole (equal to one-half wavelength at that frequency), with the adjacent elements also absorbing significant signal energy. The resonances of adjacent cells overlap, so that as the frequency increases or decreases, it is transferred smoothly from one cell to the next.

In effect, the signal is passed along as the frequency increases—the active area moving toward the apex or small end—until, as the fundamental harmonic reaches one end, the other end approaches resonance in the third harmonic. Conventional wide-band antennas are like rows of compartments, one for each channel desired, with sharp cutoffs. The log-periodic antenna is like a continually moving belt that accepts smoothly any frequency that hops aboard.

U.S. Patent 2,985,879 — 985,879. 5 Claims. (Cl. 343—792.5) Additional Patents Pending. Produced commercially by JFD Electronics under license from the University of Illinois Foundation

SEE THE JFD LOG-PERIODIC LPV AT YOUR JFD DISTRIBUTOR NOW—AND BE THE FIRST ONE IN YOUR AREA TO INTRODUCE AND PROFIT FROM THIS NEW ERA IN TV RECEPTION.

JFD

THE BRAND THAT PUTS YOU IN COMMAND OF THE MARKET

JFD ELECTRONICS CORPORATION
15th Avenue at 62nd Street, Brooklyn 19, N.Y.

JFD Electronics-Southern Inc., Oxford, North Carolina
JFD International, 15 Moore Street, New York, N.Y.
JFD Canada, Ltd., 51 McCormack Street, Toronto, Ontario, Canada

(*it ended the day JFD introduced the Log-Periodic LPV $\frac{L_{(n+1)}}{L_n}=\tau$ TV antenna)

Wave goodbye to all the Rube Goldberg contraptions with their "Chinese puzzle" combinations of collectors, directors, reflectors.

Now you can solve any reception problem with **one** compact, precisely-engineered antenna—the **first** TV antenna based on the geometrically-derived **logarithmic-periodic** scale developed by the Antenna Research Laboratories of the University of Illinois for the U.S. Air Force.

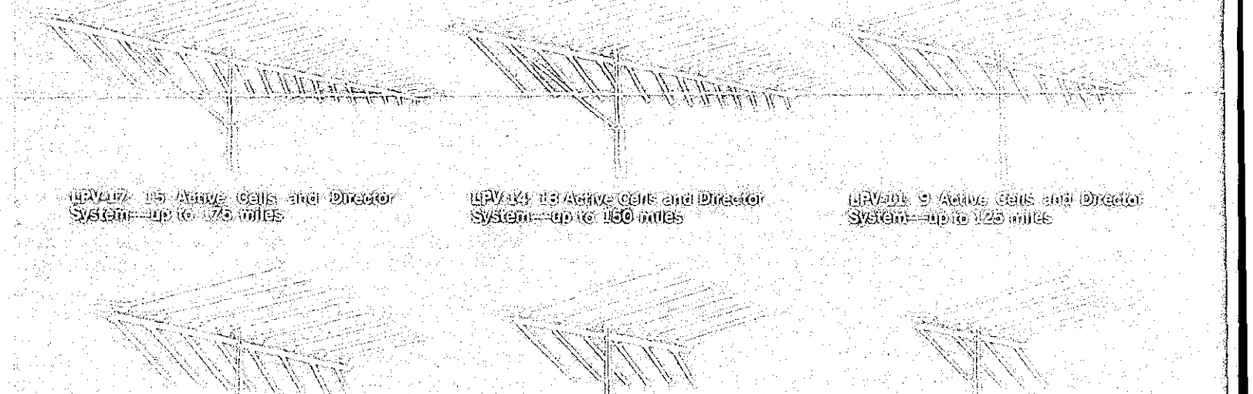
Because it is inherently frequency-independent, the JFD Log-Periodic LPV delivers **the same superb performance on every VHF channel**—performance comparable to that of a single channel Yagi. And delivers it not only in black-and-white, but in Color, and you get FM stereo too!

THE LOG-PERIODIC LPV ACTUALLY TUNES ITSELF TO EACH RECEIVED FREQUENCY—RESULTING IN:

- **HIGHEST** GAIN—as high as 14 db. in the LPV 17!
- **SHARPEST** DIRECTIVITY—on high bands as well as low!
- **HIGHEST** FRONT-TO-BACK RATIO—up to 35 db.
- **LOWEST** VSWR—as low as 1.2 to 1—with constant impedance across the full bandwidth!
- **FLAT** RESPONSE ACROSS BOTH VHF BANDS—with greater gain on the high band, where it's needed most (average increase of gain in high band over low band: 3¼ db.)!
- **BROADEST** BANDWIDTH—thanks to its unique frequency-independent characteristics!

FOR THE FIRST TIME ONE SCIENTIFICALLY FORMULATED ANTENNA CONFIGURATION SATISFIES ANY LOCATION DEMAND:
Harmonically resonant V-elements operate on the Log-Periodic Cellular Principle in the Fundamental and Third Harmonic Modes for unprecedented performance —in color—in black and white—in FM STEREO

developed by the Famous Antenna Research Laboratories



LPV-17: 15 Active Cells and Director System—up to 75 miles

LPV-14: 13 Active Cells and Director System—up to 150 miles

LPV-10: 9 Active Cells and Director System—up to 125 miles

LPV-8: 7 Active Cells and Director System—up to 100 miles

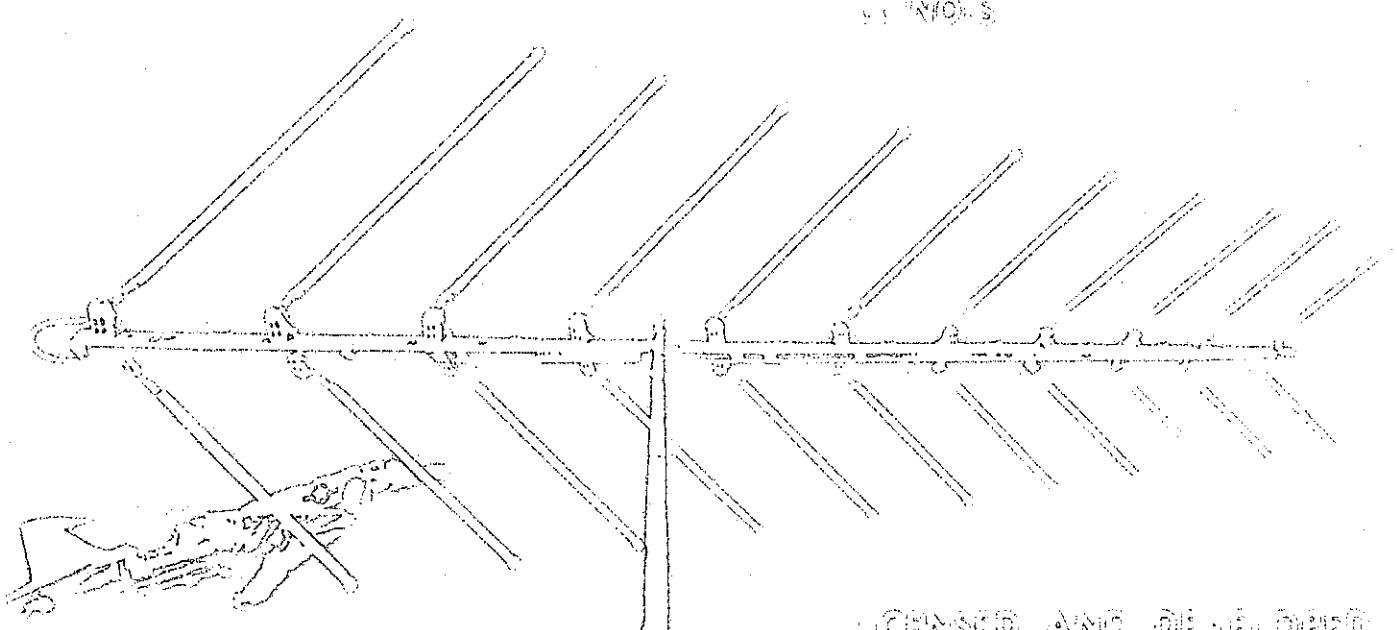
LPV-6: 6 Active Cells—up to 75 miles

LPV-4: 4 Active Cells—up to 50 miles

Adapted to TV and FM Stereo by JFD

✓ ELIMINATES THE NEED FOR AREA-DESIGNED ANTENNAS
✓ 100% PREASSEMBLED "FLIP-QUIK" ASSEMBLY
✓ MASSIVE TANK TURRET BRACKETS THAT DOUBLE-LOCK ELEMENTS
✓ AAA† GOLD BOND ALODIZED TO KEEP THAT BRAND NEW LOOK
✓ EXTRA-RUGGED, DOUBLE-REINFORCED IN EVERY DETAIL
✓ LIGHTEST IN WEIGHT PER DB GAIN
✓ WIND-TUNNEL TESTED CONSTRUCTION
✓ LEAST SNOW AND ICE LOADING

†Attractive, Anti-corrosive Armor



JFD LPV

LOG PERIODIC TV ANTENNA

whatever your picture problems.... whatever the condition of your set....

THIS SPECTACULAR BREAKTHROUGH IN ANTENNA DESIGN* GUARANTEES CRISPER, CLEARER, MORE SPARKLING RECEPTION IN COLOR, BLACK-AND-WHITE, FM STEREO—ANYWHERE

The Big Breakthrough is here! The **JFD** LOG-PERIODIC **LPV** television antenna means better reception on virtually every count, because it outperforms previous antennas on virtually every count. Masses unprecedented power—to pick up every picture detail, without regard for distance or terrain. Focuses with unmatched precision, to go after the signal you're tuned to and no other—without noise, snow or ghosts. Wherever you're located, whatever the condition of your receiver—the LOG-PERIODIC **LPV must** improve your TV reception, in color and black-and-white **(FM Stereo, too)** on every channel. Call now—see the model designed for your location.

JFD LOG PERIODIC **LPV** TV/FM ANTENNA NOW AT...

THE ANTENNA THAT ENDED THE "ERA OF COMPROMISE"

UP TO NOW "broad band" antennas those designed to receive all channels have simply been catch all conglomera tions of narrow band elements, endlessly trimmed and modified to obtain maximum width without too great a quality loss Result piled on compromises that were enormous, cumbersome, expensive BUT NOW NO LONGER ANY NEED TO SAC RIFICE QUALITY The log periodic LPV is inherently frequency-independent. You literally get all channels "best" with maximum sharpness, clarity, freedom from snow and ghosts

*U.S. Patents 2,958,081–2,985,879–3,011,168 Additional Patents Pending Produced Exclusively by JFD Electronics Under License to University of Illinois Foundation

Mat No. 254
4 cols. x 140 lines=560 lines

9/8/67
PXT-30 for id.
Mfg