

*Central Electronics Event 2017*

**Jeff Covelli WA8SAJ**





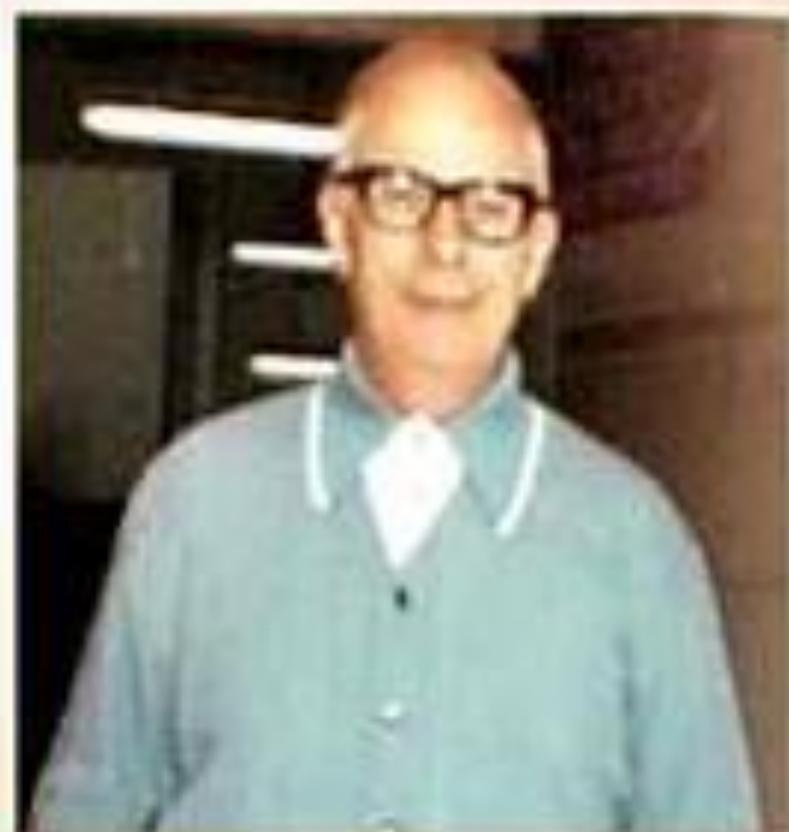
*The R.L. Drake Co.  
Started in 1942 during WW II  
Manufacturing  
R.F. filters  
&  
Jamming  
devices for the military.*

*There was also a three tube receiver  
covering 70 to 150 MHz  
manufactured Model #BC-1225A*

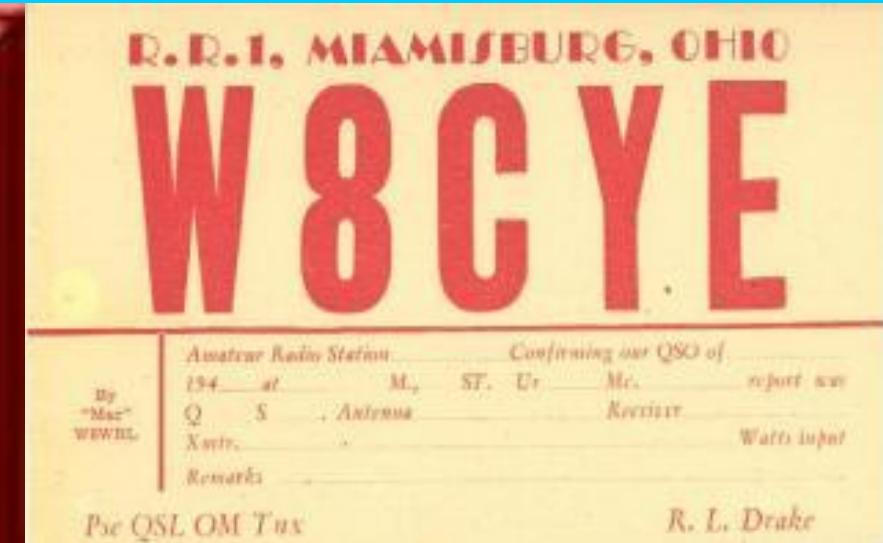


DRAKE

# *Robert Lloyd Drake (1970's)*



R.L. DRAKE





# R.F. Filters





# BC-1225A





# *The Year 1946*

*After the war was over Bob Drake  
needed help to grow the company  
and he hired a young engineer*

*Milt Sullivan from the  
University of Cincinnati.*



DRAKE

*Milt Sullivan (K8YDO)*

*Drake's Chief Engineer*

**1946 to 1983 (37 Years Service)**

***Plus 4 Years Consulting for Drake***





DRAKE

# ***Milt's Job Application in 1946 Hired for 86 cents per Hour.***

Date November 11, 1946

Applicant's Name Milton Arnold Sullivan, Jr.

Job Classification Title

Date to Begin Nov. 4, 1946

Hourly Rate .86

The above named applicant has been interviewed on the above date and hired in  
Engineering Department.

  
Supervisor



*R.L. Drake continued to  
manufacture accessories:  
Chokes  
R.F. filters  
Q-multipliers  
Phone-Patches*



# ***Chokes – Filters – Phone-Patch***





1956

*Bob Drake & Milt Sullivan*

*Came up with a fresh approach  
for an extremely stable SSB  
receiver that looked like a  
“bread box”  
that could snuggle up next to the  
large receivers of the day; which  
could not detect SSB very well.*



*Drake tried to convince:*

*National*

*Hallicrafters*

*Hammarlund*

*Bob & Milt had a better idea for a  
great SSB receiver and they all  
declined ! !*



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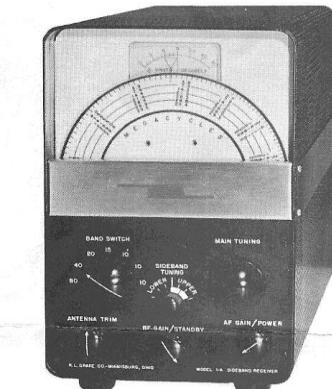
(1956)

*Drake*

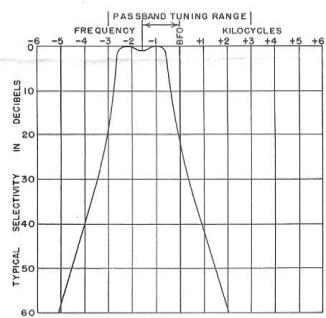
1-A

*SSB Receiver*

*Milt's First  
Receiver Design*

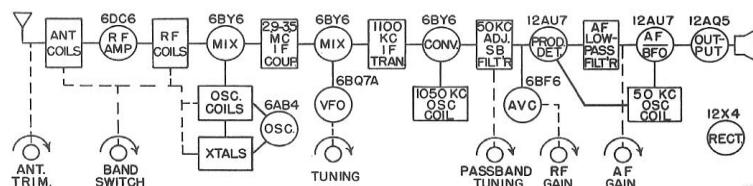


Model 1-A  
\$259.00



NEW

## A SIDE-BAND RECEIVER



### FEATURES OF R. L. DRAKE COMPANY MODEL 1-A SIDE-BAND RECEIVER

Crystal Controlled High Frequency Converter -- Seven "ham" band tuning ranges 80, 40, 20, 15, 10, 10, 10

High Stability VFO -- New circuit does not need voltage regulator or filament ballast

#### Triple Conversion

Same tuning rate and stability on all bands -- each band 600 kc wide -- 10 meter band in three sections

Sideband Tuning -- 2.3 kc sideband filter tunes with front panel control through both sidebands

Sideband A. V. C. -- fast charge -- slow discharge -- full A. V. C. without pumping and clicking

Full tuning meter action on sideband

Muting and speaker connections arranged for best sideband and patch operation

Audio low pass filter built in for best signal to noise ratio

Product detector for distortion-free sideband reception

Inverse feedback audio for better low frequency response and minimum distortion

Built in the shape of a "scope" for portability and minimum desk space. Set it beside that old general purpose receiver.

Eleven tubes -- 6DC6 1st R. F. - 6BY6 1st mixer - 6BY6 2nd mixer  
6BY6 3rd Converter - 12AU7 Product Detector  
6BF6 A. V. C. amplifier and rectifier - 6AB4 crystal oscillator  
6BQ7A V. F. oscillator - 12AU7 L. F. oscillator and 1st audio  
12AQ5 output audio - 12X4 rectifier

Weight 17.5 pounds

Size 6-3/4 x 11 x 15"

Power consumption 45 watts at 115V A.C.



# *Milt's Pride and Joy !* *The Drake 2-B & 2-BQ*





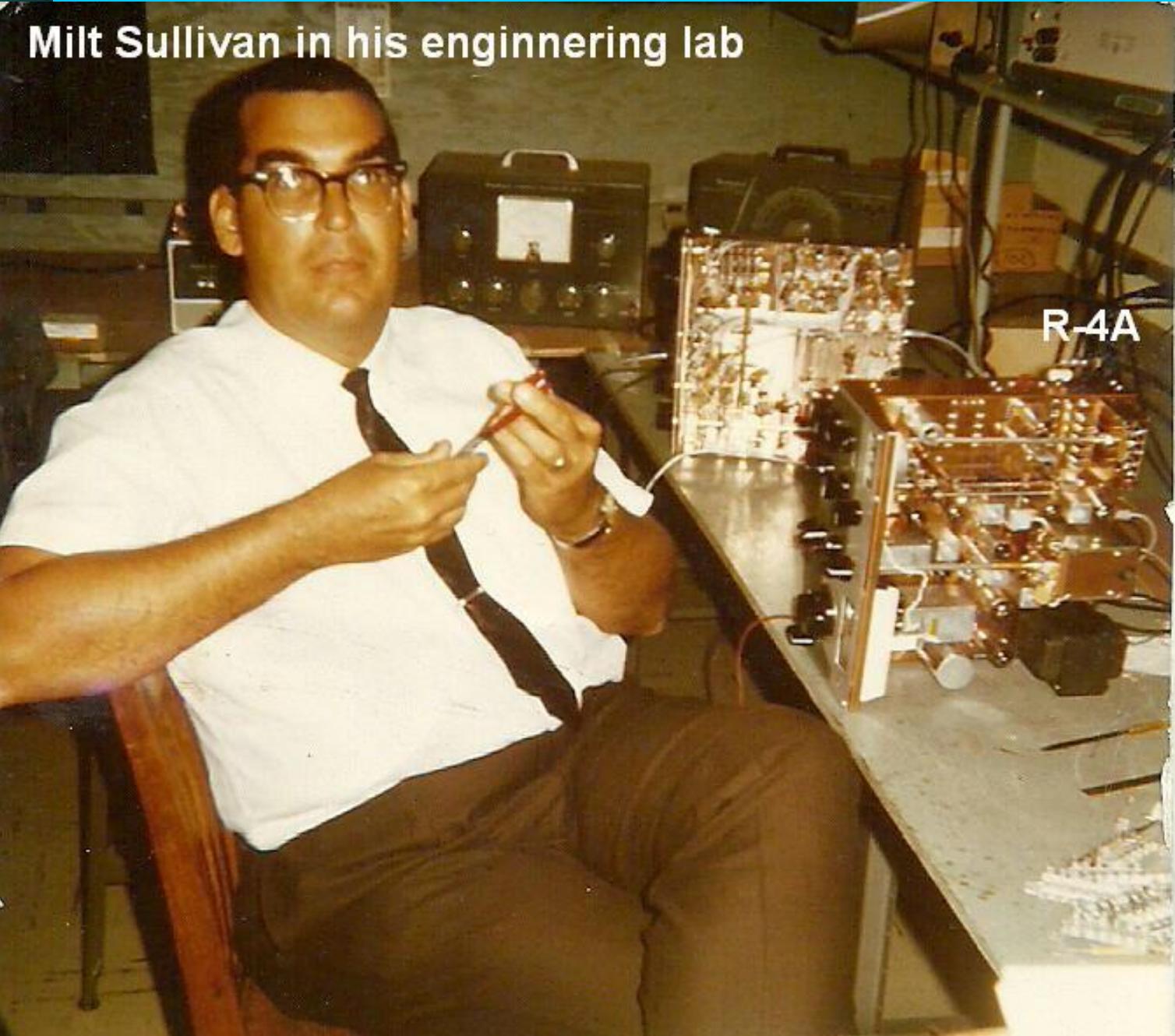
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(1965)

*Drake*

“A”  
Line

Milt Sullivan in his enginnering lab





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# *Drake B-Line (1968)*

Milt Sullivan



Ron Wysong



Bill Frost and Joe Brunso set up equipment for "Desk" shoot



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# *Milt's File Box sent to me in 2015*





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# Thousands of Notes





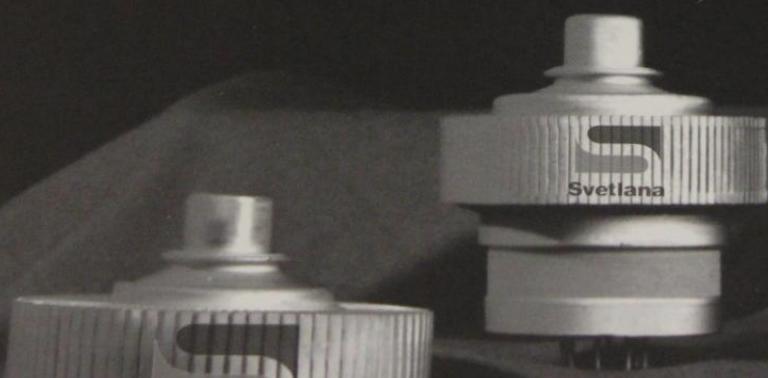
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*QRP File (note the high power tube) !*

onsior, W6FR  
1 Adobe Place  
fornia 92635

QRP XMTR

## Two New DX Winners



**4CX250**  
**Radial**



**DRAKE**

*Plenty of High Power notes!*

## POWER ON A BUDGET

*Using the Russian Svetlana 4CX1600B power tetrode in modern amplifier designs*

**S**omething new has been added for high-power linear amplifier designs. It's from Russia with love—a conservative legal limit, cost-effective power tetrode tube.

### Background

There was a film some time ago titled, "The Russians are Coming." The introduction of a rather complete line of high quality RF amplifier tubes manufactured in St. Petersburg, Russia, which employ the modern external anode technology, makes this a reality. A very large company—Svetlana Electron Devices, Inc., privatized in 1992—now sells its products worldwide. Recent descriptions in *Communications Quarterly*<sup>1</sup> of two of their tubes, gave me the incentive to try one to revitalize my needsomebrewed Class AB1 amplifier. The application data and results are presented here.

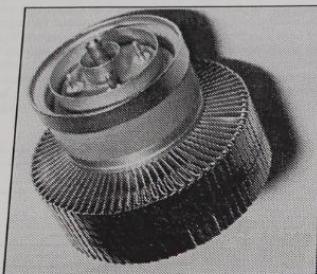


Photo A. Svetlana 4CX1600B. Photo by W6FR.

### Svetlana 4CX1600B characteristics

The tube, and its custom SK3A socket, are shown in **Photos A** and **B**. It's a ceramic-to-external anode tetrode whose original socket was in a military transmitter, which adds to its ruggedness and quality construction. This tube was called the 4CX1600A, and much smaller cooler). Thanks to several design features, the 4CX1600B exhibits performance when operated in class AB1 at relatively low anode voltage.

Mary Gonsior, W6FR  
418 El Adobe Place  
Fullerton, California 92635

## Two New DX Winners

**4CX1600B**

**4CX800A**

**Characteristics:**

- Conservative full legal output power of 1500W CW Key Down 4CX1600B (one) or 4CX800A (pair)
- Simple low cost linear design
- Low distortion
- High stability
- Rugged reliable Russian power tube quality
- Svetlana quality backed by the best warranty in the business

**Svetlana**  
ELECTRON DEVICES

**4CX250BC/8 Radial Bear**

You can't go wrong with the new Svetlana **4CX1600B** or **4CX800A** tetrodes in your amplifier. Manufactured in the world's largest power tube factory in St. Petersburg, Russia, these two reliable workhorse tetrodes bring Russian tube quality and ruggedness to modern linear design. You can depend on **Svetlana Electron Devices** to bring the finest power tubes to amateur radio.

**C**all now for more information on these two winners and *Communications Quarterly* articles describing simplicity and cost savings with tetrode linear design. We will also send you a complete list of Svetlana power tubes for amateur radio.

**Headquarters:** 8200 South Parkway • Huntsville, AL 35802  
Phone 205/882-1344 • Fax 205/880-8077 • Toll Free 800-239-6900

**Marketing & Engineering:** 3000 Portola Valley, CA 94028  
Phone 415/233-0429 • Fax 415/233-0439 • Toll Free 800-5-SVETLANA  
(800-578-3952)

**T**he Svetlana 4CX250BC is a compact metal/ceramic beam tetrode with a plate rating of 250 watts with forced cooling. The 4CX250BC is intended for Class AB SSAB linear RF amplifiers intended for stationary and mobile designs with power amplifier frequencies up to 500 MHz. The tube has an indirectly-heated oxide heater which operates at a low temperature for extended life.

The Svetlana 4CX250BC is made in the Svetlana factory in St. Petersburg, Russia, and is designed to be a replacement for the 4CX250 manufactured in the United States.



# *R.L. Drake*

## *Engineering Practices*

### *Clean slate from the start.*

*Using as few parts without  
compromising performance.*

*Calculating all cost involved to produce a  
good quality product at a reasonable  
cost to the customer.*

*Extensive pre-testing of all components  
before installing them into a radio.*



*We make everything ourselves.*

*Nothing is brought from the outside.*

*The finished product had to fit within our machinery, tools, & production line.*

*The following was made from “nothing”:*

*PTO, Crystal Filter, Pass-band Tuner, Cabinets.*

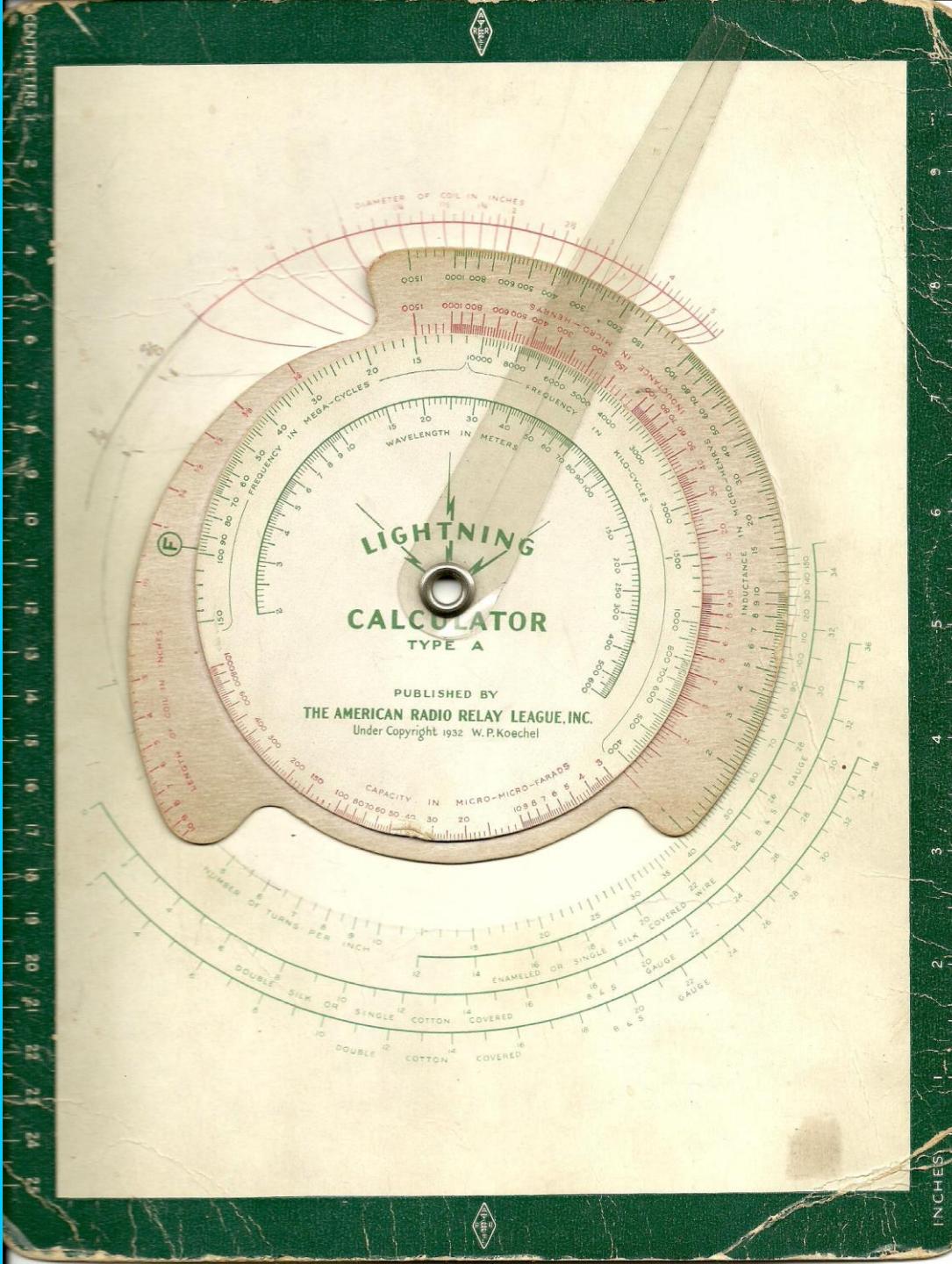


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**Circa: 1932 !**

**ARRL  
LIGHTNING  
CALCULATOR**

*This is for calculating  
Inductance  
Capacitance  
Frequency  
for Tuned Circuits*





# (1960's)

# *Drake*

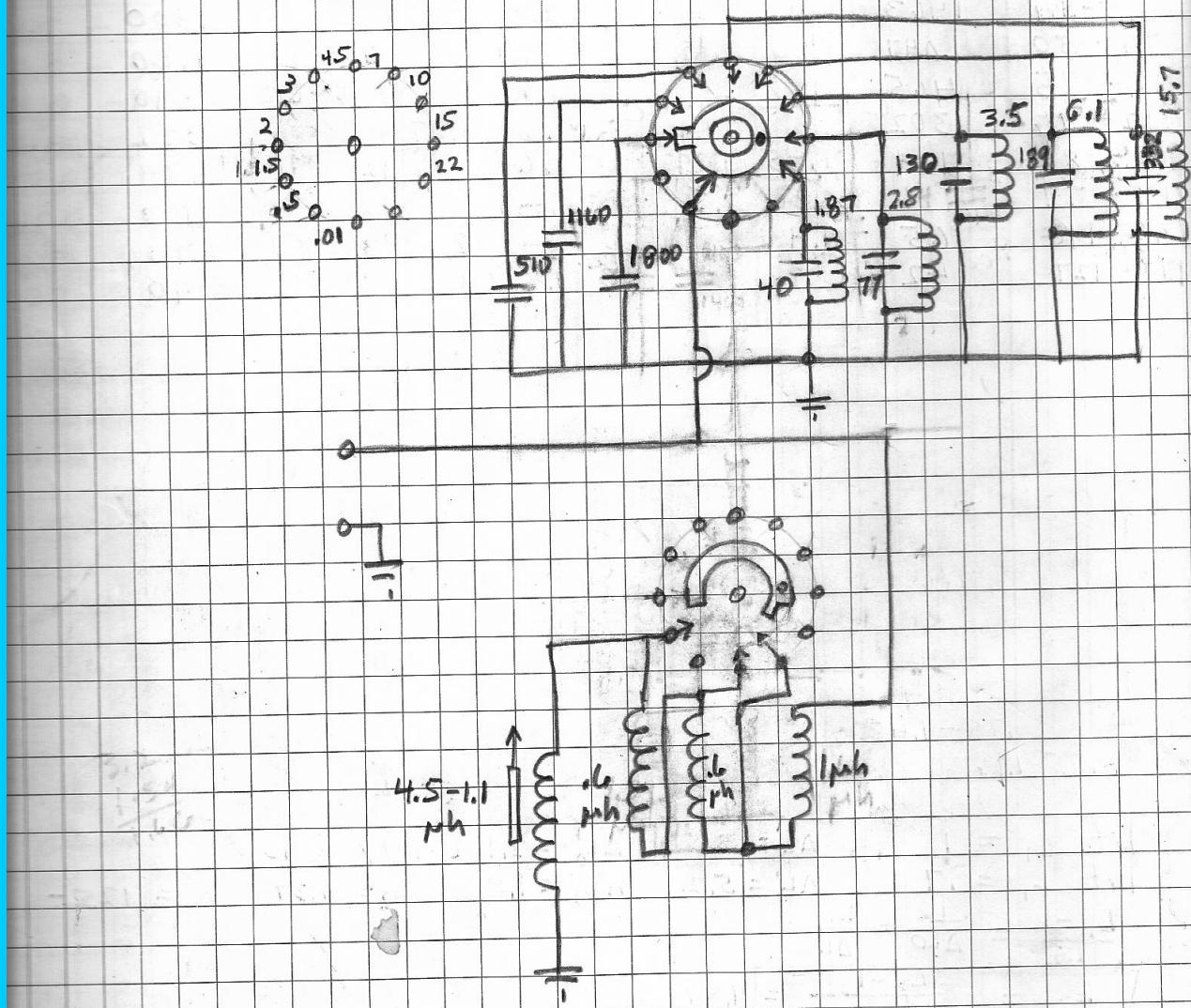
# **TR-4 & T-4X**

## *Inductance*

## *values on*

## *the*

## *Band-Switch*



TR4 Tg's plate checker ~16  $\mu$ h  
 TRX 160 M Gr. prescaler ~ 40h (-10T = 3.6 $\mu$ h) (-13T = 2.7 $\mu$ h)  
 " Punk " ~ ~~3.5~~h 1.8 $\mu$ h  
 TRX Crystal Gr 20 Ton ~ 1.  $\mu$ h  
 1nb = 13T 15/41 on QC Form  
 .6 $\mu$ h = 9T 15/41 on QC Form



**DRAKE**

(1970's)

# Drake R-4C

## Pre-Selector Band-Pass Response

Notes:  
Project No. Std R-4C ANT Coif  
Book No. Std Ant winding

TITLE Pre-Selector Response

Freq MHz	Insert Loss db	XMTR f	40db			60db	
			db	-f	+f	-f	+f
2	25	1.7	45	-2.5	+3	-5	+1.0
2	25	2.3	40				
1.6	18 or 15	1.9	42	-2	+3	-5	+1.0
2	10	1.7	48	-1.8	+2.2	-5	+1.0
2	10	2.3	45				
3	20	2.7	41	-2.8	+3.5	-6.4	+1.3
3	20	3.3	38				
3	7	2.7	40	-3	+4.2	-8.4	+1.7
3	7	3.3	35				
4.4	17	4.1	35	-4	+5	-1.0	+1.7
		(-.3)					
6.5	12	6.12	30	-6	+7	-1.5	+2.4
		(-.3)					
8.8	10	8.3	35	-8	+1.8	-2.2	+3.5
		(-.5)					
13.15	10	12.4	30	-2.0	+3.5	-3.0	+6.0
		(-.75)					
17.3	6	16.55	24	-2.2	+3.5	-6.0	+1.5
		(-.75)					
22.7	8	22.08	15	-3.2	+5.0	-7.5	+17.5
		(-.625)					

Note:  
Tried Adding turns to Ant Link

Total turns 4 { 2T at Top (slug end) 1T going up + 1T going down }

Better at 1.5 MHz 8 db insert loss  
worse at 7-15 12 db  
30 MHz 10 db



DRAKE

(1970's)

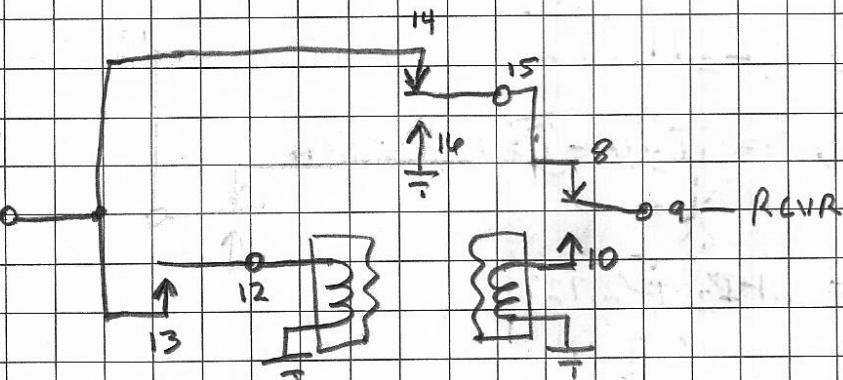
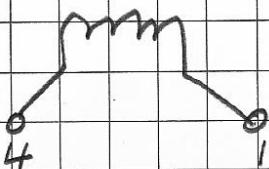
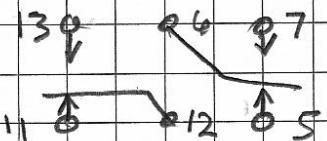
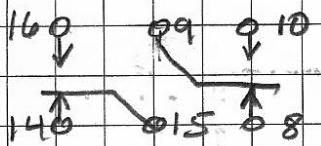
**Drake TR-4C**

**Main Relay  
Bottom View**

TITLE \_\_\_\_\_

Project No. \_\_\_\_\_  
Book No. \_\_\_\_\_

TR4C Relay Bottom View





**DRAKE**

# MN-7 & MN-2700

## Band Switch RMS Voltage Breakdown

MN-7K / MN-2700

Project No. 11-14-77  
Book No. \_\_\_\_\_

Switch Breakdown



**REYNOLDS  
ALUMINUM  
Supply Company**

PERFORMANCE AS PROMISED

ALUMINUM • STAINLESS STEEL • GALVANIZED STEEL

Cent. Type 231 COMMERCIAL BUILDING PRODUCTS

	Break Down Volts RMS
MN 2000 sw: Band Sw rotor to frame(shaft)	2600
open contact to blade contact	3200
open contact to open contact	3200
Ant sw: Ode Type HC Cent. Type 300	
Ring blade to open contact	1750
blade to shaft	2200
Contact to adj contact with blade in	1900
Blade front to blade rear	1100
in { Contact to Contact (No blade) 2750 Contact to coil with shorting blade in 2500 ← blade to strut 2850	

REYNOLDS ALUMINUM SUPPLY COMPANY  
891 Redna Terrace, Cincinnati, Ohio 45215 • (513) 771-8940  
Enterprise 8940 for Dayton & Columbus • 800-582-1637 Ohio

$$L = 4.5 \times 10^{-6} \text{ H}$$

$$X_L = 100 \Omega \quad @ 3.5$$

$$= 113 \quad @ 4.0$$

$$I = 18 = \frac{V}{X_L}$$

$$i.e. V = 1800 \text{ Volts}$$

$$W = 3240 \text{ watts}$$

$$(4.0) W = 2068 \text{ watts}$$

$$R = 1000 \Omega \quad 3.5 \text{ MHz}$$

$$= 2000 \Omega \quad 4.0 \text{ MHz}$$

$$- W = \frac{V^2}{R} = 6250 \text{ watts}$$

$$3225 \text{ watts}$$

Type HO or 300  
OK for 3000watts  
output



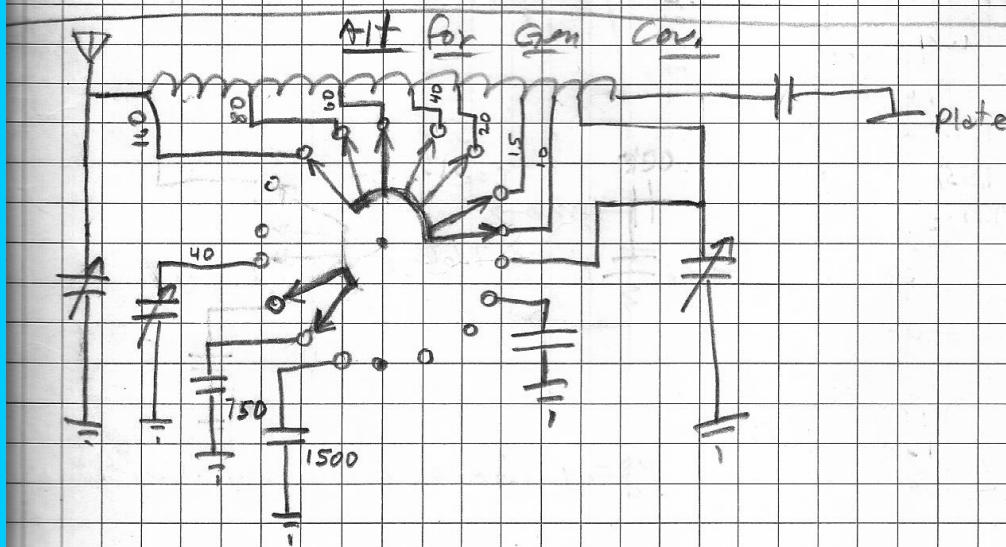
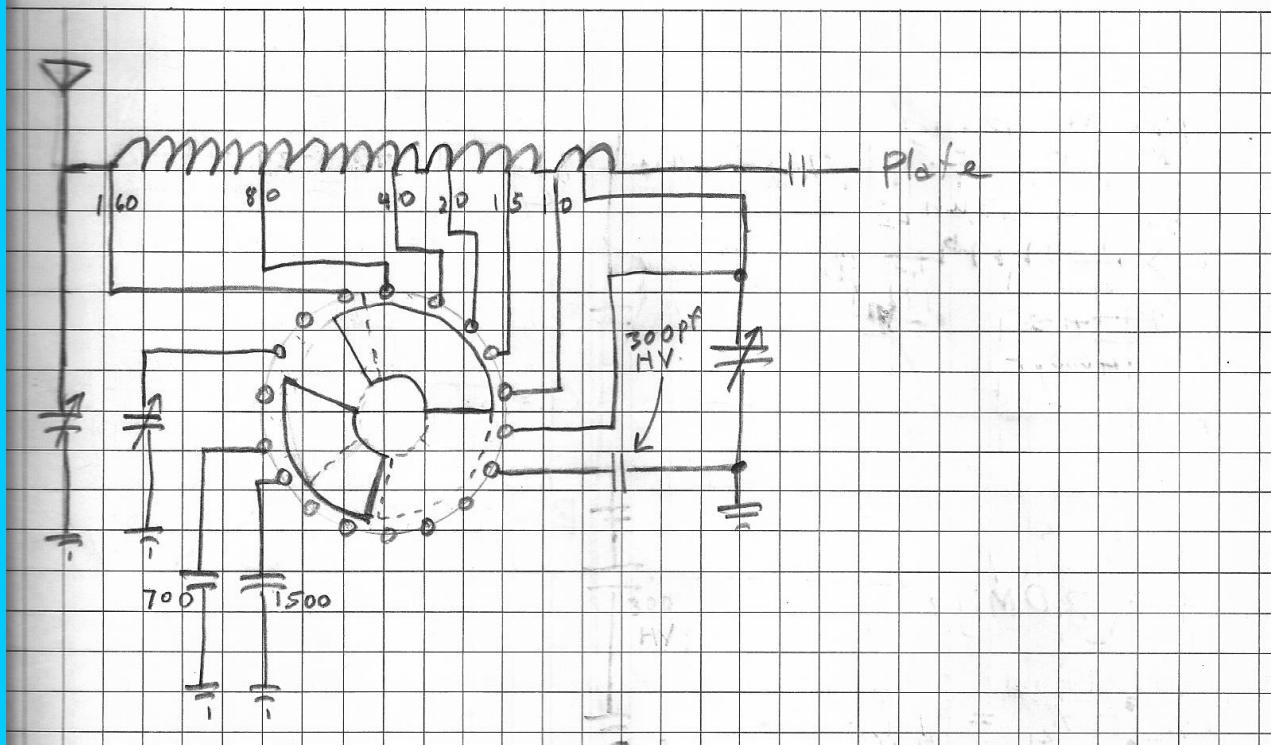
DRAKE

(1977)

# L-7 Amplifier

Tank  
Circuit  
Specs

ITLE L-7 Band Sw Project No. \_\_\_\_\_  
Book No. \_\_\_\_\_





DRAKE

# Drake L-7 Amplifier Pi-Network Notes

TITLE L-7 5-26-78 Project No.  
Book No.

## Pi Network

	C <sub>1</sub>	L	C <sub>2</sub>
1.8 - 2.0	761 - 527 pf	13.5	4050 - 2400 (1.5)
3.5 - 4.0	316 - 277 pf	7.5	2480 - 831 (2:1)
7 - 7.3	158 - 152	3.75	1243 - 458
14 - 14.35	79 - 78.4	1.8	618 - 211
21 - 21.45	53 - 51.75	1.25	415 - 156
28 - 29.7	40 - 37.4	.9	309 - 113

A, { H<sub>1</sub> Band coil : 3.75 tapped at 1.8, 1.25, .9 µh  
    { L<sub>0</sub> Band coil : 9.8 tapped at 3.75 µh

or

B { H<sub>1</sub> Band coil 1.8 tapped at 1.25, .9  
    { L<sub>0</sub> Band coil 11.7 tapped at 5.7, 1.95

L<sub>0</sub> Band coil choices

2" Dia x 3 1/2 winding CT/in # 10 AWG = 9.8

2 1/2" Dia x 3" winding CT/in # 10 AWG = 11.7

2 1/2" Dia x 4" winding ST/in # 8 AWG = 11.7



**DRAKE**

**(1977)**

**Drake**

**L-7 Amplifier**

**Plate Tank  
Circuit “Q”**

TITLE L7 Plate Tank Q

Project No. \_\_\_\_\_  
Book No. \_\_\_\_\_

3.800 MHz

$$f_1 = 3930 \quad (-45^\circ)$$

$$f_2 = 3645 \quad (+45^\circ)$$

$$\Delta f = 285$$

$$Q = \frac{3800}{285} = 13.3$$

28.000 MHz

$$f_1 = 28900$$

$$f_2 = 26700$$

$$\Delta f = 2200$$

$$Q = \frac{28900}{2200} = 12.7$$

1.900 MHz

$$f_1 = 1955$$

$$f_2 = 1820$$

$$\Delta f = 135$$

$$Q = \frac{1900}{135} = 14.1$$

21.000 MHz

$$f_1 = 21700$$

$$f_2 = 20200$$

$$\Delta f = 1500$$

$$Q = \frac{21000}{1500} = 14$$

7.200 MHz

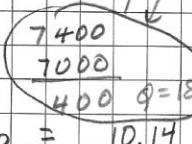
$$f_1 = 7480$$

$$f_2 = 6770$$

$$\Delta f = 710$$

$$Q = \frac{7200}{710} = 10.14$$

Moved Top



21.500 MHz

$$f_1 = 22250$$

$$f_2 = 21550$$

$$\Delta f = 1700$$

$$Q = \frac{21500}{1700} = 12.6$$

14.200 MHz

$$f_1 = 14700$$

$$f_2 = 13600$$

$$\Delta f = 1100$$

$$Q = \frac{14200}{1100} = 12.9$$

14.5 MHz

$$f_1 = 15000$$

$$f_2 = 13800$$

$$\Delta f = 1200$$

$$Q = \frac{14.5}{1.2} = 12.1$$

21.25 MHz

$$f_1 = 22000$$

$$f_2 = 20350$$

$$\Delta f = 1650$$

$$Q = \frac{2125}{1650} = 12.9$$

14.000 MHz

$$f_1 = 14500$$

$$f_2 = 13400$$

$$\Delta f = 1100$$

$$Q = \frac{14.0}{1.1} = 12.7$$

28.500 MHz

$$f_1 = 29450$$

$$f_2 = 27550$$

$$\Delta f = 1900$$

$$Q = \frac{28500}{1900} = 15$$

30.000 MHz

$$f_1 = 31100$$

$$f_2 = 28750$$

$$\Delta f = 2350$$

$$Q = \frac{30000}{2350} = 12.8$$



DRAKE

(1977)

# *Drake*

# *L-7 Amplifier*

# *Plate nsformer*

# **Specifications & Cost**

TITLE L-7 Plate Transformer Project No. \_\_\_\_\_  
Book No. \_\_\_\_\_

Project No. \_\_\_\_\_

Book No.

## Drafter Construction ☺

Lamination stack E 1-212  $5\frac{5}{16} \times 6\frac{3}{8} \times 2\frac{1}{8}$  center leg  
 $\frac{3}{8}$ "  $.018"$

$$\text{Weight of Core} = .92 \times 15.35 \times \frac{3.125}{2.125} = 20.77 \text{ lbs}$$

$$Mo' Core \rho_{CS} .0189d = 160$$

Total weight of Transformer meas = 30.125 lb

$$\text{Weight of copper} = 9.357 \text{ kg}$$

Cost of copper @ 1.30/lb = 12.16

$$\text{cost of Cote @ } 91.50/\text{mpcs} = \underline{\underline{14,64}}$$

# 26080

Contract price \$31.55

## PS-7 Transformer

Lamination stack E1-212  
1/2

$$\text{Weight of Core} = .92 \times 15.35 \times \frac{115}{2700} = 9.97 \text{ lb}$$

$$No \text{ cores} = 70 \text{ pc's}$$

Mens wt of Trans = 7.25 lb

Weight of copper = 7.2815

Cost of Copper @ 1.30/lb

Cost of Corr @ 91.50/m

9.44

6.41

~~15.87~~

Contract price \$ 21.50



**DRAKE**

(1970's)

# Drake L-4B Amplifier

## Plate Choke Specs

TLE Plate choke L4B Project No. \_\_\_\_\_  
Book No. \_\_\_\_\_

f	Z	Q	R <sub>S</sub>	X <sub>S</sub>	I	Pd
34.7	1220	-61	591	1067	1.44	1540
34.5	1000 u	-77	225	974	2.0	900
30	1900	-87	99	1897	1.05	110
29.5	2500 n	-60	1250	2165	.8	800
29.4	1740	-42	1293	1164	1.15	1708
29.25	1080 u	-47	422	994	1.85	1447
28	1660	-89	29	1660	1.2	42
23.9	6200 n	-34	5140	3467	.32	535
23.8	4300	0				
23.75	1720	+14	n			
23.7	980	0				
23.65	720 u	-35				
21.3	2370	-89.5				
17.55	25,500 n	0				
17.25	2600	+67	n			
17.00	280 u	0				
14.3	3170	-89				
7.3	30,000	-89				
6.8	100,000	-87				
6.4	100,000	+85				
4.0	5800	+88				
3.5	4500	+88				
2.0	2070	+88				
1.8	1850	+88				
1.6	1610	+88				

wire short → 18.6 23.8 29.9 34.9  
 Grip DIP Mins 18.2 23.8 29.8 34.8  
 ring wire short → 18.6 23.7 29.9 34.9  
 Maxs 12.0, 19.7, 25.1, 30.4, 35.5



DRAKE

(1970's)

# Drake L-4B Amplifier

## Out of Band Specs

TITLE L4B linear Out of Band Project No. \_\_\_\_\_  
Book No. \_\_\_\_\_

Band pos	f	Input VSWR	Pin	"CW Pout"
80M	4000	1.85	130	920
	3750	1.2	130	920
	3500	1.7	125	900
	3352	2.0	108	800
	4500	3.4	65	520
	5000	7	30	150
	5000	3.9	38	260
	5500	5.6	25	240
	6000	2.2	74	500
	6500	1.75	115	820
40M	7000	1.3	125	930
	72	1.15	125	950
	7.5	1.45	125	950
	8.0	2.3	110	800
	8.5	3.3	55	450
	9.0	5.3	33	215
	14.2	1.25	115	900
	9.765	3.4	48	300
	10.0	3.16	46	310
	11.0	3.5	48	370
20M	12.0	2.7	70	600
	13.0	1.9	118	900
	14.0	1.3	115	900
	14.5	1.4	112	900
	15.0	1.85	110	820
	16.0	3.3	45	350
	17.0	6.5	25	180
	16.0	2.3	80	600
	17.0	2.1	92	720
	18.0	1.95	100	800
15M	19.0	1.80	90	780
	20.0	1.4	92	700
	21.0	1.4	92	800
	21.5	1.4	90	780
	22.0	1.5	90	780



**DRAKE**

**(1977)**

# **Drake TR-7 PA Load Effect On Power**

Project No. \_\_\_\_\_  
TITLE TR-7 PA Load Effect on Power Book No. \_\_\_\_\_

Limits of Max output (Point where Pow just starts to drop)

f	Z	θ	Supply SWR	R	X
3.8	34	+26	1.75	30.5	15.4
	58	-37	2.6	46	-35
	40	+30	1.75	34.6	20
	46	-37	2.4	37	-28
	92	+5	1.9	92	8
	26	-10	1.9	25.6	-4.5
	79	+26	1.7	66.5	32
	40	+35	1.7	32.8	23
	40	-32	2.45	34	-21.2

1.8	24	+23	2.0	24	10.2
	68	-29	2.25	59.5	-33
	31	+29	1.9	27	15
	57	-33	2.25	48	-31
	49	-34	2.4	40.6	-27.4
	83	-20	2.4	78	-26.4
	85	0	2.0	85	0
	68	+16	1.5	45.4	18.7
	34	+31	1.75	31	18.5
	60	+23	1.4	55	23.4
	22	+2	2.3	22	.8
	35	-30	2.3	30.3	17.5

7.2	46	+34	1.7	38.1	25.7
	38	-30	2.4	33	-17
	55	-35	2.5	45	-31.5
	74	+25	1.75	67	31.3
	91	+17	1.8	89	19
	95	-14	2.4	92	23
	96	0	2.0	96	0
	27	0	2.0	27	0



**DRAKE**

**(1970's)**

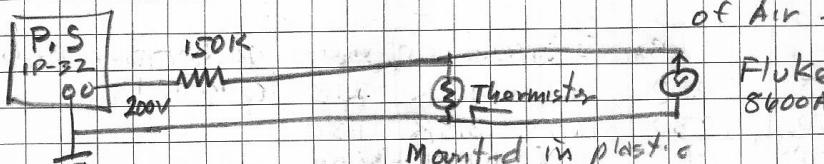
**Drake**

**Cooling Fan**

**Specs**

TITLE Cooling Fans

Project No. \_\_\_\_\_  
Book No. \_\_\_\_\_



Fan Type	Voltage fan off	Voltage fan on	$\Delta V$	HUM 1→10	NOISE 1→10
IMC WS2107-FL9	11.72	12.65			
IMC WS2107-FL2	11.73	12.80			
Rotron WR2A1	11.72	12.88			
PAMOTOR 4500C	12.50	14.90		8	10
IMC WS2107-FL		14.83		5	8
TORINTA 450 S		14.54		6	6
IMC WS2107-FL2		14.30		2	3
ROTRON WR2A1		14.27		4	4
IMC WS2107-FL9		14.07		1	1
ETRI 133-LY-2-82	12.13	14.23		3	2

ETRI	12.71	14.76
FL-9	12.71	14.57
FL-9	12.60	14.44
Rotron WR2A1	12.30	14.33
FL-9		14.12
FL-2		14.16
Rotron		14.20
FL-2		14.16
FL-9		14.02
Rotron		14.09
FL-2		14.09
FL-2	12.04	14.07
ETRI		14.07
FL-9		13.86



**DRAKE**

**(1981)**

# *Drake* **"NEW"**

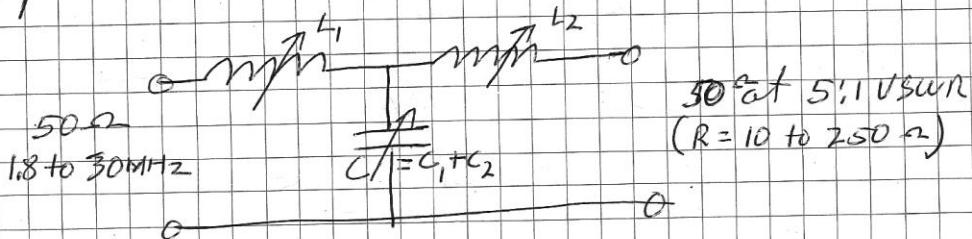
## **MN-7500**

### **Antenna Tuner**

Model Antenna Coupler MN-7500

Project No. \_\_\_\_\_  
Book No. \_\_\_\_\_

Proposed Circuit!



Input      Let  $R_p = 2500 \Omega$     $\omega = 1000$   
 $X_s$        $V = 1581$  RMS  
 $R_s$        $= 2213$  Peak

$$\equiv \frac{R_p}{2500} \equiv \frac{X_p}{X_s}$$

$$R_p = \frac{R_s^2 + X_s^2}{R_s}$$

$$X_p = \frac{R_s^2 + X_s^2}{X_s}$$

$$X_s^2 = (R_p - R_s) R_s = (2500 - 50) 50$$

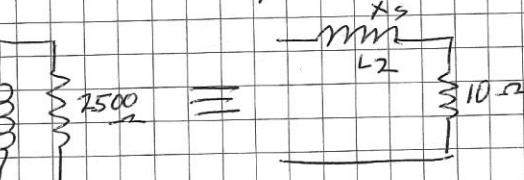
$$X_s = 350 \Omega$$

$$X_p = \frac{50^2 + 350^2}{350} = 357 \Omega$$

at 1.8 MHz       $L_1 = \frac{X_s}{2\pi f} = 30.9 \mu H \quad \leftarrow$

$$C_1 = \frac{1}{2\pi f X_p} = 248 pF$$

Output       $R_p = 2500 \Omega$     $R_s = 10$  to  $250 \Omega$



Out



**DRAKE**

**(1981)**

# **Drake MN-7500 Tuner**

## **Knob Settings Specs.**

TITLE MN7500 Knob Settings										Project No. _____	Book No. _____
freq	Ant Z	L1 mh	T <sub>1</sub>	C pf	0-10	L2 mh	T <sub>2</sub>	R P	Max Pow		
1.8	10	30.95	42	805.7	.3	13.95	21	2500	1225W		
	10	30.0		830	0	13.54		2355			
	50	30A5	42	495.1	4.2	30.95	42	2500	1225		
	250	25.4	35	424	5.1	53.24	64	1700	1800		
2.0	10	27.85	39	725.1	1.3	12.56	19	2500	1225W		
	50	27.85	39	445.6	4.8	27.85	38	"	"		
	250	27.85	39	318.3	6.4	59.7		2500	1225		
	250	25	35	351.7	6.0	53	64	2025	1512		
3.5	10	15.92	24	414.3	5.2	7.175	12.2	2500	1225		
	50	11	"	254.6	7.2	15.92	24	"	"		
	250	11		181.9	8.1	34.1	45	"	"		
4.0	10	13.93	21.5	362.6	5.8	6.3	11	"	"		
	50			222.8	7.6	13.93	21.5	"	"		
	250	↓	↓	159.2	8.4	29.84	41	"	"		
7.0	10	7.96	13.5	207.2	7.8	3.6	6.8	"	"		
	50			127.3	8.8	7.96	13.8				
	250	↓	↓	91	9.3	17.1	25				
7.5	10	7.43	12.5	193.4	8	335	6.5				
	50			118.8	9	7.43	12.5				
	250	↓	↓	84.9	9.3	159	24				
14.0	10	3.98	7.5	103.6	9.1	1.8	4				
	50			63.66	9.6	3.98	7.5				
	250	↓	↓	45.47	9.8	8.5	14				
14.5	10	3.84	7.3	100	9.1	1.73	3.9				
	50			61.47	9.6	3.84	7.3				
	250	↓	↓	43.9	9.8	8.23	13.8				
21	10	2.65	5.5	69.1	9.5	1.2	3	↓			
	10	2.4	5.0	77.1	9.4	1.07	2.5	2000	1,531		
	50			47.3	9.8	2.4	5.0	↓			
	250	↓	↓	33.7	9.95	5.0	8.1	↓			
30	10	1.5	3.5	58.5	9.6	.07	0	1700	1,800		
	10	1.86	4.1	48.3	9.8	.8		2500	1225W		
	50	1.5	3.5	35.8	9.93	1.5	3.5	1700	1800		
	250	"	"	25.4	>10	3.2	6.3	"	"		
	250	1.2	2.5	31	10	2.4		1100	2784		

C = 0 - 830 pF Max RMS V = 1750

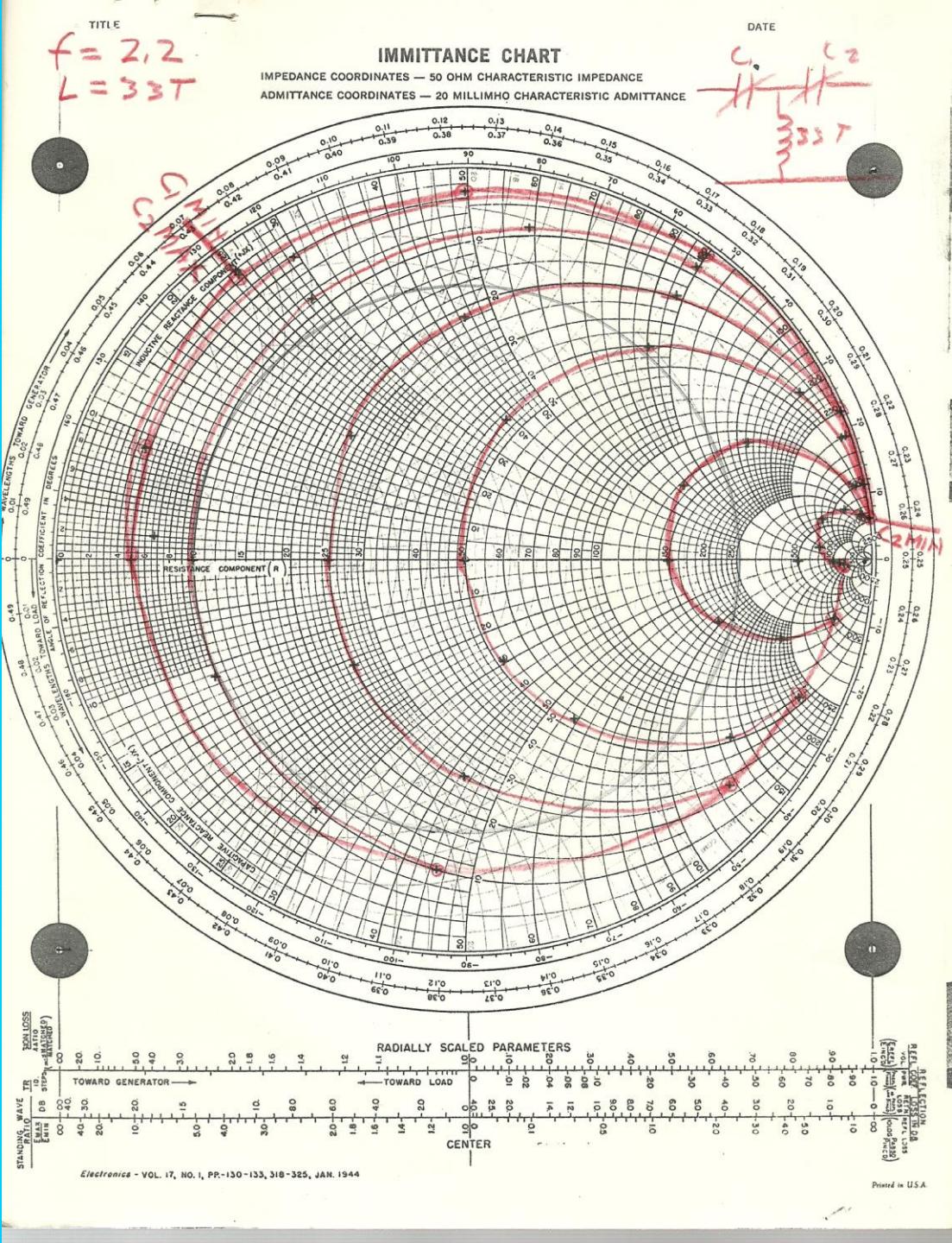


DRAKE

(1981)

# Drake MN-7500 Tuner

## Smith Chart Calculations





DRAKE

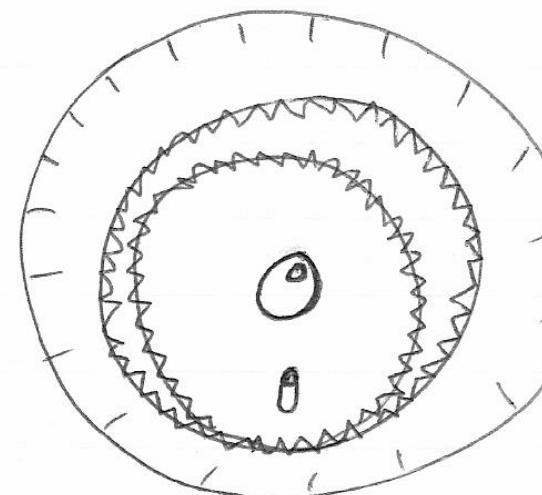
(1981)

**Drake**  
**MN-7500**  
**Tuner**

**Counter Dial  
Gear  
Calculations**

Stock  
Drive  
prod  
cat.

	EXT	INT	ratio
Pagan	(48 pitch)		
31,21	46	48	24:1
22	71	72	72:1
21	70	<del>84</del> 72	36:1
21,24	80	<del>84</del> 84	21:1
22	95	<del>120</del> 96	96:1
		120	





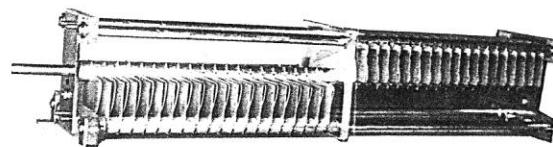
DRAKE

(1981)

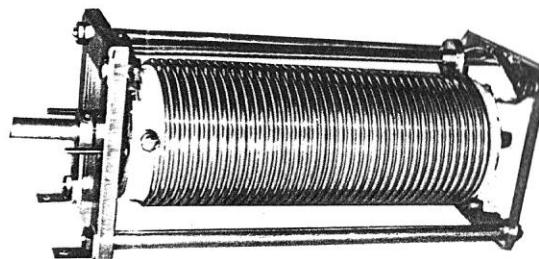
# Drake MN-7500 Tuner Roller Inductor From Murch Electronics

MURCH ELECTRONICS, INC. - COMPONENTS LIST

*They are selling this outfit  
But won't effect our order*



CAPACITORS - Aluminum plates .032" thick  
with rounded edges - brass shafts - heavy brass  
contact springs - large  $\frac{1}{4}$ " tie rods



INDUCTOR - Ceramic inductor, wound with #8  
wire - 3/8" dia. aluminum shafts - brass shaft &  
idler wheel - brass springs

ALL COMPONENTS ARE OF THE SAME RUGGED QUALITY USED IN THE ULTIMATE TRANSMATCH

*Base Price \$80.00*

TYPE

A-CAPACITOR  
A-(SPLIT CAPACITOR)  
B(SHOWN)  
INDUCTOR (SHOWN)  
4:1 BALUN

PK. V.  
100-  
250-  
500-  
4500  
4500  
4500  
4500

100- \$ 68.00 ea  
250- \$ 68.00 ea - 25%  
500- \$ 52.00 ea - 35%  
4500 \$ 8 1/4" x 3 1/4" x 3" \$ 45.00  
4500 10" x 2 3/4" x 3" \$ 45.00  
4500 14 1/4" x 2 3/4" x 3" \$ 45.00  
4500 10 1/2" x 3" x 4 1/2" \$ 45.00  
2" dia. x 2" h

RETAIL PRICE

\$48.00 & Shipping  
\$56.00 & Shipping  
\$68.00 & Shipping  
\$80.00 & Shipping  
\$21.95 & Shipping

*Wayne Murch*

*Send for price quotes on quantity.*

Order From: Murch Electronics Inc., PO Box 69, Franklin, ME 04634 207-565-3319





**DRAKE**

**Drake**

**MN-5  
500 Watt  
Antenna Tuner**

**Economy Model**

**No Wattmeter  
Small  
Roller Inductor**

**\$ 170.00**

**MN 5 Economy Match Box**

Small motor for tuning (No wattmeter) 500 w PEP

Material removed from MN7500

ITEM	Price	ITEM	Price
Smaller U, Cap, (22S / 23R) 1/2 length	.94		
Smaller Roller Coils 6" US 10" / #16 US #12 same	2.74		
Meter - diff 504	7.74		
Ant SW 1Kw 6 2 SO 239	4.54		
Push SW	.578		
<del>Rot</del>	2.85		
PC Assy			
Vinyl Mat 3/3	1.227		
DB shaft	,629		
coupler	,1491		
6.8 Megs	,1320		
Sus. Panel Hdw	,3027		
Extrusion 3/3 Mat	,4033		
Chassis 3/3 Mat	1.0222		
Bottom 3/3 Mat	,4457		
Remove from MN7500	23.719		

Cost Material for MN-5 = 31.15

Labor shop .67 hr @ 7.50 = 5.025

Labor Assy 2.5 @ 4.85 = 12.125

Total DL	17.15
OH 2.17X	37.22
	85.51
G+A 17%	23.08
Prof 20%	27.15
min Dealer price	135.74
Am Met	171.00

***Milt retired from Drake in 1983 and stays on  
for 4 years consulting for Drake.***

***He also consulted for Lytton Industries,  
taught engineering for Wright State.***

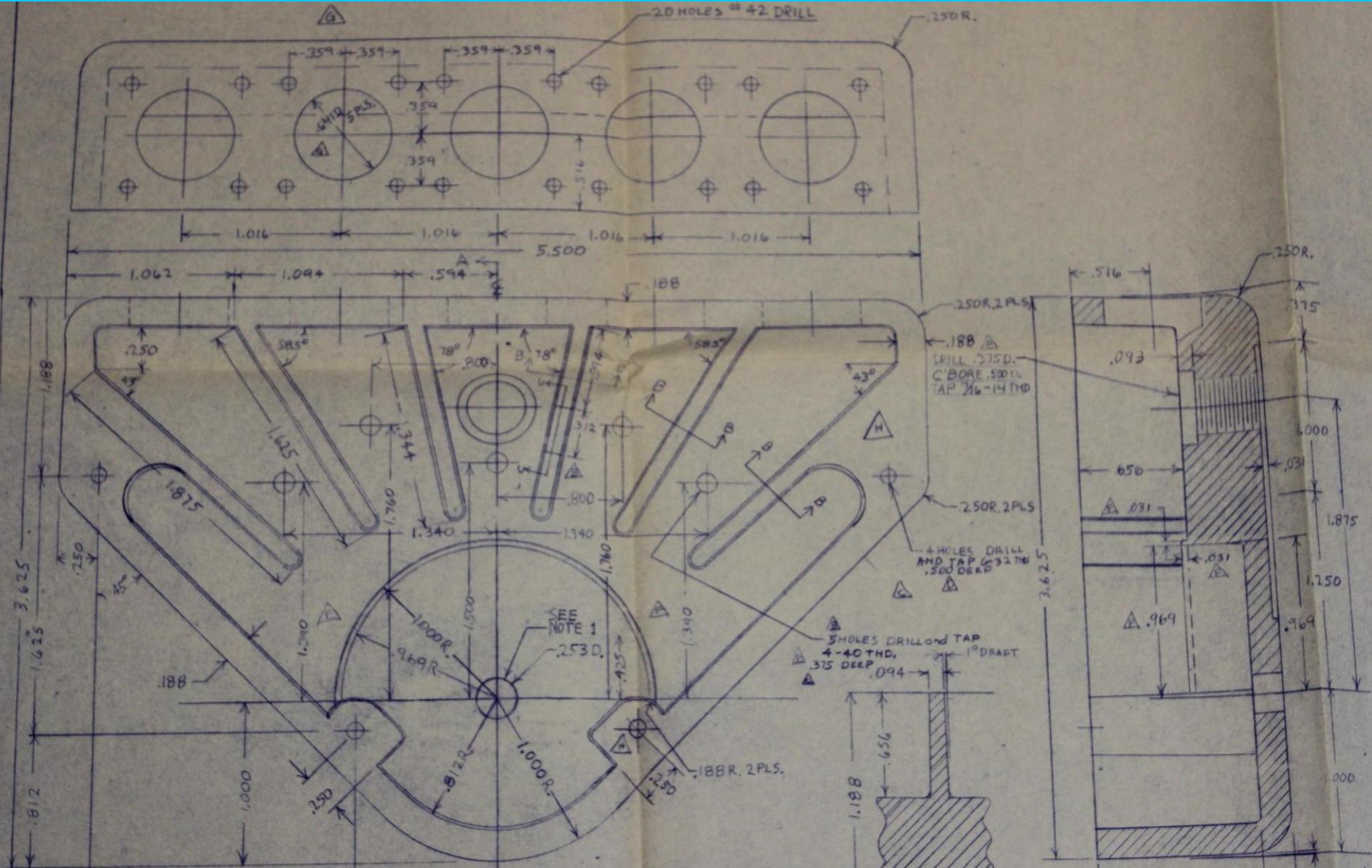
***Consulted & Designed for Alpha-Delta***



# *Milt Sullivan's Consulting & Designing for Alpha-Delta*



# **4-Position Coax Switch**



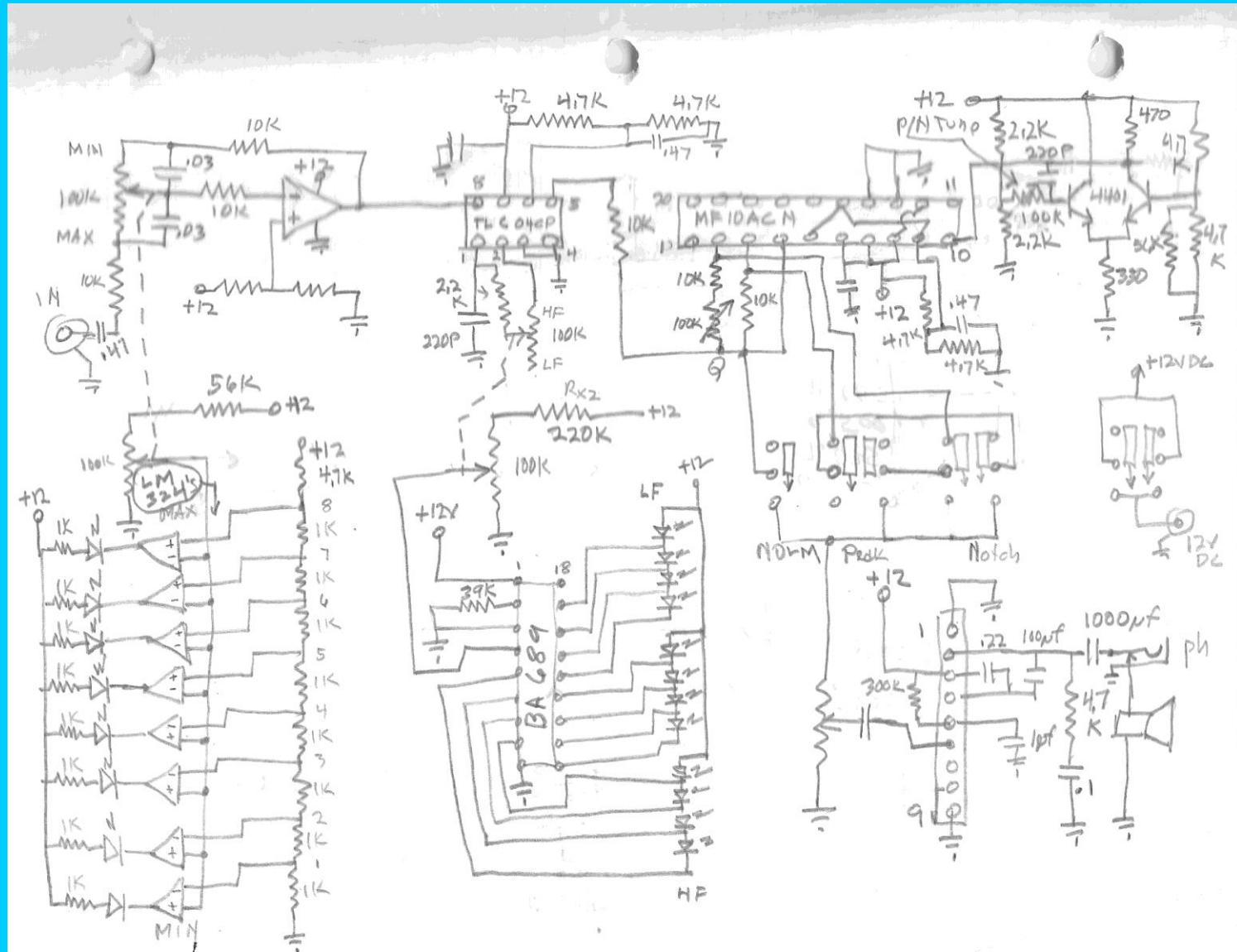
**Milt's Notes  
for  
Alpha-Delta coax switch**



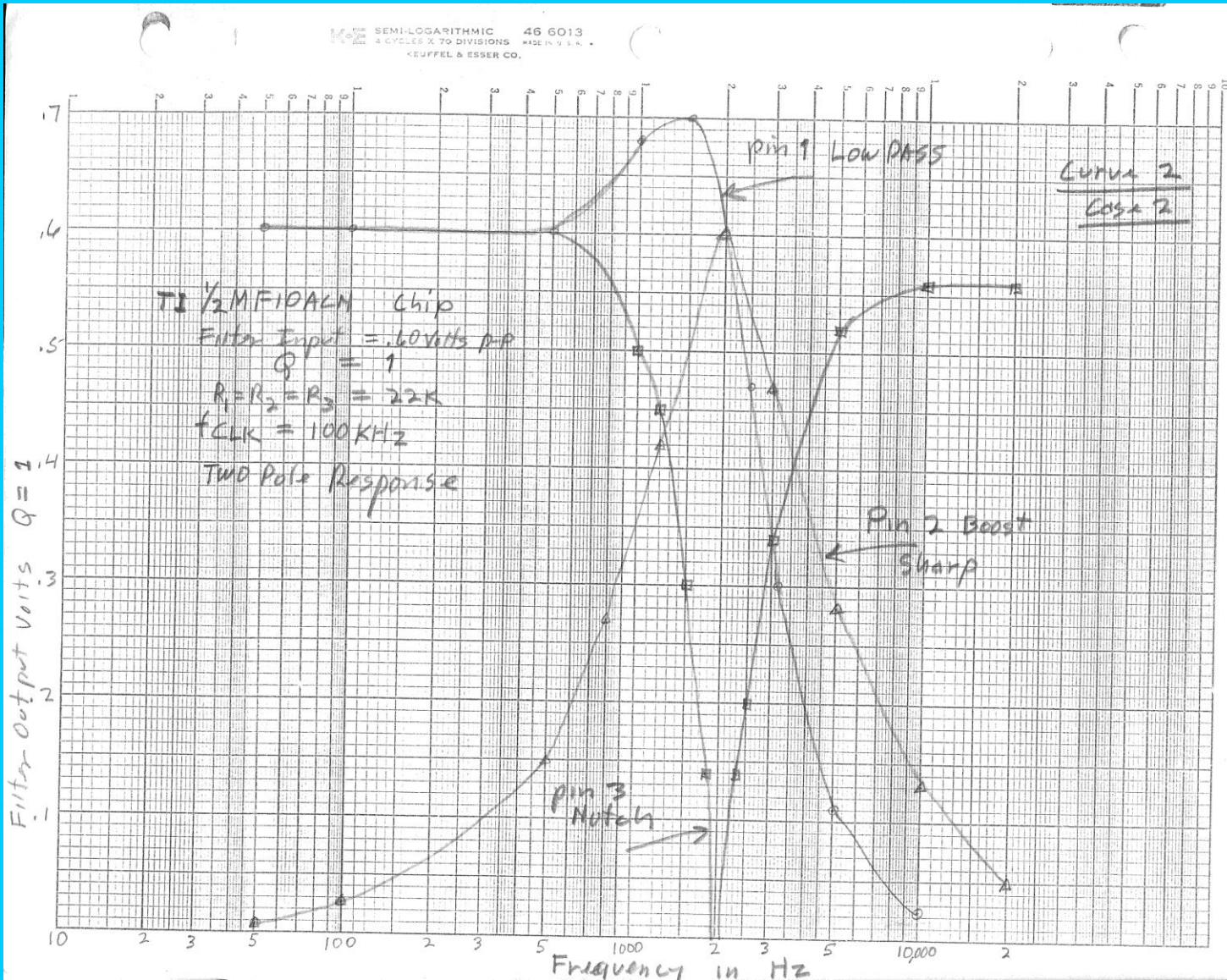
***Alpha-Delta VRC  
Variable Response Console  
Note the similar look to the  
Drake 2-BQ speaker ! !***



# VRC Hand Drawn Schematic

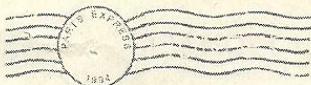


# VRC High & Low Pass Filters



# *Alpha-Delta VRC*

## *Speaker 4-1/2 Inches*



## SPEAKERS

### 10" Square Frame Woofer

woofer with a paper cone and treated cloth surround. Black stamped frame and black cone. Perfect replacement for many name brand speaker systems that require square frame woofers.

- ♦Power handling: 40 watts RMS/70 watts max.
- ♦Voice coil diameter: 1-1/2 inches
- ♦Impedance: 8 ohms
- ♦Frequency response: 29-5000
- ♦Magnet weight: 12 ozs.
- ♦Fs: 29 Hz
- ♦SPL: 92 dB 1W/1m
- ♦VAS: 5.37
- ♦Qts: .83
- ♦Qes: .38
- ♦Qms: 2.37
- ♦XMAX: .129
- ♦Net weight: 3-1/2 lbs.
- ♦Manufacturer model number: E25FC92-54F
- ♦Dimensions: A: 10-1/4", B: 9-1/8", C: 4-1/2", D: 3-1/2", E: 1-3/8".

#290-080 .... \$27<sup>50</sup><sub>(1-3)</sub> .. \$24<sup>95</sup><sub>(4-UP)</sub>

### 10" Musical Instrument Speaker

Ribbed paper cone with treated cloth accordion surround. Vented pole piece for heat dissipation and reduced distortion. Perfect replacement for many P.A. and musical type speakers.

- ♦Power handling: 100 watts RMS/200 watts max.
- ♦Voice coil diameter: 2 inches
- ♦Impedance: 8 ohms
- ♦Frequency response: 30-3000 Hz
- ♦Magnet weight: 40 ozs.
- ♦Fs: 30 Hz
- ♦SPL: 96 dB 1W/1m
- ♦VAS: 5.8
- ♦Qts: .15
- ♦Qes: .18
- ♦Qms: 1.08
- ♦XMAX: .129
- ♦Net weight: 8 lbs.
- ♦Manufacturer model number: A25GC40-51F-Q
- ♦Dimensions: A: 10-1/8", B: 9-1/4", C: 5-1/2", D: 5-1/2", E: 1-3/8".

#290-094 ..... \$41<sup>50</sup><sub>(1-3)</sub> ..... \$38<sup>50</sup><sub>(4-UP)</sub>

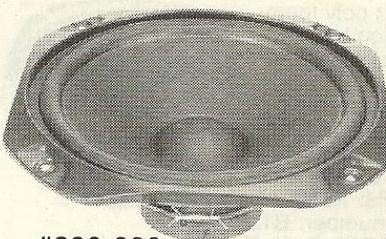
### 12" Musical Instrument Speaker

### 12" Square Frame Woofer

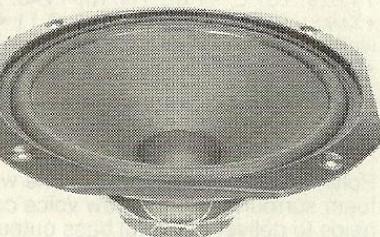
12" woofer with a paper cone and treated cloth surround. Black stamped frame and black cone. Perfect replacement for many name brand speaker systems that require square frame woofers.

- ♦Power handling: 50 watts RMS/80 watts max.
- ♦Voice coil diameter: 1-1/2 inches
- ♦Impedance: 8 ohms
- ♦Frequency response: 34-4000 Hz
- ♦Magnet weight: 14 ozs.
- ♦Fs: 34 Hz
- ♦SPL: 94 dB 1W/1m
- ♦VAS: 7.39
- ♦Qts: .42
- ♦Qes: .51
- ♦Qms: 2.38
- ♦XMAX: .129
- ♦Net weight: 5 lbs.
- ♦Manufacturer model number: L30FC14-51F
- ♦Dimensions: A: 12", B: 10-3/4", C: 5", D: 4", E: 1-3/8".

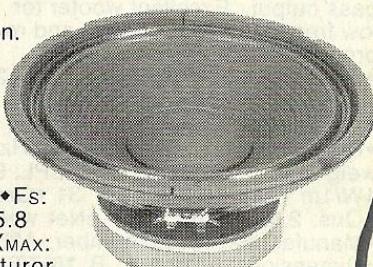
#290-130 .... \$35<sup>80</sup><sub>(1-3)</sub> .. \$32<sup>80</sup><sub>(4-UP)</sub>



#290-080



#290-130

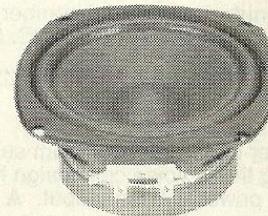


### 4-1/2" Full Range

Paper cone with treated cloth surround. Open back and stamped basket. Perfect for bookshelf type speakers and car stereo installations.

- ♦Power handling: 20 watts RMS/30 watts max.
- ♦Voice coil diameter: 1 inch
- ♦Impedance: 8 ohms
- ♦Frequency response: 70-15000 Hz
- ♦Magnet weight: 9.3 ozs.
- ♦Fs: 70 Hz
- ♦SPL: 90 dB 1W/1m
- ♦VAS: .31
- ♦Qts: .35
- ♦Qes: .47
- ♦Qms: 1.4
- ♦XMAX: .043
- ♦Net weight: 2 lbs.
- ♦Manufacturer model number: A11EC80-02F
- ♦Dimensions: A: 4-1/2", B: 4-1/8", C: 2-3/8", D: 3-1/8", E: 1".

#290-010 ..... \$10<sup>50</sup><sub>(1-3)</sub> ..... \$9<sup>80</sup><sub>(4-UP)</sub>



### 8" Full Range

Paper cone with blue poly foam

# Specs

## for

# 4-1/2 Inch Speaker

## DB Level

## VS

## Frequency

### Not Just

### Guessing at

### How it

### Reacts ! !

Pioneer  
ported 4 1/2 in  
8x8x6 Cabinet

f	dB
54	55
60	60
75	55
79	60
88	66
94	70
118	73
137	74
142	74
160	74
145	80
177	90
186	90
207	86
235	84
255	88
265	80
270	74
277	80
290	83
300	80
310	74
315	80
325	84
360	75
375	78
390	85
410	76
432	89
452	85
490	85
520	93
545	85
610	87
650	83
680	90
720	95
730	91
800	94

f	dB
820	85
840	90
870	85
940	94
960	96
980	92
1030	94
1100	90
1180	84
1250	80
1250	70
1260	68
1300	74
1320	70
1360	74
1390	74
1420	82
1450	74
1460	84
1500	18
1580	82
1650	90
1710	80
1750	88
1860	92
1900	80
2000	84
2110	74
2160	84
2200	88
2260	70
2270	80
2290	86
2350	84
2390	80
2210	86
2460	86
2520	72
2550	82
2700	86
2850	92

f	dB
2950	70
3010	80
3020	87
3180	84
3670	84
4180	86
4940	88
5550	88
6500	90
7000	93
7900	88
8500	88
9300	85
10200	88
12000	87
12800	80
13900	70
14300	70
20700	68
16100	60
17500	55

**Some  
More of  
Milt's  
Great Work**



**(1998)**

**VSWR**

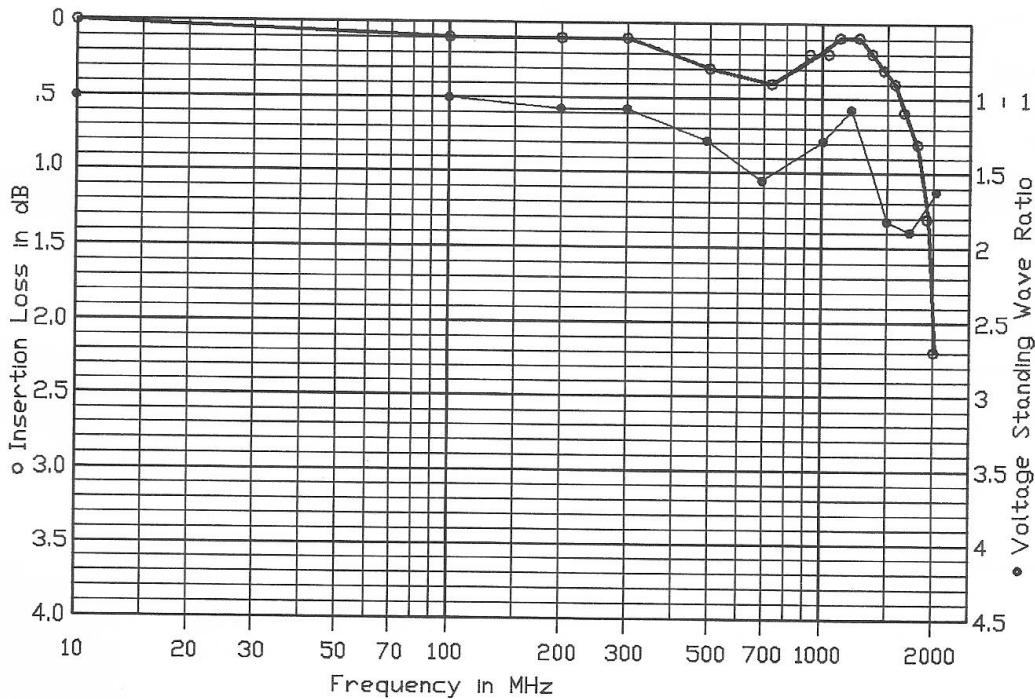
**Measurements  
For The  
Trans-Trap**

INSERTION LOSS/VSWR MEASUREMENTS

ALPHA DELTA TRANSI-TRAP

*Corrected*  
2-17-98

MODEL # RT/N-W/M



Measurements made and certified by:

MILT SULLIVAN EE- Engineering Consultant  
1303 Pilsdon Crest -- Mt. Pleasant, SC, 29464  
Phone 803-884-1441 -- Fax 803-884-3254

Signed Milton A. Sullivan Date 2-17-98



***On October 28, 2010  
Milt Sullivan  
died peacefully  
at the age of 85***



DRAKE

# *Drake Museum*





*Thank You*

*For Watching*

# *Central Electronics Event 2017*





**Sweeping the I.F.'s for L/C and  
Crystal Filters**

**Using a Tracking Generator  
Spectrum Analyzer  
&**

**Audio Sweep Generator  
for Transmit Sweeps**



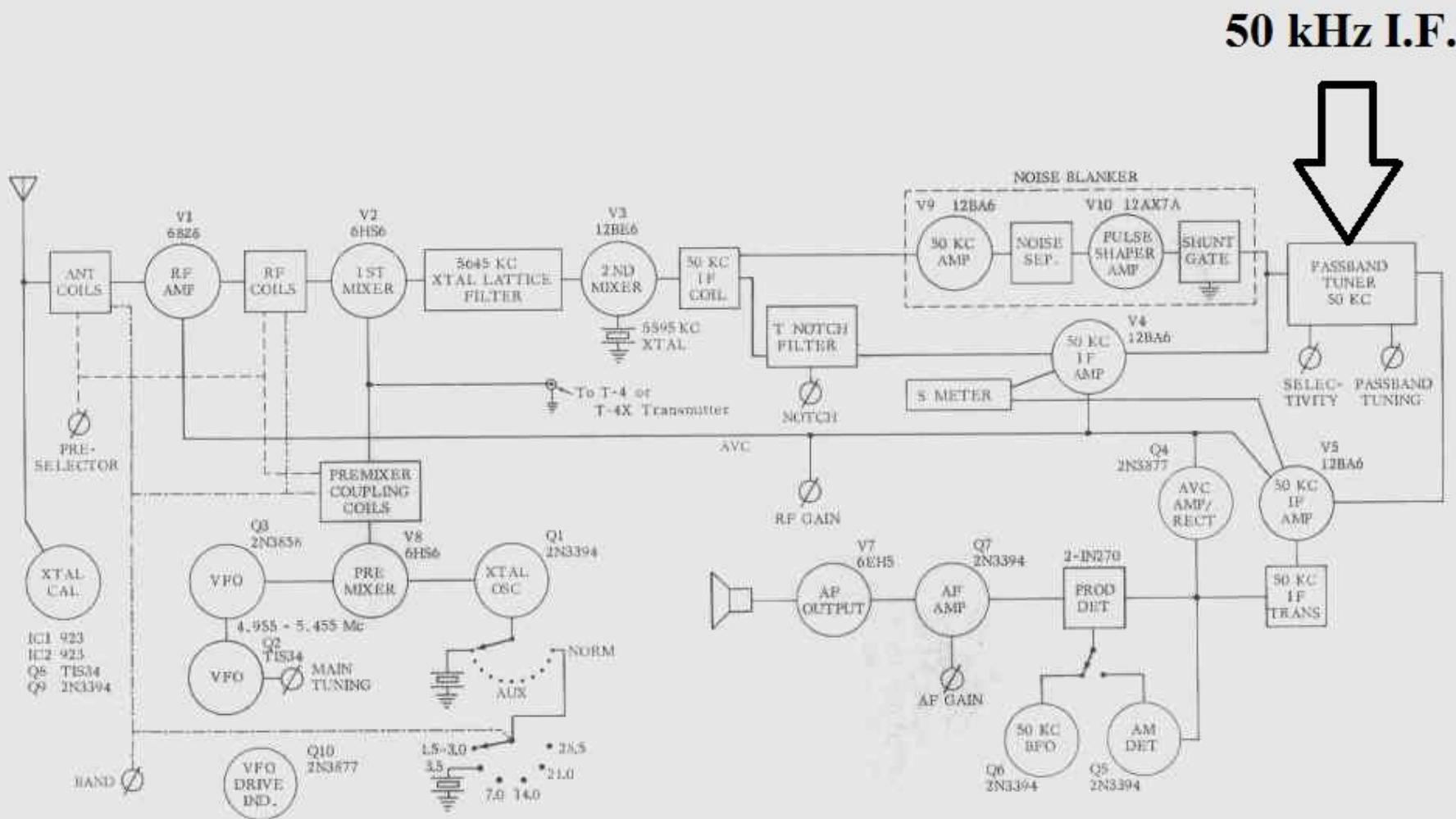
DRAKE

# Drake R-4B Receiver

Pass-Band Tuning with L / C Filtering @ 50 kHz



# R-4B Receiver Last 50 kHz I.F.



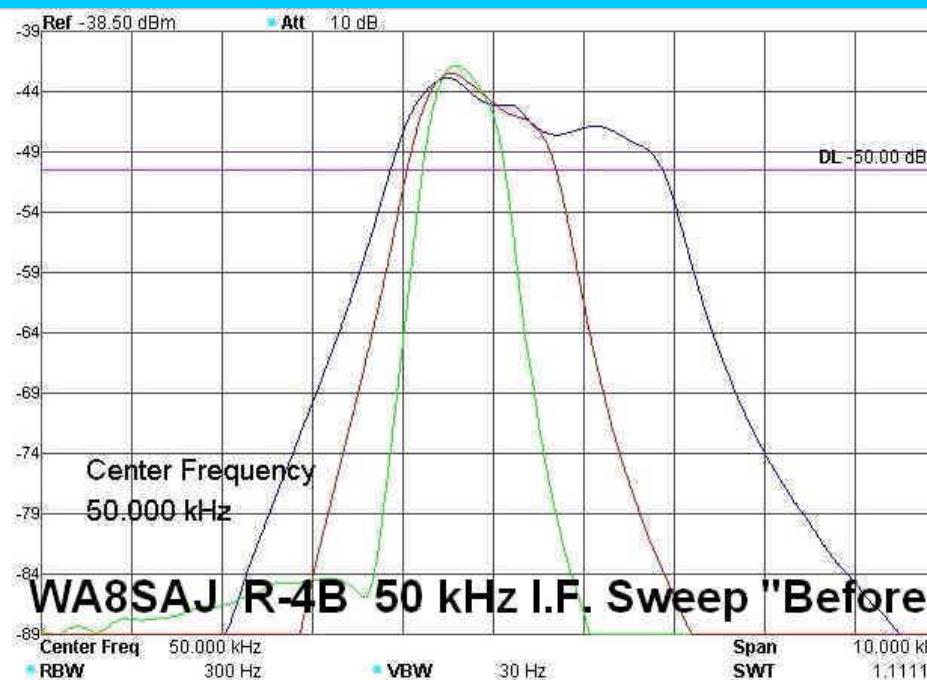
# R-4B Sweeps

**400 Hz**

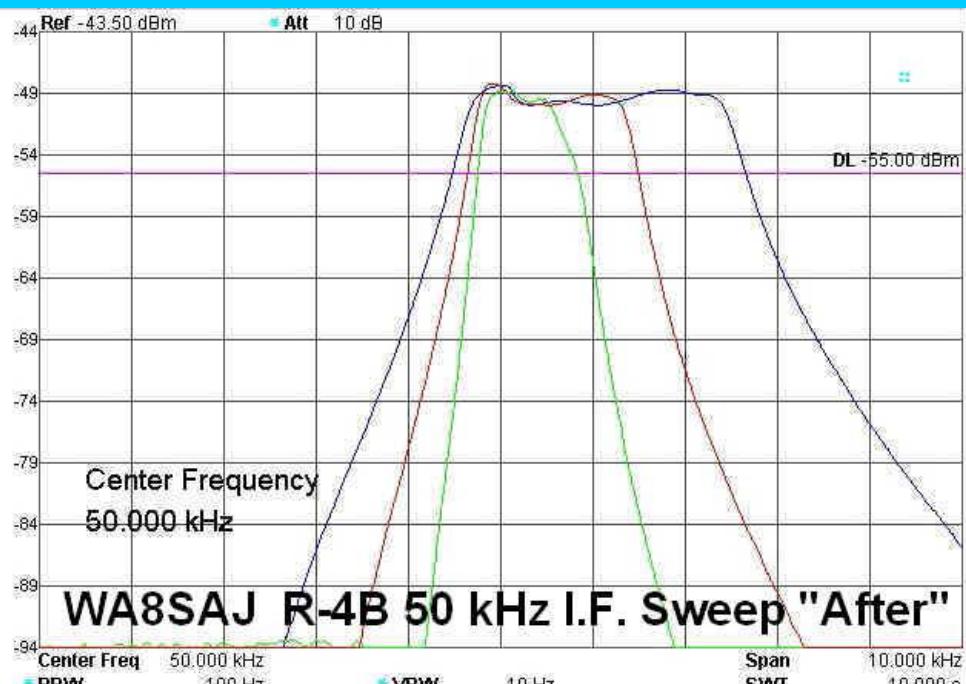
**1.2 kHz**

**2.4 kHz**

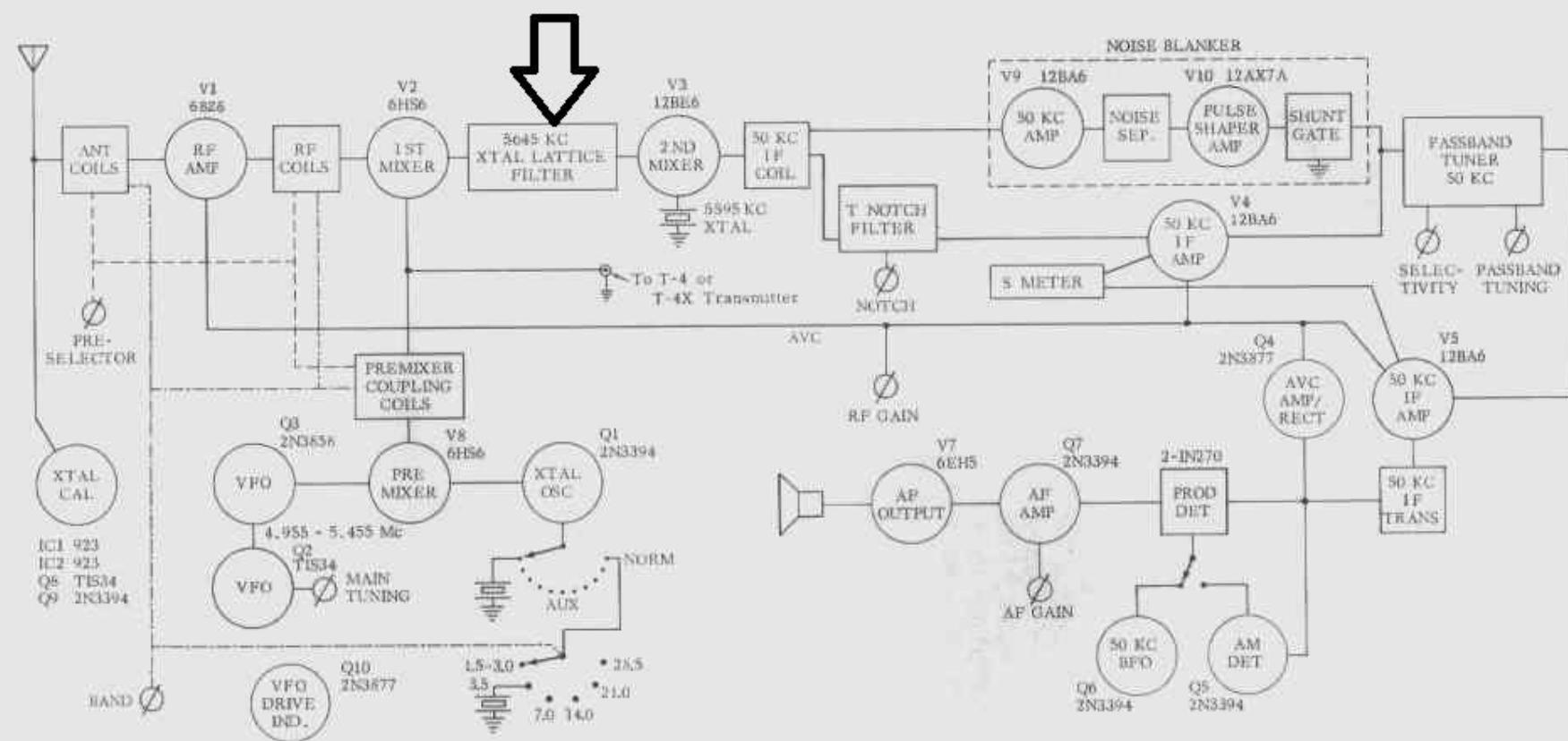
***Before***



***After***

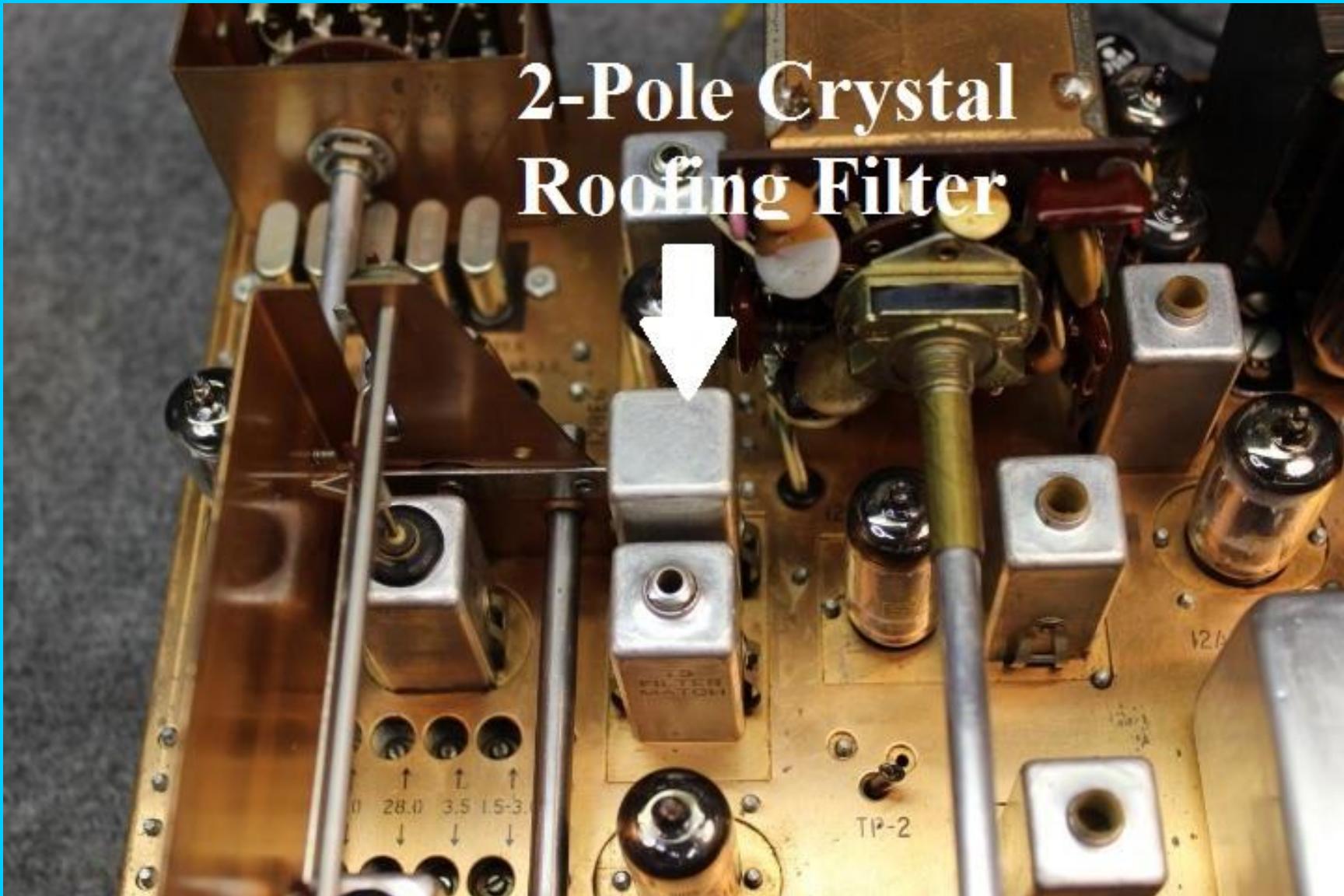


## 5646 2-Pole Roofing Filter



# R-4B 2-Pole Crystal Filter

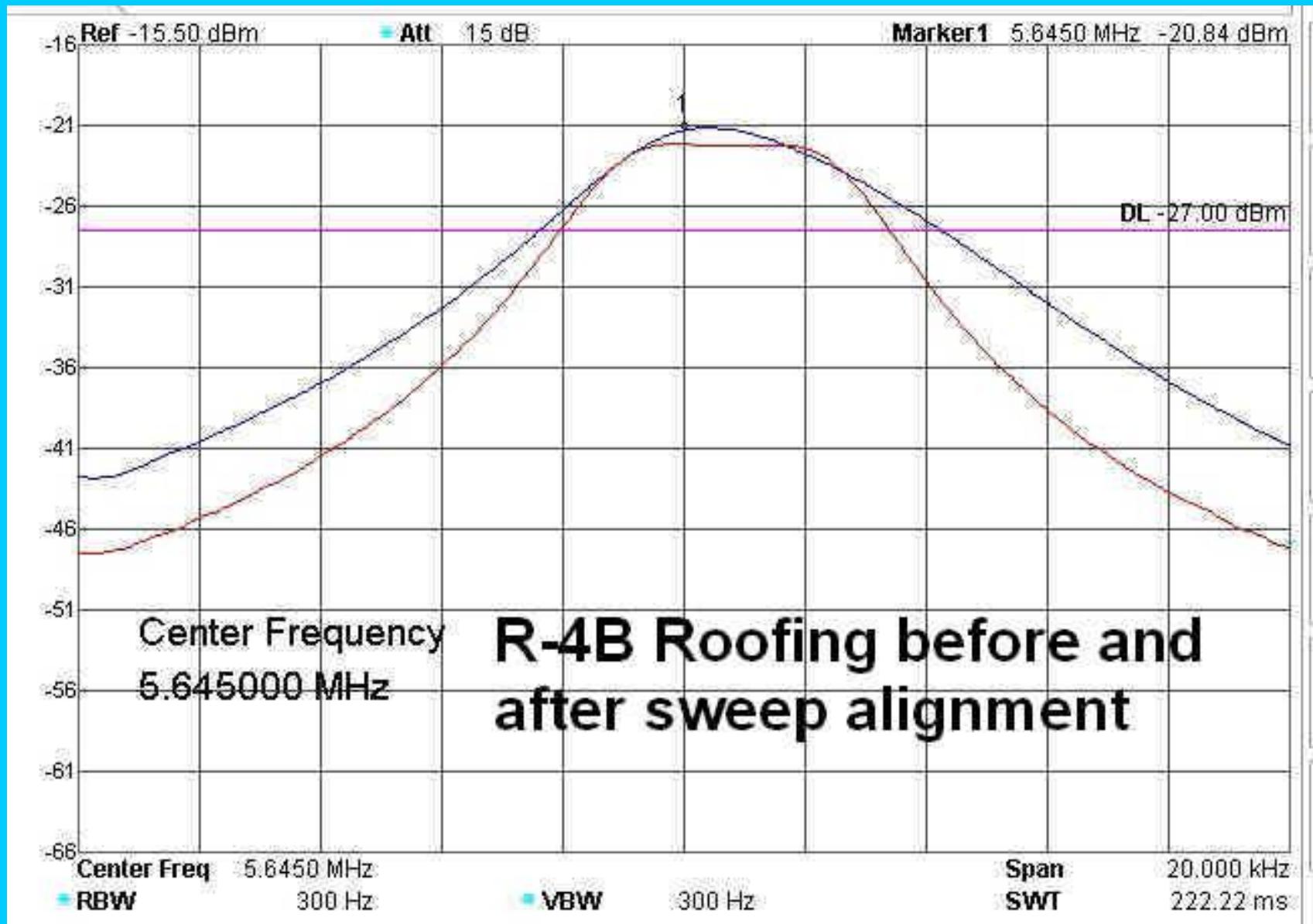
2-Pole Crystal  
Roofing Filter





DRAKE

# R-4B Sweep at 5645 kHz





DRAKE

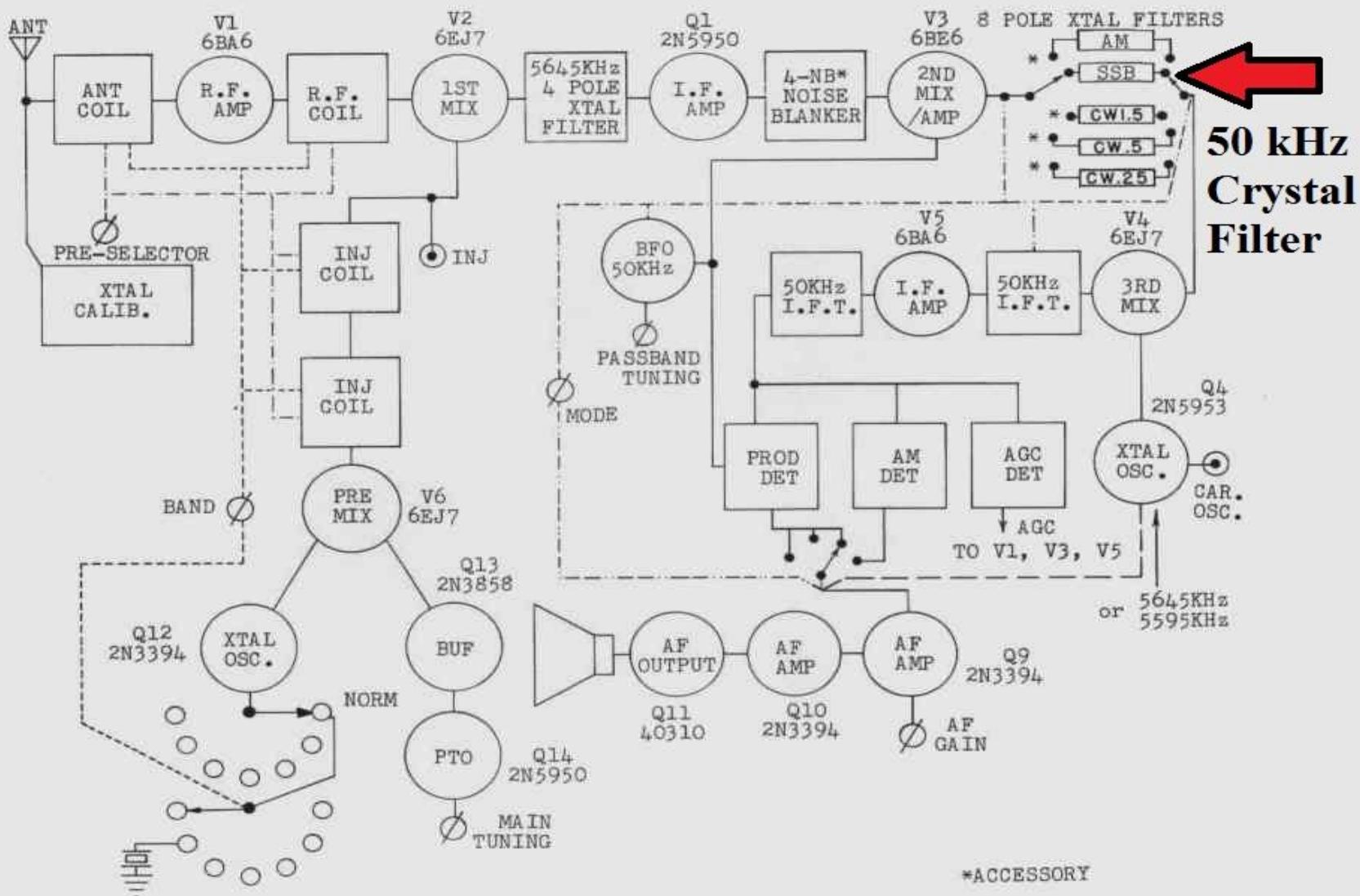
# Drake R-4C 50 kHz I.F. Using Crystal Filters





DRAKE

# R-4C 50 kHz I.F.





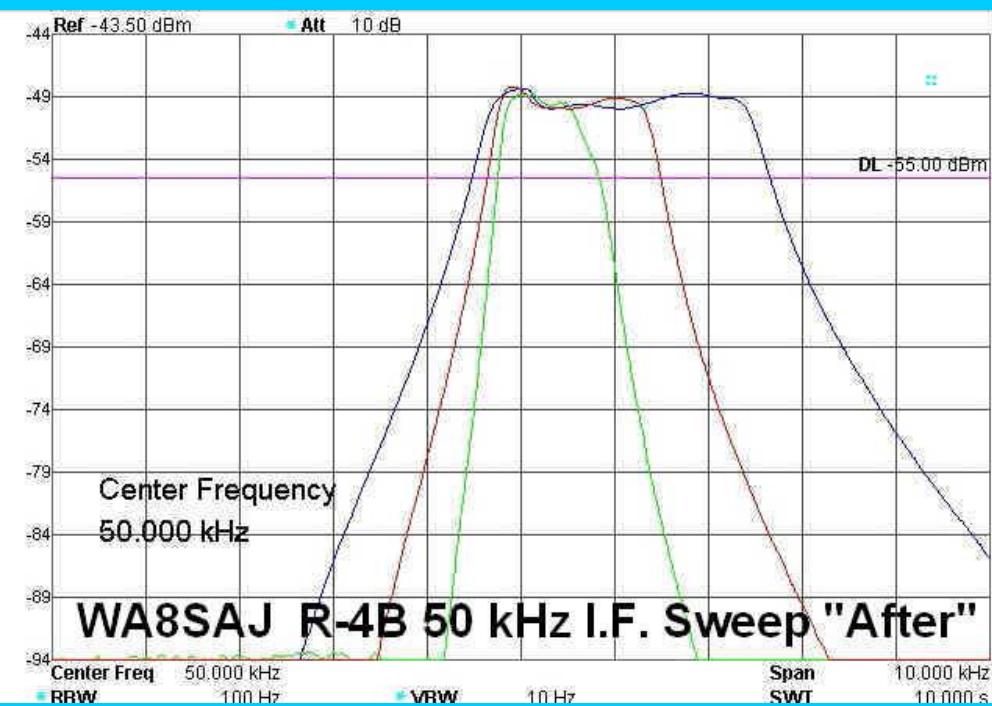
DRAKE

# R-4C Crystal Filter 50 kHz

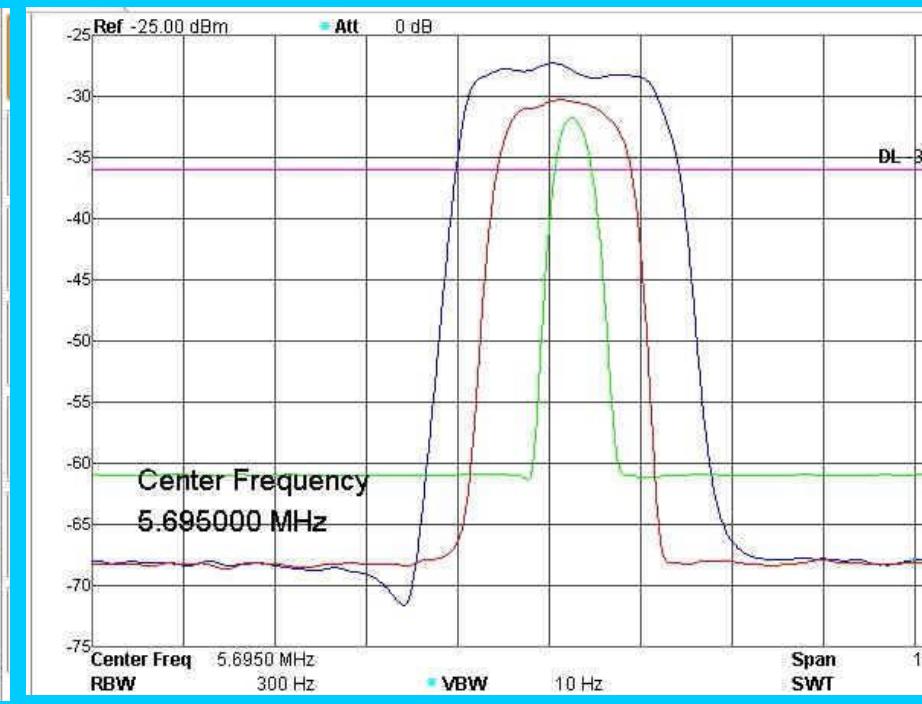


# L / C vs. Crystal in the Last I.F.

**R-4B L / C Filters**



**R-4C Crystal Filters**

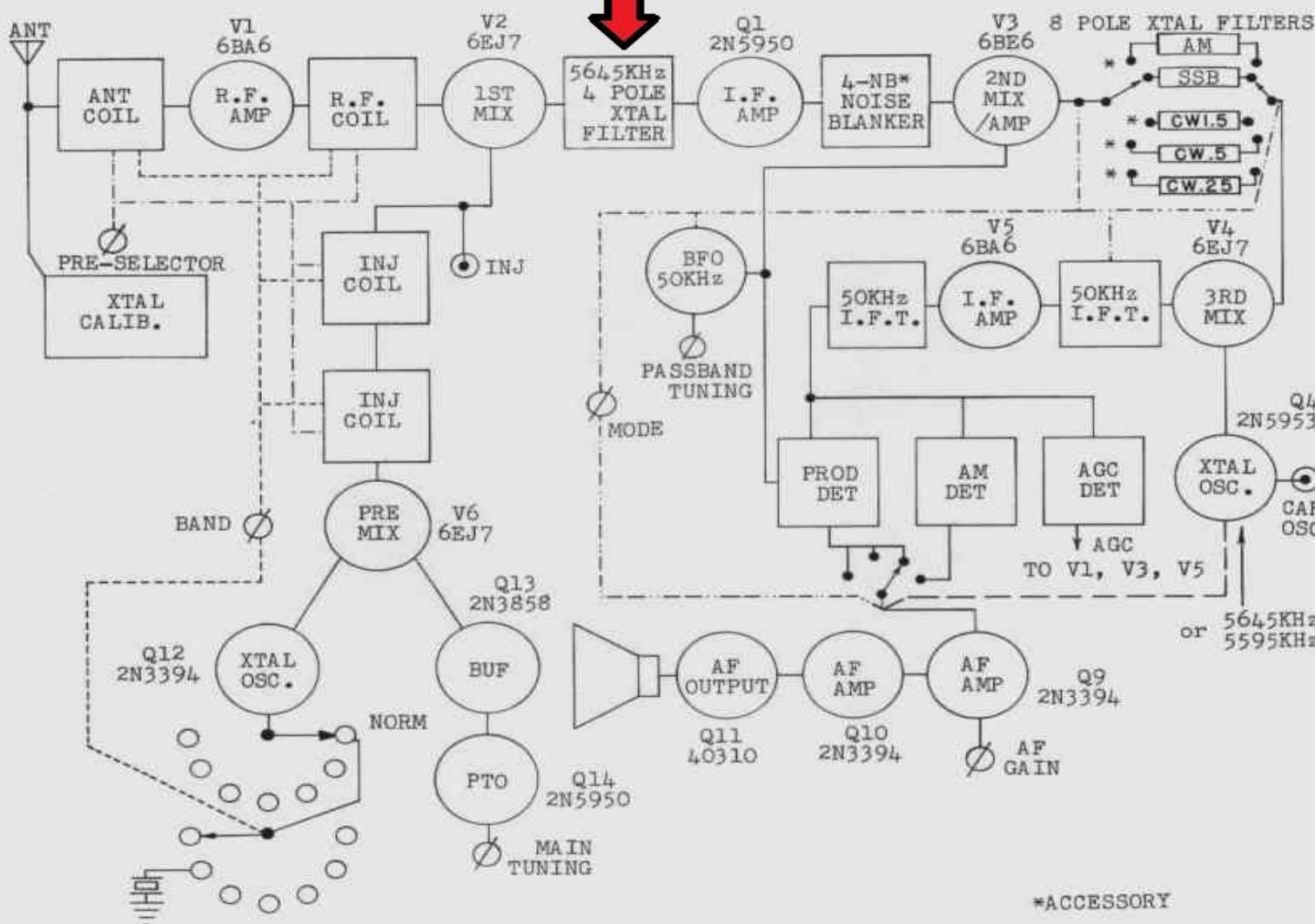




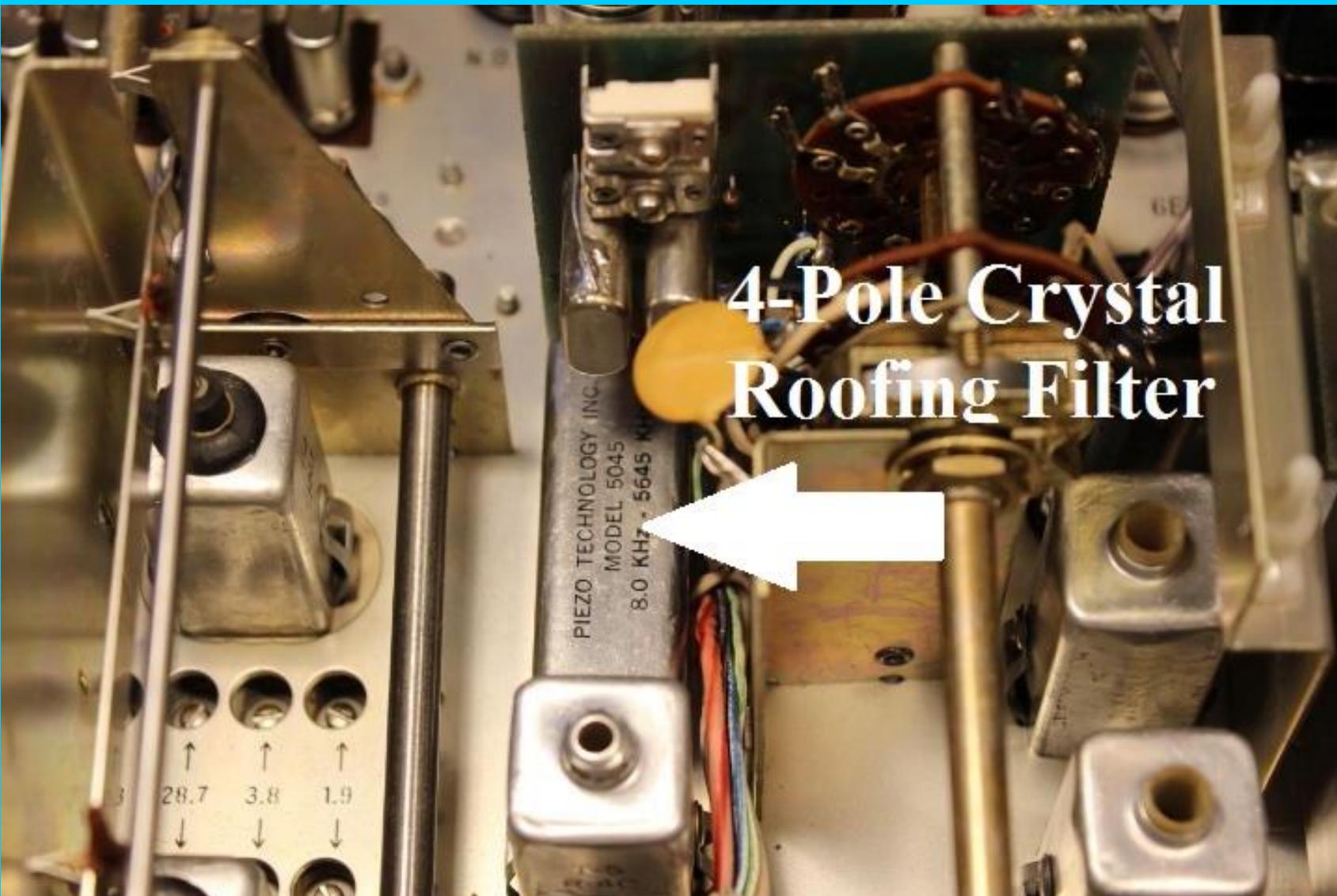
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# R-4C 4-Pole Roofing Crystal Filter

## **4-Pole Crystal Roofing Filter**



# R-4C Roofing Filter

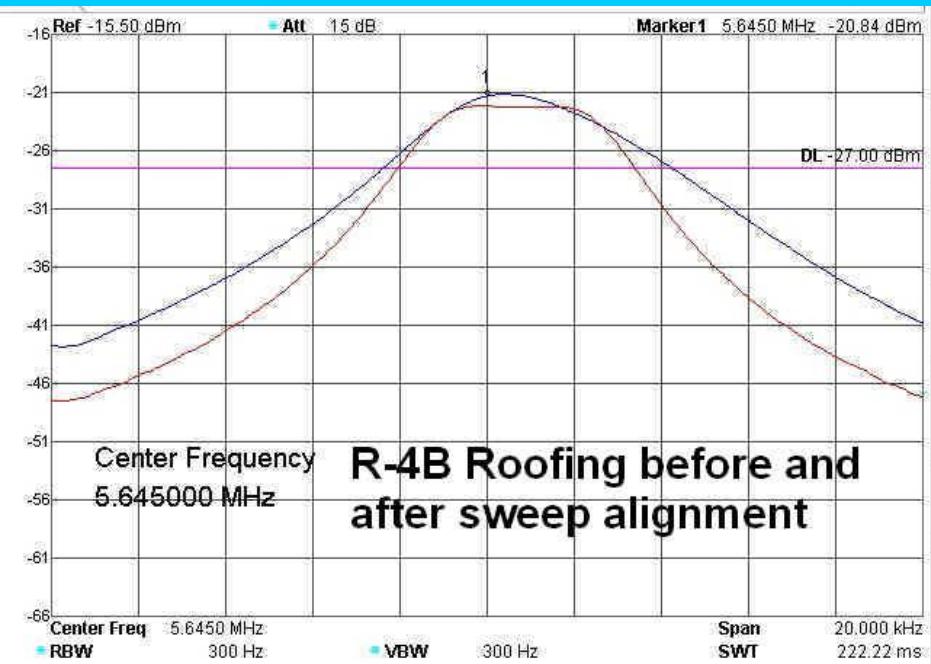


4-Pole Crystal  
Roofing Filter

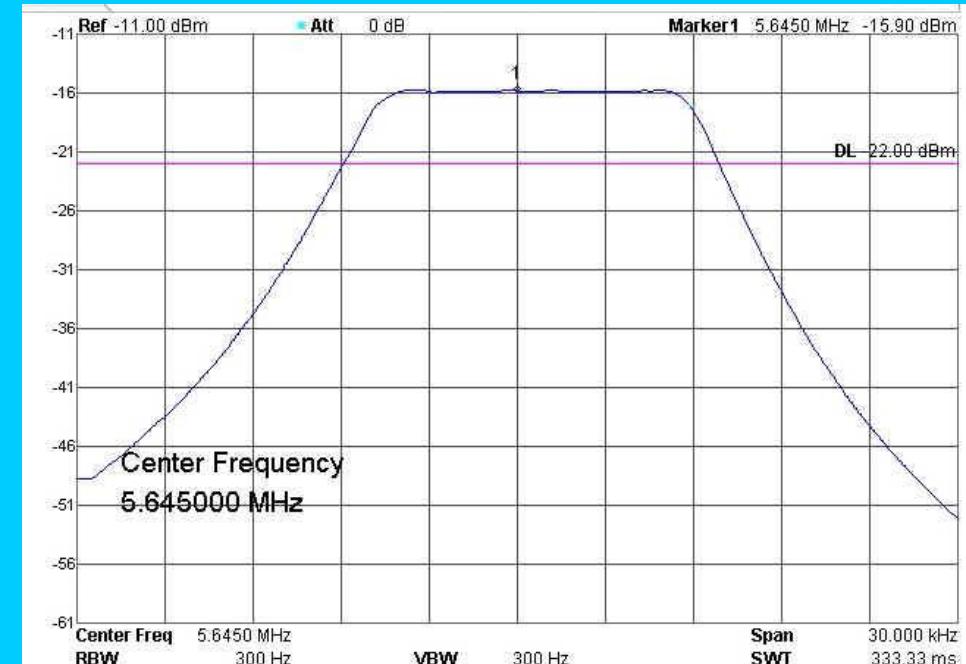
# 2-Pole Crystal Roofing Filter

# 4-Pole Crystal Roofing Filter

*R-4B Roofing Filter*



*R-4C Roofing Filter*





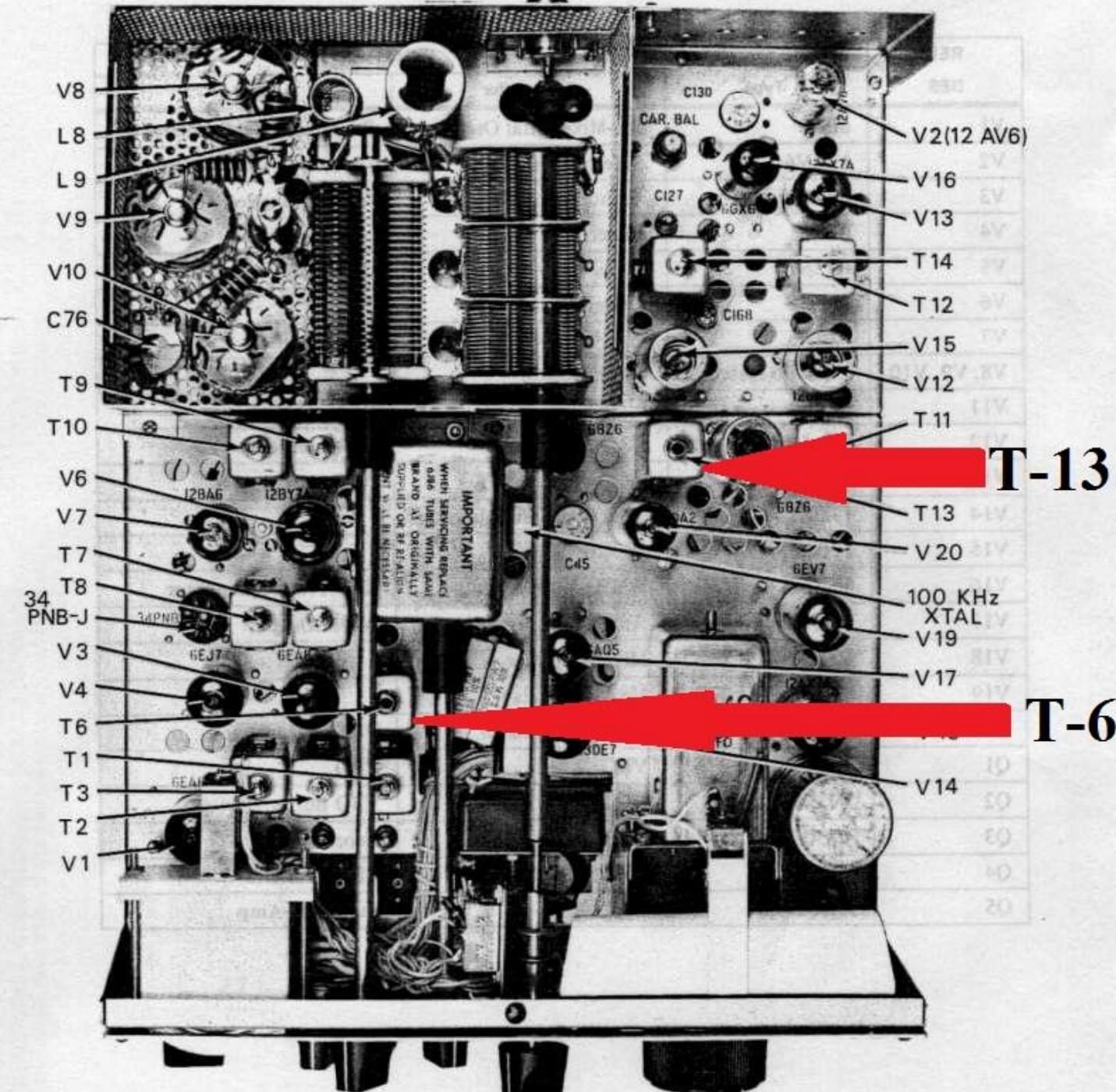
# Drake TR-4CW / R.I.T. Filter Alignment





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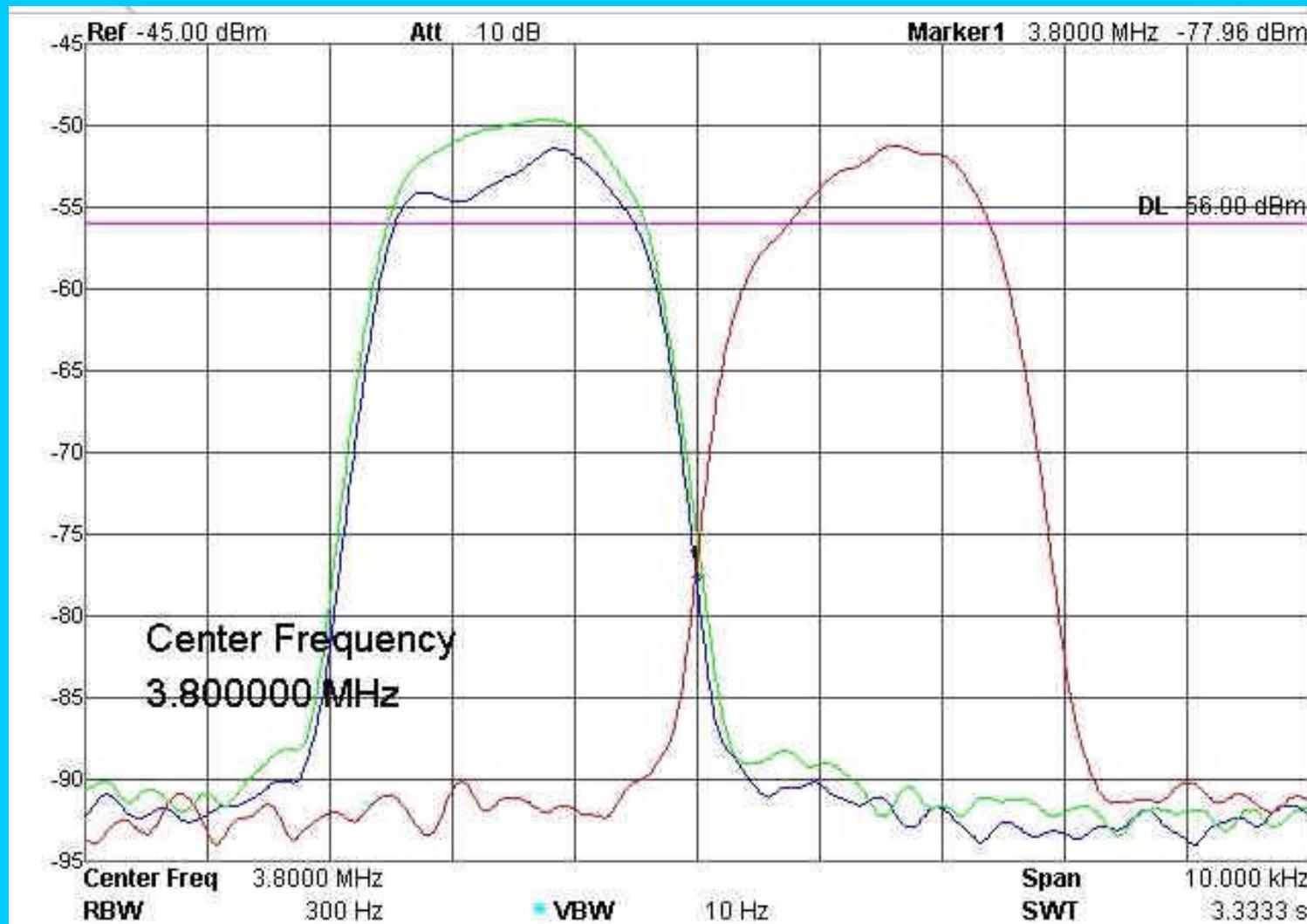
**TR-4CW**  
*Filter  
Matching  
Transformers*



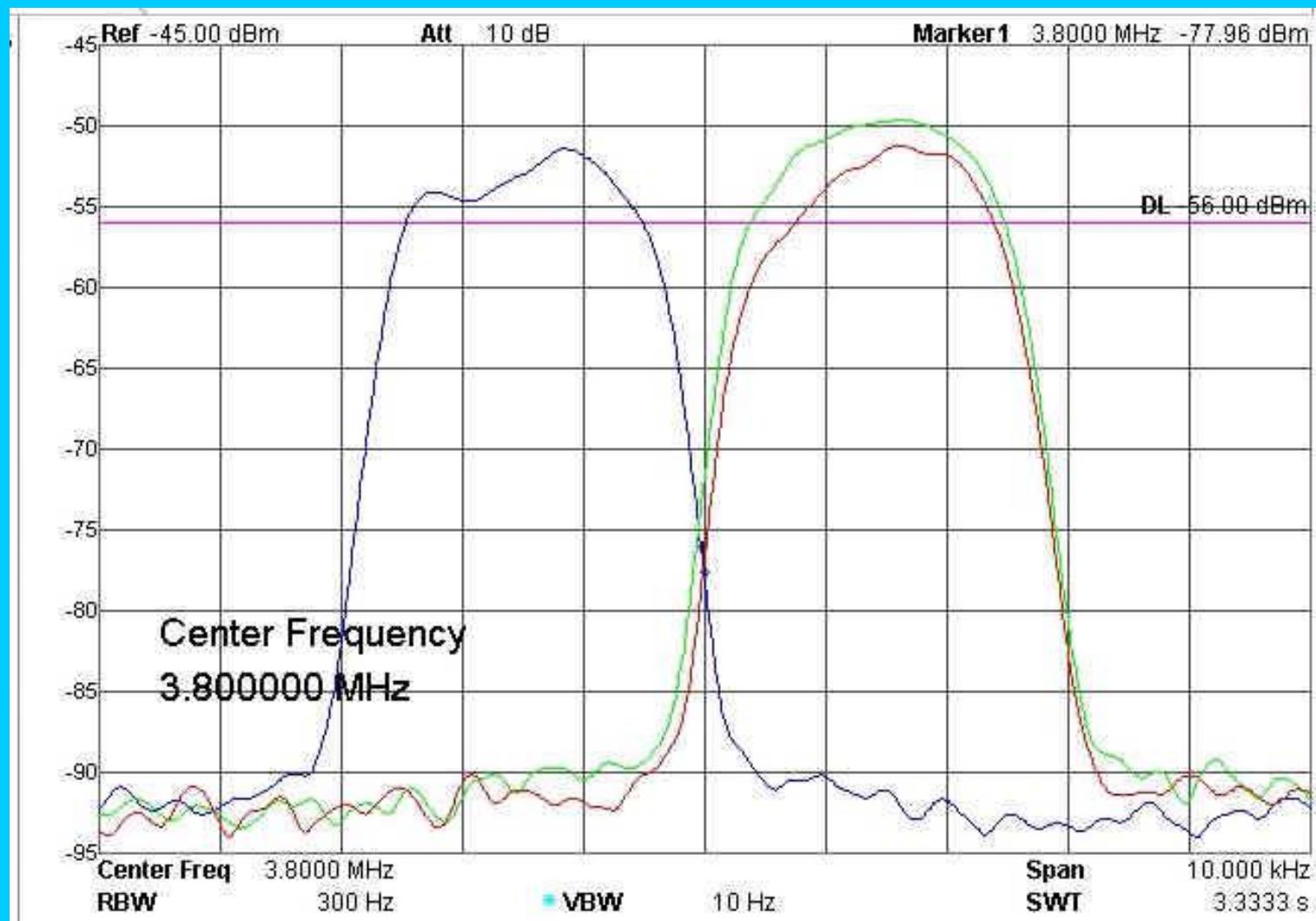


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# LSB Before & After Alignment



# USB Before & After Alignment





**TR-4CW**  
**Stock 2.1 kHz Wide**  
**SSB Crystal Filters**

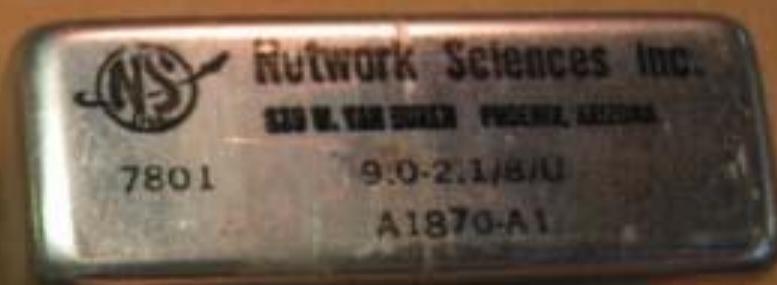
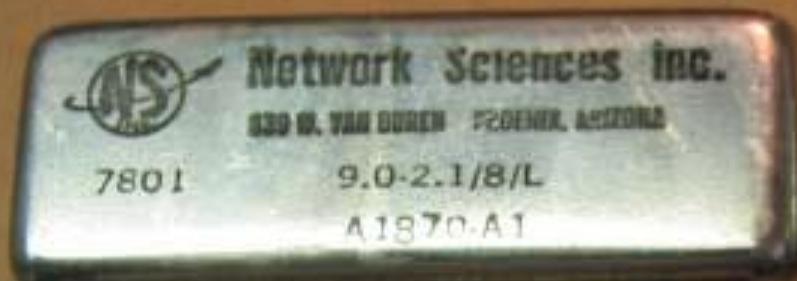
**vs.**

**INRAD**  
**2.5 kHz Wide**  
**SSB Crystal Filters**



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# TR-4 INRAD Filters

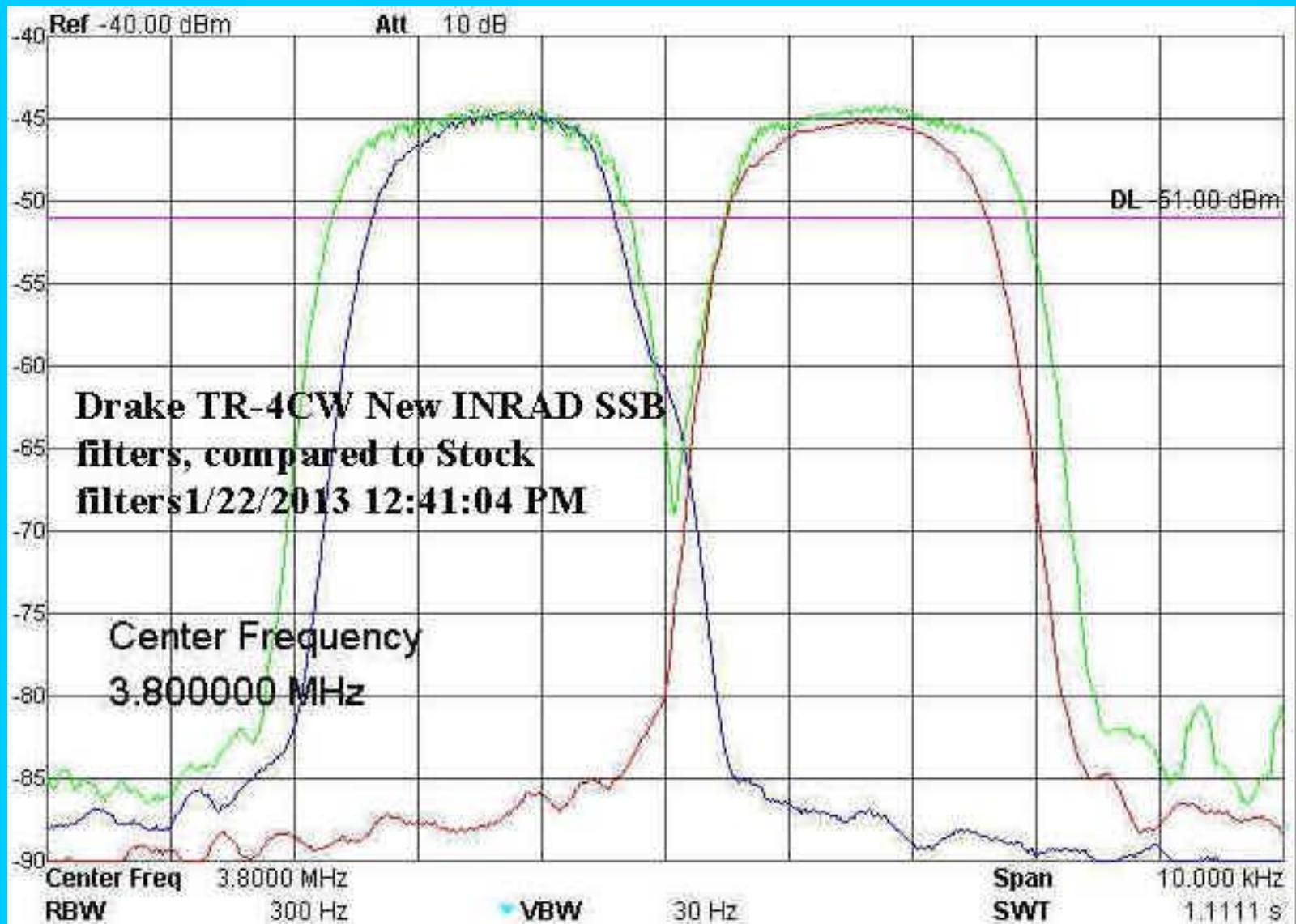


Comparison of the old and new filters



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# TR-4C Filter Comparison





# ***SSB Filter Comparison***

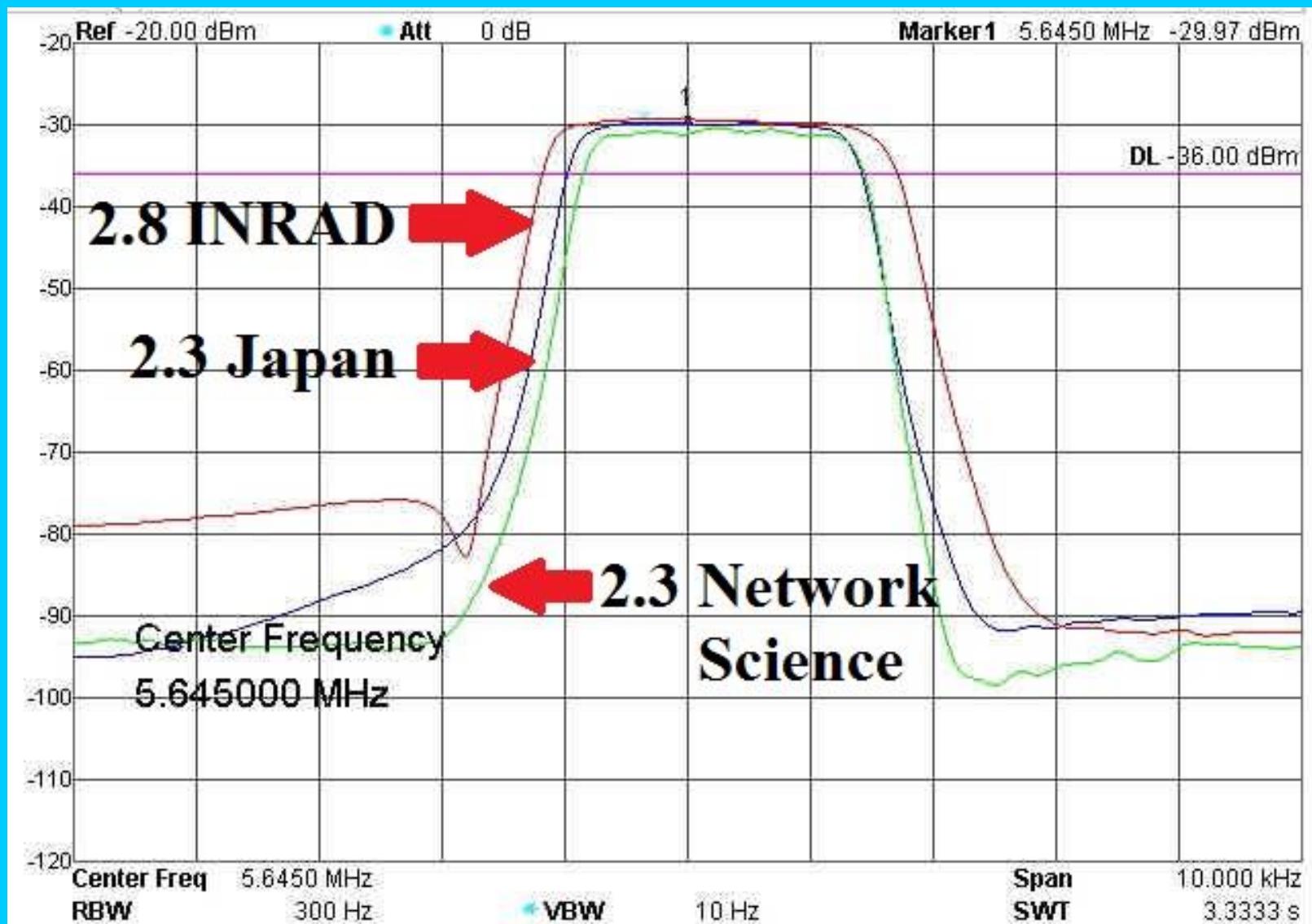
***Stock***

**VS**

***New Imported SSB Filters***

# TR-7 Filters

2.3 Network Science - 2.3 Japan - 2.8 INRAD





*Thank You*

*For Watching*