DESIGNS DEPARTMENT

MANUFACTURING INFORMATION NO. 5.238(73)

Tunable UHF Bandpass Filters FL2/533 (Band IV) and FL2/539 (Band V)

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G.G. [illegible]STONE
FOR HEAD OF DESIGNS DEPARTMENT

Written by N.T. Ellen

D.D.M.I.NO.5.238(73)
Title Sheet

Issue 1
[illegible]

Issue 2
28.3.74

DESIGNS DEPARTMENT MANUFACTURING INFORMATION NO.5.238(73)

Tunable UHF Bandpass Filters FL2/538 (Band IV) and FL2/539 (Band V)

General

These six element comb line filters were designed for UHF translator and active deflector equipment. They have a low pass band insertion loss (≤0.75dB) which makes them suitable for filtering the output of a solid state power amplifier without lossing an excessive amount of power. They also have a high stop band attenuation which can serve to reduce spurious emissions from translator equipment.

Mechanical

Each filter consists of a fabricated box with six cylindrical resonators tuned by threaded cups. Each cup contains a small threaded slug for fine adjustment. Elbow TNC connectors are fitted at the ends of the top plate and they couple capacitively to the filter via adjustable plungers.

Electrical

Band Centre Frequency Range	FL2/538 434 to 579 MHz FL2/539 618 to 835 MHz
Pass band impedance (terminated in 50ohms)	50ohms
Return loss	22dB
Recommended load	50 ohms, 20dB return loss
Transmission loss	≤ 1.1dB over 8MHz
Frequency response	±0.1dB over 8MHz
Typical out-of-band loss	20dB at ± [illegible] MHz from Band Centre 30dB at ± [illegible] MHz from Band Centre

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Issue 1
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Tunable UHF Bandpass Filters FL2/538 (Band IV) and FL2/539 (Band V)

P R O D U C T I O N T E S T S C H E D U L E

1. Equipment Required

Polyskop II
20dB coupler - Narda Microline 3020A
Selektomat
Desifix to type N adaptor
Type N to TNC adaptor
6dB or 10dB coaxial attenuator
A number of 50 ohms leads, adaptors, attenuators and terminations are useful.
2 off Male N type to female BNC for coupler ports.

2 Mechanical inspection

2.1 Remove the side plate. Adjust the coupling plunger with a screwdriver over the total range of travel, ensuring that the faces do not rotate, and that the spring is able to return the plunger to its fully retracted position.

2.2 Free off the six locking nuts and see that all six slugs adjust smoothly over their range of travel. Replace sideplate.

3. Procedure

3.1 In the block diagram below, it will sometimes be found easier to to disconnect the output of the filter and terminate it directly without adaptors. It is perfectly in order to use a male N-type termination in a female TNC scket, but the mating connector is preferred, since it will not fall off.

The 20dB coupler should be screwed directly onto the filter using a maximum of one adaptor.

Set the Polyskop output attenuator to 10dB and the centre frequency to the centre frequency of the channel required, with a sweep of about 20MHz.

Connect the Selektomatt to the forward-wave port of the coupler and tune it to track the polyskop, either on its second harmonic or third harmonic.

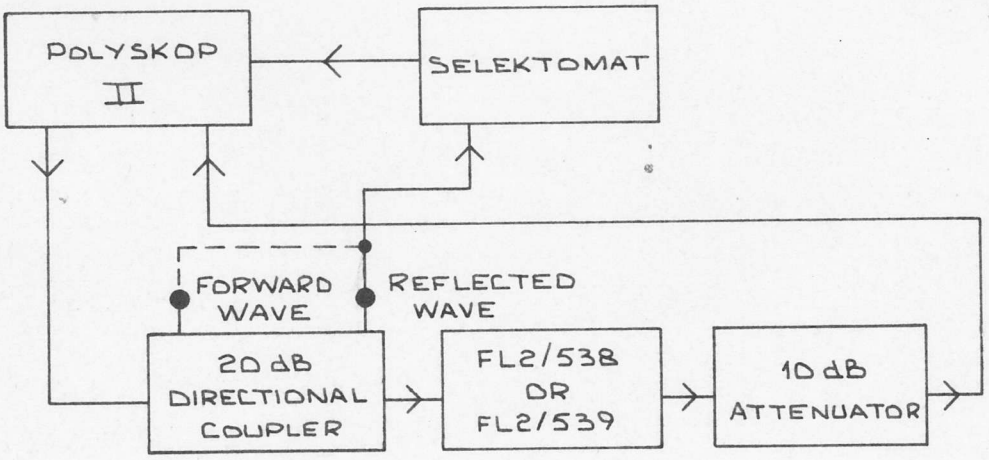

Fig.1 BLOCK SCHEMATIC FOR ALIGNMENT

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3.2. Now transfer the Selektomat to the reflected wave port of the coupler and adjust the gains of the Selektomat and/or Y2 amplifier to give a trace on the screen.

3.3 Tune the resonator nearest the input for a resonance at the centre frequency. This is indicated by a disturbance to the trace which moves along the trace as the resonator is tuned. The four centre resonators should be adjusted well away from resonance by noting whether the input resonator capacitor to the opposite condition.
Obtain a resonace trace that is not too shallow and not too sharp across the channel. Fig 2 shows typical results.

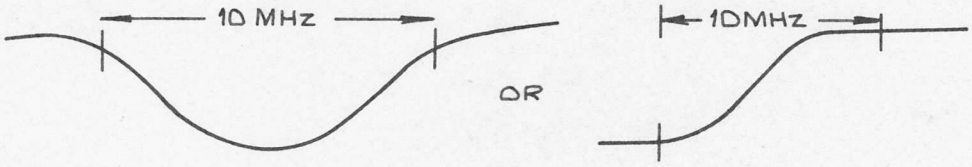

Fig. 2. RESONANCE TRACES OBTAINED ON POLYSKOP

The input coupling will probably have to adjusted to obtain a trace like either of these.

3.4 Draw the resonance trace on the screen with a wax pencil (e.g.Chinagraph). Reverse the filter and repeat 3.3 adjusting the other input resonator and coupling to obtain exactly the same trace as before.

3.5 Adjust the four centre capacitors to resonate within the channel. Six resonances on the reflected signal display should now be seen and after adjusting the four centre resonators for a symmetrical display the shape should correspond to one of the sketches in Fig. 3.

Fig. 3. TYPICAL RETURN LOSS RESPONSES

If the trace is similar to A the input and output are overcoupled. To correct this, turn the coupling adjustment screws at each end of the filter approximately one eighth of a turn anticlockwise and then adjust the two outer resonators for a symmetrical response. Continue until the display is as shown in C. (Note: when the resonators are near their final setting lock the large tuning cups and carry out final adjustments using the centre slugs).

3.6 Check that the filter through response and reflected wave response remain much the same, if the filter is reversed. If there is a significant change then the input and output resonance will have to be rematched as in 3.3 and 3.4.

3.7 Check that the through response is centred on the mid-channel frequency. If it is not then the resonances obtained in 3.3 and 3.4 should be altered in frequency to correct this. Sections 3.3 to 3.7 must be repeated if these adjustments are necessary. (Note: The centre frequency of a television channel is 2.75MHz above the relevant vision carrier frequency).

3.8 Measure the return loss in the wanted channel by setting the reflected wave display to a convenient position on the screen and drawing a horizontal line corresponding to the maximum reflected signal in the channel. Then connect the Selektomat to the forward wave port of the coupler and use the Polyskop output attenuator to bring the incident wave display down to the horizontal mark. The extra attenuation which is necessary is the return loss and this should be 22dB. Care must be taken to avoid overloading the Polyskop (indicated by a sudden depression of the response below the zero line).

3.9 Switch the Y1 amplifier to HF and the Y2 amplifier to EMF. Replace the filter with a through connection and adjust the Y1 and Y2 gains so that the two traces coincide. Now reconnect the filter and reduce the Polyskop attenuator setting by 1dB. Check by interpolation that the filter through response is 50.75dB over at least 8MHz.

3.10 The lock nuts fixing the resonator capacitors should be tightened.

3.11 The measuring capacity of the set-up may be checked by substituting the termination for the filter. This typically gives a return loss of between 26 and 36dB.

3.12 Fix a label to the top of the filter showing the channel to which it has been tuned.

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ISS.	CHANGE	
1	6/1/70	EMB. LOAN * & NOTE, SPEC. & ITEM 19 ADDED. ITEM No 3 WAS D26503 DET 3. WHW JCR. 24.11.72.
2		

ITEM No.	No. OFF	SEE NOTE	DESCRIPTION	C'C'T REF.	BBC REF. OR DRG. No.
			DRAWING NUMBERS.		
			Parts List D26500 A4		
			Assembly D26501 A2		
			Detail 1 D26502 A1		
			Details 2 & 4 D26503 A2		
			Details 5-9 D26504 A3		
			Details 10-11 D26505 A4		
			DETAIL 3 E14542 A4		
			FURTHER INFORMATION REQUIRED FOR MANUFACTURE.		
			Assembly Information EA10484		
			SPEC: ED/FL2/538.		
1	1		Box		D26502 A1, Det. 1
2	1		Cover Plate		D26503 A2, Det. 2
3	2		Block		E14542 A4. DET. 3.
4	2		Slide		D26503 A2, Det. 4
5	2		Copression Spring		D26504 A3, Det. 5
6	2		Stud		D26504 A3, Det. 6
7	2		Clip		D26504 A3, Det. 7
8	6		Locking Nut		D26504 A3, Det. 8
~~9~~	~~6~~		~~Bush~~		~~D26504 A3, Det. 9~~
10	6		Tuning Slug		D26505 A4, Det. 10
11	6		Sleeve		D26505 A4, Det. 11
12					
13					
14	2	*	Panel Elbow Socket T.N.C. 50Ω GE35814.H. GREENPAR.		
15					
16					
17	2	*	Copper Braid 1/16" LG (EACH MADE BY CONTRACTOR FROM:-		
	3"	*	COAXIAL CABLE RG174) SEALECTRO		
			SCREWS FOR FIXING ITEMS.		
19	4		8BA x 1/2" CH. HD. ST. 2n P. 3.		
20	27		6 BA X 1/4" LG. CH. HD. ST. Zn. P 2, 14		
21	2		2BA X 1" Lg. CH. HD. ST. Zn. P		
22	4		6 B.A. X 1"/2 CH. HD. ST. ZN. P. 3		
23			NUTS		
24	6		1/4" B.S.F. Hex HD Full 10		
25	2		2 B.A. HEX HD. FULL		
26	1.		CARTON CARDBOARD		SPEC. ED/FL2/538
27					
28					
29			NOTE:		
30		*	DENOTES ITEMS SUPPLIED ON EMBODIMENT LOAN TO THE		
31			CONTRACTOR BY THE B.B.C. FREE OF CHARGE		
32					
33					
34					
35					

FL2/538 Parts List.

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DS/PLA4

FL2/538
Filter Band Pass U.H.F. Band IV.
Parts List.

DRN.	
TPD.	AG
CKD.	
APPD.	

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