

MARK IV MEMO #189.1

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Subject: Upgrade to video converters for 16 MHz bandwidth
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The Mark III video converters can be upgraded to support 16 MHz by changing capacitor values in the SSB mixer submodule and replacing the filter boards. The new filter board supports the following bandwidths:

- 16 MHz (replacing the 250 KHz filter)
- 8 MHz (replacing the 1 MHz filter)
- 4 MHz
- 2 MHz
- 0.5 MHz
- 0.125 MHz
- External

The new board provides the same gain to the square law detector *output* as the original design while providing a constant (AGC leveled) 0 dBm output to the formatter and -10 dBm to the front panel monitor. *The circuit has recently been revised (per suggestion of Albert Bos) to use an IC square law detector in place of the back diodes.*

The 10 dB gain switch changes only the gain to the square law detector. The AGC action is within ± 0.5 dB for total power levels from 0.05 (0.5 with extra 10 dB gain selected) to saturation. The AGC levelling action is absent for total power readings less than 0.01 (0.1 with extra 10 dB gain selected). Figure 1 shows the total power reading and video output level vs the input signal level. Figure 2 shows the 16 MHz bandpass. Since the AGC is extremely broadband the 16 MHz bandpass flatness is independent of input signal level. Figures 3 and 4 show the updated circuit diagrams for the Mk4 version of the SSB mixer and filter board. *The change in single band delay through the board over the full range of the AGC action is less than 1 ns.*

The combination of the new filter board and changes to the SSB mixer pole zeroes will require software phase corrections for the Lower Sidebands for baselines between mixed systems like those now applied for VLBA to Mk3. The exact values for VLBA to Mk4 to Mk 3, etc. have yet to be determined.

Revised Text

SSB Mixer Capacitor Values (from Mark IV Memo #072)

Change range of all pass filters from 800Hz→8MHz to 1600Hz→16MHz by changing capacitors.

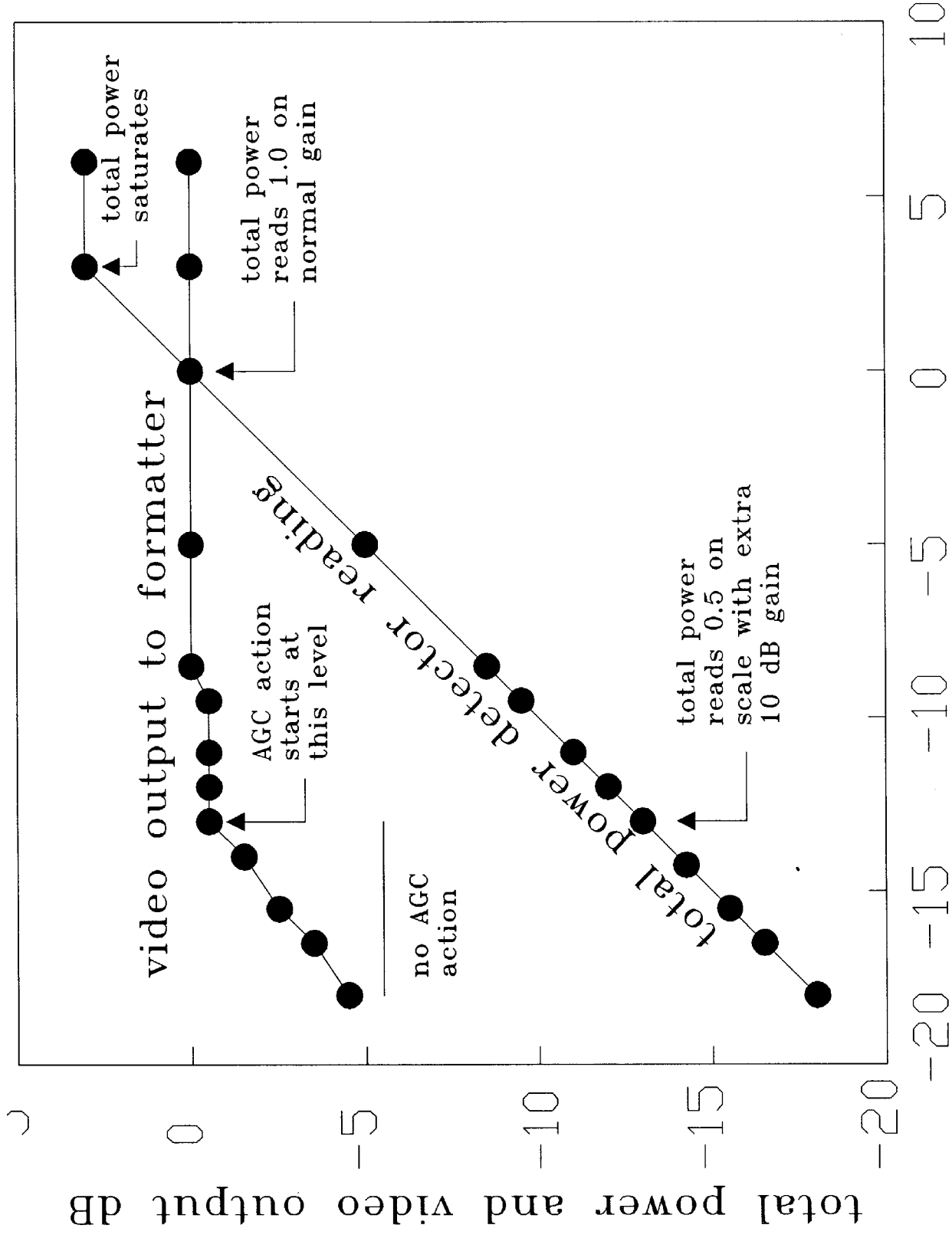
<u>CAPS</u>	<u>MKIIIμf</u>	<u>MKIV PROPOSED</u>	<u>KEMET PART #</u>
C19,C20	560,000	273,744	C1210C274M5UAC
C17,C18	110,000	53,800	C1208C563K5RAC
C15,C16	29,000	14,184	C1208C153K5RAC
C13,C14	7,700	3,805	C1210C392J5GAC
C11,C12	2,000	1,007	C1208C102J5GAC
C9, C10	550	267	C1208C271J5GAC
C7, C8	140	70	C1208C680J5GAC
C5, C6	28	14	C1208C150J5GAC
C1,C2,C3,C4	12	4.7	C1208C479D5GAC

Parts list for new filter board

<u>Part #</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Qty/Filter</u>	<u>Brd</u>	<u>Unit Cost</u>
F205-14P4	16 MHz LPF	Allen-Avionics	1		100
F205-7P2	8MHz LPF	Allen-Avionics	1		100
835JN	*Sq.Law Det.*	Analog Devices	2		
811AN	Op. Amp.	Analog Devices	*3*		
834JN	Multiplier	Analog Devices	1		
3401	Pin Diodes		16		
*BD4	Back Diodes	*DELETE*	2	*	
5082-2835	Diode	Hewlett-Packard	1		
LM340	Regulator		1		
10 μ F 25v	Cap.		28		
1 μ F	Ceramic Cap.		4		
0.1 μ F	Ceramic Cap.		*3*		
SMC	Connector		5		
220pF	Cap.		2		
0.47 μ H	Inductor		1		
1/4W Resistors	See circuit diagram for values				
3M3491	Connectors		2		

Attachment: 4 Figures (Figure 4 Revised)

Revised Text



total power and video output dB

video output to formatter

total power detector readings

total power saturates

total power reads 1.0 on normal gain

AGC action starts at this level

no AGC action

total power reads 0.5 on scale with extra 10 dB gain

relative input power dB

AGC leveled output for new MKIII filter board

REF 0.0 dBm ATTEN 10 dB

10 dB/

STOP
32.0 MHz

STOP 32.0 MHz
SWP 960 msec

START 0 Hz
RES BW 100 kHz VBW 1 kHz

New filter board 16 MHz BW

