

Radio Direction Finder DDF6000 from Doppler Systems

Rev 1.5
December 9th 2011
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Hello,

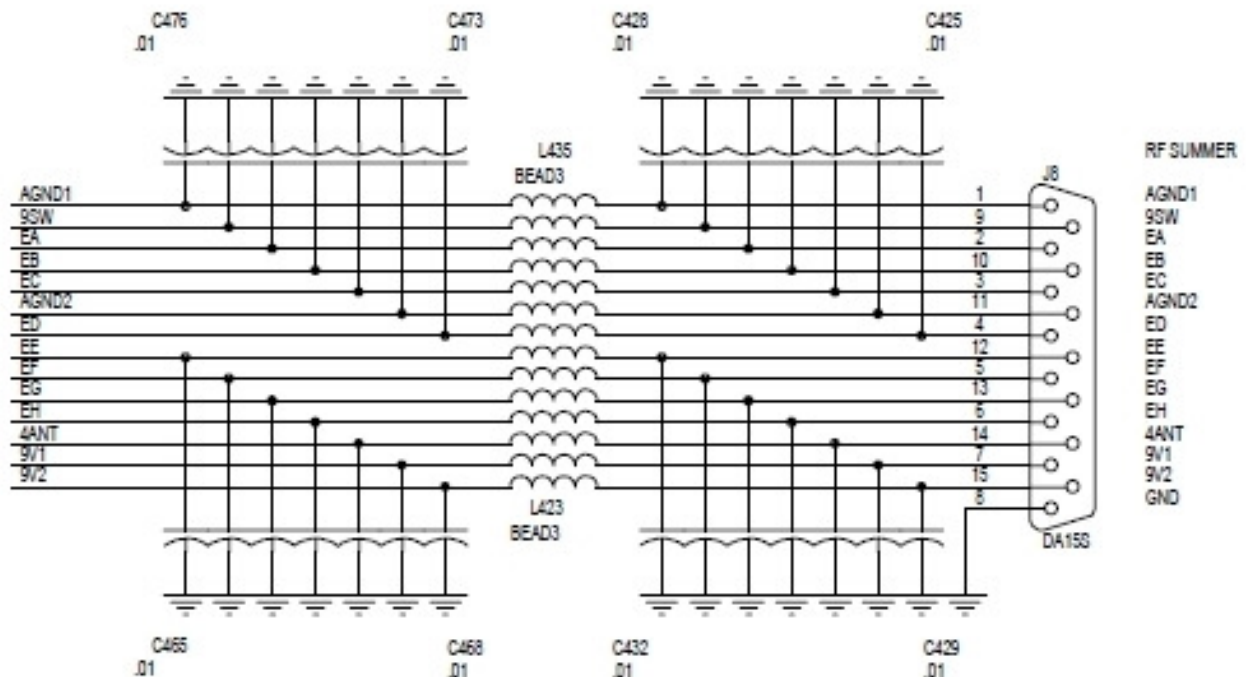
Having always been interested in Radio Direction Finders based on Doppler effect I noticed, that the DDF6000 system from Doppler Systems is meanwhile available second hand on the market. Reviewing the data of said system I got very interested for use in Ham Radio applications, especially for 2m, 70cm and 23cm bands.

I was able to acquire such a unit not including the antenna switch unit and no antenna. Here are pictures of the unit:



As the RF units are missing I gathered some of the necessary information from the available documentation:

Interface specification of J8 (RF summer) port (15 pin SUB-D):



The signals are as follows:

AGND01, AGND02 and GND = ground

9SW = output signal which controls an attenuator in each channel,
(0V = attenuator off, 9V = attenuator on)

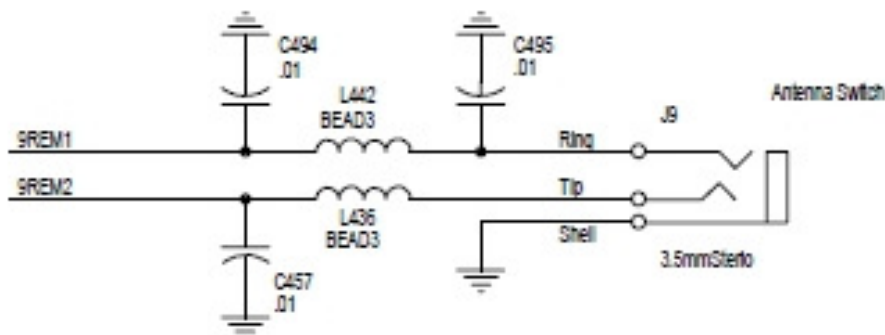
EA-EH = enable signals for each channel A to H, this is not a rectangular digital signal but in order to have a higher performance "soft switching" Doppler based radio direction finder the signal has slopes,
(0V channel enabled, 9V channel disabled)

4ANT = control input to determine whether a 4 antenna array or a 8 antenna array is connected
(open = 4 antenna mode, externally connected to ground = 8 antenna mode)

9V1 = output providing +9V DC supply to the 4 antenna array electronics

9V2 = output providing +9V DC supply (not use for 4 antenna arrays, connect externally to 9V1 when using an 9 antenna array)

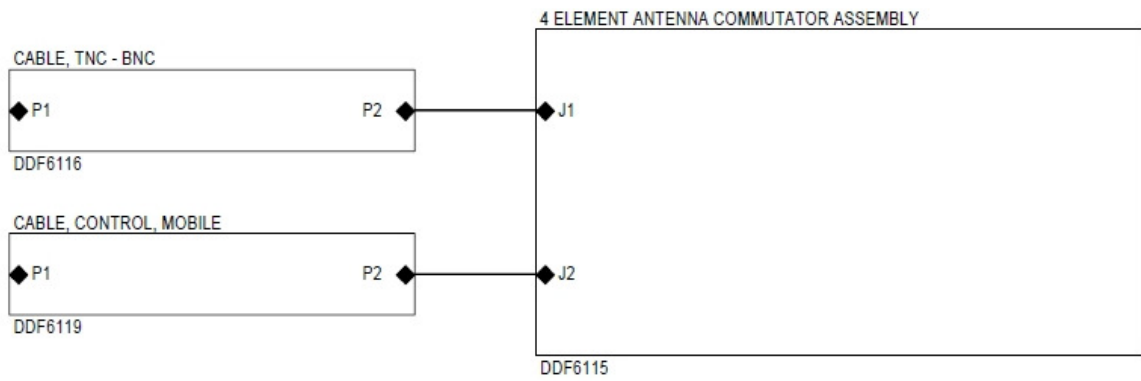
There is another signal which can be used in the RF section in order to select the intended antenna array. It is called J9 (Ant. SW) and is a 3.5mm stereo phono plug. With this output it is possible to switch between 3 different RF summers and antenna array.



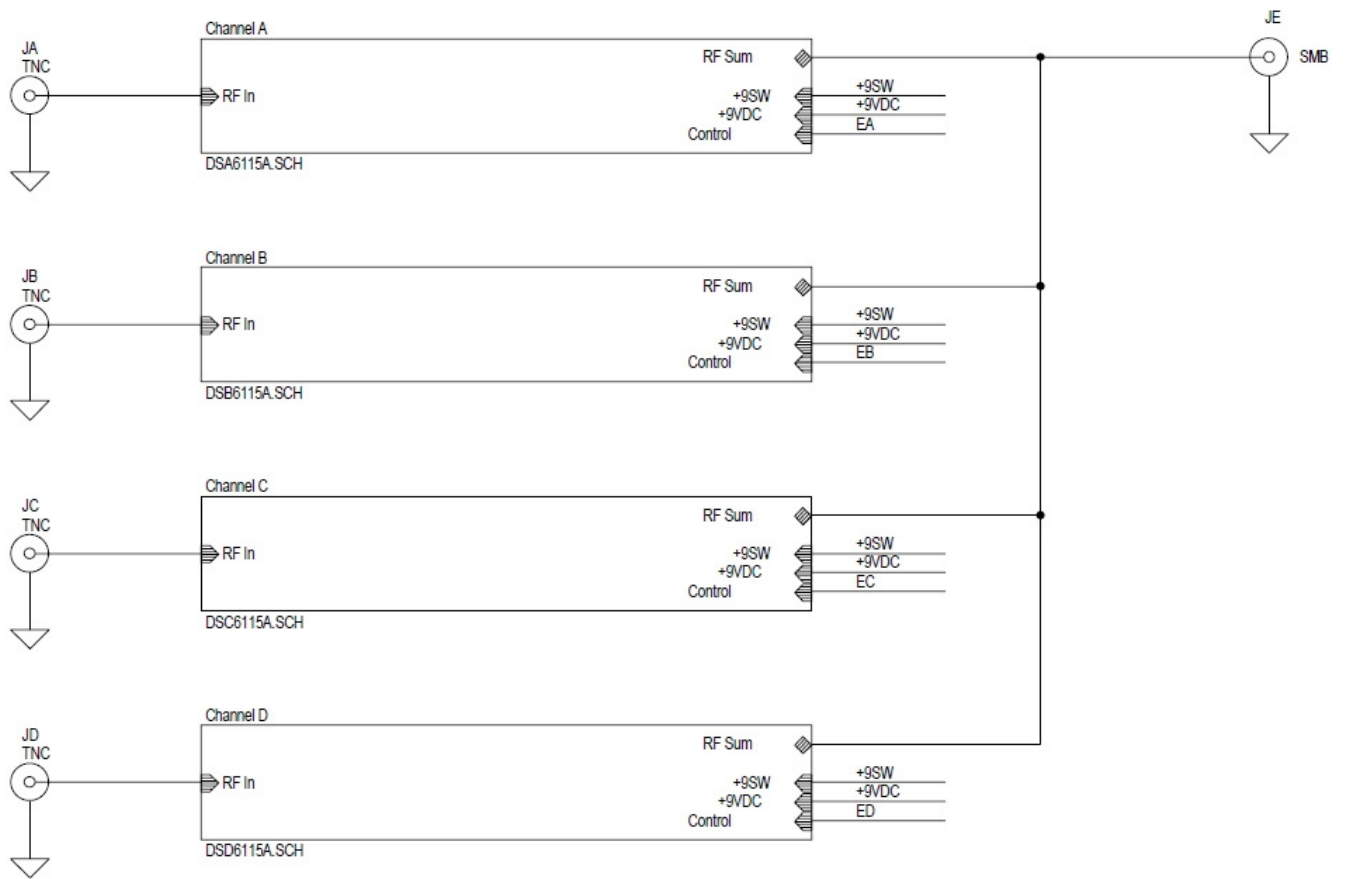
9REM1 and 9REM2 are output ports which are each internally connected via 350 Ohms to the +9V DC supply rail when enabled. They can thus drive directly small relays.

There are two families of RF summers available: one family is intend to be used at stationary setups and supports an array of 8 antennas, the other family is mostly intended for mobile setups and supports an array of 4 antennas. Both are connected to the above mentioned port J8 (RF summer).

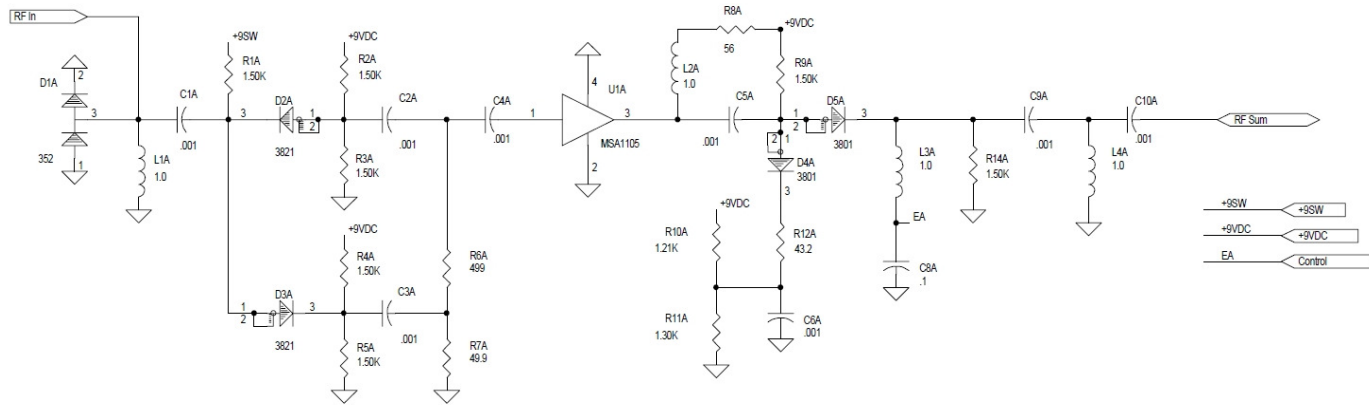
Here are descriptions for a 4 antenna setup. First the description of the necessary interconnections:



Here is the DDF6115 4-Element Commutator Assembly

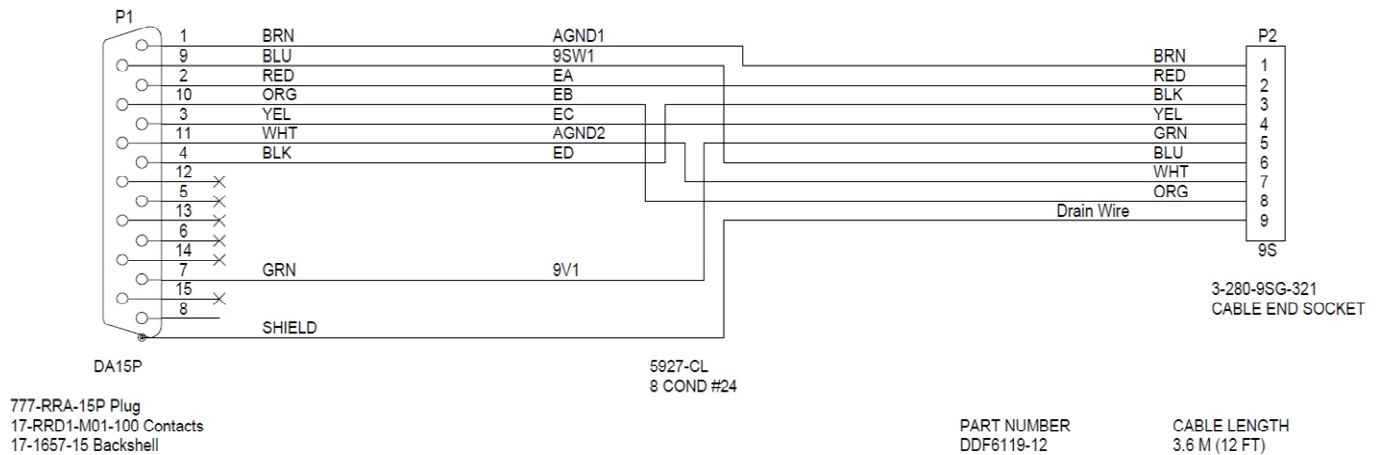


Here is a schematic of each channel:

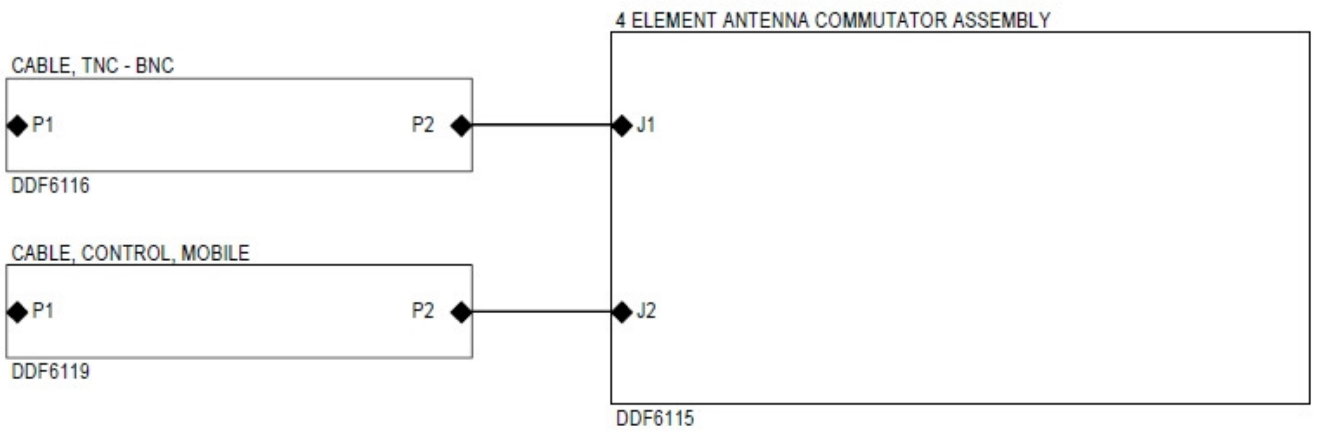


The electronics of each channel consists of a switchable 20 dB attenuator (comprised of D2A, D3A, R6A, R7A), a broad band amplifier (based on MSA-1105, $G_p=13\text{dB}$, $NF=3.6\text{dB}$), and an output switch (comprised of D4A, D5A, R12A) which either routes the amplified signal to the summing port or routes the signal to an integrated dummy load..

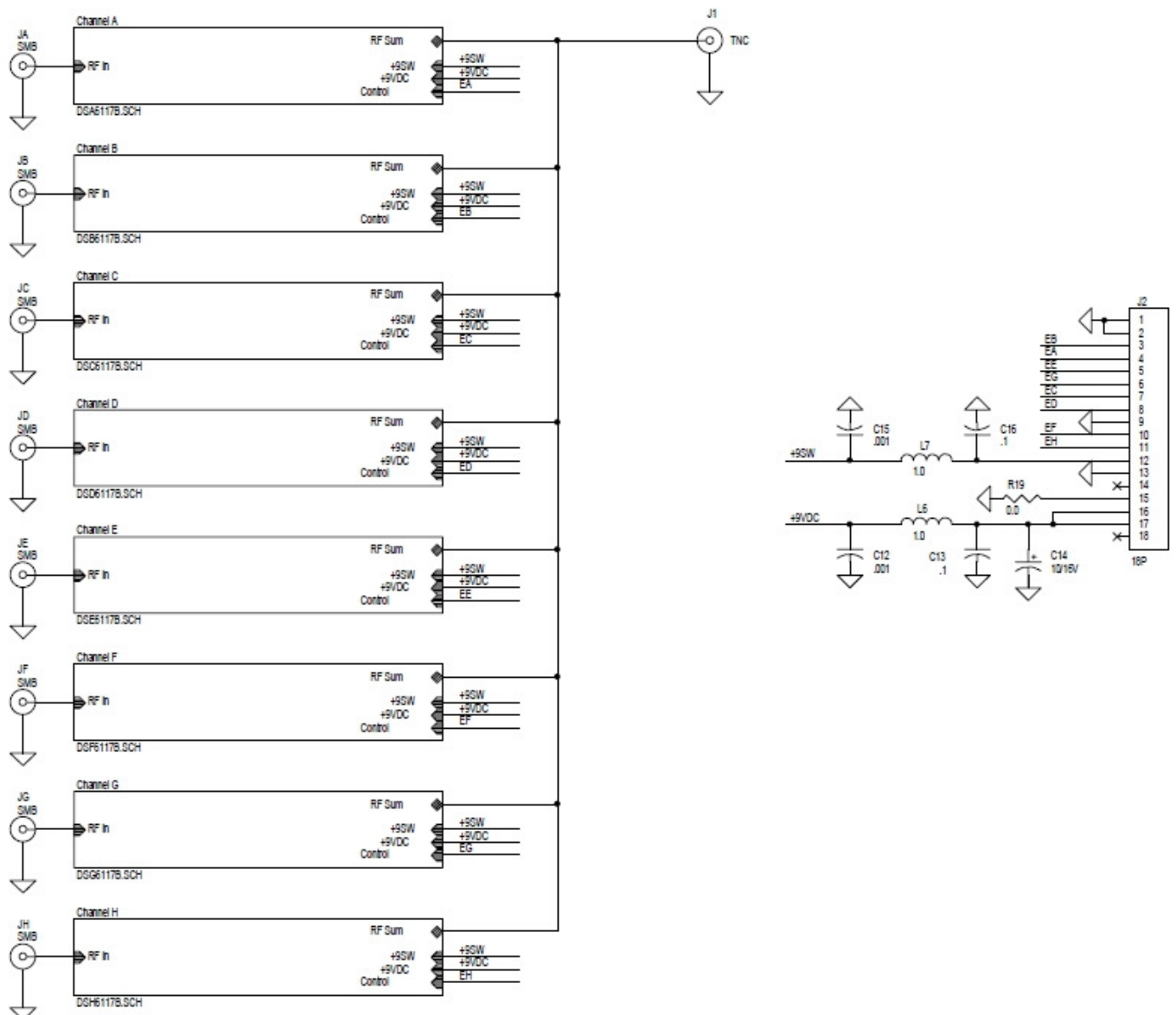
Finally the description of the DDF6119 Mobile Control Cable which connects the main unit to the Commutator Assembly:

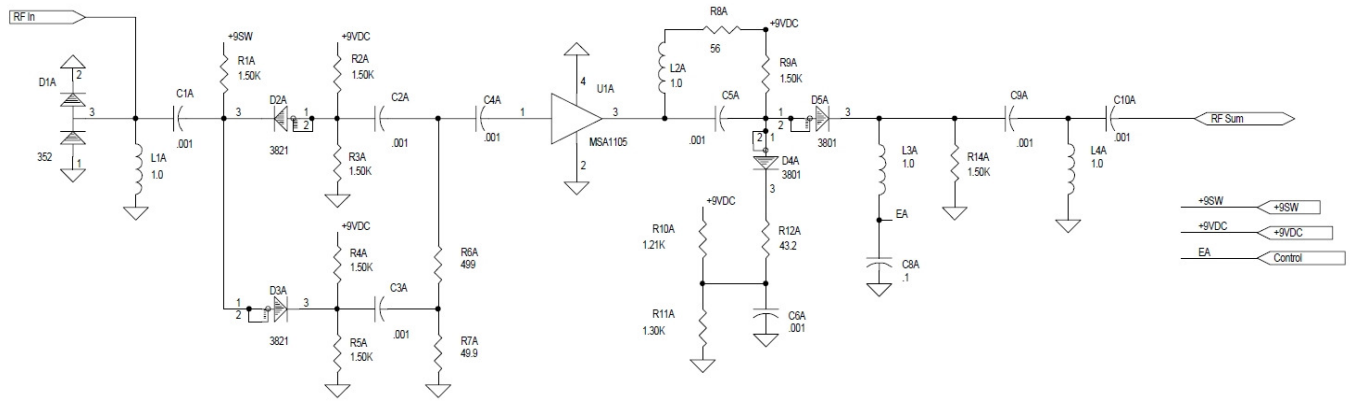


Here are descriptions for a 8 antenna setup. First the description of the necessary interconnections:

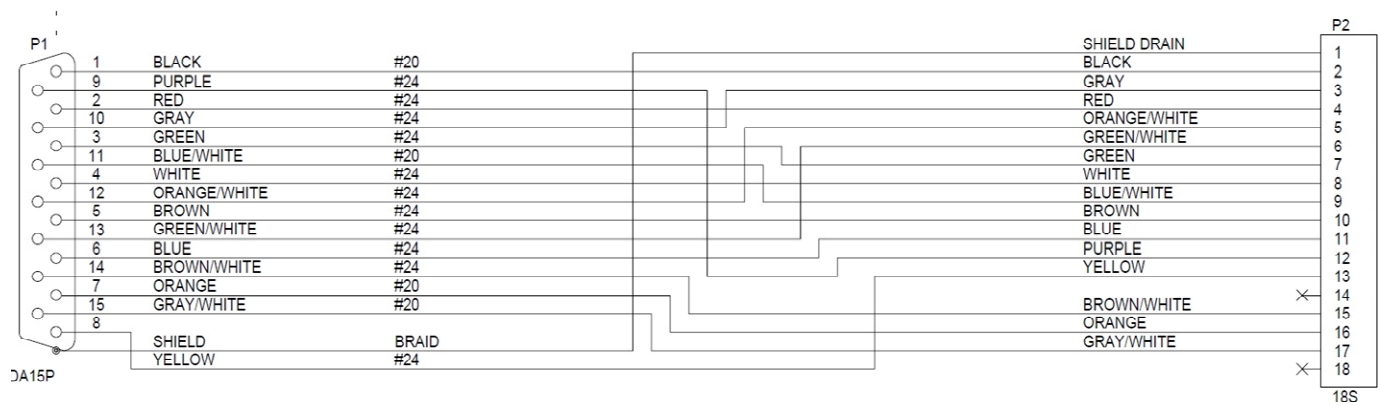


Here is the DDF6117 8-Element Commutator Assembly

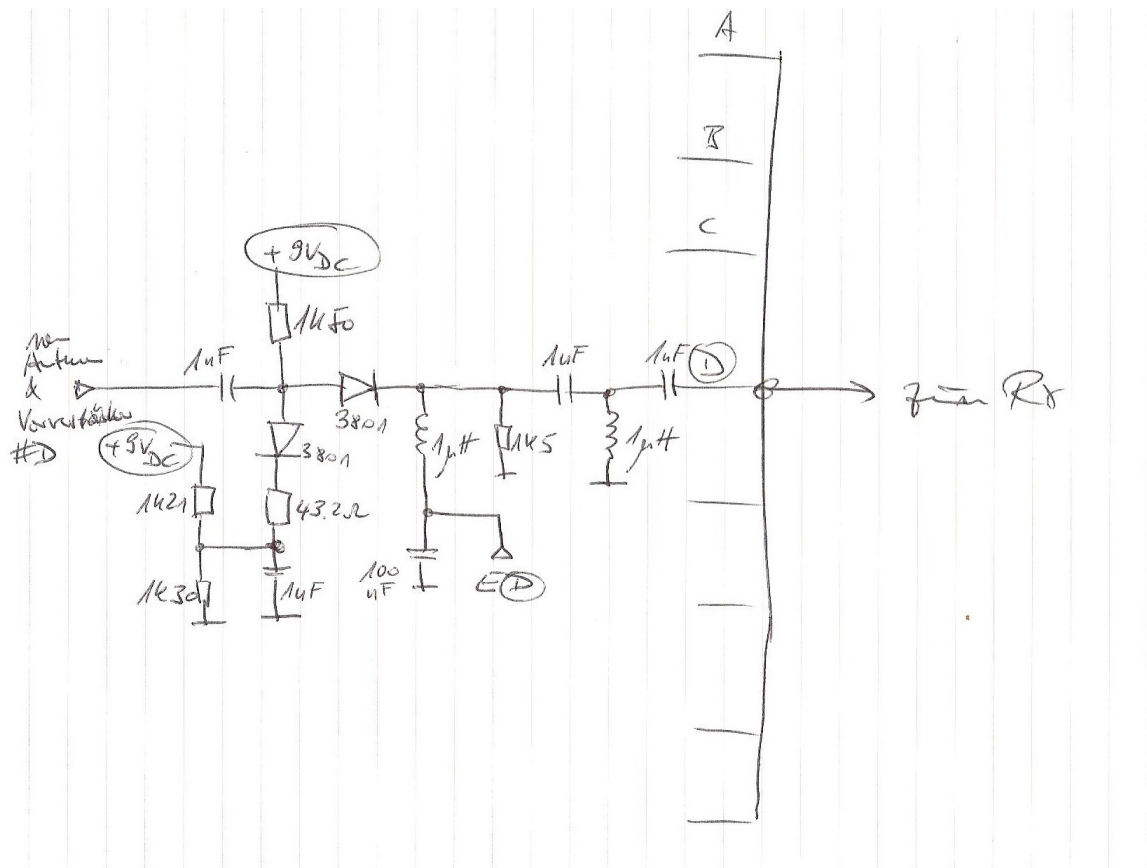




Finally the description of the DDF6118 Fixed Site Control Cable which connects the main unit to the Commutator Assembly:



Here is a first draft of a homebrew antenna summer which I intend to use with active antenna elements and does therefore not include the MMIC amplifier stage:



The PIN-Diodes “3801” are most likely of the type HMSP-3801 from Agilent.

I intend to use active dipole antennas from R&S. As their power is supplied via the coaxial output port appropriate bias-Ts will have to be inserted. The band switching of the R&D antennas are done by changing the supply voltage. The output signals 9REM1 and 9REM2 could be used in combination with some logic to control the band switching of the R&S antennas.

Please send your feedback it to the Email address below.

Best regards

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