



JH 20-pole Phaser  
 (c) 2007 J.Haible  
 inspired by ARP, Tau and Aries circuits  
 Drawing 2:  
 All Pass Filters

Transistors need to be matched in pairs.  
 They can be either

10 x CA3046 Arrays (tested), or

20 x LM394 pairs (tested), or

10 x CA3086 Arrays (untested), or

20 x SSM2210 (untested)

Similar npn transistor pairs will probably all work  
 if they have the right pinout.

Capacitors are 15nF.

The board is designed for either 5mm spacing  
 (like Wima MKS2) , or 7.5mm spacing (like  
 Siemens MKH)

There should be plenty of other types available  
 that fit into the board.

I recommend 5% tolerance; but the (related)  
 ARP Quadra phaser specifies tolerances as high  
 as 20%, so I guess it's not that critical.

If you have difficulties getting 15nF value, 10nF  
 or 22nF will probably do also.