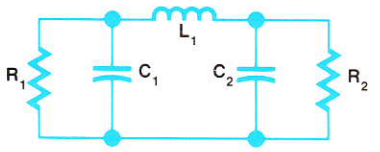
PI NETWORK IMPEDANCE MATCHING

A lossless network is often used to match between two resistive impedances, R_1 and R_2, as shown.



Given the values of R_1 and R_2, the frequency f, and the desired circuit Q (center frequency/desired half-power bandwidth), the values of C_1, C_2, and L_1 can be found.

Notes:

1. R_1 must always be greater than R_2 and

$$Q > \sqrt{R_1/R_2 - 1}\,.$$

2. Circled numbers on the magnetic card designate the register in which a variable is stored.

HP-65 User Instructions

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Initialize		RTN	R/S	0.0000
3	Input R_1	$R_1(\Omega)$	E	A	$R_1(\Omega)$
	and R_2	$R_2(\Omega)$	A		$R_2(\Omega)$
	and f	f(Hz)	E	B	f(Hz)
	and Q	Q	B		Q
4	Compute C_1		E	C	C_1(F)
5	Compute C_2		C		C_2(F)
6	Compute L_1		D		L_1(H)
7	Recall inputs (optional)				
	R_1		RCL	1	$R_1(\Omega)$
	and/or R_2		RCL	2	$R_2(\Omega)$
	and/or f		RCL	3	f(Hz)
	and/or Q		RCL	4	Q
8	For new case change appropriate				
	input in step 3.				

Fig. 3. *This program converts the HP-65 into an electrical engineer's calculator.*

series inductor (see Fig. 3).

For more information on HP-65 keys and programming, see the article beginning on page 8.

Magnetic-Card Reader/Writer

The HP-65's built-in magnetic card reader/recorder uses mylar-based ferrite-oxide-coated cards 0.95 cm wide and 7.1 cm long. Each card can store 100 program steps or 600 bits of information. A two-track self-clocking recording scheme is used to maximize the system's tolerance to head skew and n speed variations (see box below).

When the right-hand switch just below the dis is in the RUN position, insertion of a card intc reader slot in the right side of the calculator trig the motor and read circuits. All 100 program step the card are read into the calculator's memory.

When the same switch is in the W/PRGM positio sertion of a card triggers the motor and writing cuits, and the contents of the calculator's memor written on the card. A card that has the file-pr tab (upper left corner) clipped off will not trigge writing circuits; the program on the card is the protected against accidental erasure.

More information on the design of the tiny reader is contained in the article beginning on 15.

System Organization

Like its ancestor, the HP-35, the HP-65 contai arithmetic and register circuit, a control and ti circuit, and three read-only-memory (ROM) circ In the HP-65, each ROM is actually a quad ROM taining the equivalent of four single ROMs. Lik more recent predecessor, the HP-45, the HP-65

A Self-Clocking Two-Track Recording Techniqu

When the HP-65 records a program on one of its sm magnetic cards, it places two side-by-side tracks of varyi magnetic flux on the card. One track represents the logical in the binary data stream coming from the program memo and the other track represents the logical 0's. The 1 track cc tains a flux reversal for each 1 in the data sequence and no f change for each 0. The 0 track contains a flux reversal for ea 0 and no flux change for each 1. The diagram shows example.

The technique is self-clocking because there is a flux trar tion for each bit. Thus no separate clock track is needed.

The scheme also maximizes the system's tolerance to he skew and motor speed variations. The data can be recover correctly even if a transition in one track almost overlaps transition in the other. By contrast, other two-track schem usually have one clock track and one data track, and may m read data when there is only minor misalignment of clock a data transitions.