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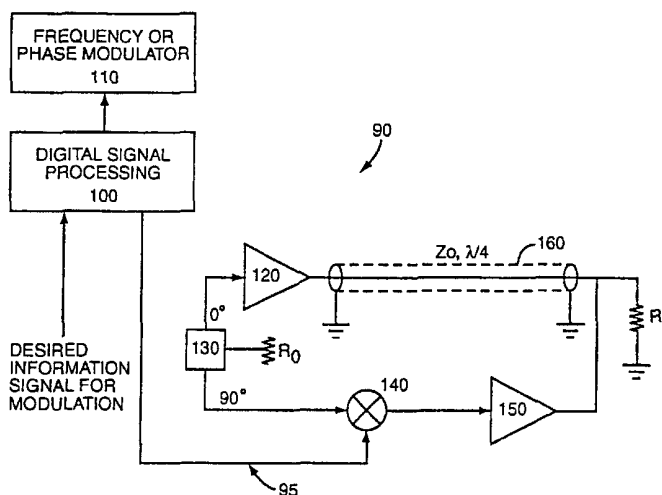
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(54) Title: LINEAR MODULATION USING A LINEAR AND A NON-LINEAR AMPLIFIER



(57) Abstract: A power amplifier uses a modulation technique that varies amplitude of a drive signal and, optionally, phase angle of the drive signal. The power amplifier comprises two coupled amplifiers, a first one of which is operated saturated to produce a constant voltage output. The first amplifier is coupled to a second one of the amplifiers via a quarter wave transmission line. The second amplifier is operated in a linear mode to deliver an output signal controlled by an amplitude-modulating signal. The amplitude modulating signal may be a bipolar modulation signal that produces both positive and negative outputs from the second amplifier that add to or subtract from the output from the first amplifier to develop at a load impedance net output signal amplitudes varying between a minimum or "trough" amplitude and a maximum or "crest" amplitude. The coupling of the first and second amplifiers through a quarter-wave line allows the signal current of the second amplifier to modulate the effective load impedance seen by the first amplifier to provide efficient amplifier coupling.

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H03F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

PAJ, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 757 229 A (MITZLAFF JAMES EDWARD) 26 May 1998 (1998-05-26) column 3, line 11 - line 20; figures 1,6 column 6, line 14 - line 25	1-3, 20, 21, 48-50
A	US 6 097 252 A (MYERS RONALD GENE ET AL) 1 August 2000 (2000-08-01)	
A	RAAB F H: "EFFICIENCY OF DOHERTY RF POWER-AMPLIFIER SYSTEMS" IEEE TRANSACTIONS ON BROADCASTING, IEEE INC. NEW YORK, US, vol. BC-33, no. 3, 1987, pages 77-83, XP000971246 ISSN: 0018-9316	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Information on patent family members

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Patent document cited in search report	A	Publication date	Patent family member(s)	Publication date
US 5757229	A	26-05-1998	AU 702964 B2	11-03-1999
			AU 2729297 A	21-01-1998
			CA 2257887 A1	08-01-1998
			EP 0908006 A1	14-04-1999
			JP 2000513535 T	10-10-2000
			WO 9800912 A1	08-01-1998
US 6097252	A	01-08-2000	WO 9856107 A1	10-12-1998