

Exhibit E-27
Invalidity of U.S. Patent No. 10,958,296 by U.S. Patent No. 6,999,523 to Posti (“Posti”)

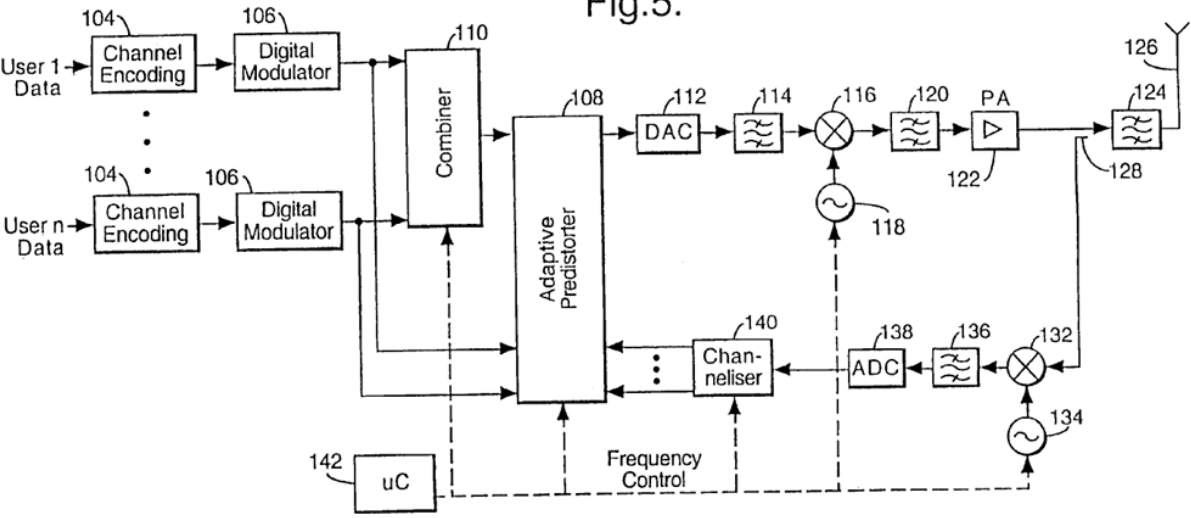
The Asserted Claims of U.S. Patent No. 10,958,296 (“the ’296 Patent”) are anticipated and/or rendered obvious in view of U.S. Patent No. 6,999,523 (“Posti”) alone or in combination with other prior art. . Posti was filed on June 22, 2001 and was published on February 21, 2002, claiming priority as a continuation of International Patent Application No. PCT/EP98/08445, filed December 24, 1998. Posti, thus, is prior art to the ’296 Patent at least under 35 U.S.C. § 102(b).

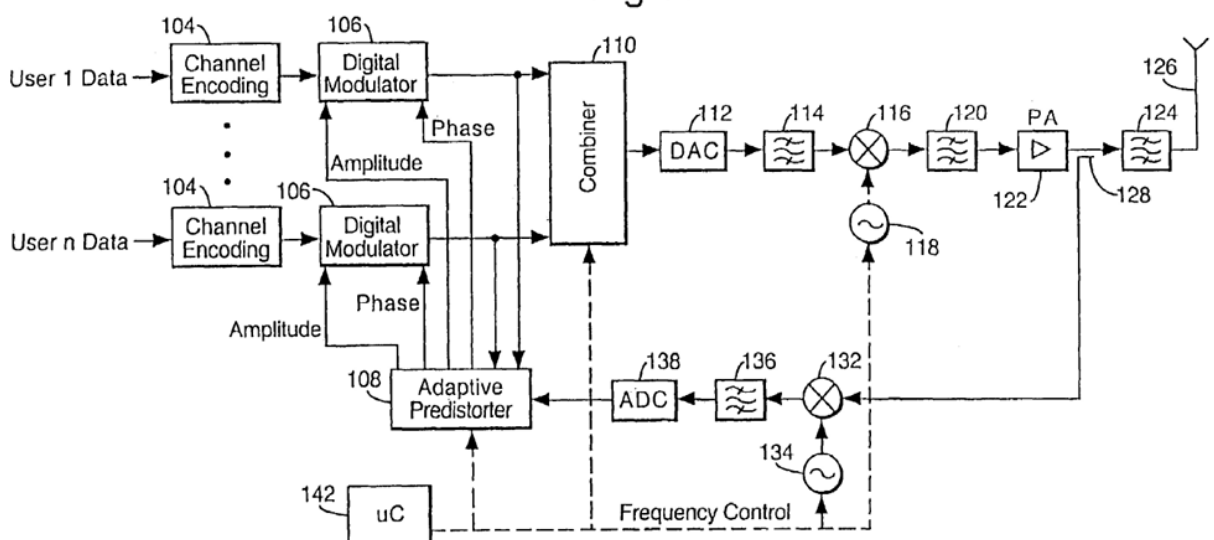
As described in detail below, Posti anticipates Asserted Claims 1–10 of the ’296 Patent. In addition, to the extent that Smart RF asserts that Posti or citations below are insufficient, every limitation set forth in the claim was predictable and obvious in view of the knowledge and progression of the art. As such, it would have been obvious to one of ordinary skill in the art at the time of the alleged invention, based on the explicit and implicit teaching of this reference and the prior art, the knowledge of one of ordinary skill in the art, and/or the nature of the claimed invention and the problem(s) purportedly being solved to take the purportedly missing element from the art and combine it with the other elements in prior art identified in the cover pleading or herein.

This claim chart is based on Defendants’ present understanding of the asserted claims, Smart RF’s vague and overbroad infringement contentions (and corresponding, implicit claim constructions), and Defendants’ investigations to date. Defendants are not adopting Smart RF’s apparent constructions, nor are Defendants admitting to the accuracy of any particular construction. Defendants reserve all rights to amend this invalidity claim chart in light of any claim-construction developments or any amendment to Smart RF’s infringement contentions. Further, as discovery is ongoing and Defendants continue to seek discovery from third parties regarding the references identified in Defendants’ invalidity contentions as well as other potential prior art, Defendants reserve the right to amend or supplement this claim chart identified in connection with Defendants’ continuing investigation. At minimum, Defendants intend to revise their invalidity contentions as appropriate to include discovery from third parties as discovery progresses. The claim chart below identifies where each limitation of the asserted claims of the ’296 Patent can be found in Posti. The citations provided below are exemplary, rather than exhaustive, and Defendants reserve the right to rely upon any other portion of the cited references.

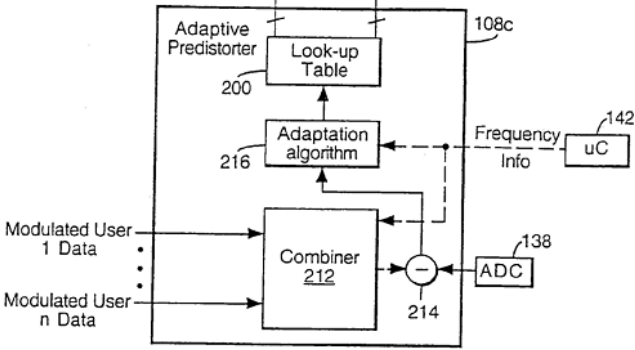
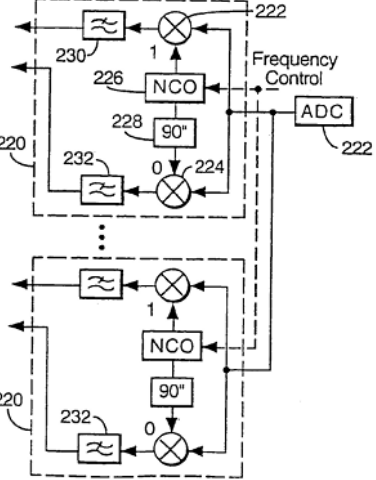
Claim No.	’296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
1[pre]	A linearized transmitter comprising:	To the extent the preamble is limiting, Posti discloses and/or renders obvious a linearized transmitter. <i>See, e.g.,</i>

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		“A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” Fig.4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104) and Digital Modulators (106). The outputs of the digital modulators are combined in a Combiner (110). The combined signal then passes through an Adaptive Predistorter (108). The output of the predistorter is converted to analog by a DAC (112) and then filtered by a low-pass filter (114). This signal is multiplied by a carrier wave (118) in a mixer (116). The resulting signal is filtered by a low-pass filter (120) and amplified by a Power Amplifier (PA, 122). The amplified signal is transmitted via an antenna (126) and received by a receiver antenna (124). The received signal is filtered by a low-pass filter (128) and converted to digital by an ADC (138). The digital signal is then filtered by a low-pass filter (136) and multiplied by a carrier wave (134) in a mixer (132). The output of the mixer is converted to analog by a DAC (140) and fed back into the Adaptive Predistorter (108). A microcontroller (uC, 142) provides Frequency Control signals to the Adaptive Predistorter (108) and the DAC (140). Fig. 5.

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		Fig.6.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a central Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116) where it is mixed with a local oscillator signal (118). The resulting signal (120) passes through another filter (122) and a Power Amplifier (PA) (124) to be transmitted via an antenna (126). A feedback loop is shown where the transmitted signal is received by an antenna (128), passes through a filter (132), and is mixed with a local oscillator signal (134) in a multiplier (136). The output of this multiplier goes through a filter (138) and an ADC (138) to an Adaptive Predistorter (108). The Adaptive Predistorter provides feedback to the Digital Modulators (106) to adjust their Amplitude and Phase outputs. A microcontroller (uC) (142) is connected to the Adaptive Predistorter and the Frequency Control block, which provides the local oscillator signals (118 and 134) to the multipliers (116 and 136). Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7. Fig.8. Figs. 7 and 8.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

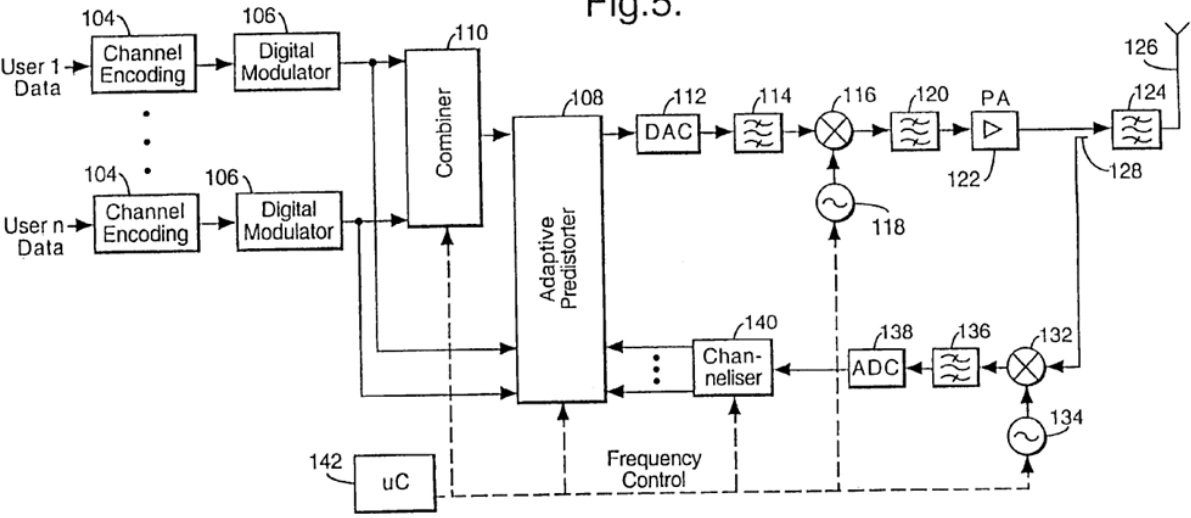
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
1[a]	a digital signal predistorter block including digital baseband signal predistorters effecting predistortion of concurrent input signals to output concurrent predistorted signals;	Posti discloses and/or renders obvious a digital signal predistorter block including digital baseband signal predistorters effecting predistortion of concurrent input signals to output concurrent predistorted signals. <i>See, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

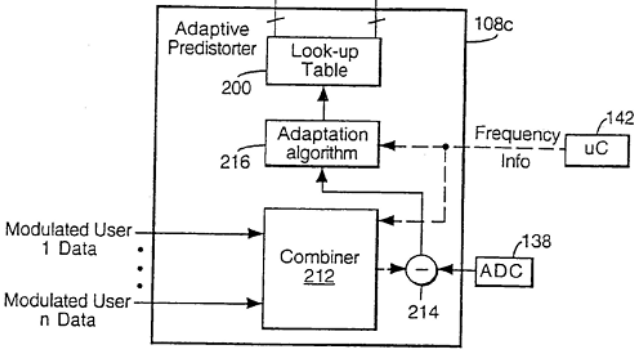
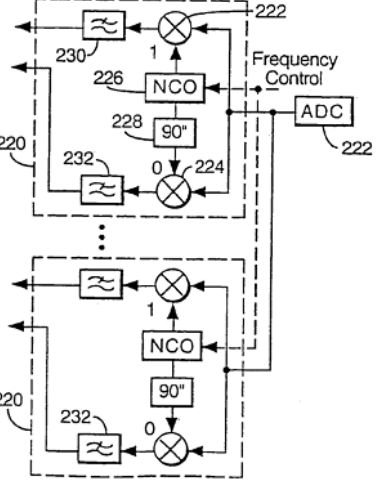
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

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		Fig.5.  The diagram illustrates a system for processing multiple users' data. On the left, 'User 1 Data' and 'User n Data' are inputs to 'Channel Encoding' blocks (104). These outputs go to 'Digital Modulator' blocks (106). The modulated signals are combined in a 'Combiner' (110). The combined signal passes through an 'Adaptive Predictor' (108), then a 'DAC' (112), and a filter (114). It is then multiplied by a local oscillator (118) at block 116. The resulting signal passes through another filter (120) and a 'PA' (122). The output is transmitted via an antenna (126) and received by a receiver antenna (124). The received signal passes through a filter (128) and is multiplied by a local oscillator (134) at block 132. The result passes through a filter (136) and an 'ADC' (138). The digitized signal is then processed by a 'Channeliser' (140). A 'uC' (142) provides 'Frequency Control' to the 'Adaptive Predictor' (108) and the 'Channeliser' (140). The 'Channeliser' (140) also provides feedback to the 'Adaptive Predictor' (108). Fig. 5.

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1[b]	a power amplifier block connected to amplify the predistorted signals; and	Posti discloses and/or renders obvious a power amplifier block connected to amplify the predistorted signals. <i>See, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55.

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		“Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

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		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

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		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

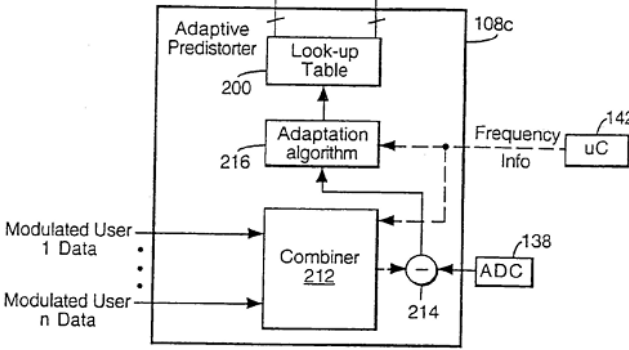
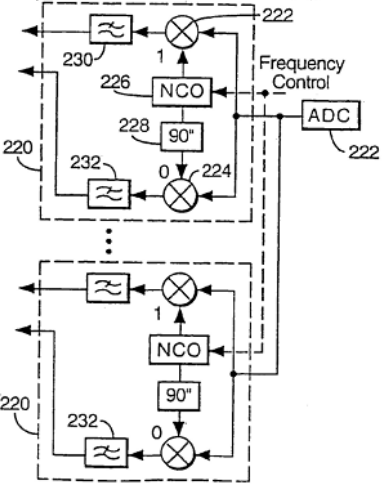
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtractor 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtractor 208 thus receives two modulated signals. The two signals received by each subtractor 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

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		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

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		Fig.5. Fig. 5.

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		Fig.6. Fig. 6.

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		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

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1[c]	an analyzing and modelling stage receiving first feedback signals taken from an output of the power amplifier, and second feedback signals taken concurrently from the concurrent predistorted signals and using the first feedback and the second feedback signals in the analyzing and modelling stage to model a nonlinearity in the power amplifier, wherein the digital baseband signal predistorters are updated by the analyzing and modelling stage.	Posti discloses and/or renders obvious an analyzing and modelling stage receiving first feedback signals taken from an output of the power amplifier, and second feedback signals taken concurrently from the concurrent predistorted signals and using the first feedback and the second feedback signals in the analyzing and modelling stage to model a nonlinearity in the power amplifier, wherein the digital baseband signal predistorters are updated by the analyzing and modelling stage. <i>See, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55. “Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

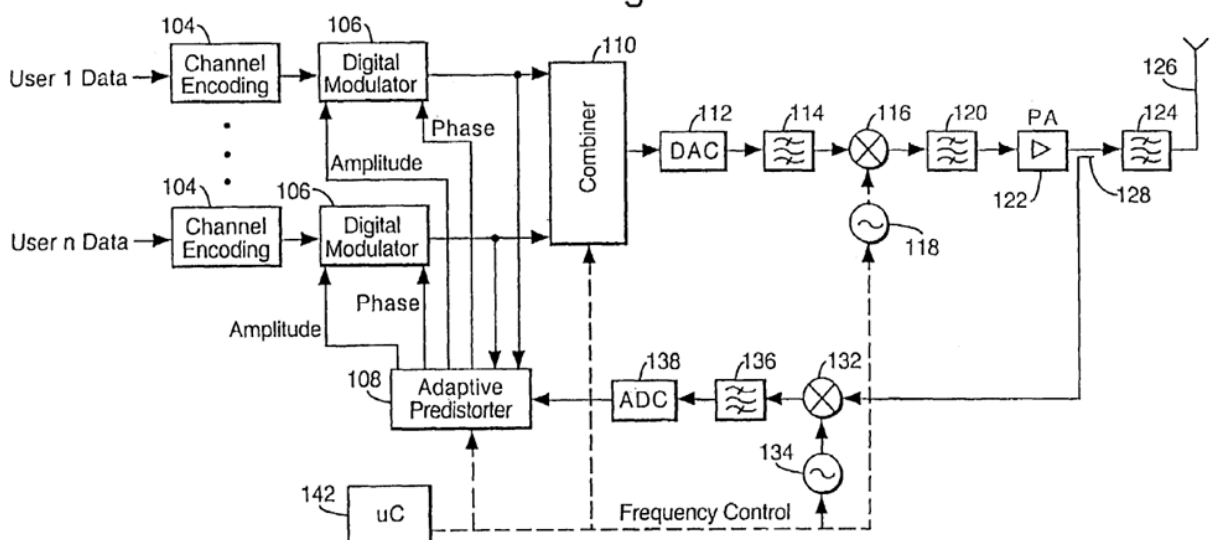
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

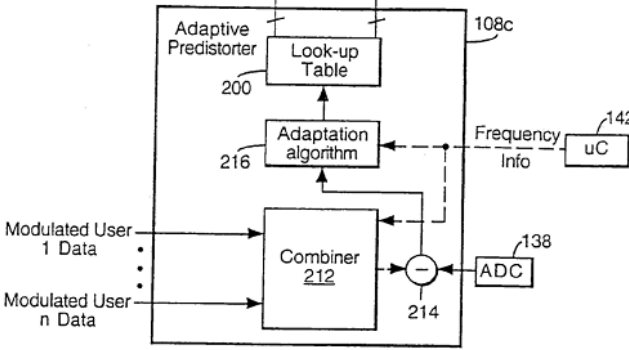
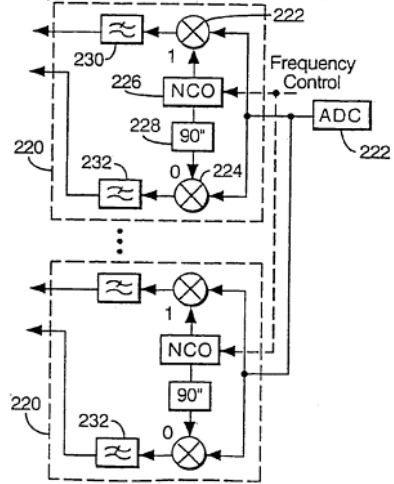
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtractor 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtractor 208 thus receives two modulated signals. The two signals received by each subtractor 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5. The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders pass through Digital Modulators (106) and are then combined in a Combiner (110). The combined signal enters an Adaptive Predictor (108). The output of the Adaptive Predictor is converted to analog by a DAC (112) and then passes through a filter (114). It is then multiplied by a local oscillator signal (118) at a multiplier (116). The resulting signal passes through another filter (120) and is amplified by a Power Amplifier (PA, 122). The final output is transmitted via an antenna (126). A feedback path is shown where the transmitted signal is received by an antenna (124), passes through a filter (128), and is converted to digital by an ADC (138). The digital signal then passes through a filter (136) and is multiplied by a local oscillator signal (134) at a multiplier (132). The output of this multiplier is processed by a Channeliser (140). The Channeliser's output is fed back into the Adaptive Predictor (108) and also provides Frequency Control information to a microcontroller (uC, 142). The microcontroller (142) also receives input from the Combiner (110) and provides control signals to the Adaptive Predictor (108) and the Channeliser (140). Fig. 5.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.6.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a central Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116) where it is mixed with a local oscillator signal (118). The resulting signal (120) passes through another filter (122) and a Power Amplifier (PA) to an antenna (124). A feedback path is shown where the signal from the antenna (126) is received by a receiver antenna (128), passes through a filter (132), is mixed with a local oscillator signal (134), and then passes through a filter (136) and an ADC (138). The ADC output (142) is fed into a uC (microcontroller) which provides Frequency Control signals to the Digital Modulators (106) and the multiplier (132). Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7. Fig.8. Figs. 7 and 8.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
2	The linearized transmitter of claim 1, wherein said concurrent digital multi-band predistortion block further comprises: a plurality of the digital baseband signal predistorters each corresponding to a respective channel; and a signal observation feedback loop for generating said first feedback signals.	Posti discloses and/or renders obvious the linearized transmitter of claim 1, wherein said concurrent digital multi-band predistortion block further comprises: a plurality of the digital baseband signal predistorters each corresponding to a respective channel; and a signal observation feedback loop for generating said first feedback signals. <i>See</i>, claim 1, <i>supra</i>, which is incorporated by reference herein. <i>See also, e.g.</i>, “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55. “Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

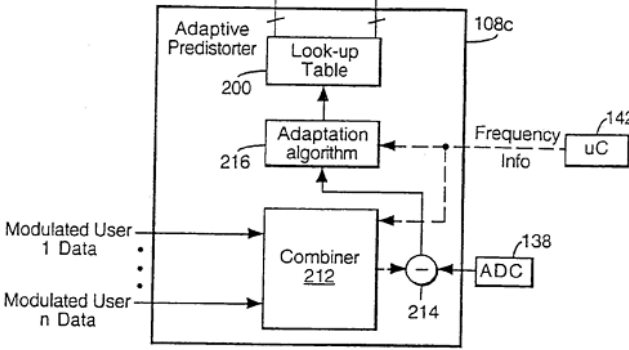
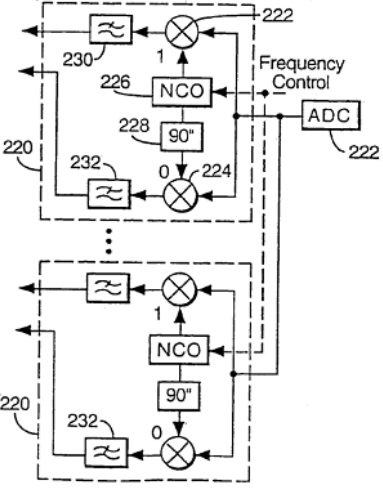
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtracter 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtracter 208 thus receives two modulated signals. The two signals received by each subtracter 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5. Fig. 5.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.6. The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116) where it is mixed with a local oscillator signal (118). The resulting signal (120) passes through another filter (122) and a Power Amplifier (PA) to an antenna (124). A feedback path is shown where the signal from the antenna (126) is received by an antenna (128), passes through a filter (132), and is mixed with a local oscillator signal (134). The output (136) is converted by an ADC (138) and fed into an Adaptive Predistorter (108). The Adaptive Predistorter provides feedback to the Digital Modulators (106) and is also controlled by a microcontroller (uC, 142) via a Frequency Control line. Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7. Fig.8. Figs. 7 and 8.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
3[a]	The linearized transmitter of claim 2, wherein said plurality of digital baseband signal predistorters further comprises: a plurality of inputs, each input corresponding to a single frequency channel; and	Posti discloses and/or renders obvious the linearized transmitter of claim 2, wherein said plurality of digital baseband signal predistorters further comprises: a plurality of inputs, each input corresponding to a single frequency channel. <i>See claim 2, supra</i>, which is incorporated by reference herein. <i>See also, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55. “Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

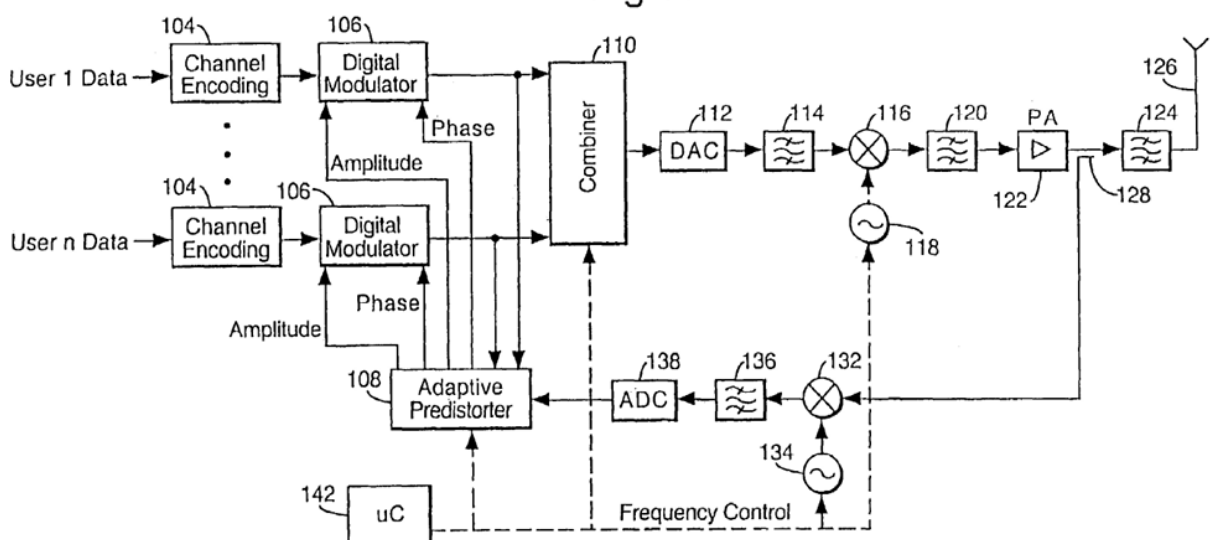
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

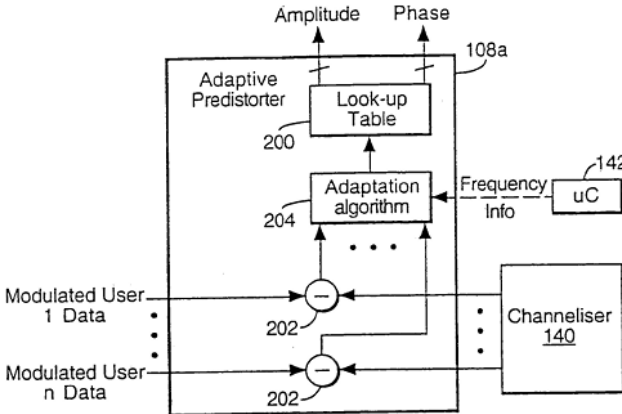
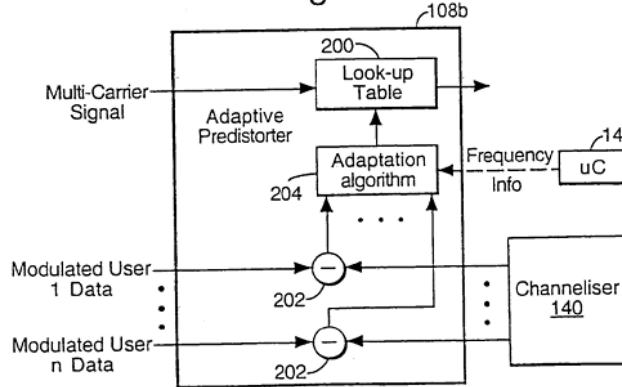
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

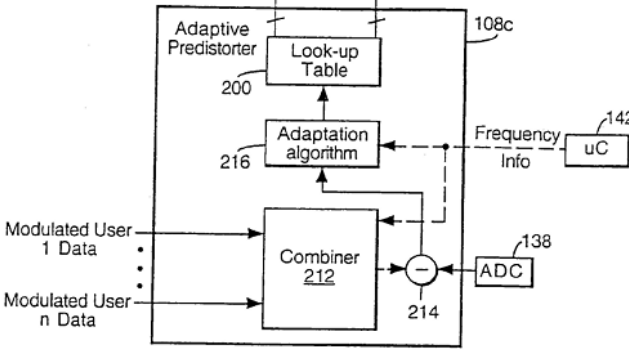
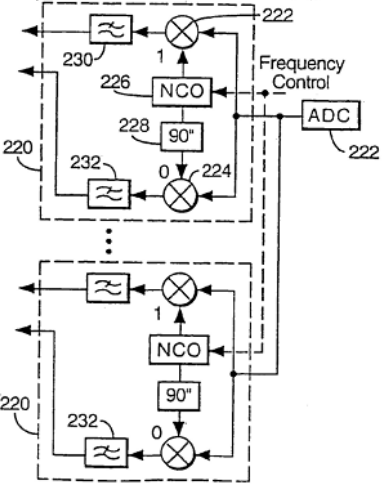
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtracter 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtracter 208 thus receives two modulated signals. The two signals received by each subtracter 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5. Fig. 5.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.6.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a central Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116) where it is mixed with a local oscillator signal (118). The resulting signal (120) passes through another filter (122) and a Power Amplifier (PA) to an antenna (124). A feedback loop is shown where the signal from the antenna passes through a filter (126) and is mixed (132) with a local oscillator signal (134). The output of the mixer (136) is filtered (138) and converted by an ADC (138). The ADC output is fed into an Adaptive Predistorter (108), which in turn provides feedback to the Digital Modulators (106). A microcontroller (uC, 142) is connected to the Adaptive Predistorter and the Frequency Control block, which provides the local oscillator signals (118, 134) to the mixers. Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7.  Fig.8.  Figs. 7 and 8.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
3[b]	a plurality of outputs, each output corresponding to a single frequency channel, and each output connected to an input of a concurrent multi-band transmitter.	Posti discloses and/or renders obvious a plurality of outputs, each output corresponding to a single frequency channel, and each output connected to an input of a concurrent multi-band transmitter. <i>See</i> claim 2, <i>supra</i>, which is incorporated by reference herein. <i>See, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55. “Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

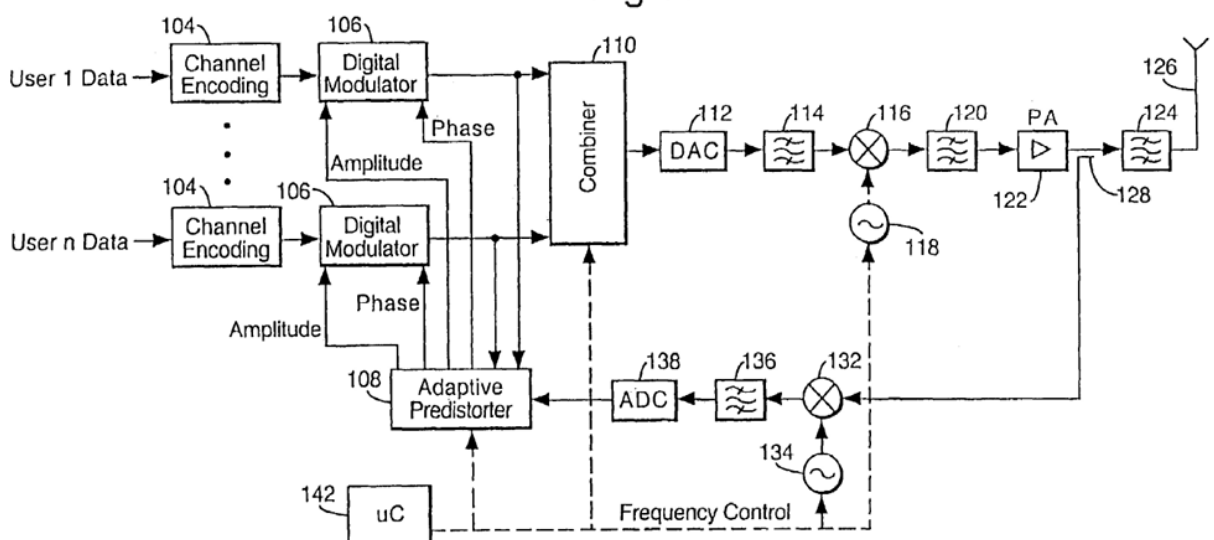
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

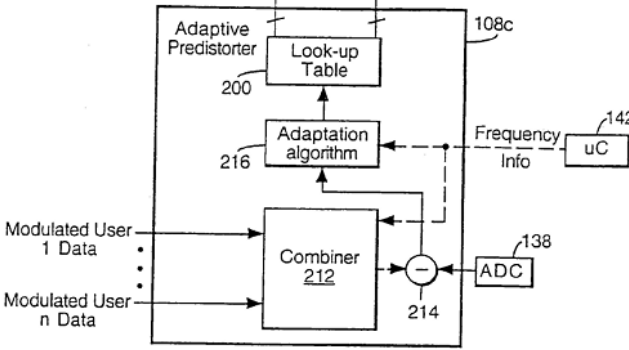
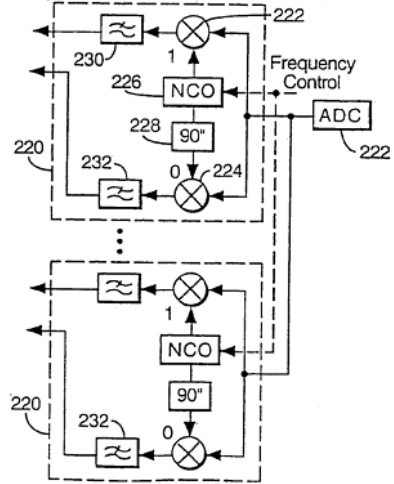
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtracter 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtracter 208 thus receives two modulated signals. The two signals received by each subtracter 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5. Fig. 5.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.6.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a central Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116) where it is mixed with a local oscillator signal (118). The resulting signal (120) passes through another filter (122) and a Power Amplifier (PA) to an antenna (124). A feedback path is shown where the signal from the antenna (126) is received by an antenna (128), passes through a filter (132), and is mixed with a local oscillator signal (134) at a multiplier (136). The output of this multiplier goes through a filter (138) and an ADC (138) to an Adaptive Predistorter (108). The Adaptive Predistorter provides feedback to the Digital Modulators (106) and also receives control signals from a microcontroller (uC, 142) via a dashed line labeled Frequency Control. Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7. Fig.8. Figs. 7 and 8.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
4[a]	The linearized transmitter of claim 2, wherein said analyzing and modeling stage further comprises: a plurality of outputs connected to update the parameters of said digital baseband signal predistorters; and	Posti discloses and/or renders obvious the linearized transmitter of claim 2, wherein said analyzing and modeling stage further comprises: a plurality of outputs connected to update the parameters of said digital baseband signal predistorters. <i>See</i> claim 2, <i>supra</i>, which is incorporated by reference herein. <i>See, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55. “Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

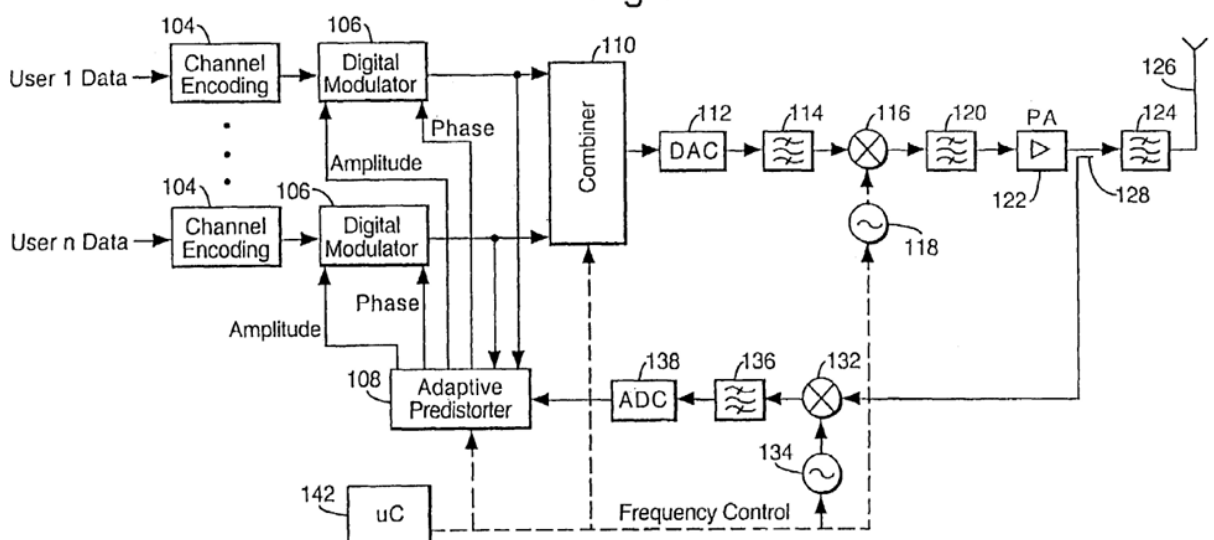
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		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

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		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

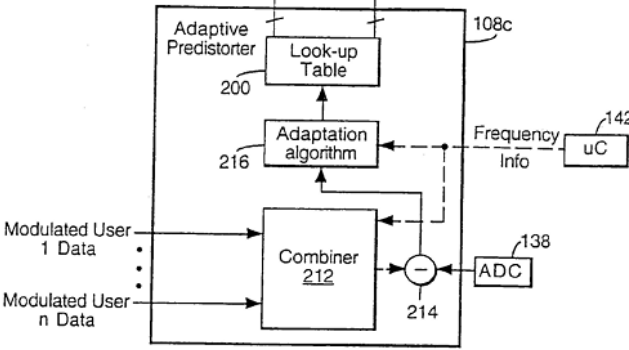
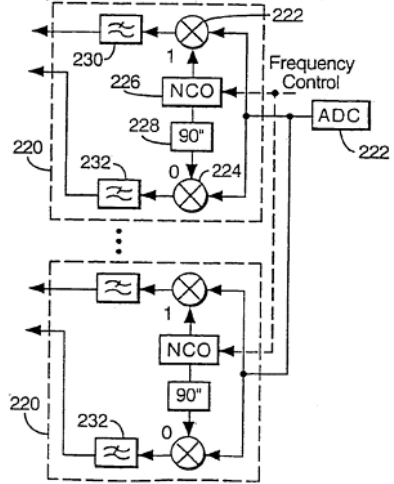
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtractor 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtractor 208 thus receives two modulated signals. The two signals received by each subtractor 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5. Fig. 5.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.6.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a central Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116) where it is mixed with a local oscillator signal (118). The resulting signal (120) passes through another filter (122) and a Power Amplifier (PA) (124) to be transmitted via an antenna (126). A feedback loop is shown where the transmitted signal is received by a receiver antenna (128), passes through a filter (132), is mixed with a local oscillator signal (134), and then passes through a filter (136) and an ADC (138). The ADC output (142) is fed into an Adaptive Predistorter (108), which provides feedback to the Digital Modulators (106) to adjust their Amplitude and Phase settings. Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7. Fig.8. Figs. 7 and 8.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
4[b]	a plurality of inputs connected to both: (a) outputs of said signal observation feedback loop comprising said first feed back signals, and (b) to outputs of said digital signal predistorter block.	Posti discloses and/or renders obvious a plurality of inputs connected to both: (a) outputs of said signal observation feedback loop comprising said first feed back signals, and (b) to outputs of said digital signal predistorter block. <i>See</i> claim 2, <i>supra</i>, which is incorporated by reference herein. <i>See, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in

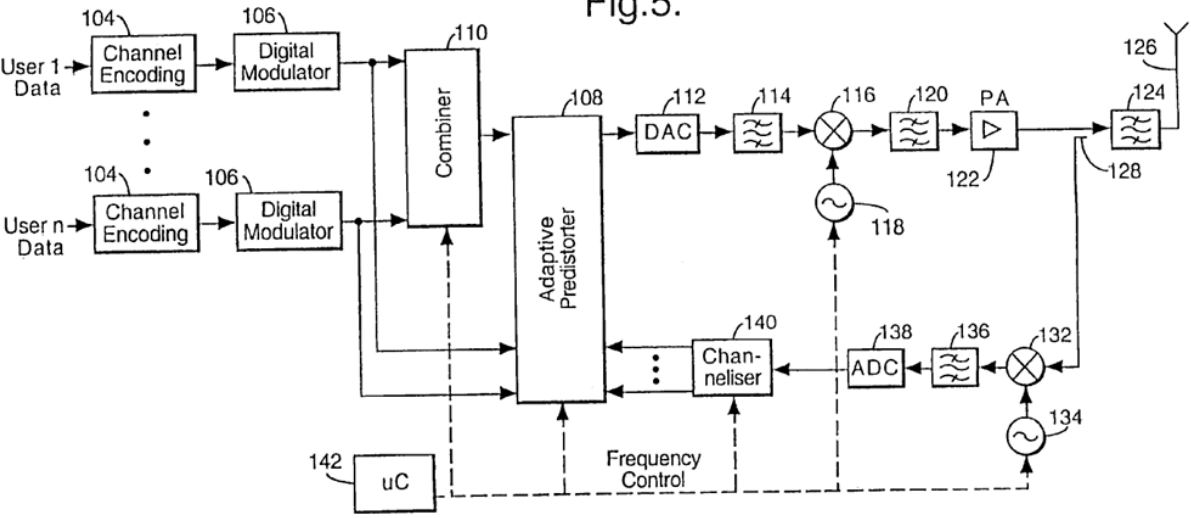
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55. “Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

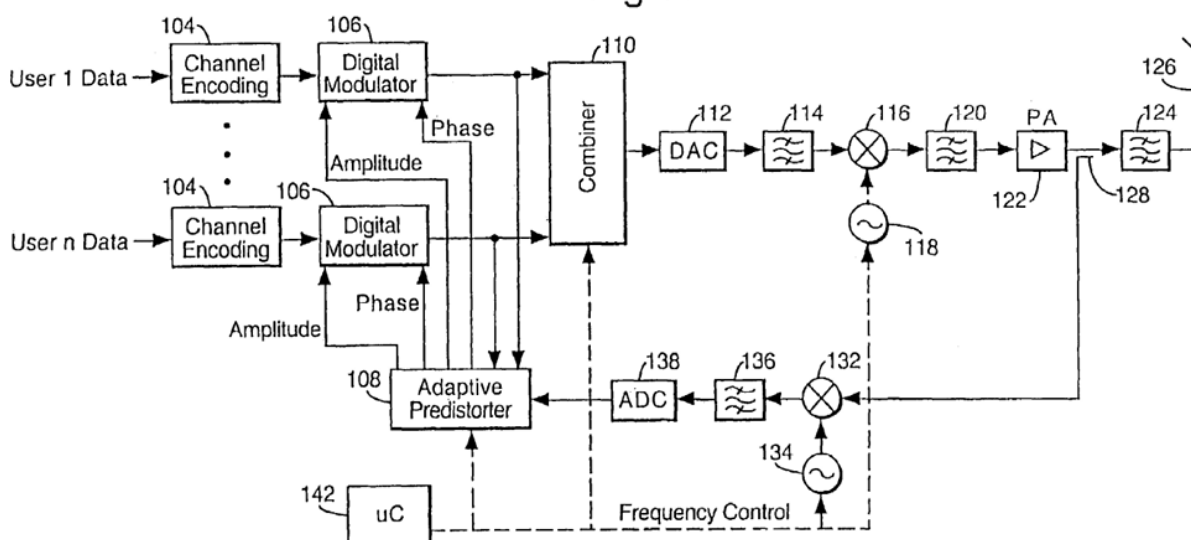
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

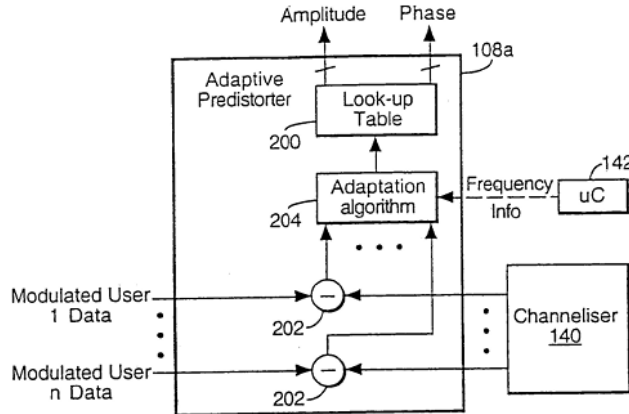
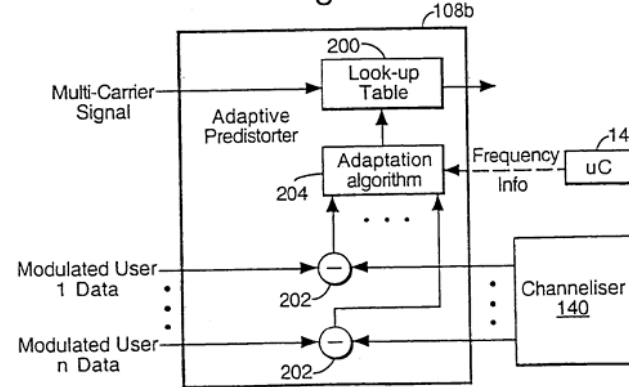
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

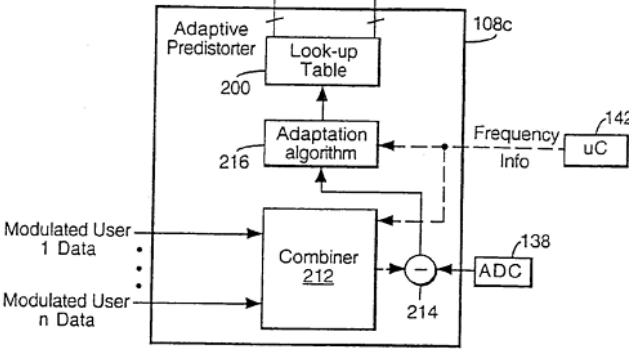
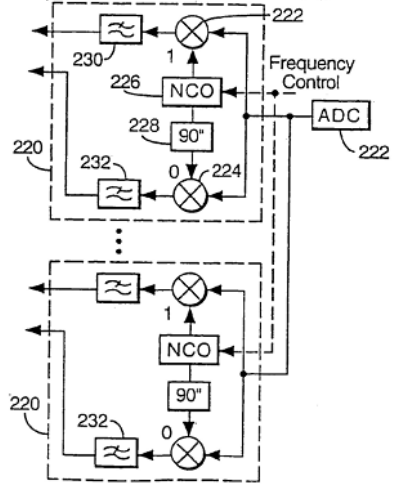
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtracter 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtracter 208 thus receives two modulated signals. The two signals received by each subtracter 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5.  Fig. 5.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.6.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a central Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116) where it is mixed with a local oscillator signal (118). The resulting signal passes through another filter (120) and a power amplifier (PA, 122) before being transmitted via an antenna (126). A feedback loop is shown where the transmitted signal is received by an antenna (124), passes through a filter (128), and is mixed with a local oscillator signal (134) at a multiplier (132). The output of this multiplier passes through a filter (136) and an ADC (138). The ADC's output is fed into an Adaptive Predistorter (108), which in turn provides feedback to the Digital Modulators (106) to adjust their Amplitude and Phase. A microcontroller (uC, 142) is connected to the Adaptive Predistorter and the Frequency Control block, which provides the local oscillator signals (118 and 134) to the multipliers (116 and 132). Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7.  Fig.8.  Figs. 7 and 8.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
5	The linearized transmitter of claim 2, wherein said analyzing and modeling stage is further adapted to: perform time alignment of complex baseband signals from sampling said first feedback signals; and perform reconstruction of the complex baseband signals from said sampling.	Posti discloses and/or renders obvious the linearized transmitter of claim 2, wherein said analyzing and modeling stage is further adapted to: perform time alignment of complex baseband signals from sampling said first feedback signals; and perform reconstruction of the complex baseband signals from said sampling. <i>See claim 2, supra, which is incorporated by reference herein.</i> <i>See also, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55. “Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

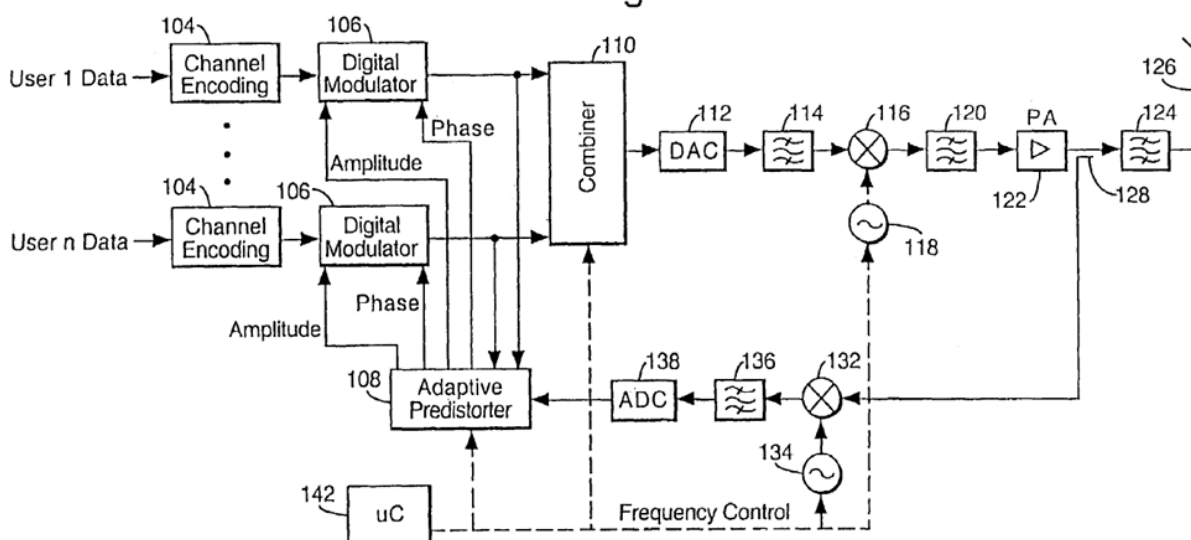
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

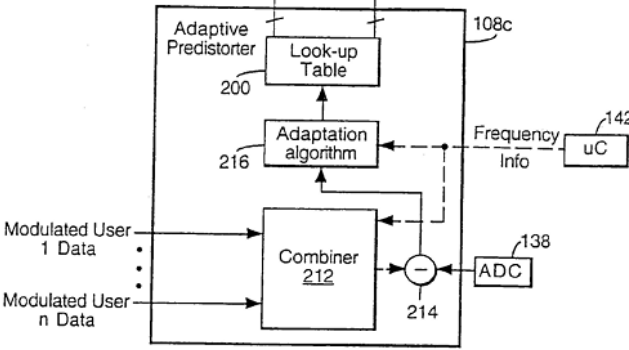
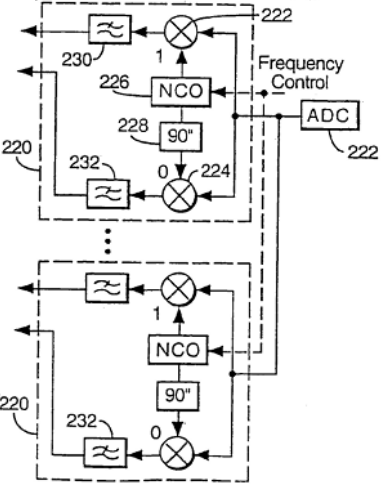
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		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtractor 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtractor 208 thus receives two modulated signals. The two signals received by each subtractor 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5. Fig. 5.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.6.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a central Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116) where it is mixed with a local oscillator signal (118). The resulting signal (120) passes through another filter (122) and a Power Amplifier (PA) (124) to be transmitted via an antenna (126). A feedback loop is shown where the transmitted signal is received by a receiver antenna (128), passes through a filter (132), and is mixed with a local oscillator signal (134). The resulting signal (136) is converted by an ADC (138) and fed into an Adaptive Predistorter (108). The Adaptive Predistorter provides feedback to the Digital Modulators (106) to adjust their Amplitude and Phase outputs. A microcontroller (uC) (142) is connected to the Adaptive Predistorter and the Frequency Control block, which provides the local oscillator signals (118 and 134) to the multiplier and mixer stages. Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7. Fig.8. Figs. 7 and 8.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
6	The linearized transmitter of claim 2, said first feed back signals corresponding to a baseband equivalent for all frequency channels and wherein the baseband equivalent signals being extracted from down-converted samples of RF signals output from said power amplifier block.	Posti discloses and/or renders obvious the linearized transmitter of claim 2, said first feed back signals corresponding to a baseband equivalent for all frequency channels and wherein the baseband equivalent signals being extracted from down-converted samples of RF signals output from said power amplifier block. <i>See</i> claim 2, <i>supra</i>, which is incorporated by reference herein. <i>See, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55. “Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

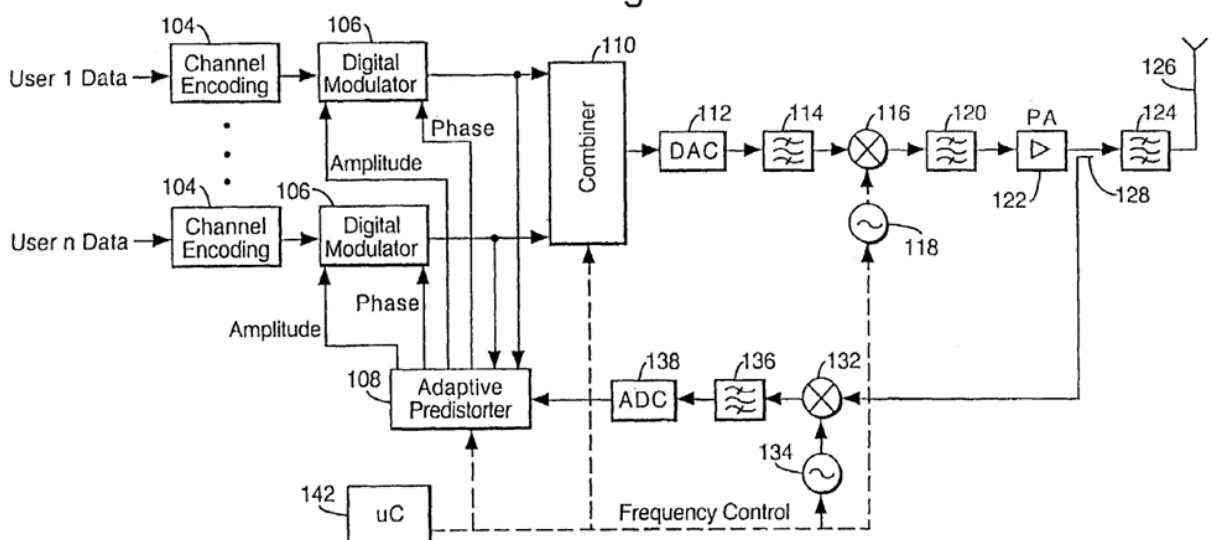
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

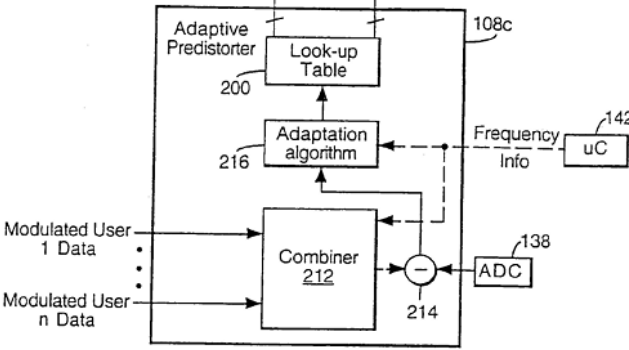
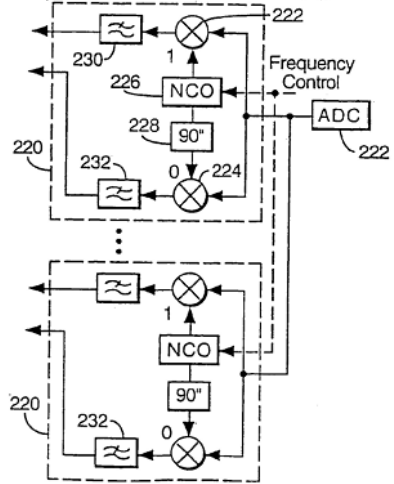
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtracter 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtracter 208 thus receives two modulated signals. The two signals received by each subtracter 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig. 4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5. Fig. 5.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.6.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a central Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116) where it is mixed with a local oscillator signal (118). The resulting signal passes through another filter (120) and a Power Amplifier (PA, 122). The PA output is connected to an antenna (124) and also to a feedback loop. The feedback loop includes a multiplier (132) where the PA output is mixed with a local oscillator signal (134). The result passes through a filter (136) and an ADC (138). The ADC output goes to an Adaptive Predistorter (108), which provides feedback to the Digital Modulators (106) to adjust their Amplitude and Phase. A microcontroller (uC, 142) is connected to the Adaptive Predistorter and the Feedback Control block, which also receives input from the Frequency Control block. Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7. Fig.8. Figs. 7 and 8.

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		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
7	The linearized transmitter of claim 2, wherein said signal observation feedback loop further comprises a plurality of channels, each channel comprising: an RF filter; a signal down conversion block; and an analog-to-digital converter (ADC).	Posti discloses and/or renders obvious the linearized transmitter of claim 2, wherein said signal observation feedback loop further comprises a plurality of channels, each channel comprising: an RF filter; a signal down conversion block; and an analog-to-digital converter (ADC). <i>See claim 2, supra, which is incorporated by reference herein.</i> <i>See also, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55. “Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

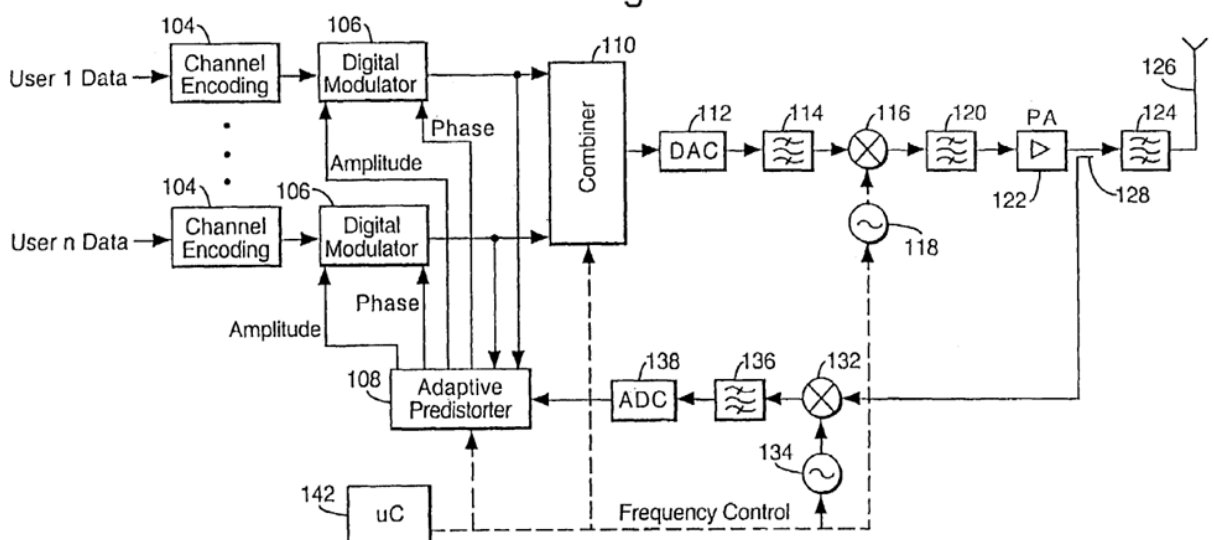
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

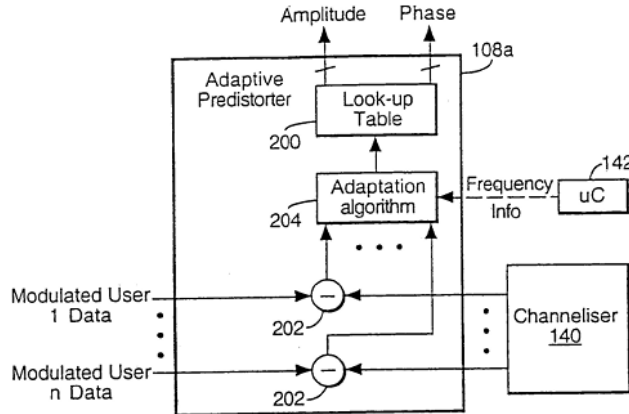
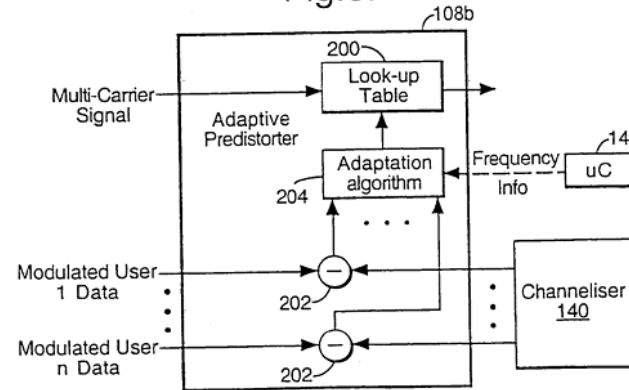
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

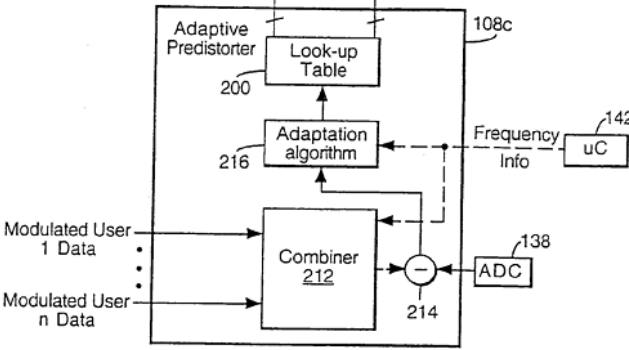
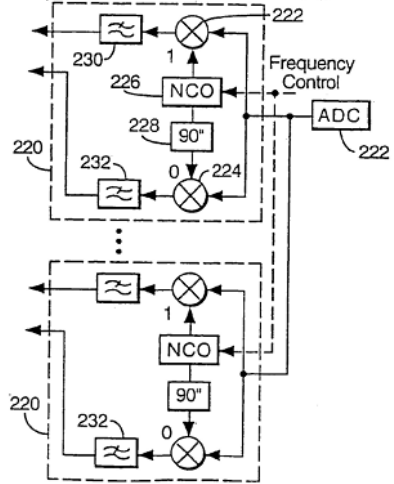
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtracter 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtracter 208 thus receives two modulated signals. The two signals received by each subtracter 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5. Fig. 5.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.6.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116) where it is mixed with a local oscillator signal (118). The resulting signal passes through another filter (120) and a Power Amplifier (PA, 122) to be transmitted via an antenna (126). A feedback loop is shown where the transmitted signal is received by an antenna (124), passes through a filter (128), and is mixed with a local oscillator signal (134) at a multiplier (132). The output of the multiplier (132) passes through a filter (136) and an ADC (138) to an Adaptive Predistorter (108). The Adaptive Predistorter provides feedback to the Digital Modulators (106) and also receives control signals from a microcontroller (uC, 142) via a Frequency Control line. Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7.  Fig.8.  Figs. 7 and 8.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
8	The linearized transmitter of claim 2, wherein said signal observation feedback loop further comprises: a single subsampling-based receiver to down-convert samples output from said power amplifier block.	Posti discloses and/or renders obvious the linearized transmitter of claim 2, wherein said signal observation feedback loop further comprises: a single subsampling-based receiver to down-convert samples output from said power amplifier block. <i>See claim 2, supra, which is incorporated by reference herein.</i> <i>See also, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55. “Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

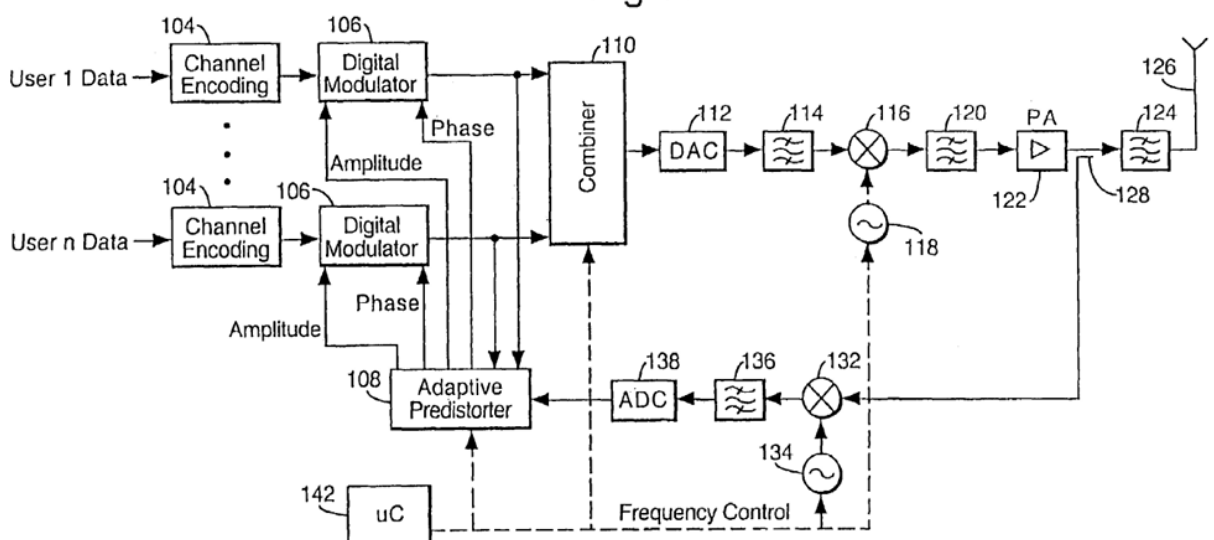
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

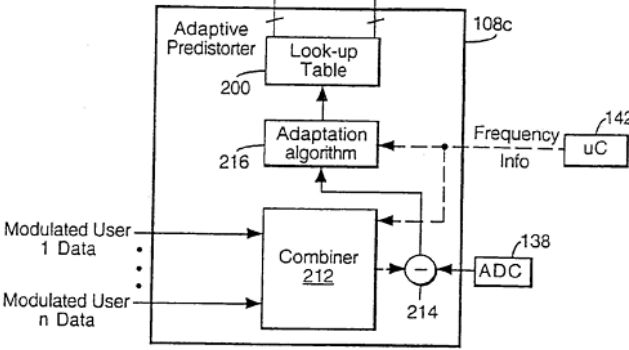
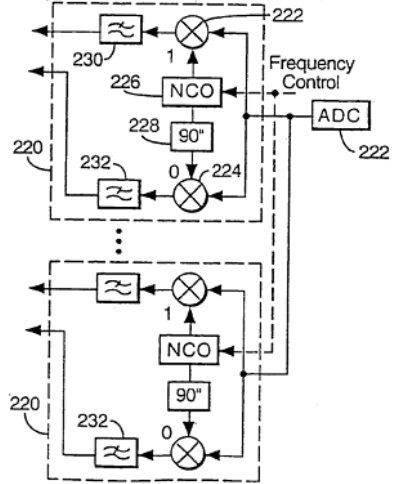
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtractor 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtractor 208 thus receives two modulated signals. The two signals received by each subtractor 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5. Fig. 5.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.6.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a central Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116) where it is mixed with a local oscillator signal (118). The resulting signal passes through another filter (120) and a Power Amplifier (PA, 122) before being transmitted via an antenna (126). A feedback loop is shown where the transmitted signal is received by an antenna (124), passes through a filter (128), and is mixed with a local oscillator signal (134) at a multiplier (132). The output of this multiplier passes through a filter (136) and an ADC (138). The ADC's output is fed into an Adaptive Predistorter (108), which then provides feedback signals (Amplitude and Phase) to the Digital Modulators (106). A microcontroller (uC, 142) is connected to the Adaptive Predistorter and the Frequency Control block, which provides the local oscillator signals (118 and 134) to the multipliers (116 and 132). Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7. Fig.8. Figs. 7 and 8.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
9	The linearized transmitter of claim 8, wherein said single subsampling-based receiver further comprises: an RF filter; a track and hold (T&H) block; and an analog-to-digital converter (ADC).	Posti discloses and/or renders obvious the linearized transmitter of claim 8, wherein said single subsampling-based receiver further comprises: an RF filter; a track and hold (T&H) block; and an analog-to-digital converter (ADC). <i>See claim 8, supra, which is incorporated by reference herein.</i> <i>See also, e.g.,</i> “A multi frequency carrier transmitter comprises input means for receiving a plurality of different digital signals to be transmitted. The different signals are to be transmitted on different carrier frequencies. Amplifier means receive a composite signal comprising the different signals at the respective carrier frequencies and amplify the composite signal. Predistortion means predistort the plurality of digital signals prior to amplification of the composite signal by the amplification means. The predistortion provided by the predistortion means is subsequently altered in dependence on the difference between the input signals and the output at the amplifier means.” Abstract. “The present invention relates to a transmitter and a method of transmitting and in particular, but not exclusively, for use in a telecommunications network.” “The output of each transmit path 14–14' is connected to the input of a combiner 22 which combines the signals from each path 14–14' to provide a multicarrier signal. The output of the combiner 22 is connected to an antenna 24 which transmits the multicarrier signal containing each of the N different channels to the terminals in the cell served by the base station.” 1:53-59. “According to one aspect of the present invention, there is provided a multi frequency carrier transmitter comprising input means for receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; amplifier means for receiving a composite signal comprising said different signals at the respective carrier frequencies and amplifying said composite signal; and predistortion means for predistorting said plurality of digital signals prior to amplification of the composite signal by said amplification means, said predistortion provided by said predistortion means being subsequently altered in

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		dependence on the difference between said input signals and the output at said amplifier means.” 2:43-55. “Accordingly, embodiments of the present invention provide a multi carrier transmitter which is able to deal with the problems of nonlinearity by using predistortion. The predistortion can be implemented more simply than the feedback method discussed in the prior art.” 2:55-60. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The input means are preferably arranged to separately receive each of the different signals. Combiner means are preferably provided between the input means and the amplifier means for combining said plurality of different signals to provide a composite signal. This may be the composite signal input to the amplifier means or may be a composite signal at a lower, intermediate frequency. In the latter case, that composite signal at a lower frequency would be upconverted to provide the composite signal input to the amplifier means.” 2:61-3:3. “A feedback path may be arranged between the amplifying means and the predistorting means. Preferably, the predistorting means is arranged to compare the output from the amplifying means from the feedback path with the signals received by the receiving means and to provide, if necessary, at least one new predistortion value to be applied to at least one subsequent signal received by the receiving means. In this way, the predistorting means can adapt to changes in the operating conditions of the amplifier means.” 3:14-21. “Preferably, means are provided in the feedback path for separating the output of the amplifying means into a plurality of different signals. The predistorting means is preferably arranged to compare each of the separated signals with the corresponding signals received from the input means and to determine if the at least one predistortion value needs to be altered.” 3:23-29.

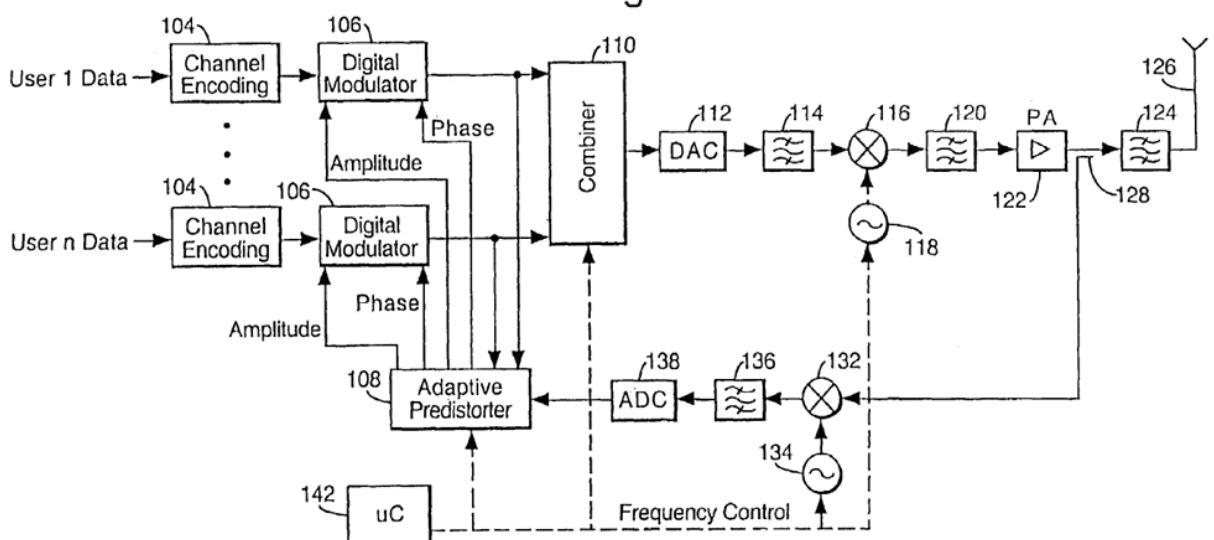
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“Alternatively, the predistorting means is arranged to compare the composite signal from the amplifying means with a plurality of different signals to provide, if necessary, the at least one new predistortion value.” 3:30-33. “The amplifier means is preferably a nonlinear amplifier. The predistortion means is preferably arranged to compensate for the nonlinearity of the phase and/or amplitude of the output of the amplifier.” 3:45-58. “A digital to analogue converter may be provided for converting the plurality of signals to analogue form before said signals are amplified by said amplifier means. The transmitter is preferably incorporated in a base station or alternatively in a mobile station. According to a second aspect of the present invention, there is provided a multi carrier frequency transmission method comprising the steps of receiving a plurality of different digital signals to be transmitted, said different signals to be transmitted on different carrier frequencies; combining said plurality of different signals to provide a composite signal comprising the different signals at the respective carrier frequencies; and amplifying said composite signal, wherein the method further comprises the steps of: predistorting the plurality of different digital signals prior to amplification of the composite signal by the amplification means; and altering the predistortion applied to subsequent signals in dependence on the difference between said different signals and the amplified signal.” 3:49-67. “Reference will now be made to FIG. 4 which shows a first embodiment of the present invention. In particular, the transmit part 102 of the base station 100 is shown. The base station 100 is in a cellular system of the type shown in FIG. 1.” 4:30-34. “The transmit part 102 of the base station 100 comprises N channel encoders 104 where N is the number of different frequencies on which the base station 100 will transmit signals. Each channel encoder 104 receives the data to be transmitted on the particular frequency associated with the given channel encoder 104. The data is placed in a suitable form for transmission. This may include digitising the data, encoding the data, interleaving the data and/or any other step required to be carried out. As mentioned hereinbefore, each channel is on a different frequency after the

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		modulator. The signals output by the channel encoders 104 are in digital form and are at a baseband frequency. Coding, interleaving etc is performed on the digital baseband signals.” 4:35-36. “The output of each channel encoder 104 is input to a respective digital modulator 106. Each digital modulator 106 also receives two outputs from the adaptive predistorter 108. The first output from the predistorter 108 provides one or more amplitude coefficients which are used to predistort the signal which is output by the digital modulator to compensate for the non linearity of an amplifier 122 with respect to amplitude. The second output from the predistorter 108 provides one or more phase coefficients which are used to predistort the signal which is output by the modulator 106 to compensate for phase distortion provided by the amplifier 122. The amplifier 122 will be described in more detail hereinafter.” 4:48-60. “The predistortion to compensate for the phase and amplitude distortion introduced by the amplifier 122 can take place at the same time. The predistortion can be performed during or more preferably after the modulation has been carried out by the modulator 106.” 5:6-10. “The output of the second bandpass filter 120 is input to the power amplifier 122 which amplifies the received input. The output of the amplifier 122 is input to a third bandpass filter 124 which is arranged to filter out any signal components introduced by the amplifier 122 which fall outside the radio frequency band of the signals to be transmitted. The output of the third bandpass filter 124 is passed to an antenna 126 which transmits the signals to the terminals in the cell associated with the base station.” 5:41-49. “The adaptive predistorter 108 does not, as in the first embodiment, have outputs connected to the digital modulators 106. The output of the combiner 110 is connected to the input of the predistorter 108. The output of the predistorter 108 is connected to the input of the digital to analogue convertor. The predistorter 108 thus predistorts the multicarrier output of the combiner 110 and outputs a predistorted multicarrier signal. The feedback path is the same in the first and second embodiments and accordingly the predistorter 108 operates in a similar manner to that shown in the first embodiment. However, phase correction is not applied and the amplitude correction is the

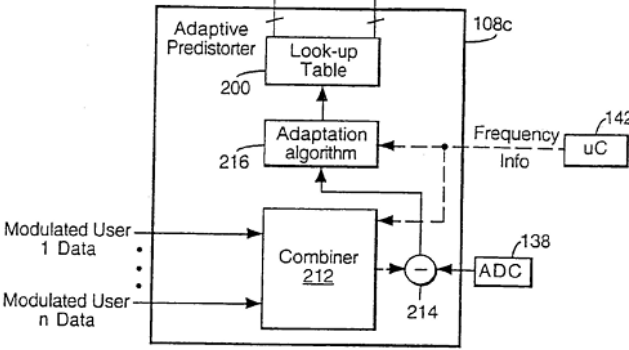
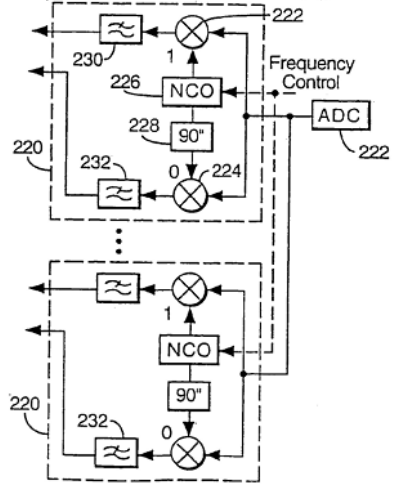
Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		same for all frequencies. This solution is simple but may not provide the required performance in all cases.” 7:39-52. “Reference will now be made to FIG. 8 which shows a second predistorter 108 b which can be used in the second embodiment shown in FIG. 5. This second predistorter 108 comprises n subtractors 208 each of which receives an output from a respective one of the digital modulators. Each subtracter 208 also receives a corresponding input from the channelizer 140 as in the first embodiment. Each subtracter 208 thus receives two modulated signals. The two signals received by each subtracter 208 are subtracted one from the other to generate a difference signal. This output difference signal is input to the adaption algorithm block 204 which is the same as discussed in relation to the first predistorter of FIG. 7. As with the first predistorter of FIG. 7, the adaption algorithm block 204 also receives an input from the microcontroller 142 with information concerning the frequency. The adaption algorithm block 204 provides amplitude coefficients on its output which are output to the look-up table 200. Unlike the embodiment shown in FIG. 7, the look-up table receives the multicarrier signal from the combiner 110 which defines an address in the look-up table. Accordingly, the multicarrier signal is modified in accordance with the amplitude values from the look-up table and output to the digital to analogue convertor 112.” 7:53-8:8. “Reference is now made to FIG. 10 which shows a possible construction of the channeliser 140. The channeliser comprises n blocks 220, with one block provided for each frequency. Each block of the channeliser 220 comprises an input for receiving the output of the analogue to digital converter 138 and a frequency control signal from the microcontroller 142. The output from the analogue to digital converter 138 is input to first and second multipliers 222 and 224. The first multiplier 222 produces the I or in-band, component of the input signal whilst the second multiplier 224 produces the Q, or quadrature-phase component of the input signal. Each of the multipliers 222 and 224 receives a frequency from the numerically controlled oscillator 226. The frequency of the oscillator 226 is controlled by the frequency control input. The output of the oscillator 226 is connected directly to one of the multipliers 222 whilst the output for the second multipliers 224 is connected to a phase shifter 228 which shifts the phase of the output signal from the oscillator 226 by 90°. The phase shifted output signal of the oscillator 226 is input to the second multipliers 224.” 8:9-28.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		“The output of each of the first and second multipliers 222 and 224 are connected to filters 230 and 232 which are arranged to filter out signal components introduced by the respective multipliers as well as other carriers within the multicarrier signal.” 8:29-33. “In the embodiments where the composite signal is predistorted, the combiner output consists of amplitude words, the correction occurring by adjusting the magnitude of the words. Nonlinearities in the amplifier output could be compensated by correcting the magnitude of the combiner output words with an inverse function. The correction may thus be dependent on the particular combiner output. This might occur by indexing a look-up table with the combiner output word and outputting the respective contents to the digital to analogue converter.” 9:18-27. Fig.4. Fig. 4.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.5. Fig. 5.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.6.  The diagram illustrates a multi-user communication system. On the left, multiple users (User 1 Data to User n Data) feed into Channel Encoders (104). The outputs of these encoders go to Digital Modulators (106). Each Digital Modulator outputs Amplitude and Phase signals to a Combiner (110). The Combiner's output passes through a DAC (112), a filter (114), and a multiplier (116). A local oscillator (118) provides a reference signal to the multiplier. The signal then passes through another filter (120) and a Power Amplifier (PA, 122). The PA output is connected to an antenna (124) and also to a feedback loop. The feedback loop includes a multiplier (132) and a filter (136). A local oscillator (134) provides a reference signal to this multiplier. The output of the filter (136) goes to an ADC (138). The ADC output is fed into an Adaptive Predistorter (108). The Adaptive Predistorter outputs Amplitude and Phase signals back to the Digital Modulators (106). A microcontroller (uC, 142) is connected to the Adaptive Predistorter and the Feedback Control block, which also receives input from the ADC (138) and provides control signals to the Digital Modulators (106) and the Adaptive Predistorter (108). Fig. 6.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.7. Fig.8. Figs. 7 and 8.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
		Fig.9. Amplitude Phase  Fig.10. Principle of an NCO-Based Channeliser  Figs. 9-10.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
10[pre]	A method for linearizing a transmitter, said method comprising:	To the extent the preamble is limiting, Posti discloses and/or renders obvious a method for linearizing a transmitter. <i>See above re claim 1[pre] which is incorporated by reference herein.</i>
10[a]	effecting predistortion of concurrent input signals to output concurrent predistorted signals using a digital signal predistorter block including digital baseband signal predistorters;	Posti discloses and/or renders obvious effecting predistortion of concurrent input signals to output concurrent predistorted signals using a digital signal predistorter block including digital baseband signal predistorters. <i>See above re claim 1[a] which is incorporated by reference herein.</i>
10[b]	amplifying the predistorted signals using a power amplifier block;	Posti discloses and/or renders obvious amplifying the predistorted signals using a power amplifier block. <i>See above re claim 1[b] which is incorporated by reference herein.</i>
10[c]	receiving in an analyzing and modelling stage first feedback signals taken from an output of the power amplifier, and second feedback signals taken concurrently from the concurrent predistorted signals; and	Posti discloses and/or renders obvious receiving in an analyzing and modelling stage first feedback signals taken from an output of the power amplifier, and second feedback signals taken concurrently from the concurrent predistorted signals. <i>See, e.g.,</i> <i>See above re claim 1[c] which is incorporated by reference herein.</i>
10[d]	using the first feedback and the second feedback signals in the analyzing and modeling stage to model a nonlinearity in the power amplifier, wherein the digital	Posti discloses and/or renders obvious using the first feedback and the second feedback signals in the analyzing and modeling stage to model a nonlinearity in the power amplifier, wherein the digital baseband signal predistorters are updated by the analyzing and modelling stage.

Claim No.	'296 Patent	Exemplary Evidence of Anticipation and/or Obviousness
	baseband signal predistorters are updated by the analyzing and modelling stage.	<i>See, e.g.,</i> <i>See above re claim 1[c] which is incorporated by reference herein.</i>