REMARKS

The undersigned party requests a telephonic interview with Examiner Wimer when he takes up this application for examination. Examiner Wimer can call the undersigned at the number set forth in the closing of this response or at 321 724 8972. A call to the 321 number is more likely to result in reaching the undersigned. The telephonic interview can be scheduled at that time.

By this amendment certain claims have been amended as set forth above, several claims have been cancelled as enumerated above and the following remarks are presented in an effort to convince Examiner Wimer that the present application with its pending claims is allowable.

In the final Office communication Examiner Wimer has finally rejected claims 1, 4, 6, 10-28, 31, 34, 35, 38-40, 43-45, 50-53 and 55-58 under 35 U.S.C. 103(a) as unpatentable over Cooper (4564843) in view of Harrington (4165493).

Independent claim 4 and independent claim 10 (and its dependent claims 11-13, 15-20 and 25) remain in the application for reconsideration by the Examiner. The Examiner's allowance of all pending claims is earnestly solicited.

Claims 2, 3, 5, 7-9, 29, 30, 32, 33, 36, 37, 41, 42, 46-49 and 54 were cancelled, without prejudice, by previous amendment. Claims 1, 6, 14, 21-24, 26, 27, 28, 31, 34, 35, 38-40, 43-45, 50-53, 55-58 are cancelled by this amendment, without prejudice. Thus claims 4, 10-13, 15-20 and 25 remain in the application for further consideration by the Examiner.

CLAIM REJECTIONS UNDER 35 U.S.C. 103(a)

CLAIMS 1, 4, 6, 10-28, 31, 34, 35, 38-40, 43-45, 50-53 and 55-58

These claims have been rejected under 35 U.S.C. 103(a) as unpatentable over Cooper (4564843) in view of Harrington (4165493). Claims 55-58 are not listed in the specific rejection, but it is assumed they have suffered the same fate as their brethren.

Claims 1, 6, 14, 21-24, 26, 27 28, 31, 34, 35, 38-40, 43-45, 50-53 and 55-58 have been cancelled, without prejudice.

Within the listed group of claims, claims 4, 10-13, 15-20 and 25 remain in the application for examination. Claims 4 and 10 are independent claims; claims 11-13, 15-20 and 25 are dependent claims depending from claim 10.

Amended independent claim 4, as set forth above, claims an apparatus comprising an antenna, the antenna having an input impedance, and a power amplifier supplying a signal to the antenna for transmitting. An impedance controlling element controls the impedance into which the power amplifier operates (the impedance that the power amplifier "sees") by actually modifying the antenna input impedance or by transforming the antenna input impedance so that the power amplifier "sees" or operates into a different (more optimal) impedance. The impedance controlling element is responsive to the power amplifier variable output power or to the power amplifier variable output impedance. Since each of these parameters reflects changes in the power amplifier output impedance and since changes in the power amplifier output impedance will change the power amplifier efficiency, changing the impedance that the power amplifier "sees" increases the power amplifier efficiency.

These concepts are explained in and support for the claim amendments can also be found in paragraphs [0035] through [0044] of the application as filed. Figure 1 illustrates changes in the PA efficiency as a function of the PA output power and paragraph [0035] states that the power amplifier's output impedance is a function of the power amplifier's output power level.

Claim 4 currently stands rejected under Cooper in view of Harrington. In his all-encompassing rejection of all pending claims in the final Office Action, the Examiner cites Cooper as disclosing controlling antenna parameters, such as input impedance and tuning of the antenna. Examiner Wimer refers to Harrington as monitoring the average input power [presumably referring to Harrington's amplifier 16.] The Examiner concludes that the combination "provid[es] a fail-safe system for

tuning, impedance control and amplifier protection. But these are not the features that the Applicants are interested in.

Cooper specifically relates to the problem of retuning an antenna to follow the frequency of a frequency-hopping signal. Cooper's antenna comprises a capacitive radiating/receiving element with a plurality of discrete tuning inductors in series therewith. See Cooper column 1 beginning at line 55 and continuing to line 62. See also Cooper column 3 lines 19 and 20. Each inductor is shunted by a short-circuiting switch for short circuiting the inductor and thus tuning the resonant frequency of the antenna. Cooper also refers to the transformer 23 for matching between the 50 ohm line and the antenna impedance. See Cooper lines 46-49 of column 4.

Harrington relates to protecting a power amplifier from failure or damage due to improper antenna loads that may cause the antenna to draw excess current from the power amplifier. Harrington focuses on maximizing the power delivered by the power amplifier to the antenna load without violating any operating parameters or limits of the power amplifier. To accomplish this objective, Harrington discloses limiting the power dissipation of the power amplifier by limiting the level of the signal input to the power amplifier. He controls the level of the input signal by monitoring device dissipation and the instantaneous output voltage. Further, Harrington's antenna coupler 60 operates on the antenna impedance to present an appropriate impedance to the power amplifier, i.e., about 50 ohms. See Harrington's column 5, lines 18-22. Harrington does not appreciate (nor does Cooper) that the "the power amplifier [has] a variable output power and responsive thereto a variable output impedance]," as claimed in Applicants' amended claim 4. Harrington does not "control the impedance into which the power amplifier operates to increase the power amplifier efficiency."

Harrington's objective is to minimize the likelihood of power amplifier overloads, especially while the amplifier is being tuned. As Harrington states beginning at line 13 of column 2, "the input signals on line 10 [input to the power amplifier/automatic level control] are modified in amplitude in accordance with the

input on line 18 [a control signal derived from various operating parameters of the power amplifier elements, as illustrated in Harrington's Figure 1 and including the collector voltage, the average input power, the dissipation, the average power, the peak power and whether the output signal exceeds a threshold as determined by the threshold detector] before they are output on line 14 [the output from the automatic level control]." Thus to ensure that the power amplifier does not operate in a potentially damaging operating region, Harrington discloses limiting the amplitude of the input signal to a value that ensures no damage will be sustained as the input signal is processed through the various power amplifier stages before it is supplied to the antenna coupler 60.

The function of the antenna coupler 60 is explained in Harrington's lines 18-22 of column 5. The antenna coupler is required because the impedance seen looking into the antenna from the output of the power amplifier varies from 50 ohms as the frequency of the signal presented to the antenna varies from the resonant frequency of the antenna. If the signal frequency never changed, the power amplifier could be designed with an output impedance that matched the antenna input impedance at the fixed signal frequency. Since the signal frequency does change, the antenna coupler 60 imposes an impedance transformation so that the power amplifier is always seeing about 50 ohms, irrespective of the actual input impedance of the antenna. By always presenting an impedance of about 50 ohms to the power amplifier, the operating parameters of the power amplifier are limited to safe values.

Unlike Harrington and Cooper, the Applicants seek to improve the efficiency of the operation of the power amplifier.

Turning to the Applicants' claim 4, the Applicants claim an impedance controlling element that controls the impedance into which the power amplifier operates. This controlling element is responsive to the power amplifier variable output power or responsive to the power amplifier variable output impedance. The objective of the Applicants' control feature is to increase the power amplifier efficiency. As explained in the application at paragraphs [0018], [0035] and [0036],

because the power amplifier output impedance is a function of the power amplifier output power, when the output power changes (for example, as a power control element increases or decreases the output power) the power amplifier output impedance changes. Thus the amplifier no longer "sees" (looking into the antenna) an optimal load impedance and the power amplifier efficiency decreases. To increase the power amplifier efficiency the impedance that the power amplifier "sees" must be changed too.

Continuing with amended claim 4, to change the impedance that the power amplifier "sees" the Applicants' claim modifying the antenna input impedance or transforming the antenna input impedance, both to increase the power amplifier efficiency. Of course, as is known in the art, the power amplifier efficiency can be improved by matching the power amplifier output impedance to the input impedance of the antenna (or alternatively by transforming the antenna input impedance to a value that matches the power amplifier output impedance). Thus the Applicants certainly do not require or claim that the power amplifier always see 50 ohms, as Harrington discloses. Instead, the Applicants want the power amplifier to see a load that increases the efficiency of the power amplifier, where the value of that load will vary because the value of the power amplifier output impedance will vary according to the power amplifier output power.

For the power amplifier to always operate into a 50 ohm impedance (Harrington's objective) would render many operating scenarios grossly inefficient. As explained, the Applicants recognize that the power output level changes during operation of the communications device and thus the output impedance changes and thus the power amplifier efficiency changes. The Applicants do not attempt to operate the power amplifier into a 50 ohm impedance, but instead into an impedance that improves the efficiency of the power amplifier.

Harrington is different in that he states, unequivocally, that "the antenna coupler 60 operates on the amplifier load impedance [the antenna] to match the antenna and the output of the amplifier so as to present the appropriate (in one

embodiment approximately 50 ohms) impedance to the amplifier 16." Thus clearly Harrington is not modifying the impedance seen by the power amplifier to present an impedance that maximizes power transfer into the antenna. The Applicants paragraph [0035] further explains this concept.

The Applicant's invention is different in that the Applicants teach that the power amplifier for most efficient operation does not always want to see 50 ohms. Instead, recognizing that the power amplifier output impedance changes as the power amplifier power output changes, the Applicants teach changing the antenna impedance as seen by the power amplifier to a value that approximates the power amplifier output impedance. Modifying the antenna impedance or transforming the impedance that the power amplifier "sees" maximizes power transfer into the antenna.

It is suggested that as claimed in claim 4, the Applicants' invention is patentably distinct from the Cooper/Harrington reference combination.

Independent claim 10 has been amended similar to the amendments to independent claim 4 described above. However, in claim 10 the impedance controlling element is responsive to an operation parameter of the power amplifier or responsive to a characteristic of the signal (i.e., the signal supplied by the power amplifier to the antenna). This difference from claim 4 is not believed to affect the patentable distinctions between claim 10 and the Cooper and Harrington combination.

These claim 10 elements are not disclosed by the combination of Cooper and Harrington since Harrington modifies the input signal to the power amplifier to avoid power amplifier damage while Cooper tunes the antenna resonant frequency by using tuning inductors; Cooper discloses tuning the resonant frequency dependent on the frequency of the signal to be carried on the antenna.

While the Applicants understand that the combination of Cooper and Harrington can be used to provide a fail safe system for tuning (as in Cooper) and amplifier protection (as in Harrington), it is not clear how the combination provides at

least the claim element of "an impedance controlling element for controlling the impedance into which the power amplifier operates by modifying the antenna input impedance or by transforming the antenna input impedance to increase the power amplifier efficiency, the impedance controlling element responsive to an operating parameter of the power amplifier or responsive to a characteristic of the signal."

Cooper discloses using the transformer 23 "to provide impedance matching between the 50 ohm line and the total of the radiation resistance plus the loss resistance of the antenna." This use of the transformer is standard for matching the 50 ohms of the feed line to the antenna. But there is no awareness of the problem addressed by the Applicants, that is, the power amplifier output impedance changes with the amplifier output power and further to improve the power amplifier efficiency, the antenna impedance must be changed to match, or approximately match, the power amplifier output impedance.

Harrington also refers to the impedance and beginning at about line 18 of column 5 explains that the coupler 60 operates on the amplifier load impedance to match the antenna and the output of the amplifier so as to present the appropriate load (in one embodiment approximately 50 ohms) to the amplifier 16. Here too there is no recognition of the problem addressed by the Applicants in that the amplifier output impedance changes with the amplifier output power and thus there is no disclosure in Harrington (or Cooper) of modifying the antenna input impedance for more efficient power transfer from the amplifier as the amplifier output impedance changes. Without recognizing the Applicants' problem, it is not possible for the combination of the cited references to set forth a solution that will address the problem.

Each of the dependent claims 11, 12, 13, 15-20 and 25 further distinguishes the invention as claimed as each defines a novel and non-obvious combination of additional elements. It is therefore respectfully submitted that these dependent claims are allowable over the cited art. Certain of these claims have been amended as set forth above for consistent term usage with the independent claim 10.

The Applicants hereby petition for an extension of time of one month until September 30, 2008 under 37 C.F.R. 1.136. The extension of time fee has been paid by charging to a credit card concurrent with the filing of this amendment.

The Applicants have responded to all of the objections and claim rejections in the final Office Action and it is believed that the claims remaining in the application are now in condition for allowance. In view of the foregoing amendments and discussion, it is respectfully submitted that all of the Examiner's claim rejections have been overcome and therefore it is respectfully requested that the Examiner reconsider these rejections and issue a Notice of Allowance for all pending claims

Respectfully submitted,

/john l. deangelis/

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