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$SU(2N_F)$ -Ward identities for QCD with restored chiral symmetry

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Motivated by the recent discovery of the $SU(2N_F)$ symmetric degeneracy in the spectrum of QCD with truncated low modes of the Dirac operator, we derive Ward identities associated to $SU(2N_F)$ -transformations in the limit of vanishing quark masses. Low temperature QCD is not invariant under the $SU(2N_F)$ -transformations due to the non-invariance of the classical action and the path integral measure, its part related to chiral symmetry is broken spontaneously. We show that, when the quark condensate vanishes at sufficiently high temperature or when it is removed artificially, the restoration of chiral symmetry leads to the simplification of the $SU(2N_F)$ -Ward identities. The simplified Ward identities look like they would be if $SU(2N_F)$ is preserved by the classical action and path integral measure.

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