NOTES

1) The bibliography on this subject is broader than one can reasonably quote; so we have to limit ourselves to giving some sample references.

R.Becker, Electromagnetic fields and interactions (Blaisdell Publishing Co., New York 1964) Vol.I pp.144-149, 217, 234

B.T.Bleaney and Bleaney, Electricity and magnetism (Clarendon Press, Oxford 1957) pp.60-64

G.Bruhat, Cours de physique générale - Electricité (Masson & C.ie, Paris 1967) pp. 228-231, 305-307

E.G.Cullwick, Electromagnetism and relativity (Longmans, Green and Co, Glasgow 1957) pp.82, 255-256

W.J.Duffin, Advanced electricity and Magnetism (Mc Graw Hill, London 1968) p.23 and pp.143-146

G.P.Harnwell, Principles of electricity and electromagnetism (Mc Graw Hill Book Co., New York 1949) pp.98-108

J.D.Jackson, Classical electrodynamics (John Wiley & Sons Inc, New York 1967) p.222.

J.B.Marion, Classical electromagnetic radiation (Academic Press, New York 1965) pp. 105-106, 142-144

W.Panofsky, M. Phillips, Classical electricity and magnetism (Addison Wesley Publishing Co., Reading 1956) pp. 107-112, 166-168

B.Podolsky, K.S.Kunz, Fundamentals of electrodynamics (Marcel Dekker, New York 1969) p.339.

J.A.Stratton, Electromagnetic Theory (Mc Graw Hill Book Co., New York 1941) pp. 13-16, 268

2) J.Van Bladel, Electromagnetic fields (Mc Graw Hill Book

Co., New York 1964) pp. 81-87

3) F.E.Blatt, Physic of Electronic Conduction in Solids (Mc Graw Hill Book Co., New York 1968) p.183-202, 216-224
W.Shockley, Electrons and holes in semiconductors (D.Van Nostrand Co., New York 1950) pp. 195-217
J.M.Ziman, Principles of the theory of solids (Cambridge University Press 1964) pp. 181, 211-218

4) See for instance the books of B.I.Bleaney (pp.534-536), E.G.Cullwick (pp.255-256), G.P.Harnwell (pp.310-311) quoted in note 1, or also:
C.Kittel, Introduction to Solid State Physics (John Wiley & Sons, New York 1960) pp. 296-298
R.A.Levy, Principles of Solid State Physics (Academic Press, New York 1968) pp.271-275, 340-342
D.M.Warshauer, Semiconductors and transistors (Mc Graw Hill Book Co., New York 1959) pp 79-88

5) If eq. (1.3) holds, eq. (1.2) is no longer correct, and $\rho(P,t)$ obeys the equation

$$\frac{d\rho}{dt} + \alpha\bar{E}\cdot\nabla\rho + \frac{4\pi\alpha}{\varepsilon}\rho_c\rho = 0.$$

Considering the particular case of a conductor where the charge is uniformly distributed at t=0, we get $(\nabla\rho)_{t=0}=0$, and it is easy to demonstrate, using the same methods as above, that it is possible to give a physical situation such that the special relativity is violated.

6) We recall that this is a mean value over small volumes; moreover, we observe that eq.(2.1) is supposed to hold within the limits of Ohm's law quoted in the introduction (i.e. it does not hold at high frequencies of the fields, strong

fields in high pressure gases and so on).

7) See for instance the books of R.Becker (pp. 237-239) and J.D.Jackson (pp.225-226) quoted in the note (1)

8) E.M.Purcell, Electricity and Magnetism, (Mc Graw Hill Book Co., New York, 1965) pp. 117-122.

9) We note that the mean momentum $\bar{p}(t)$ (like the mean velocity $\bar{v}(t)$ introduced in the following) changes in time at the same rate of $\bar{E}$ and $\bar{B}$; thus, in particular, $\bar{p}$ is constant whenever $\bar{E}$ and $\bar{B}$ are constant, and, in any case, it does not vary appreciably during an interval of the order of T (see assumption d) above).

10) We expect to see a surface charge on the surface of the cylinder such that the total charge of the cylinder per unit length is zero.

11) See Landau-Lifchitz, Electrodynamics of continuous media, (Pergamon Press, London 1960) pp. 96-98