SYMBOLS

THROUGHOUT this book there is employed, as far as possible, a consistent set of symbols. The following list includes definitions of most of the symbols used.

a	half-thickness of a slab
a_l	coefficient of wavefunction $\phi(\mathbf{p}_l\uparrow, -\mathbf{p}_l\downarrow)$ in pair wavefunction
$\mathbf{A}$	magnetic vector potential, defined by $\mathbf{B} = \text{curl } \mathbf{A}$
$\mathscr{A}$	area
B	magnetic flux density
B_a	flux density of applied magnetic field (§ 2.1)
B_c	critical flux density ($= \mu_0 H_c$)
C_n	specific heat of normal phase
C_s	specific heat of superconducting phase
C_{el}	electronic contribution to specific heat
C_{latt}	lattice contribution to specific heat
d	thickness of a plate
e	electronic charge
E	energy *or* electric field strength
E_g	energy gap of superconductor ($= 2\Delta$)
g_n	Gibbs free energy per unit volume of normal phase
g_s	Gibbs free energy per unit volume of superconducting phase
G_n	Gibbs free energy of specimen in normal state
G_s	Gibbs free energy of specimen in superconducting state
$\hbar$	Planck's constant $\div 2\pi$
h_l	probability that pair state $(\mathbf{p}_l\uparrow, -\mathbf{p}_l\downarrow)$ is occupied in BCS ground state
H	magnetic field strength
H_a	applied magnetic field strength (see p. 16)
H_i	field strength inside specimen *or* field strength due to transport current
H_c	thermodynamic critical magnetic field strength

H_c'	enhanced critical magnetic field of a thin specimen
H_0	critical magnetic field strength at 0°K
H_{c1}	lower critical field of type-II superconductor
H_{c2}	upper critical field of type-II superconductor
i	current
i_c	critical current
i_s	supercurrent, current of electron-pairs
I	magnetization (magnetic moment per unit volume) *or* current
$\mathscr{I}$	current *or* current per unit width
j	surface current density per unit length
J	volume current density per unit area (= magnitude of current density vector **J**)
J_c	critical current density
J_n	current density due to normal electrons
J_s	current density due to superconducting electrons
k	Boltzmann's constant *or* effective susceptibility of plate [eqn. (8.4)]
l_e	electron mean free-path in normal state
L	self-inductance *or* latent heat
m	electronic mass *or* number of turns/unit length of solenoid
M	mutual inductance *or* total magnetic moment of specimen
n	demagnetizing factor [defined by eqn. (6.2)] *or* any integer
n_s	density of superelectrons
$\mathcal{N}(\varepsilon)$	density of states for electrons with kinetic energy ε
p	momentum of an electron *or* pressure
p_F	Fermi momentum [$= \sqrt{(2m\varepsilon_F)}$]
P	total momentum of a Cooper pair
q	electric charge *or* momentum of a phonon
R_n	resistance of specimen in normal state
R'	flow resistance of a type-II superconductor in the mixed state
s	entropy density *or* velocity of sound
T_c	transition temperature in zero field (or critical temperature)
u	internal energy per unit volume
$\mathbf{v}_s$	velocity of superelectrons
V	volume *or* matrix element of scattering interaction *or* voltage difference
W	kinetic energy
x_n	thickness of normal lamina in intermediate state
x_s	thickness of superconducting lamina in intermediate state
α	surface energy per unit area *or* a parameter $= m/\mu_0 n_s e^2$ (Chap. 3)

γ	Sommerfield specific heat constant [eqns. (5.6) and (9.11)]
Δ	surface energy parameter defined by $\alpha = \frac{1}{2}\mu_0 H_c^2 \Delta$ *or* a parameter defined by $\Delta = 2h\nu_L \exp[-\{\mathcal{N}(\varepsilon_F)V\}^{-1}]$, equal to half the energy gap
$\Delta(0)$	half energy gap at 0°K
ε	kinetic energy of an electron ($= p^2/2m$)
ε_F	Fermi energy
ζ	attenuation length for tunnelling wave function
η	fraction of body in normal state ($= x_n/(x_n + x_s)$) *or* viscosity coefficient for flux flow (Chap. 13)
ξ	coherence length (§ 6.9)
ξ_0	coherence length in pure superconductor
θ	angle *or* Debye temperature
$\varkappa$	Ginzburg–Landau parameter (§ 12.3)
λ	penetration depth [defined by eqn. (2.2)] *or* wavelength
λ_0	penetration depth at 0°K
λ_L	London penetration depth [defined by eqn. (3.13)]
μ_0	permeability of free space ($4\pi \times 10^{-7}$ Hm^{-1})
μ_r	relative permeability
ν	frequency
ν_0	threshold frequency for onset of absorption of electromagnetic radiation
ν_q	phonon frequency
ν_L	an "average" phonon frequency
ρ	electrical resistivity
ρ'	flow resistivity in mixed state
ρ_0	resistivity at 0°K
σ	electrical conductivity
χ	magnetic susceptibility
$\psi(x, y, z, \mathbf{p})$ or $\psi(\mathbf{p})$	one-electron wavefunction for non-interacting electron of momentum $\mathbf{p}$
ϕ	phase
$\Delta\phi$	phase difference
$\phi(x_1, y_1, z_1, \mathbf{p}_1, x_2, y_2, z_2, \mathbf{p}_2)$ or $\phi(\mathbf{p}_1, \mathbf{p}_2)$	two-electron wavefunction for non-interacting electrons with momenta $\mathbf{p}_1$ and $\mathbf{p}_2$
Φ	magnetic flux
Φ'	fluxoid [eqn. (11.5)]
Φ_0	fluxon [eqn. (11.8)]
$\Phi(x_1, y_1, z_1, x_2, y_2, z_2)$ or $\Phi(\mathbf{r}_1, \mathbf{r}_2)$	two-electron wavefunction for a pair of interacting electrons, defined by eqn. (9.4)

Φ_P wavefunction of Cooper pair with total momentum P

Ψ Ginzburg–Landau effective wavefunction (§ 8.5)

$\Psi_G(\mathbf{r}_1, \mathbf{r}_2, \ldots, \mathbf{r}_{n_s})$ many-electron wavefunction describing BCS ground state [eqn. (9.6)] and formally identical with the Ginzburg–Landau Ψ

Ψ_p electron-pair wave function