APPENDIX - ABBREVIATIONS AND SYMBOLS

a constant in ~~equat~~ radar/rainfall eqn 10.14.
~~Ocean~~ wave amplitude

A area (m^2)

A_e effective aperture of aerial (m^2)

B

B

b exponent ~~constant~~ in radar/rainfall eqn (10.14).

Ty Beaufort force

C

c velocity of light (m/s)

C

Wave celarity.

C Ocean wave phase speed or celerity. m/s.

C A Constant ~~known~~ specific to a radar (eqn 10.11).

A constant in $V_\theta = C r^{-}$

C_p Pressure coefficient

C_f force "

C_L Lift "

D

~~d — diameter (m).~~

D

D diameter. (m)

D_0 " of drops with median volume

E.

e - complex dielectric constant

- ~~exponential~~ 2.71828

ε_w - emissivity of water Chap 11 ε

F

f Coriolis parameter (1/s)
frequency of electromagnetic waves (H_2)

F

F - total force (N)
υ - fraction of radar beam filled by target.

G

g the acceleration due to gravity (m/s^2)

G

G Radial gain of an aerial

H

h pulse length (m).

H

I

I

J

J

K

K

K radar attenuation factor

M

M

N

n – frequency (Hz)
– an integer

N

raindrops etc
N number of events, of a structure failing in years

N_D no of drops having diameters between D and dD (eqn 10.12).
N_0 constant is eqn 10.12

O

O centre, centre of rotation

O_i enantiomeric " " "

O_b barometric centre

O

P

P Pressure

P_0 Static pressure

P_c Central minimum pressure at MSL in a T.C.

P_r power received (W)

P_t " transmitted (W)

P

Q

q dynamic pressure (N/m^2)

Q

R

r radial distance from the centre (m)
radar range (m)

R_m radius of maximum winds in a T.C. (m)
R rate of rainfall (mm/h)
Re Reynolds number
~~R Radius~~

R

S

S

T

t time (s)

T period of oscillation (s)

T_B thermodynamic brightness temperature (Chap 11)

T

U

U wind speed component towards the east (m/s).

U

v wind ~~speed~~ velocity (m/s)

wind speed component towards the north (m/s)

v_z wind at height z above a surface

v_{max} maximum wind speed

v_θ tangential wind velocity

v ~~f~~d velocity of propagation of T.C centre (m/s)

x a variable quantity.

Y

Y a non-dimensional quantity varying with latch of waves.

Y

Z

z height above a surface

Z* radar reflectivity factor (mm^6/m^3)

Z

Greek letters

α exponent in power law for variation of wind with vertical
" " M-P drop-size distribution (eqn. 10.12)

λ wavelength of electromagnetic waves (m)

ω vertical velocity (mb/s or m/s)
angular velocity (/s)

ϕ latitude (deg.)

μ viscosity (Ns/m^2)
parameter in statistics

σ standard deviation
radar scattering cross section (m^2)

ρ mass density of air (kg/m^3)

J_0 magnitude of angular velocity about O

Ω magnitude of earth's angular velocity

Abbreviations

amsl	above mean sea level
msl	
W.M.O	World Met - Org
IMC	International Met - Committee.
T.C	Tropical cyclone
BS	British Standard
cp	Code of practice
H.K	Hong Kong
R.O.H.K.	
~~H.K.~~ G.M.T.	
U.S.A	United States of America.
U.S	" " (of America)
RHI	Range Height Indicator
PPI	Plan Position Indicator
prf	pulse repetition frequency
STC	Sensitivity time control.
M-P	Marshall-Palmer ~~drop~~ - refers to their drop size distribution
MTI	moving target indication

Units

milli
micro
nano

m

dB decibel
dBZ reflectivity factor relative to $Z = 1\ mm^6/m^3$.

a year
m metre
°C
K
bar mbar amb
s secon
Knot
min minute
Hz frequency (/s)

Maths

ln = Natural logarithm
Log or Log_{10} = Logarithm to base 10
e =

Greek letters

N

λ = wavelength of electromagnetic waves (m)
ω = vertical velocity, magnitude of angular velocity
ω_0 angular velocity about 0
ϕ = latitude
α = exponent in power law for wind variation in vertical
μ = viscosity (Ns/m^2) / micro or parameter in statistics of extremes
γ = " " "
σ = standard deviation, radar cross section (m^2).
parameter in statistics of extremes
ρ = mass density of air (kg/m^3)
Ω = magnitude of earth's angular velocity

Symbols

a

b B Beaufort

C C = wave velocity
C_0 = Deep water wave velocity
C_g = " " group velocity.

c = Speed of light.

d d = depth of water

e

F Frequency of radar wave. (10.8.4)
Doppler frequency. (10.8.4)

g g = acceleration due to gravity $9.8 m/s^2$

h Hz Hertz, one cycle per second
H wave height

J Joules

k

L L = wavelength.
L_0 = deep water wavelength.

M m = metre.

N N = total number
n = some lesser number

O

P

q/ dynamic pressure

R R = radius of strong wind
r = some greater radius

S s = second

T T = period

U

V V = tangential velocity
small v = wind velocity Also tangential motion - radial 10.8.4
V_{max} = maximum wind

W

X

Y

Z height

Greek

Power law
α factor

ρ = density
v = viscosity

λ = ~~radio~~ radar wavelength.

τ stress.

r(ω)wd speed v
V forward speed.

LIST OF SYMBOLS

(Recommended by AMS Committee on Radar Meteorology)

Symbol	Quantity	Common Units
A	Geometric area of antenna aperture	m^2
A_e	Effective area of antenna aperture	m^2
c	Speed of light	m/sec
d	Antenna diameter	m
D	Raindrop diameter	mm
E	Pulse energy	J
f	Frequency generally	Hz, MHz or GHz
f_t	Transmitted frequency	MHz or GHz
F_r	Pulse repetition frequency	Hz
$G(\theta,\phi)$	Antenna gain function (one-way)	
G_0	Antenna axial gain	
h	Pulse length in space	m
$\lvert K\rvert^2$	Dielectric factor	
M	Liquid water content	gm/m^3
m	Complex index of refraction	
N_t	Raindrop concentration	m^{-3}
$N(D)$	Drop-size distribution function	$mm^{-1}\,m^{-3}$
P_t	Peak power transmitted	KW or MW
$\overline{P_r}$	Average power received	mW
R	Rate of precipitation (usually rain)	mm/hr
r	Radar range	km or n. mi.
T_r	Pulse repetition period	msec
V_c	Volume of contributing region	m^3
Y	Specific attenuation	dB/km
$Z(=\Sigma_j D_j^6/V_c)$	Reflectivity factor	mm^6/m^3
$Z_e(=\lambda^4\eta/\pi^5\lvert K\rvert^2)$	Equivalent reflectivity factor	mm^6/m^3
α	Antenna elevation angle	deg
η	Radar reflectivity (cross section per unit volume)	cm^{-1} or m^{-1}
θ,ϕ	Angular coordinates of target relative to beam axis	deg
θ_0,ϕ_0	3-dB beamwidths (one-way)	deg
τ	Attenuation factor	
λ	Wavelength	cm
σ	Radar cross section	m^2
τ	Pulse duration	μsec
Ψ	Fraction of beam filled	