1 The Inner Track Chamber (ITC)

Description: Conventional cylindrical drift chamber with small staggered cells. Eight layers of sense wires. 96 cells on the inner four layers, 144 on the outer four. Hexagonal cell with 4 field wires per sense wire. Each pair of layers separated by a wire mesh. Outer wall of carbon fibre takes the load of wires. Inner wall of polystyrene and aluminium foil until 1990, polystyrene and carbon fiber from 1991. Z-measurement using the time difference for the pulse to reach the two ends of the wire. Provides correlated $r-\phi-z$ information for a fast 3-d track trigger. Gas: $ArCO_2$ (80% : 20%)

Dimensions:

Active length	2 m
R_{inner}	12.8 cm
R_{outer}	28.8 cm
Radiation length:	inner wall $0.0034X_0$
	outer wall $0.01X_0$
W/Au sense wires	960 (30μ diameter)
Al/Au field wires of	3840 (147μ diameter)

Electronics: Single-hit electronics with preamplifier on chamber. Specially constructed AZ board with combined amplifier/constant-fraction discriminator for signal detection and time expansion circuitry for the time difference (z) measurement. 0.5 nsec CAMAC TDC's for drift time measurement until 1992, 0.6 nsec from 1993. FASTBUS readout controlled by ALEPH Event Builder. $R-\phi$ and $r-\phi-z$ fast trigger processors with special bits to indicate the number of tracks, number of hits per layer and back-to-back tracks.

Performance: Track with $-0.97 < cos\theta < 0.97$ will traverse all layers.
$\sigma_{r\phi} = 150\mu$ averaged over the drift cell. (With ArC_2H_6 50%:50% $\sigma_{r\phi} = 130\mu$)
$\sigma_z = 7cm$ averaged over z and all layers
$r-\phi$ trigger decision in 500 nsec.
$r-\phi-z$ trigger decision in 2 $\mu sec.$