Now for a dual quat * plane

$(q.w + q.e23 + q.e31 + q.e12 + q.e01 + q.e02 + q.e03 + q.e0123)$
$\times (p.e0 + p.e1 + p.e2 + p.e3)$

$= +(q.w)(p.e0)\,e0 + (q.w)(p.e1)\,e1 + (q.w)(p.e2)\,e2$
$+ (q.w)(p.e3)\,e3$
$+ (q.e23)(p.e0)(-e032) + (q.e23)(p.e1)\,e123 + (q.e23)(p.e2)(-e3)$
$+ (q.e23)(p.e3)\,e2$
$+ (q.e31)(p.e0)(-e013) + (q.e31)(p.e1)\,e3 + (q.e31)(p.e2)\,e123$
$+ (q.e31)(p.e3)(-e1)$
$+ (q.e12)(p.e0)(-e021) + (q.e12)(p.e1)(-e2) + (q.e12)(p.e2)\,e1$
$+ (q.e12)(p.e3)\,e123 + (q.e1)$
$+ (q.e01)(p.e1)\,e0 + (q.e01)(p.e2)(-e021) + (q.e01)(p.e3)\,e013$
$+ (q.e02)(p.e1)\,e021 + (q.e02)(p.e2)\,e0 + (q.e02)(p.e3)(-e032)$
$+ (q.e03)(p.e1)(-e013) + (q.e03)(p.e2)\,e032 + (q.e03)(p.e3)\,e0$
$+ (q.e0123)(p.e1)(-e032) + (q.e0123)(p.e2)(-e013) + (q.e0123)(p.e3)(-e021)$

Group up to find

$e0 \quad (q.w)(p.e0) + (q.e01)(p.e1) + (q.e02)(p.e2) + (q.e03)(p.e3)$

$e1 \quad (q.w)(p.e1) - (q.e31)(p.e3) + (q.e12)(p.e2)$

$e2 \quad (q.w)(p.e2) + (q.e23)(p.e3) - (q.e12)(p.e1)$

$e3 \quad (q.w)(p.e3) - (q.e23)(p.e2) + (q.e31)(p.e1)$

$e032 \quad -(q.e23)(e0) - (q.e02)(p.e3) + (q.e03)(p.e2) - (q.e0123)(p.e1)$

$e013 \quad -(q.e31)(p.e0) + (q.e01)(p.e3) - (q.e03)(p.e1) - (q.e0123)(p.e2)$

$e021 \quad -(q.e12)(p.e0) - (q.e01)(p.e2) + (q.e02)(p.e1) - (q.e0123)(p.e3)$

$e0123 \quad (q.e23)(p.e1) + (q.e31)(p.e2) + (q.e12)(p.e3)$