12.05 From the information provided in the question, determine the structure for both the product and the starting material.

(a) Compound A: a ketone; $C_7H_{14}O$; 3 ^{13}C-NMR signals; 2 ^{1}H-NMR signals (6:1 ratio) → ($NaBH_4$, CH_3OH) → Compound B: a 2° alcohol; $C_7H_{16}O$; 3 ^{13}C-NMR signals; 4 ^{1}H-NMR signals (12:2:1:1 ratio)

(b) Compound C: an aldehyde; $C_5H_{10}O$; 5 ^{13}C-NMR signals; 5 ^{1}H-NMR signals (3:3:2:1:1 ratio) → (1) $LiAlH_4$, (2) H_3O^+) → Compound D: a 1° alcohol; $C_5H_{12}O$; 5 ^{13}C-NMR signals; 6 ^{1}H-NMR signals (3:3:2:2:1:1 ratio)

(c) Compound E: a ketone; $C_6H_{12}O$; 4 ^{13}C-NMR signals; 2 ^{1}H-NMR signals (3:1 ratio) → (1) CH_3MgBr, (2) H_3O^+) → Compound F: a 3° alcohol; $C_7H_{16}O$; 4 ^{13}C-NMR signals; 3 ^{1}H-NMR signals (9:6:1 ratio)

(d) Compound G: an aldehyde; $C_5H_{10}O$; 5 ^{13}C-NMR signals; 5 ^{1}H-NMR signals (3:2:2:2:1 ratio) → (1) CH_3CH_2Li, (2) H_3O^+) → Compound H: a 2° alcohol; $C_7H_{16}O$; 7 ^{13}C-NMR signals; 8 ^{1}H-NMR signals (3:3:2:2:2:2:1:1 ratio)

12.06 Provide a complete, stepwise mechanism for the following reaction.