points where the sequence changes. Thus set A of Figure 5 requires the sequence to change from L23 at I_2 to 23L at I_3, which necessitates the intermediate sequence 2L3 and two singular points S_2 and S_3. The curve of congruent melting of a phase must, of course, lie on the opposite side of the singular point from the curve of incongruent melting of that phase.

In set B the sequence 2L3 is the same at both invariant points so the connecting curve does not require singular points. Since 12L and L34 are the incongruent melting curves of phase 2 and 3, it is on these that S_2 and S_3 must occur. Because S_2 and S_3 can occur anywhere along these curves a number of minor variations of this diagram are possible. Thus curves 3L4, L34, and 3 $\leftrightarrow$ L can cross indifferently any of curves 1L2, 12L, and 2 $\leftrightarrow$ L.

In Figure 5C the sequence of L23 near I_2 must change to 2L3 before the curve reaches I_3. This places singular point S_2 on this curve while S_3 must occur on the incongruent melting curve of phase 3, L34. Curve 1L2 can cross either 2L3 (and L34) or 234. S_3 can fall on either side of 2 $\leftrightarrow$ L.

In Set D the sequence 23L is the same at both invariant points; therefore they are connected by the single curve 23L. Because the singular point for phase 3 cannot occur on 23L, it must occur on 13L. Phase 2 has only a single incongruent melting curve (12L) and S_2 must occur on it.

Sets E and especially F present situations of increasing complexity and are probably very unlikely in any systems but are included for completeness. Set E requires not two but four singular points, three of them involving phase 2 plus phases 1, 3 and 4 respectively. Set F on the other hand requires a total of six singular points divided equally between phases 2 and 3.

All of these diagrams can be separated into two parts, one resembling Figure 3 and the other its mirror image, the two being superimposed and connected in various ways. In A, the two are attached by connecting 1L2 in Figure 3 to the same curve in its mirror image. In B, curve 2L4 of Figure 3 connects the two parts. In C, curve 1L2 of Figure 3 is connected to 2L4 of its mirror image. In D, the situation is obscured by the fact that curve 23L (corresponding to 12L in Figure 3) is interrupted by the breakdown of phase 2 which produces an invariant point I_2. However, the incongruent melting of phase 3 continues to the left as curve 13L, finally reaching S_3. E and F are obscured by the presence of additional singular points. In E, phase 3 goes thru the usual change of incongruent to congruent melting but phase 2 first melts incongruently (12L), then conguently (2 $\leftrightarrow$ L), but then goes through a second stage of incongruent melting (L23 and L24) and finally melts congruently again. In F, *both* phases 2 and 3 behave as did phase 2 of E.

The diagrams of Figure 5 can be applied to systems in which the solid phases can vary in composition so long as their *relative* positions along the composition axis do not change. If a third intermediate phase becomes stable it may complicate things considerably. However, with five solid phases stable, we can consider subsystems of phases 1–4 (or 2–5) over the *P-T* range of our newly chosen component, phase 4 (or phase 2). In all cases, the congruent melting curve of an intermediate phase must change to an incongruent melting curve before reaching the limit of stability of that phase on the liquidus.

Near the beginning of this section we mentioned a fundamentally different situation (case 3) where the two intermediate phases are both initially stable and with change in pressure become unstable. Although it does not correspond to the system $NaAlSiO_4$-SiO_2, we might mention that it can be treated in the same manner as the foregoing and there are six possible diagrams.

Phase relations in the system $NaAlSiO_4$-SiO_2. We will now see which of the possible diagrams of Figure 5 best fits our data as shown in Figures 1 and 2. All of these Figures have been drawn in the same orientation to facilitate direct comparisons. The numbers of Figure 5 will be assigned to phases in the system as follows: (1) nepheline, (2) jadeite, (3) albite, (4) quartz. In all of the diagrams the shaded curves marking the *P-T* limits of phase 2 (which begin on the right with 2 $\leftrightarrow$ L and end on the left with 123) correspond in Figure 1 to the curves bounding the jadeite field. I_2 and S_2 of Figure 5 correspond to I_{Jd} and S_{Jd} of Figure 1 whereas the curve 1L3 corresponds to the upper limit of the albite + nepheline field. The remaining two curves in Figure 1 which separate the liquid field from albite + liquid and nepheline + liquid are divariant and vary with composition; thus they do not appear in Figure 5. Figure 5 may be similarly related to Figure 2—the shaded curves indicating the *P-T* limits of phase 2 correspond to the curves bounding the albite field of Figure 2, while I_2, S_2 and 2L4 are equivalent to I_{Ab}, S_{Ab} and the curve separating the jadeite + coesite field from jadeite + liquid. The curve in Figure 2 separating liquid from jadeite + liquid is divariant.

The compositional sequences at invariant points I_{Jd} and I_{Ab} indicate that diagram A of Figure 5 should be the correct one. It can be seen from Figure 1 that I_{Jd} must have the sequence of phases nepheline-liquid-jadeite-albite or 1L23 because the existence of the albite + liquid field in runs of jadeite composition means that the liquid must lie on the opposite side of jadeite composition from albite. Similarly in Figure 2, jadeite + liquid must add up to the bulk composition albite which indicates that the sequence of phase compositions near I_{Ab} will be jadeite-albite-liquid-quartz or 23L4. Other facts confirm the choice of diagram. Figure 1 clearly implies a singular point (S_{Jd}) where jadeite (2) stops melting congruently (2 $\leftrightarrow$ L) and instead jadeite melts to albite + liquid (L23). This means that S_2 must lie on curve L23 (or a mirror image with S_3 on 23L). Only with sets A and C (or E and F) is this possible. C would require the albite congruent melting