magnitude, near m5.3 , for explosions. However, the separation between populations in terms of the ratio or of the amplitude of the longer period waves is sufficiently great that absence of the longer period waves for explosions is a useful negative criterion (see following section) with possible application down to about m4.5 . The procedure is feasible using any LPZ data capable of being bandpass filtered, and can be considered a possible discriminant using station data available to this study.

8.5 Identification by Negative Criteria

The explosion identification thresholds described in the previous sectionsare defined as being equal to the threshold of detection of explosion Rayleigh waves. The procedure to be discussed in this section is identification of explosions by the absence of a recorded wave on the basis that had the event been an earthquake of the same P wave magnitude, the wave in question would have been observable on the record. An associated concept is the identification of earthquakes as such by measurement of a factor which shows the event to conform to prior knowledge of earthquakes with respect to this factor.

Consider as an illustrative example the results presented by Basham (1969b) for identification of Asian events using M versus m observations on Canadian stations. Identification of earthquakes using observed Rayleigh waves has a threshold of about m5.0 ; identification of explosions using observed Rayleigh waves has a threshold at about m6.0 ; because of the wide separation between populations, both can be considered positive identification. Because of the variation in detection thresholds due to variations in the noise levels, the largest earthquake whose Rayleigh wave can be obscured by noise is about m5.4 . Thus, any event larger than m5.4 which does not have an observable surface wave (and which is known from other information to be shallow) can be identified as a probable explosion. As the magnitudes approach m6.0 , the Rayleigh wave will again be observable for all events and M versus m will plot in either the explosion or earthquake population and yield positive identification. In this case, the threshold of probable identification is reduced by about δm0.6 from the threshold of positive identification by the application of a negative criterion.

The M versus m relationships of the earthquakes and explosions discussed in this example are near to the assumed world-wide averages given by equations (5) and (7), i.e., for which earthquakes and explosions are separated by about δM1.5 . Therefore, we estimate that extensive studies should demonstrate a usable negative criterion with an improvement of about δm0.5 on a world-wide basis. The general validity of this assumption, however, depends on the general scatter of populations with respect to the average trends and, for any regional application, to the closeness of the earthquake and explosion average M versus m trends. For example, the regional data for R_g for North American paths presented by Basham (1969a) shows M versus m trends separated by about δM1.4 and with data point scatter that nearly overlaps. In fact, the two sets of data in the study by Basham show a theoretical (formal) overlap at about the 2 per cent level; hence great care must be exercised in the development and application of negative criteria. However, provided precautions are taken to have information