As part of an identification programme undertaken on the southern section of the Molonglo Deep Sky Survey of Radio Sources, the limiting magnitudes of some of the available ESO-B films and SRC-J films and plates in this area have been determined. The Molonglo Deep Sky Survey has been described by Robertson (1977). The southern section comprises a 45′ wide strip centred about declination -62° and stretching in an irregular fashion from 18° 25′ to 00° 16′.

The ESO-B Sky Survey

Four different methods used to estimate the limiting B magnitude of the ESO-B Sky Survey are described below. The results are summarised in Table I.

1. Walker's (1970) "Kron 3" sequence was used to establish the electronographic B magnitude of the faintest object positively visible on the survey. The positive identification of faint objects on the survey films is often complicated by photographic grain density variations.

2. A ‘Stellar image density-magnitude’ scale was established using the Kron 3 cluster for ESO stellar images fainter than 18m (White 1977). This scale was then used to estimate the stellar magnitude equivalent of the survey sky background in the ten adjacent fields covering the radio source survey.

3. Using the same ten films, the object densities (i.e. the number of objects per square degree of sky) on the survey were compared with the expected object densities for various magnitude limits (See Figure 1). The expected number of stars was obtained from Allen (1973) who draws his data from Sears et al. (1925) and Sears and Joyner (1928). Here an error of about ± 0.2 may be present at m_0 = 22 due to an extrapolation of their data. The expected number density of galaxies was taken from Hubble (1936). Hubble's magnitude scale was converted to the photographic scale (McEwan et al. (1975)) and hence to the B scale (Lang (1974)). A small correction for galactic absorption was also made (White 1977).

4. A direct comparison was made with the Palomar Sky Survey (P.S.S.) at δ = 33°. Minkowski and Abell (1963) give...
the limiting magnitude of the O P.S.S. as 21.0, which is assumed to apply to the Palomar zenith (δ = +33°). This value was converted to m_B(lim) (Lang (1974)). Differential object counts at δ = +33° and δ = -33° (at similar galactic latitude and longitudes) gave the m_B(lim) for the southernmost limit of the P.S.S. as ~ 20.1°. On field 423 the P.S.S. and the ESO-B Sky Surveys were compared again using differential object counts.

Table I. ESO-B Sky Survey Limiting B Magnitude

<table>
<thead>
<tr>
<th>Method</th>
<th>Field No.</th>
<th>m_B(lim)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kron 3 comparison</td>
<td>28</td>
<td>20.9 ± 0.3</td>
</tr>
<tr>
<td>Stellar image Density</td>
<td>(140 to 148)</td>
<td>20.65 ± 0.25</td>
</tr>
<tr>
<td>Scale Object counts</td>
<td>+ 111</td>
<td>20.7 ± 0.25</td>
</tr>
<tr>
<td>P.S.S. Comparison</td>
<td>423</td>
<td>20.7 ± 0.4</td>
</tr>
</tbody>
</table>

The weighted mean of the above results is m_B(lim) = 20.73 ± 0.14.

The theoretical limiting B magnitude was determined using the equation of Baum (1962). All Baum parameters, except the seeing disc Diameter (a) were taken directly from Schuster and West (1975). The average diameter (measured to the very outer edge of the image) of stellar images on 10 adjacent plates (fields 140 to 148 and 111) was measured to be 2.7 ± 0.2. Schuster and West state that only plates that have a < 2.5° were accepted for the survey. They do concede, however, that plates with a as large as 3°0 were present in the survey. For a = 2.7 ± 0.2, the Baum equation gives m_B(lim) = 21.0 ± 0.1 in good agreement with the above experimentally determined value.

Schuster and West (1975) stated that the limiting magnitude of the only survey plate examined was “slightly brighter than 21°". They also state that other plates, some especially taken to reach faint objects, reach 21°5 to 22°. Schuster and West conclude that the limiting magnitude for both glass and film copies of the survey is 21°0 to 21°5 with a mean of 21°2. The present estimate of 20°73 ± 0°14 is significantly brighter than the result of Schuster and West.

The SRC-J Sky Survey

A similar investigation was carried out on the preliminary SRC-J Sky Survey material that was available and applicable to the identification programme on the southern section of the Molonglo Deep Sky Survey of Radio Sources. The results of this investigation are presented in Table II. The formal errors quoted for the ‘Object counts’ method do not include any error that may result from the extrapolation to 22° of the star densities given in Allen (1973). It should be noted that the available material does not include my final survey material nor does it include field 28 which contains the Kron cluster. A more detailed investigation will be carried out when field 28 becomes available.

Table II. SRC-J Sky Survey Limiting

<table>
<thead>
<tr>
<th>Method</th>
<th>Fields</th>
<th>m_B(lim)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object Counts</td>
<td>141, 143</td>
<td>21.7 ± 0.2</td>
</tr>
<tr>
<td></td>
<td>140, 142, 144</td>
<td>21.6 ± 0.1</td>
</tr>
<tr>
<td></td>
<td>147 and 111</td>
<td>21.5 ± 0.35</td>
</tr>
<tr>
<td>Predicted by</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baum Equation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes
(1) Preliminary “sample” film copies of the SRC-J Sky Survey
(2) Polaroid copies of small areas of “B” grade plates obtained from the SRC Schmidt at Siding Spring Observatory.
(3) All parameters, except the smallest image diameter a, were from Schuster and West (1975).

Acknowledgment
I wish to thank the staff of the SRC Schmidt for kindly allowing polaroid copies of their plates to be made. This work was supported by the Australian Research Grants Committee, the University of Sydney Research Grants Committee and the Science Foundation for Physics within the University of Sydney.