

More VLA Calibrators at Q Band

VLA Test Memo #193

Mark Holdaway, Frazer Owen, and Michael Rupen

April 20 1995

Abstract: We present 96 compact sources with 90-GHz fluxes above 0.5 Jy which are not in Chandler's VLA Test Memo #192. Most of these sources will make excellent high frequency VLA calibrators.

Sources which are bright at 90 GHz are likely to be bright at 43 GHz. We are currently engaged in a project to determine the number of MMA calibrators in the sky at 90 GHz. We have observed many of Alok Patniak's 3000 compact, flat spectrum, extragalactic radio sources with the NRAO 12 m telescope at 90 GHz. (These sources are designated by an "A" next to the source name in the Table below.) At 8 GHz in the A array, these sources typically have only a few percent of their flux in extended emission. At 43 GHz and 90 GHz, the extended emission will be that much weaker. Even though the 90 GHz fluxes were measured with a single dish, we expect these sources to make excellent calibrators. The positional accuracy of Patniak's sources is about 10 mas.

Patniak's survey avoided the Galactic plane to select against compact HII regions, which would generally not be useful calibrators for MERLIN. We have also observed a sample of bright, flat spectrum sources in the plane, some of which might be compact HII regions. These are the "maybe" sources, designated by an "M" next to the name. Positions of these sources were taken from the most accurate survey in which they appeared, usually the Texas 365 MHz survey, and positional accuracy is probably a few arcseconds.

We have also gathered from the literature a sample of lobe dominated, steep spectrum quasars with bright flat spectrum cores. These are designated by an "S". One potential hazard of using these sources as calibrators is that the 12 m flux may include emission from the extended structure (ie, hotspots). Core positions were taken from tables (when possible) or directly from published maps, and the positional accuracy is on the order of an arcsecond.

Katagiri, Morita, and Holdaway have observed 21 of these sources ("A" and "M" sources) with the NMA at 90 GHz, and find similarly high fluxes in a point source component in 20 of the 21 sources. The source which was not a point source to the NMA was an "M" source, likely to be a compact HII region in the galaxy. The most variable source increased in flux by a factor of 3 over 3 months.

In the Table below, we present the sources with 90 GHz flux greater than 0.5 Jy which are not presented in Chandler's VLA Test Memo 192. We include the 1950 source name, the 1950 coordinates, a centimeter flux in Jy (taken from Patniak for "A" sources, from the literature for "S" sources, and from various single dish surveys for the "M" sources), our measured 90-GHz flux in Jy, the rms in Jy, and the date of the 90 GHz flux measurement. The flux scale was determined by observations of bright planets, and is accurate to 5-10%. The uncertainties in the flux scale are not included in the rms.

We recommend that these sources be added to the VLA calibrator list and observed at other frequencies. While the Patniak sources have positions which are at least as accurate as the VLA calibrators, the "M" and "S" sources will require astrometry prior to entry into the VLA calibrator list.

Name (1950)	Code	RA (1950)	DEC (1950)	S_cm (Jy)	S_90GHz (Jy)	E_90GHz (Jy)	Date
0002+541	A	00:02:29.056	+54:11:43.178	0.334	0.706	0.093	Oct94
0005+683	A	00:05:54.354	+68:20:40.698	0.103	0.682	0.093	Oct94
0010+405	A	00:10:54.299	+40:34:56.616	0.534	0.723	0.036	Oct93
0012+610	M	00:12:06.9	+61:01:02.	2.034	0.516	0.093	Oct94
0017+200	A	00:17:02.120	+20:05:06.711	1.183	0.546	0.093	Oct94
0237-016	A	02:37:13.717	-02:47:32.852	0.802	0.586	0.139	Feb95
0321+467	A	03:21:51.289	+46:44:34.798	0.302	0.969	0.093	Oct94
0354+231	A	03:54:23.254	+23:11:17.303	0.339	0.711	0.136	Feb95
0433+295	S	04:33:55.210	+29:34:12.6	0.120	0.692	0.046	Oct93
0529+483	A	05:29:27.564	+48:20:47.968	0.539	1.133	0.061	Oct93
0603+476	A	06:03:36.206	+47:40:11.007	0.363	0.953	0.215	Feb95
0616+136	M	06:16:07.3	+13:38:12.	0.927	0.814	0.105	Feb95
0640+090	M	06:40:42.2	+09:00:40.4	0.629	0.525	0.106	Feb95
0650-063	M	06:50:34.2	-06:21:48.3	0.560	0.820	0.105	Feb95
0653-033	M	06:53:41.3	-03:19:09.2	0.607	0.609	0.105	Feb95
0704+293	A	07:04:16.251	+29:22:02.632	0.112	0.535	0.105	Feb95
0749+540	A	07:49:06.444	+54:00:46.414	?	1.221	0.058	Oct93
0805-060	A	08:05:49.555	-07:42:22.386	1.075	0.967	0.184	Feb95
0842+048	A	08:42:39.205	+04:50:44.688	0.249	0.661	0.185	Feb95
1004+141	A	10:04:59.785	+14:11:10.934	0.942	0.832	0.103	Feb95
1005+066	A	10:05:23.466	+06:36:03.311	0.646	0.526	0.102	Feb95
1015+057	A	10:15:51.238	+05:45:32.819	0.291	0.889	0.102	Feb95
1040+123	S	10:40:06.	+12:19:15.1	1.627	0.517	0.062	Oct93
1040+244	A	10:40:25.199	+24:24:19.632	0.664	0.695	0.093	Oct94
1049+215	A	10:49:07.188	+21:35:48.593	1.135	1.092	0.061	Oct93
1100+305	A	11:00:29.718	+30:30:52.591	0.231	0.604	0.093	Oct94
1125+596	A	11:25:23.183	+59:41:46.144	0.538	0.502	0.093	Oct94
1128+385	A	11:28:12.513	+38:31:51.648	0.748	0.544	0.030	Oct93
1200-051	S	12:00:00.430	-05:11:20.4	0.478	0.634	0.079	Oct93
1212+171	A	12:12:31.449	+17:11:18.145	0.395	0.588	0.137	Feb95
1219+044	A	12:19:49.256	+04:29:53.634	1.008	0.555	0.137	Feb95
1222+037	A	12:22:19.098	+03:47:27.086	0.783	0.703	0.137	Feb95
1222+216	A	12:22:23.412	+21:39:23.094	1.055	0.840	0.136	Feb95
1236+049	A	12:36:59.935	+04:59:33.367	0.288	0.563	0.101	Feb95
1302-019	A	13:02:08.717	-03:29:58.542	0.389	0.652	0.101	Feb95
1307+121	A	13:07:04.351	+12:10:22.413	0.785	0.730	0.098	Feb95
1319+220	A	13:19:46.944	+22:03:52.355	0.139	0.577	0.100	Feb95
1324+224	A	13:24:37.118	+22:26:22.704	2.072	1.617	0.100	Feb95
1417+273	A	14:17:45.097	+27:20:09.124	0.326	0.612	0.096	Feb95
1417+385	A	14:17:43.057	+38:35:32.312	0.678	0.616	0.052	Oct93
1423+146	A	14:23:25.458	+14:38:25.976	0.581	0.550	0.097	Feb95
1456+044	A	14:56:29.153	+04:28:09.352	0.587	0.773	0.097	Feb95
1504+377	A	15:04:12.958	+37:42:23.347	1.014	0.688	0.039	Oct93
1505+428	A	15:05:04.056	+42:50:52.743	0.359	0.579	0.025	Oct93
1508-040	A	15:08:14.973	-05:31:48.982	0.694	0.734	0.097	Feb95
1514+004	A	15:14:06.740	+00:26:01.341	0.979	1.034	0.097	Feb95
1514+197	A	15:14:40.988	+19:43:10.983	0.606	0.500	0.098	Feb95
1601+112	A	16:01:19.639	+11:14:00.136	0.357	0.595	0.098	Feb95
1604+159	A	16:04:49.4	+15:59:32.735	0.220	0.562	0.098	Feb95
1623+578	A	16:23:27.709	+57:48:03.967	0.583	0.945	0.224	Feb95
1636+473	A	16:36:19.146	+47:23:28.592	0.704	0.636	0.046	Oct93
1645+410	A	16:45:18.217	+41:04:34.508	0.337	0.512	0.054	Oct93
1656+477	A	16:56:39.602	+47:42:19.649	1.069	0.716	0.047	Oct93

Name (1950)	Code	RA (1950)	DEC (1950)	S_cm (Jy)	S_90GHz (Jy)	E_90GHz (Jy)	Date
1700+685	A	17:00:19.666	+68:34:25.169	0.355	0.549	0.093	Oct94
1717+178	A	17:17:00.4	+17:48:09.	0.640	0.642	0.093	Oct94
1726+455	A	17:26:01.201	+45:33:04.556	1.248	0.690	0.058	Oct93
1734+063	A	17:34:47.355	+06:22:48.241	0.544	0.721	0.093	Oct94
1746+469	A	17:46:04.348	+46:59:48.716	0.761	0.525	0.093	Oct94
1747+433	A	17:47:29.598	+43:22:42.568	0.272	0.638	0.093	Oct94
1807+279	A	18:07:13.638	+27:57:35.848	0.327	0.636	0.202	Feb95
1827+062	A	18:27:39.474	+06:17:09.966	0.460	0.738	0.093	Oct94
1849+005	M	18:49:13.7	+00:31:53.8	0.624	0.659	0.093	Oct94
1855+031	M	18:55:32.2	+03:09:11.1	0.722	0.514	0.093	Oct94
1901+319	A	19:01:02.307	+31:55:13.874	1.685	0.808	0.037	Oct93
1929+226	M	19:29:16.9	+22:37:07.7	0.450	0.968	0.093	Oct94
1936-146	A	19:36:36.026	-15:32:38.781	1.078	0.546	0.149	Feb95
1937+630	A	19:37:42.004	+63:00:22.329	0.111	0.731	0.227	Feb95
1944+250	M	19:44:41.3	+25:05:12.	6.163	3.524	0.093	Oct94
1952+138	A	19:52:52.319	+13:50:17.951	0.322	0.524	0.093	Oct94
3C405	S	19:57:44.360	+40:35:46.6	0.327	2.789	0.093	Oct94
1959+330	M	19:59:14.2	+33:02:40.	3.988	1.422	0.093	Oct94
2005+642	A	20:05:42.457	+64:16:01.882	0.851	0.578	0.041	Oct93
2010+463	A	20:10:30.811	+46:19:52.6	0.491	0.597	0.045	Oct93
2013+370	M	20:13:37.1	+37:01:43.9	1.456	3.124	0.093	Oct94
2022+031	A	20:22:38.866	+03:06:55.760	0.375	0.733	0.093	Oct94
2022+204	A	20:22:15.319	+20:26:57.555	0.058	0.649	0.221	Feb95
2023+372	M	20:23:30.9	+37:13:23.9	1.219	0.692	0.093	Oct94
2023-065	A	20:22:59.594	-07:45:42.981	0.534	0.926	0.220	Feb95
2032+117	A	20:32:14.291	+11:44:09.494	0.211	0.633	0.093	Oct94
2043+440	M	20:43:53.6	+44:03:57.	2.246	0.886	0.093	Oct94
2047+181	A	20:47:01.249	+18:10:55.859	0.125	0.830	0.220	Feb95
2049+175	A	20:49:17.427	+17:32:18.472	0.421	0.579	0.093	Oct94
2053-039	A	20:53:12.776	-04:28:18.611	0.243	2.719	0.222	Feb95
2107+353	A	21:07:30.450	+35:20:43.218	0.829	0.814	0.040	Oct93
2247+596	M	22:47:30.3	+59:39:04.	2.258	1.259	0.093	Oct94
2251+134	S	22:51:51.870	+13:25:49.1	0.558	0.717	0.093	Oct94
2251+244	A	22:51:44.396	+24:29:23.998	0.442	0.589	0.093	Oct94
2256+585	M	22:56:36.2	+58:30:57.1	1.338	0.835	0.093	Oct94
2303+599	M	23:03:04.2	+59:58:25.	2.114	1.214	0.093	Oct94
2309+454	A	23:09:28.214	+45:27:37.237	0.543	0.614	0.093	Oct94
2320+506	A	23:20:05.997	+50:41:24.319	1.552	0.738	0.043	Oct93
2327+335	A	23:27:45.966	+33:32:03.589	0.465	0.516	0.093	Oct94
2331+073	A	23:31:40.088	+07:19:52.381	0.966	0.972	0.093	Oct94
2344+092	A	23:44:03.773	+09:14:05.429	1.351	0.526	0.053	Oct93
2346+385	A	23:46:49.833	+38:32:36.957	0.224	0.674	0.055	Oct93
2351+456	A	23:51:49.972	+45:36:22.760	0.831	0.582	0.036	Oct93

