NATIONAL RADIO ASTRONOMY OBSERVATORY
Edgemont Road, Charlottesville
Virginia 22901

29 March 1984

Dr. G.G.Byrd,
Department of Physics and Astronomy,
University of Alabama,
P.O.Box 1921,
AL 35486

Dear Gene,

I am glad you found the plots from the November run. I have since tried one more self calibration at 2cm to see if I could remove the crud around the point source, but concluded that the reduction I did at the VLA is very close to being noise limited. I will not pursue calibration any further.

I made one-dimensional profiles across the jet at 6cm and 2cm and fitted these with Gaussians to estimate the jet widths. The jet is unresolved with the 0.38" beams, but may be resolving at 2cm with the 0.2" beam. The variation of peak brightness with beamsize at 2cm confirms this, and I estimate (deconvolved) FWHMs of 0.12" at the first jet knot southeast of the core (0.8" from the nucleus) and 0.17" at the second knot in this direction (1.4" from the nucleus). These estimates will allow us to derive equipartition parameters, etc. for the jet.

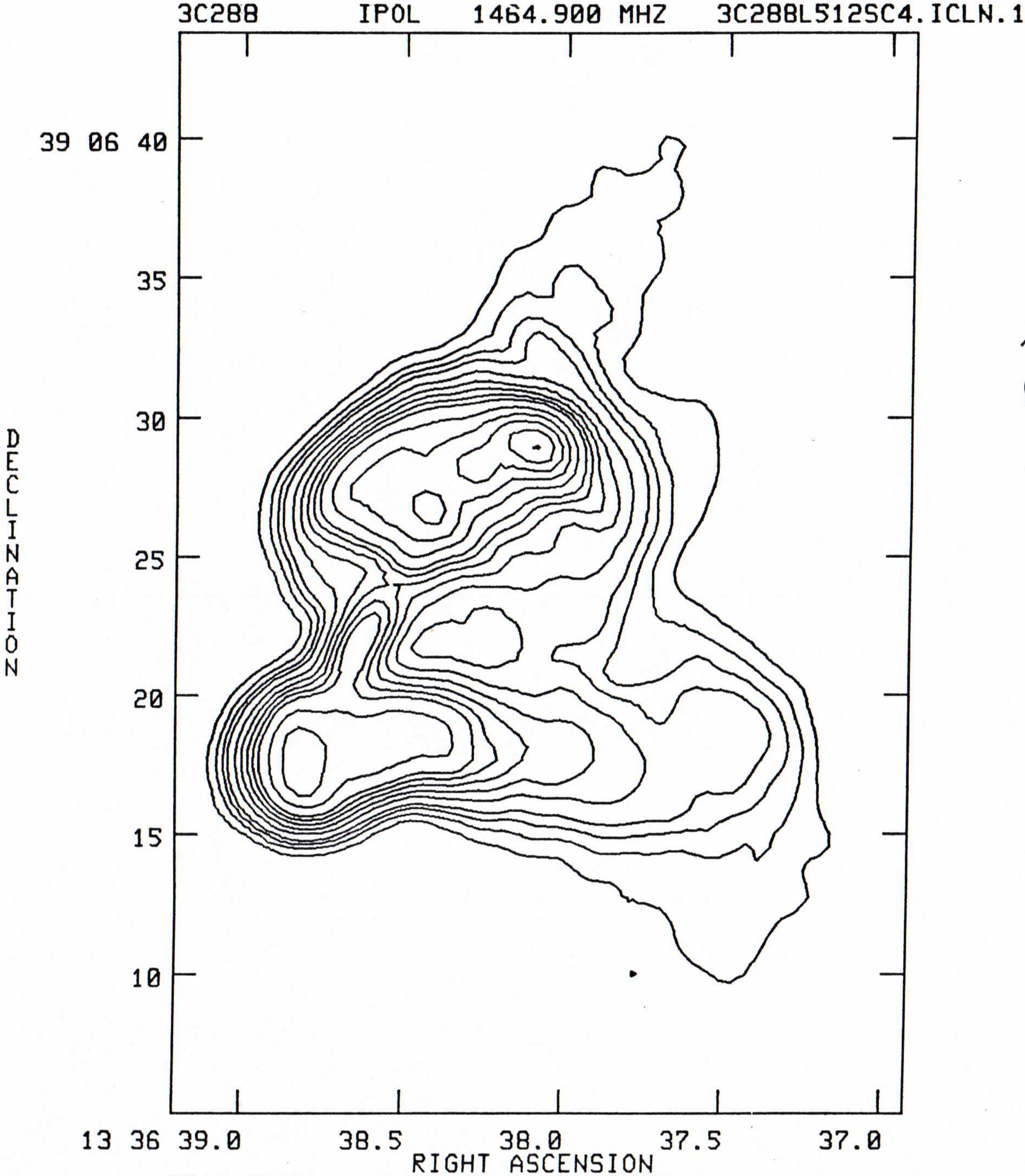
I have also made 20cm and 6cm maps of the whole source at 1.6" resolution for spectral comparison, excluding the outer 120,000 wavelengths in the (u,v) plane at 6cm. These maps both contain essentially all of the single-dish flux densities of 3C288 at these frequencies. I enclose the 20cm and 6cm maps contoured so that emission with the integrated spectral index of 3C288 would have equal numbers of contours at the two frequencies. This very clearly shows the increased prominence of the jet region at 6cm (flatter than average spectrum) and of the "spurs" extending from the lobes at 20cm (steeper than average spectrum). I also enclose a spectral index map made by combining these two 1.6" resolution maps.

I have also measured integrated fluxes for various parts of the source (jets, hot spots, lobes, etc.) at 20cm, 6cm and 2cm, for use in various parts of the paper.

I think I am now all done with mapmaking and measuring, and can finish writing the paper.

Yours sincerely,

Alan



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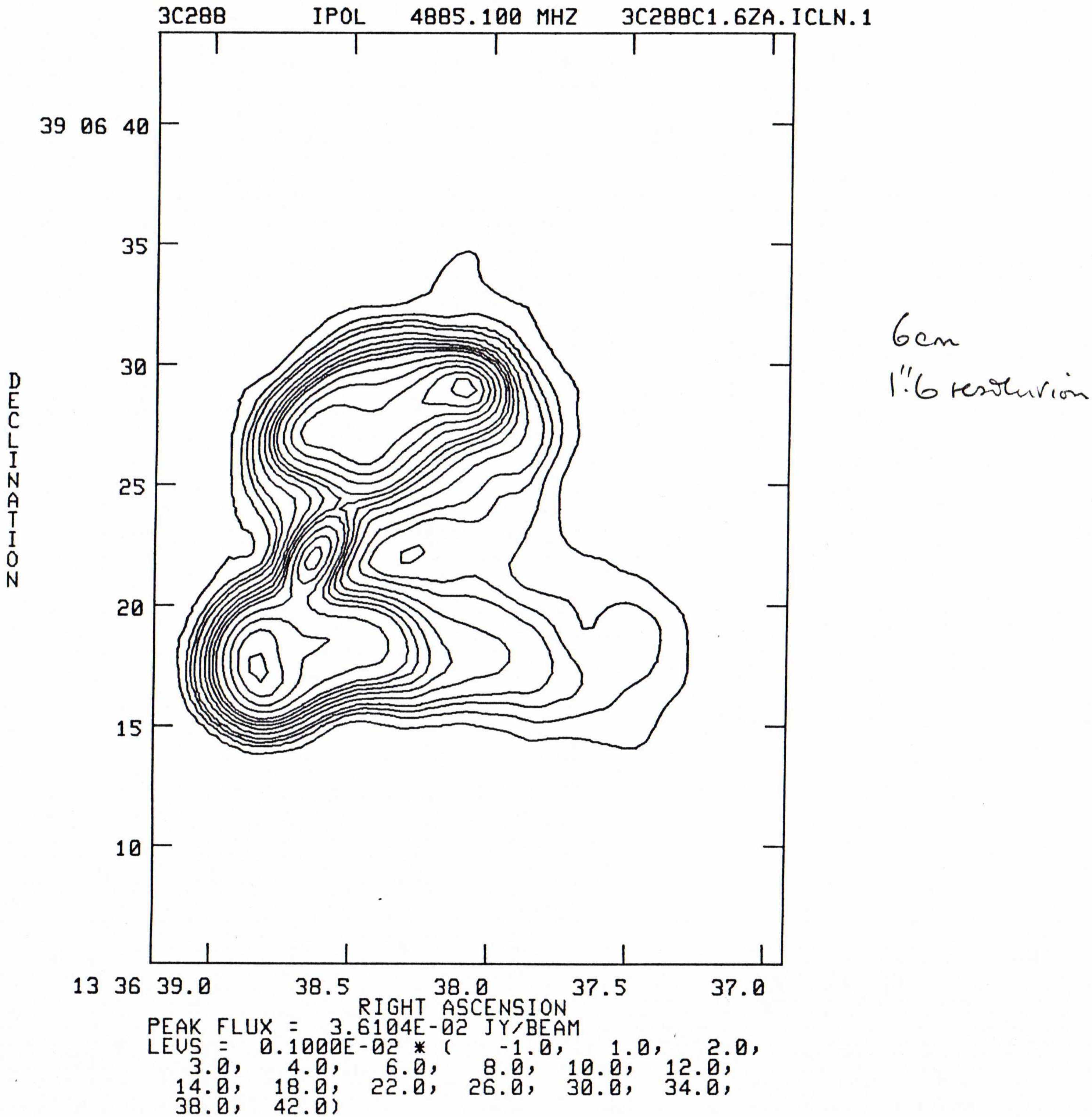
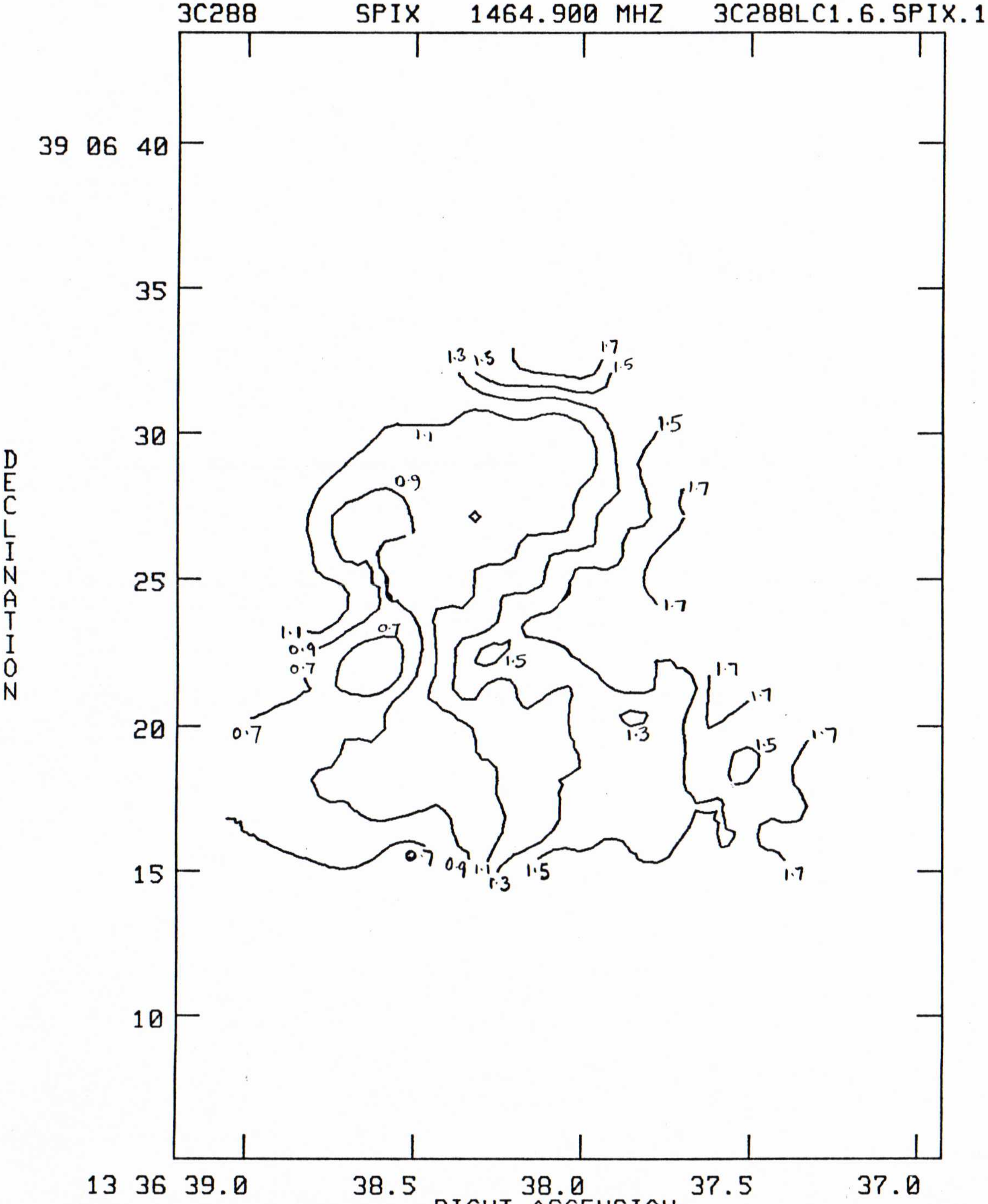
3.0, 4.0, 6.0, 8.0, 10.0, 12.0,
14.0, 18.0, 22.0, 26.0, 30.0, 34.0,
38.0, 42.0)

20cm
1″6 resolution


3C288 IPOL 4885.100 MHZ 3C288C1.6ZA.ICLN.1
DECLINATION
39 06 40
35
30
25
20
15
10
13 36 39.0
38.5
38.0
37.5
37.0
RIGHT ASCENSION
PEAK FLUX = 3.6104E-02 JY/BEAM
LEVS = 0.1000E-02 * (-1.0, 1.0, 2.0, 3.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 18.0, 22.0, 26.0, 30.0, 34.0, 38.0, 42.0)
6cm
1"6 resolution



PEAK FLUX = 1.8888E+00 SP INDEX
LEVS = 0.1000E+00 * (5.0, 7.0, 9.0,
11.0, 13.0, 15.0, 17.0)

20cm/6cm
spectral index α
$S_\nu \sim \nu^{-\alpha}$

1''6 resolution

NATIONAL RADIO ASTRONOMY OBSERVATORY
1000 BULLOCK BOULEVARD, N.W. POST OFFICE BOX O SOCORRO, NEW MEXICO 87801
TELEPHONE 505 835 2924 TWX 910 988 1710 VLA SITE 505 772 4011

5 November 1983

Dear Gene, Mauri, Ed.

Here are the maps from the A array 3C288 run. The observing weather was poor, and the 2cm phase stability was typically only ~ 1 radian in 2-3 minutes. However, the few good segments allowed Gene and I to make some externally calibrated maps that confirmed the 2cm core position as $13^h 36^m 38^s.59$, $+39° 06' 22''.6$. This is ± ~0''.1. It (just) agrees with my optical position measured on the Charlottesville engine.

The miracle of self cal (starting with a point source model) then got everything to latch on, and I successfully lined up the phases on a 3-min cycle. The maps at 2cm are noise-limited, judging from a trial circular polarization map I made, $\sigma \sim 120\,\mu Jy$. The hour of 6cm data we sneaked in because the phases at 2cm were so bad gave a nice map at 0''.38 resolution (I have also self-calibrated that). So I have made tapered maps of the 2cm data at 0''.38 and 0''.2 resolution.

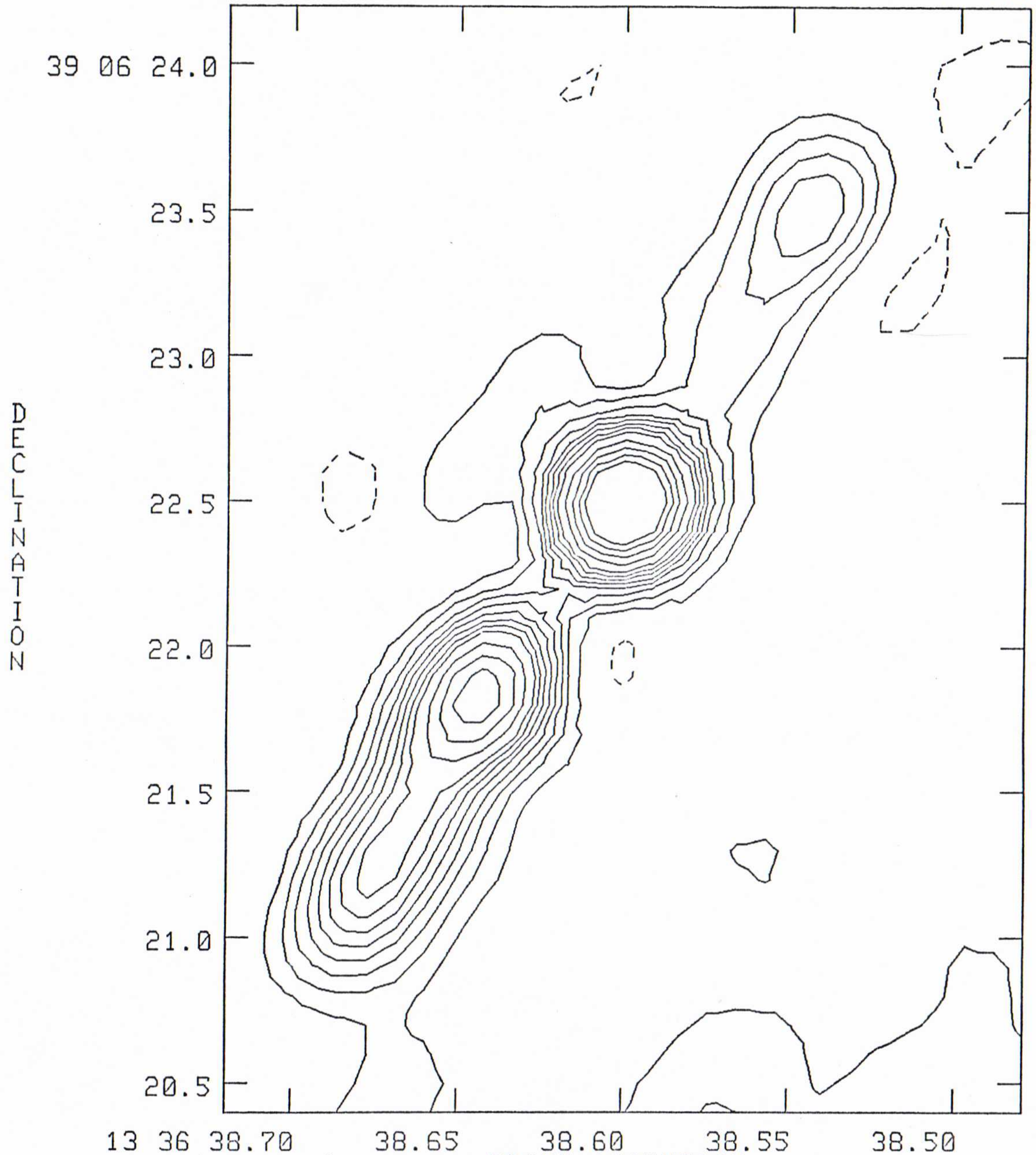
Take a look at them all – I'll redraft the paper on my return to Charlottesville.

Best wishes.

Alan

3C288 IPOL 4885.100 MHZ 3C288SC3.ICLN2.2

Self calibrated
0."38



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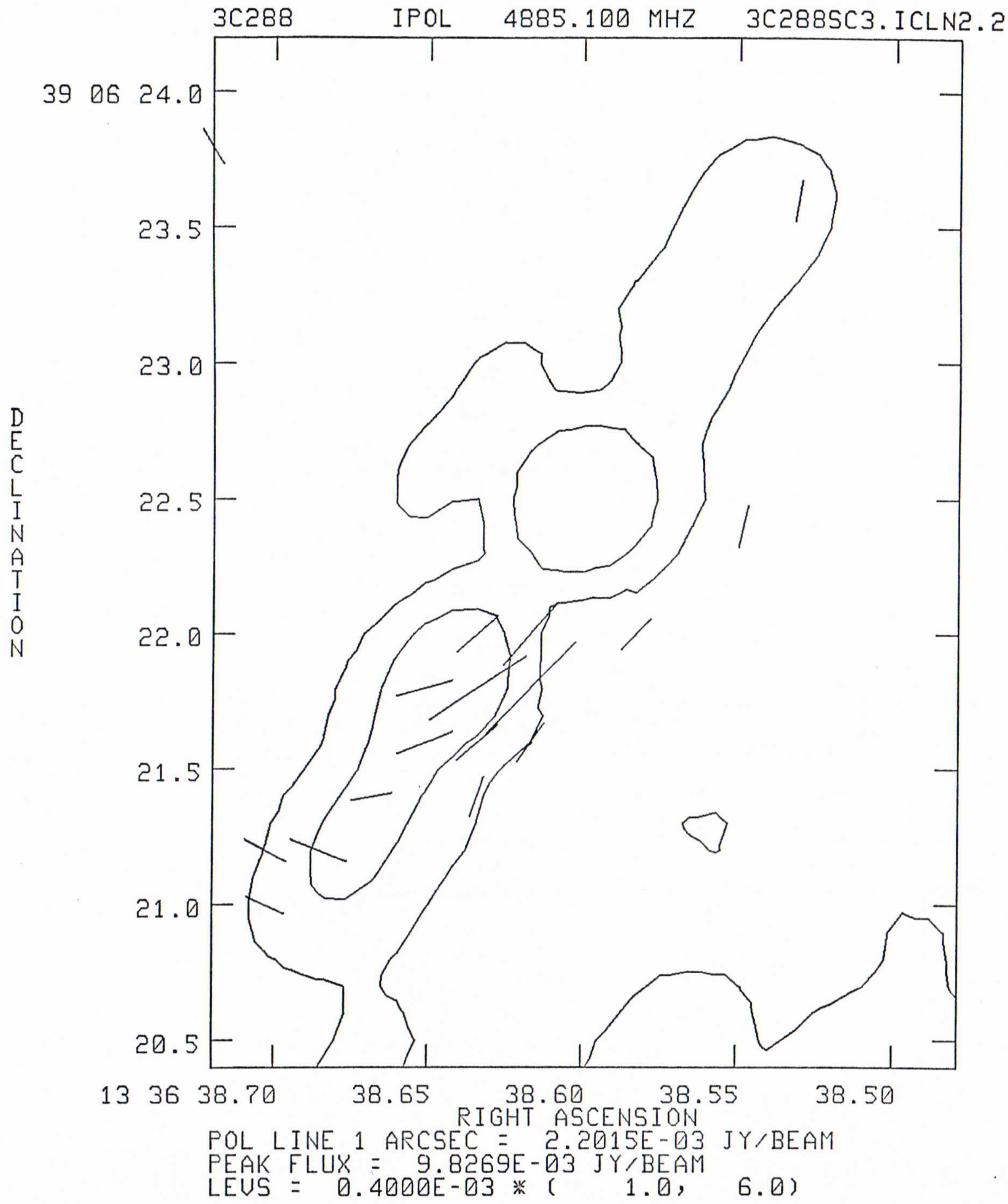
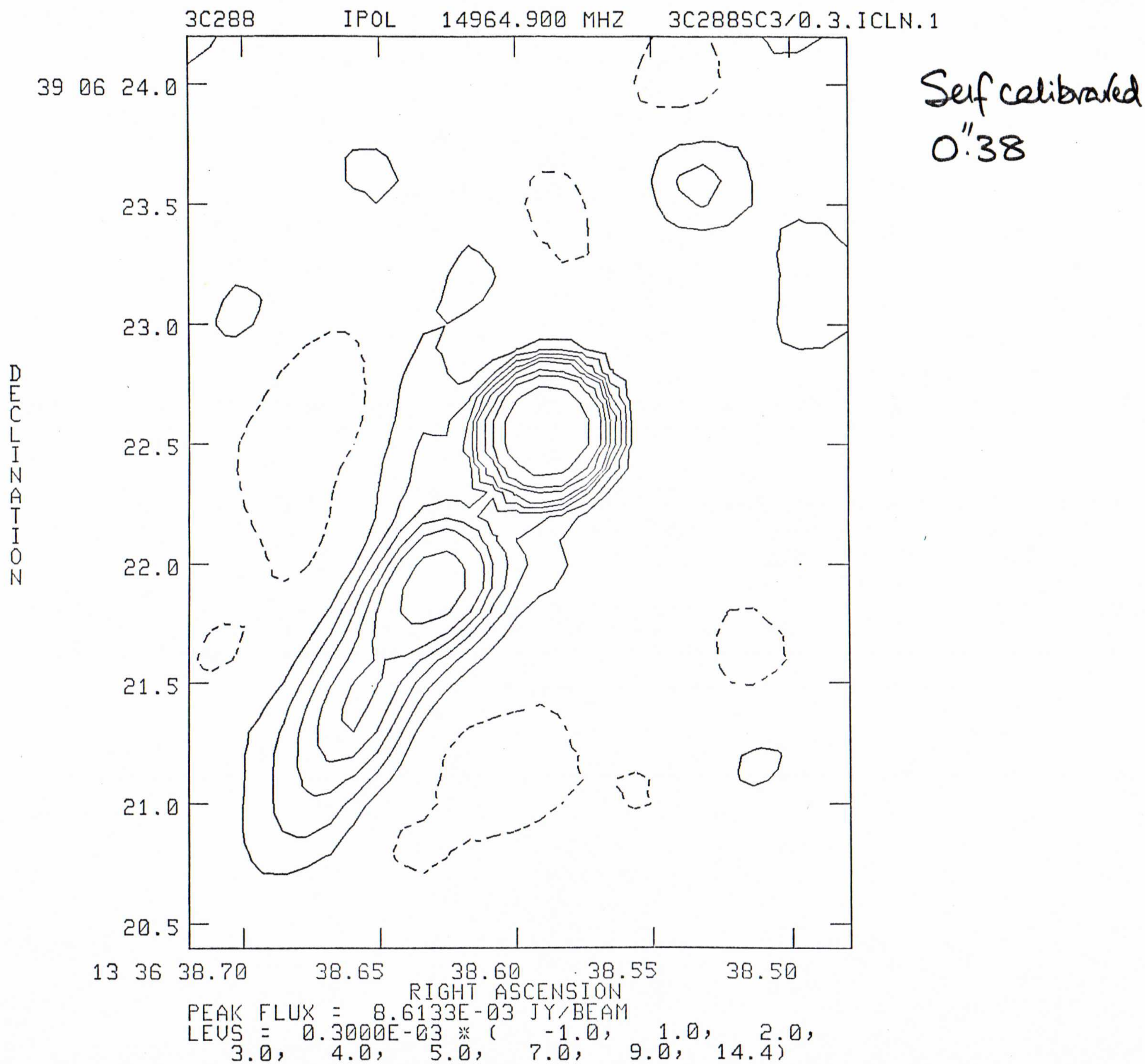
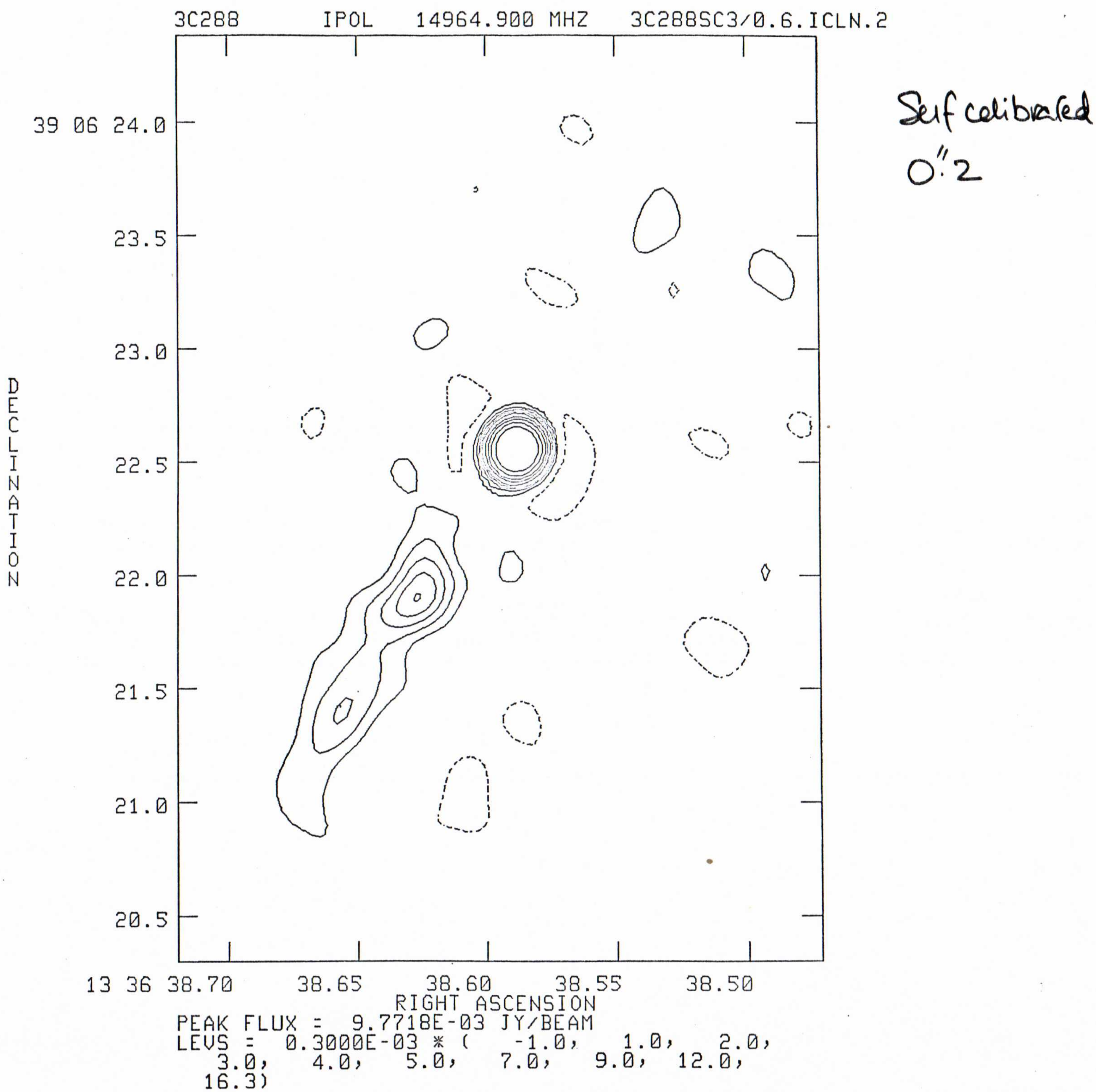
LEVS = 0.4000E-03 * (-1.0, 1.0, 2.0,
3.0, 4.0, 5.0, 6.0, 7.0, 8.0,
10.0, 12.0, 14.0, 16.0)

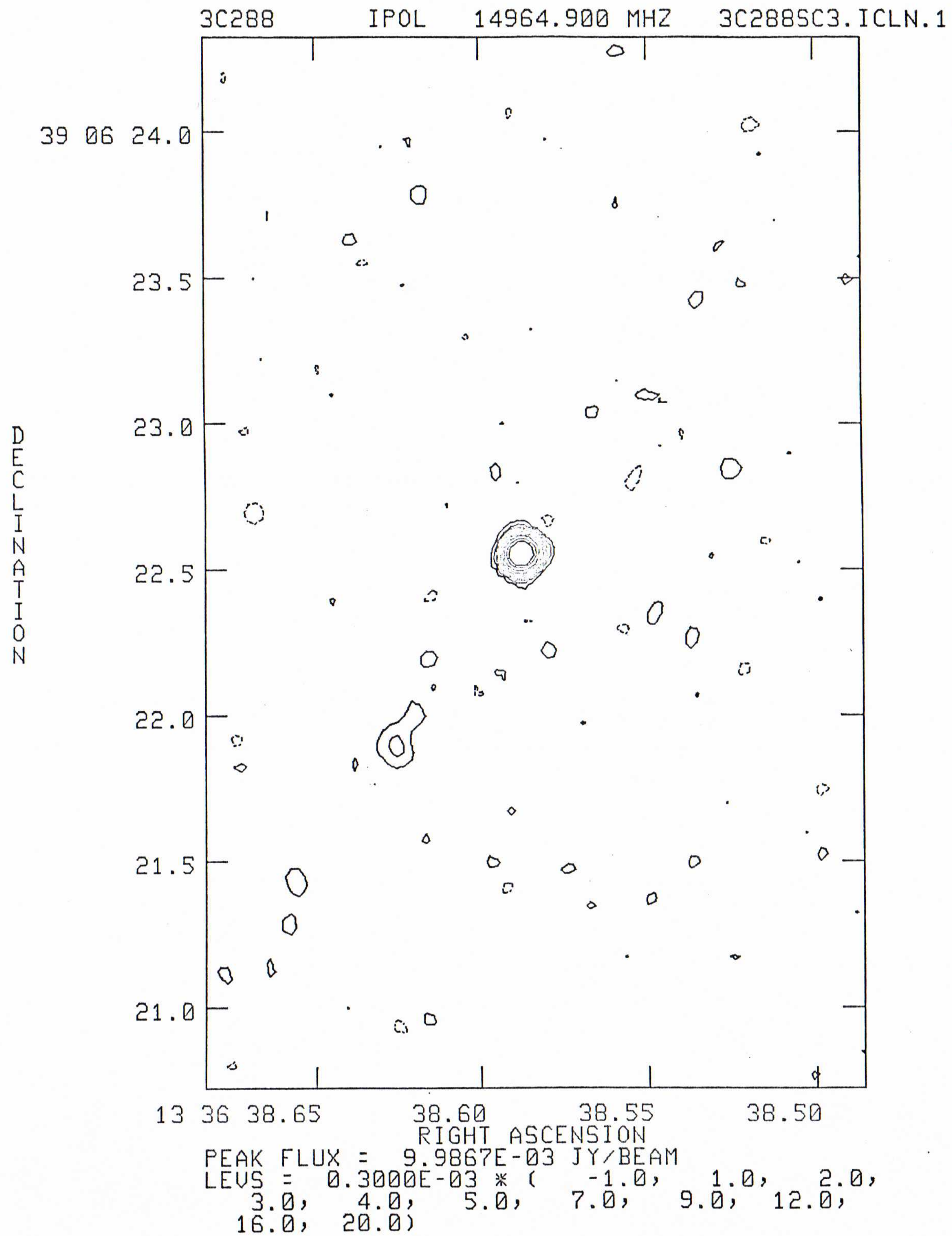


0.″38

P Peak 1.1mJy/beam
I there = 2.68mJy/be


3C288 IPOL 14964.900 MHZ 3C288SC3/0.3.ICLN.1
39 06 24.0
23.5
23.0
22.5
22.0
21.5
21.0
20.5
DECLINATION
13 36 38.70
38.65
38.60
38.55
38.50
RIGHT ASCENSION
PEAK FLUX = 8.6133E-03 JY/BEAM
LEVS = 0.3000E-03 * (-1.0, 1.0, 2.0,
3.0, 4.0, 5.0, 7.0, 9.0, 14.4)
Self calibrated
0.″38

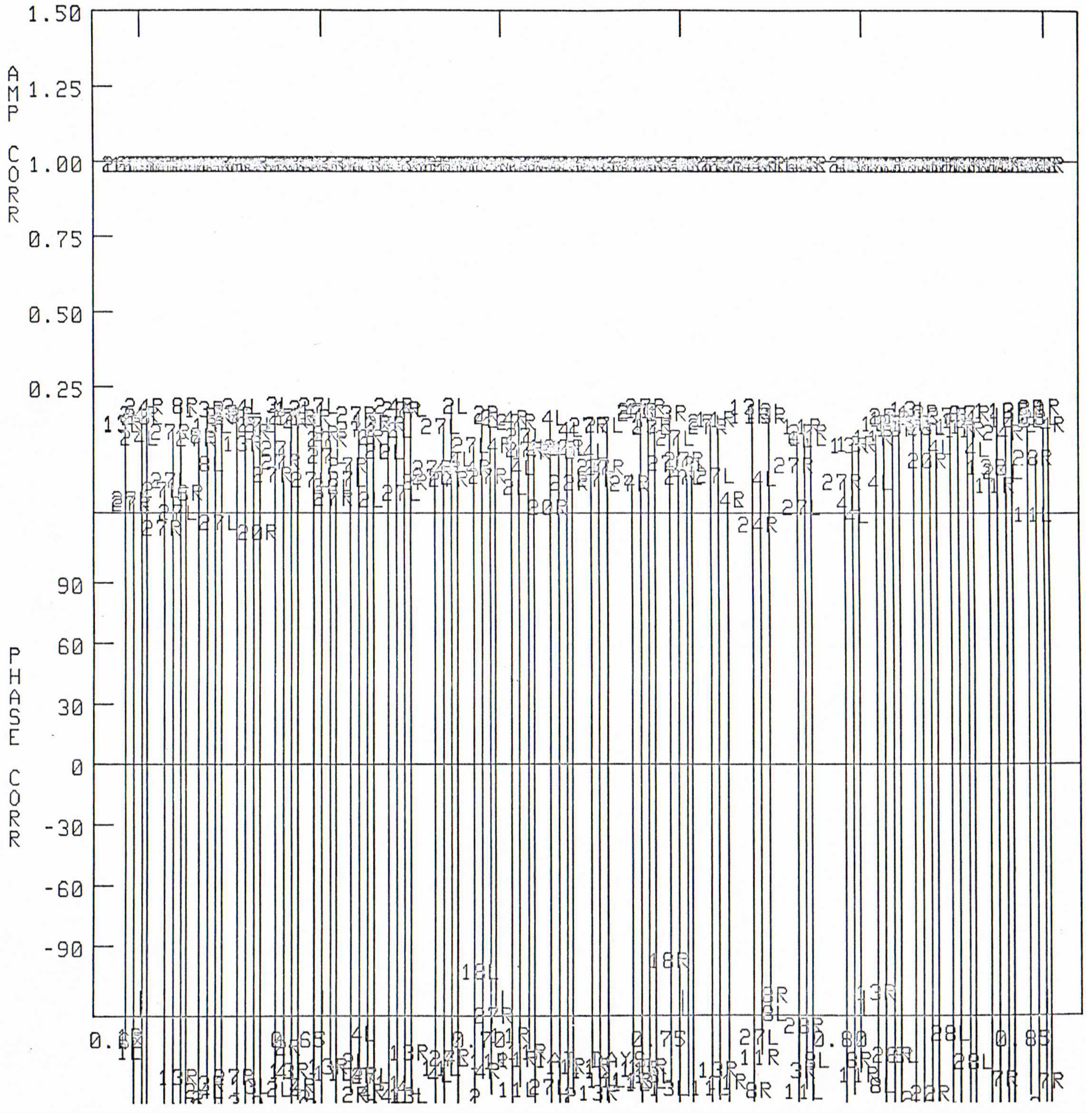

3C288 IPOL 14964.900 MHZ 3C288SC3/0.6.ICLN.2
Self calibrated
0".2
DECLINATION
39 06 24.0
23.5
23.0
22.5
22.0
21.5
21.0
20.5
13 36 38.70
38.65
38.60
38.55
38.50
RIGHT ASCENSION
PEAK FLUX = 9.7718E-03 JY/BEAM
LEVS = 0.3000E-03 * (-1.0, 1.0, 2.0,
3.0, 4.0, 5.0, 7.0, 9.0, 12.0,
16.3)



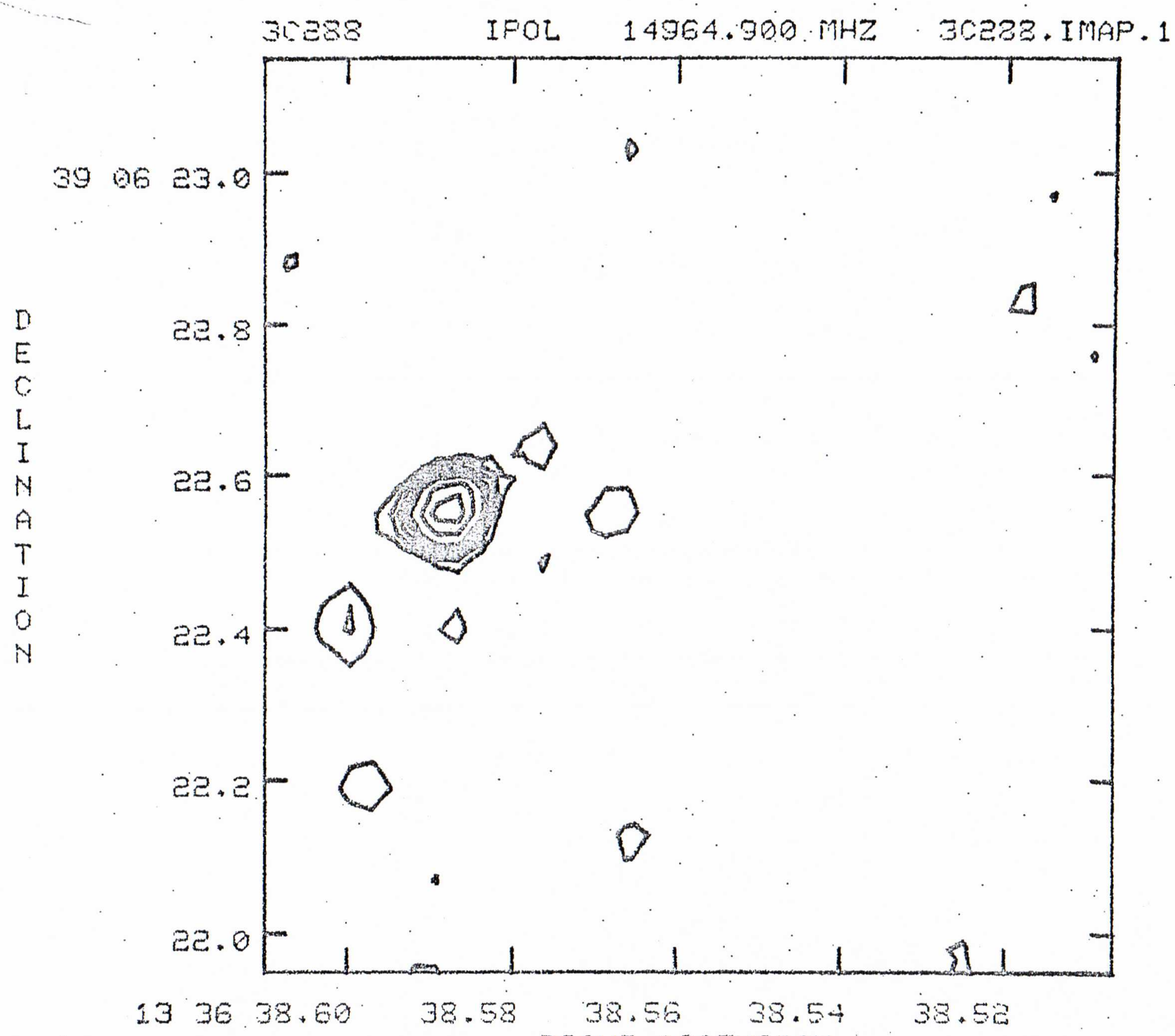
Selfcalibrated

0."09

SELF-CAL GAIN SOLUTION 3C288.UVTBSC.2

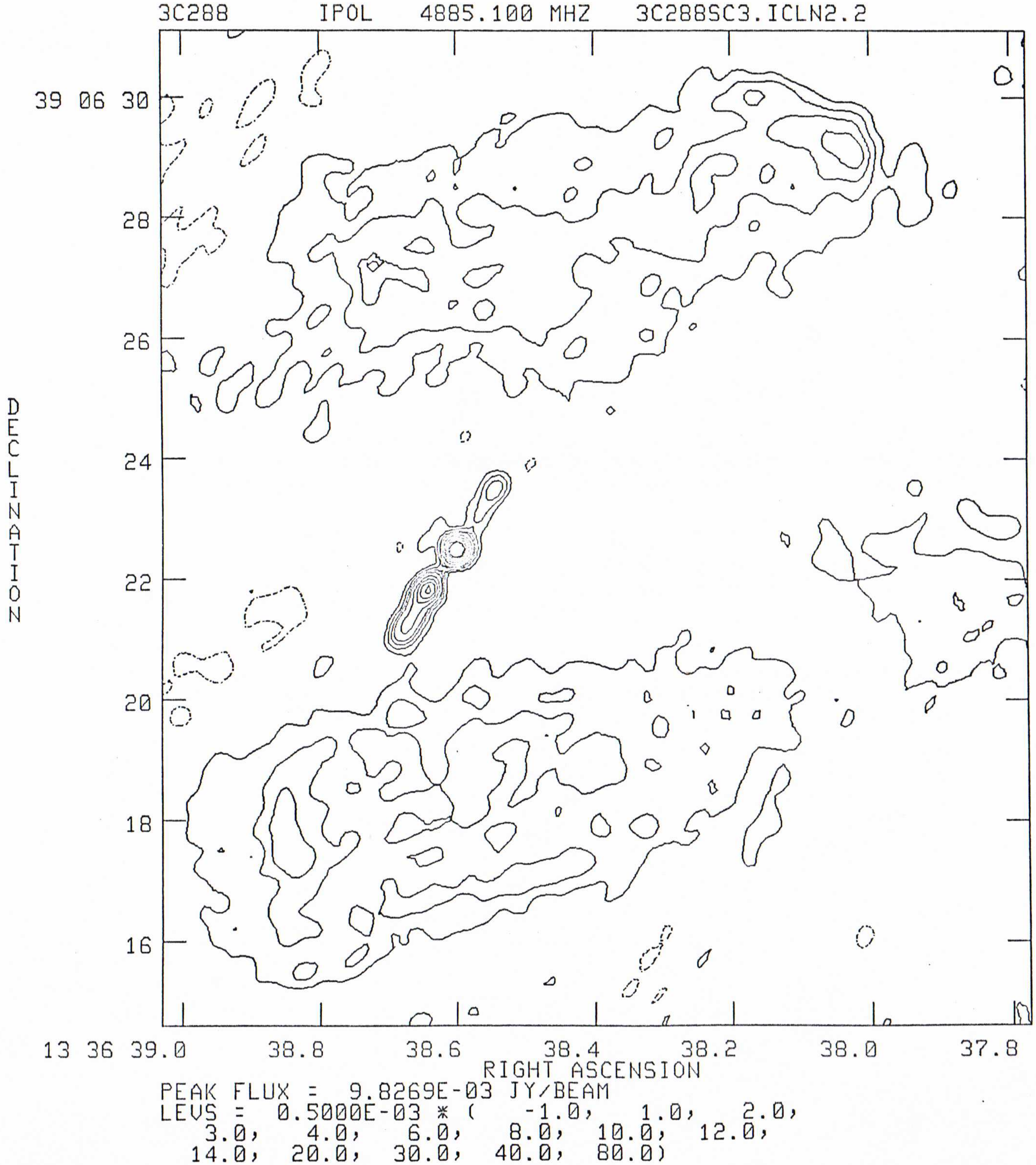


The first ø selfcal!



PEAK FLUX = 4.0022E-03 JY/BEAM ← N.B. much reduced by ϕ decorrelation!
LEVS = 0.4002E-03 * (1.0, 2.0, 3.0,
4.0, 5.0, 7.0, 9.0)

Externally Calibrated map
0".09



Self calibrated
0".38

NRAO use only

A

received:

VLA OBSERVING APPLICATION

SEND TO: Director NRAO Edgemont Rd. Charlottesville, Va. 22901

DEADLINES: 15th of Jan., Apr., July, Oct. for Q 2, 3, 4, 1 respectively

(1) Date: 14 July 1983

(2) Title of Proposal: Fine structure of 3C288

(3) Authors	Institution	Who will observe?	Grad Student?	Observations for PhD Thesis?	Anticipated PhD Year
A.H. Bridle	NRAO – CV	✓			
G.G. Byrd	University of Alabama				
E.B. Fomalont	NRAO – VLA				
M.J. Valtonen	University of Turku				

(4) Contact author for scheduling: A.H. Bridle

Address: NRAO - Charlottesville

(5) Telephone: 804-296-0375
or TWX:

(6) Any related VLA proposal: AB-67

(7) Scientific category: ☐ planetary, ☐ solar, ☐ stellar, ☐ galactic, ☑ extragalactic

(8) Preferred Configuration(s) (A, B, C, D, Any, Special)	A				Alternate(s) if any ______
(9) Wavelength (20 18 6 2 1.3 cm)	2cm				
(10) Time requested (hours or days)					

(11) Type of observation: ☑ mapping, ☐ point source, ☐ monitoring, ☑ continuum, ☑ lin poln, ☐ circ poln, ☐ spectral line, ☐ solar, ☐ VLBI, ☐ phased array, ☐ other ______

(12) ABSTRACT (do not write outside this space):

We hope to map the bridge emission in 3C288 to determine (a) whether it is a jet, (b) its symmetry with respect to the core, (c) its polarization properties. We also hope to locate and map any hot spots in the lobes.

NRAO use only

(13) Reduction: Number of maps 3 Maximum size of maps 512 Self-cal maps 3

(14) Off-site reduction: ☐ none, ☐ post map, ☑ post calibration, ☐ everything.

(15) Help required: ☑ none, ☐ consultation, ☐ friend, ☐ absentee observing, ☐ staff collaborator.

(16) Spectral line only: transitions to be observed ________ ________ ________ ________

channel bandwidth (KHz)(Δ) ________ ________ ________ ________

observing frequency (±Δ/2) ________ ________ ________ ________

number of channels ________ ________ ________ ________

number of antennas ________ ________ ________ ________

rms noise after 1 hour (mJy) ________ ________ ________ ________

(17) Number of sources _____ (If more than 10 sources please attach list. If more than 30 give only selection criteria and LST range(s).)

	Name	coord (1950.0) RA hh mm	Dec ±xx°x	Config.	Band (cm)	Band width (MHz)	Total flux (Jy)	Largest ang. size	Weakest signal (mJy/beam)	Required dynamic range	~~Possible~~ Preferred LST range hh - hh	Time requested
1.	3C288	1336	+39.1	A	2	50	0.35	15"	0.03	several hundred	9.30 - 17.30 (high elevations if possible)	8hrs
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												

(18) Special hardware, software, or operating requirements: none

(19) Preferred range of dates for scheduling: prefer to avoid week of Nov 7-11

(20) Dates which are not acceptable:

(21) Please attach a self-contained Scientific Justification not in excess of 1000 words.

When your proposal is scheduled, the contents of this cover sheet become public information. (Any supporting documents are for refereeing only)

NATIONAL RADIO ASTRONOMY OBSERVATORY
Edgemont Rd, Charlottesville, VA 22901

14 July, 1983

To: M.S.Roberts

From: A.H.Bridle, G.G.Byrd, E.B.Fomalont, M.J.Valtonen

Subject: VLA Observing Proposal - 3C288

We request 8 hours of 2cm VLA observing time in the A configuration to make a high-resolution map of the central bridge of emission in 3C288, and to identify any hot spots in the radio lobes.

3C288 is identified with an 18-magn elliptical galaxy with z = 0.246 in a faint cluster. Our previous VLA observations of the source at 20cm and at 6cm (AB-67) revealed an unusual structure. The 20cm map (Figure 1) shows two unusually broad lobes, out of which there project several faint tongues or spurs of emission. This map shows that the source is almost twice as large as was evident from the earlier Cambridge map (Pooley and Henbest 1974); the northern lobe structure does not admit a simple "orbiting head-tail" interpretation as we suggested in our earlier proposal (AB-67). The 6cm A configuration map (Fig. 2) shows a narrow bridge of emission across the center of the source, within the optical image of the galaxy. This may be a combination of emission from a core and a jet, but it is not presently well enough resolved either to distinguish the core or to classify the elongated structure as a jet on Bridle's (1982) criterion. The optical positions for the center of the optical galaxy measured at Queen's University (Goodson et al. 1979) and by AHB on the "CIA" engine in Charlottesville suggest, but do not require (due to their 0.4" accuracy) that the central peak in the bridge contains the galactic nucleus.

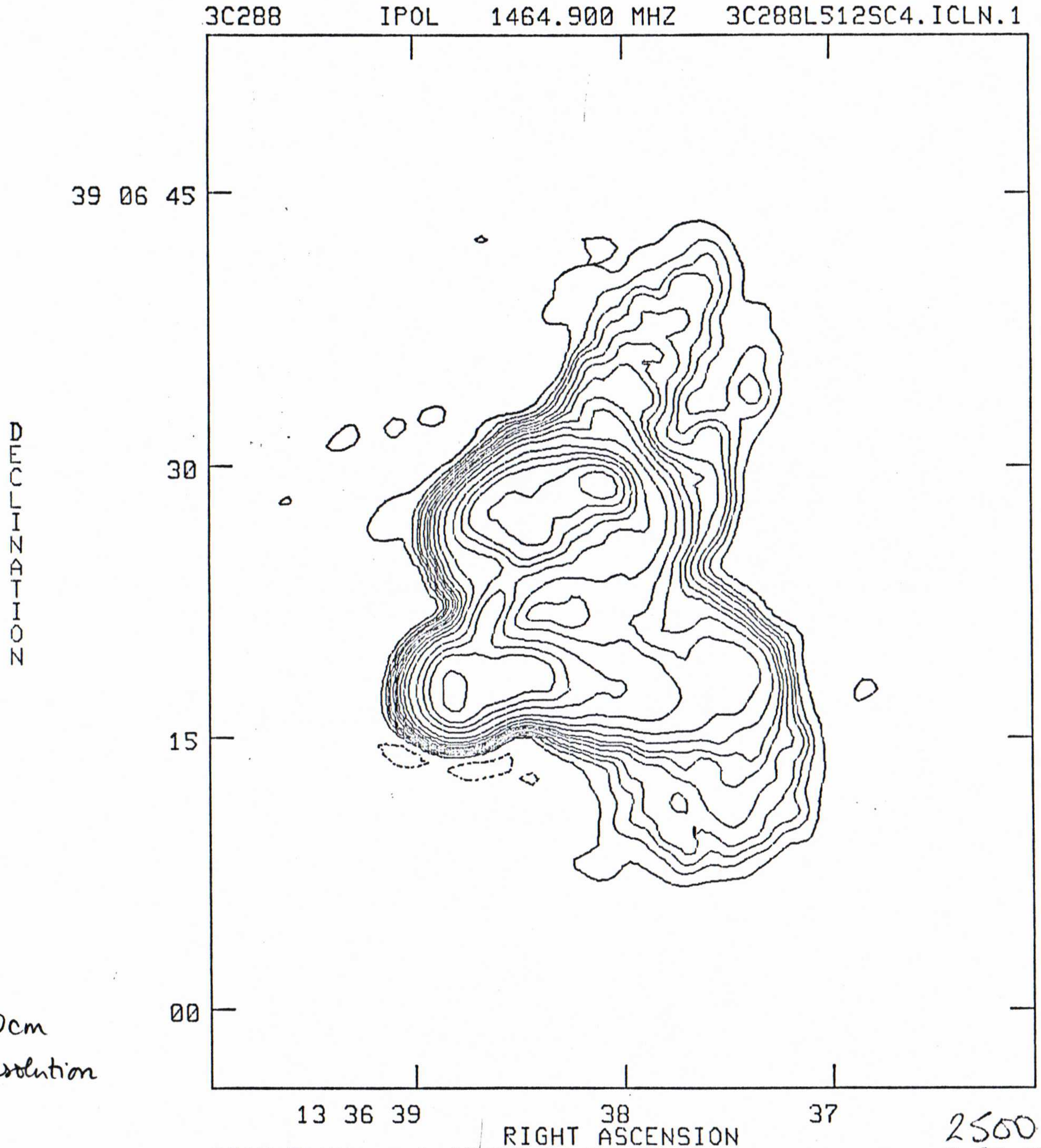
If this is correct, then the rest of the bridge may be a two-sided jet (<4:1 brightness ratio between the two sides - Bridle 1982). This makes the the source more unusual, as it would be the most powerful radio galaxy known to have a two-sided jet. Two-sidedness is common among sources more than ten times weaker than 3C288, but other radio galaxies of this power either have jets that are notably more asymmetric than 4:1 in brightness, or no detectable jets at all. The core may not however be in the central peak. If it is in the northern or southern peaks, the bridge might be a "one-sided jet". The higher resolution of the proposed 2cm observations may allow the core to be identified by its compactness amd spectrum alone, independently of the optical position data.

One-sided jets in powerful sources are normally dominated by magnetic field stretched along their axes, while two-sided jets in weak sources are normally dominated by perpendicular field (Bridle 1982, confirmed by a sample of 120 extragalactic jets compiled by Bridle and R.A.Perley for a forthcoming review article). It is of interest to know whether the bridge in 3C288 has a magnetic configuration like that in other jets of its power (B parallel), or like that in other jets of its brightness symmetry (two-sided, giving B perpendicular, or possibly one-sided, again giving B parallel). Our 6cm data at 0.6" resolution detected too little polarization (<5%) to characterize the E vector orientation reliably. We do not know the cause of the low polarization in the bridge (low polarization is very uncharacteristic of jets in general, although, curiously, two other jets in fairly powerful radio galaxies - 3C277.3 and 3C388 - have 6cm polarization <5%). But whatever its cause, both the higher resolution (0.15") and the higher frequency of the proposed new observations can be expected to increase the degree of linear polarization that is observed, and may allow us to examine the E vector orientations along the bridge.

As the source is not very strong, we deferred requesting A configuration observations at 2cm until now to take advantage of the front-end retrofit. An 8-hr integration at 50 MHz bandwidth using the AC and BD IF's should give us enough S/N to map the bridge satisfactorily at 2cm. The core flux density is probably only 10-20 mJy however, so it will not be possible to self-calibrate very rapidly; we will need some luck with the weather to be successful and to get good dynamic range. If successful, we will (a) locate the core and thus establish the intensity symmetry of the bridge, (b) determine the detailed structure of the bridge - is it a "jet", is it expanding ? ,(c) search for linear polarization in the bridge, (d) try to pick out any compact features or hot spots in the lobes. The reasons for the elongation of the lobe structure, and for the "tongues" of emission extending from it, are presently unclear. It may help interpretation of the source to resolve away the more extended lobe emission, thus showing the locations and shapes of any more compact features in the lobes. For example, is there any connection between the bridge and the longer of the two northern tongues, which has almost the same position angle as the bridge ?

REFERENCES

Bridle,A.H. 1982, Proc. IAU Symposium No. 97, 121.
Goodson,R.E., Palimaka,J.J. and Bridle,A.H. 1979, A.J., 84, 1111.
Pooley,G.G. and Henbest,S.N. 1974, MNRAS, 169, 477.



PEAK FLUX = 1.1842E-01 JY/BEAM
LEVS = 0.6500E-03 * (-1.0, 1.0, 2.0,
3.0, 4.0, 6.0, 8.0, 10.0, 14.0,
20.0, 30.0, 50.0, 70.0, 90.0, 120.0,
150.0, 200.0)

Figure 1 - 20cm
map at 1".6 resolution

2500 cprs
3.22 Jy restored
1".6 x 1".6
after 4th selfcal

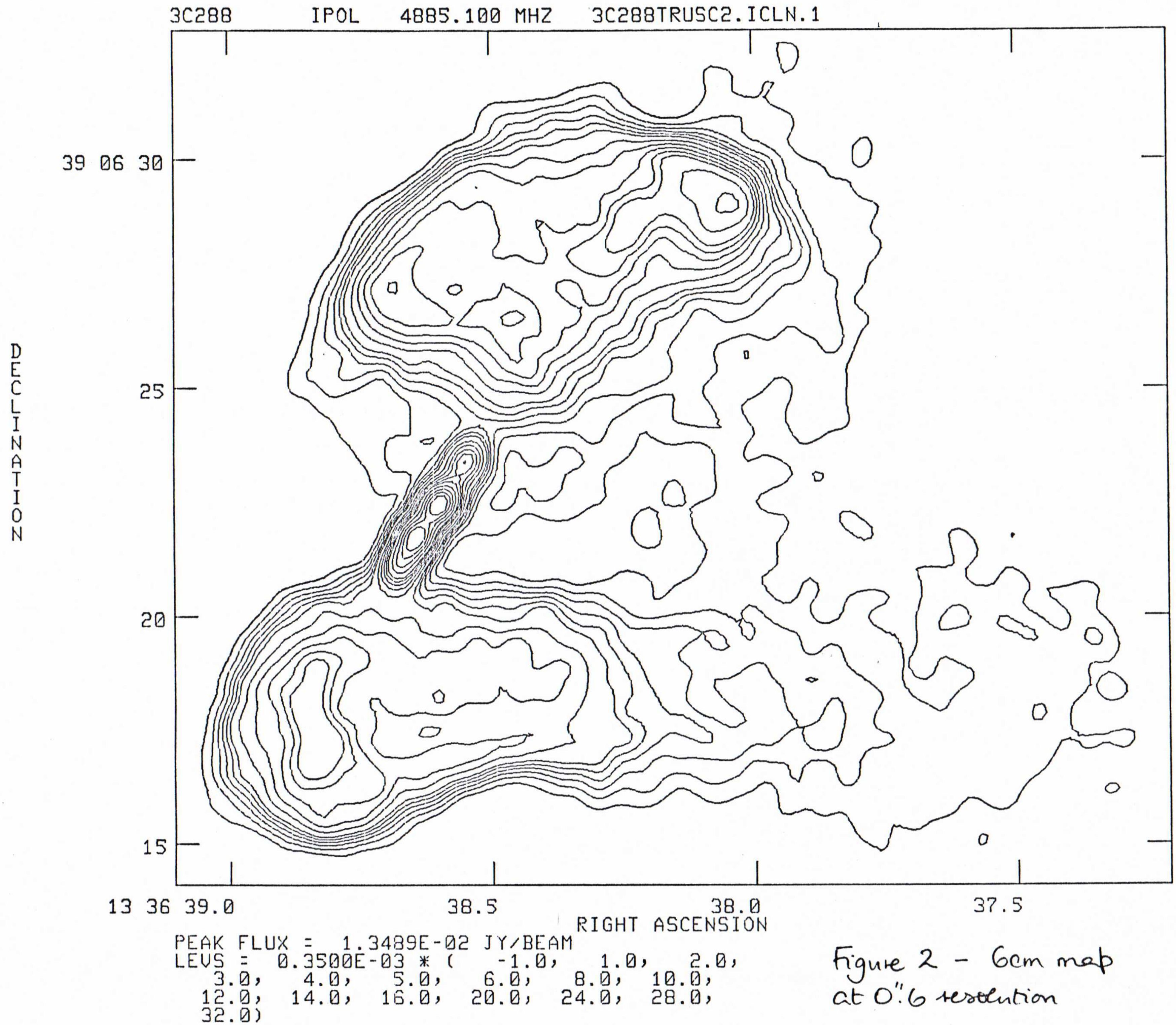


Figure 2 - 6cm map at 0."6 resolution

THE UNIVERSITY OF ALABAMA
~~College of Arts and Sciences~~

Department of Physics & Astronomy

May 27, 1983

Dear Alan,

I've suddenly realized that almost a month has passed and I haven't answered your letter yet. The maps you sent are a definite improvement. I have forwarded copies to Mauri as you requested. Regarding the last paragraph on p. 1 of your letter, Plot O looks fine. Regarding the question on p. 2 of your letter, I agree that contours of polarized intensity and vectors of degree of polarization would be better.

Once again the plots look much better. Its good that you re analysed them.

Gene

208 GALLALEE 205/348-5050 POST OFFICE BOX 1921 UNIVERSITY, ALABAMA 35486

NATIONAL RADIO ASTRONOMY OBSERVATORY

EDGEMONT ROAD CHARLOTTESVILLE, VIRGINIA 22901
TELEPHONE 804 296 0211 TWX 510 587 5482

2 May 1983

Dr. G.G.Byrd,
Department of Physics and Astronomy,
University of Alabama,
Box 1921,
University, AL 35486

Dear Gene,

On looking carefully at the 20cm map for 3C288 I realised that the 'noise' on the map was well above the expected system sensitivity, so I have delved into the data using the Export Tape which Ed Fomalont had left in the library here. I have analysed this using the self-calibration algorithm, and have achieved about a factor of three improvement in sensitivity. Plot A attached is the IMPS output of the map made at the VLA without self-calibration in 1980, Plot B is a remake of that map in AIPS, before self-calibration. Both are quite noisy, with lots of off-course contours at the 2 mJy level. Plot C is my new map after four passes through self-calibration, two passes to do phase corrections only, then two doing both amplitude and phase. Plots D,E,F and G show the gain corrections made at each of these iterations. There were some large phase glitches in the data still, and antenna 15L seems particularly bad. After the first run of selfcalibration, I started flagging the data on the basis of 4-sigma discrepancies between the visibilities and the model, and 15L accounted for about 3/4 of the new flags. I have circularised the beam on all the new maps (it makes it easier to recognise extended features and the position angle of their extent), and propose a resolution of 1.6 arcsec for the spectral comparison. After four iterations the self calibration has converged nicely and I doubt that much noticeable improvement could be obtained by continuing the analysis. Plot H shows the polarized intensity map at the 1.6 arcsec resolution.

I decided to try the same procedure with the 6cm data. Plot I shows the amplitude of the visibility function plotted against (u,v) distance - there were some isolated high points in the distribution which I have edited out by clipping off all data above 110 mJy.* I made one pass of phase self-calibration and one of phase and amplitude. Plot J gives the visibility plot for the final clipped and calibrated data set. Plot K gives the untapered 6cm map from this data set, contoured to almost the same level as your IMPS plot. Plot L gives the map from the data as with your calibration, using the same contours for comparison purposes, while Plot M is the original IMPS output. The only small problem remaining is a very low-level fringe pattern running through the extended emission of the northern lobe, which I suspect is related to an unsampled region of the outer (u,v) plane. Trimming the data set down to 300 kilowavelengths circularises the outer boundary of the coverage, and Plot N shows the map made without tapering but with this truncation. Its resolution is 0.66 arcsec rather than 0.6 arcsec, and the fringing is somewhat reduced. It is not enough to bother our interpretation, so I propose to stop there, and consider the data set calibrated.

Now a question regarding display. I would like to show the total intensity data at 6cm as in Plot O, for clarity given there will be a lot of contours drawn. This would require a statement to the effect that no emission was detected from the extended wings on the 20cm map. Will this be acceptable ?

* in the range 200→370 kλ !

Second, when displaying the polarization data, we can either plot vectors of polarized intensity (as in Plot P), or a contour map of polarized intensity (Plot Q) and vectors of degree of polarization (Plot U). I lean to the latter approach as it gives a lot more information in the long run. (The 'ratio' in the present caption is degree of polarization - the caption can be made more explicit by drawing a vector of length 0.5, perhaps in the upper right corner of the map).

I am now preparing the 6cm map at the lower resolution for comparison with the 20cm map. I note in the paper that you said this was done by convolution. I would propose to do a little more. I will truncate the 6cm data set at 120 kilowavelengths, to correspond to the truncation of the 20cm data, then will excise the data from the 20cm data in the inner part of the (u,v) plane where there are no corresponding samples in the 6cm data. Comparison of the untapered maps made from these modified data sets should give us the spectral comparison with the coverages at the two frequencies as similar as possible, and thus with equivalent sensitivities to more compact and more extended structures.

I also note that the 20cm CLEANing restored 3.22 Jy (Plot C), while the (u,v) data contains visibilities up to about 3.4 Jy (Plot V). The integrated flux density of 3C288 (from the single-dish spectrum) should also be about 3.4 Jy, so there may some still more extended structure to find. I will try making a tapered 20cm map to see if any more can be dug out.

Note - I have added zero-spacing fluxes to both the 20cm and 6cm data sets to give CLEAN as much help as possible on the more extended structures.

I am about to depart for the Jansky Workshop at Green Bank, and will then be at the VLA for about ten days, so the final processing on this will be done in the last week of May. I think this is all worth it (a) because we now have the maps back again for more quantitative analysis, (b) because we have got deeper on the extended wings of the source. The Northern wing now appears quite clearly to be double (its weaker branch was just visible on the earlier reduction, but would not have been taken seriously). I will think about what it all means in the meanwhile. I will also be seeing Ed at the VLA and will take the new maps out for him. Could you pass them on to Mauri - I don't have his sabbatical address ?

With best wishes,

Alan B.

NATIONAL RADIO ASTRONOMY OBSERVATORY

EDGEMONT ROAD CHARLOTTESVILLE, VIRGINIA 22901
TELEPHONE 804 296 0211 TWX 510 587 5482

21 March 1983

Dr. G.G.Byrd,
Department of Physics and Astronomy,
University of Alabama,
Box 1921,
University, AL 35486.

Dear Gene,

First, my apologies for taking so long to reply to your letter about 3C288 and NGC4869. I was particularly busy with another project, then was sick with the flu for a while.

It appears that there is no backup here or at the VLA of the maps which were made on IMPS. To obtain contour plots of the usual publication quality, the maps should be remade and plotted on the CalComp plotter here. I have a tape of the calibrated data which can be used for this. It will also be necessary to do this to get beam sizes and quantitative estimates of integrated flux densities, etc. It is also possible that some improvement could be made to the maps with the self-calibration algorithm, although this does not appear strictly necessary for our purposes.

I enclose the annotated spectral index map, and a version of the polarized vector map which shows the polarization scale. Note that there is an 8.1-GHz map of 3C288 in Rudnick and Adams (AJ, 84, 437) which by visual appearance confirms the spectral index gradient across the North lobe. They also quote a very inaccurate ($\pm$2 arcsec) optical position, which is plotted on their map.

I measured the optical position using the Mann engine here, and 20 AGK3 reference stars. The galaxy is elongated, possibly even double (?), but the centroid has a position which I was able to estimate very consistently. I find $\alpha(1950) = 13\ 36\ 38.61\pm0.04$, $\delta(1950)$ $+39\ 06\ 22.1\pm0.4$. This is in good agreement with the position we measured with our Gaertner engine at Queen's University, $\alpha(1950) = 13\ 36\ 38.59\pm0.04$, $\delta(1950) = +39\ 06\ 21.8\pm0.4$, which was published in Goodson, Balimaka and Bridle (AJ, 84, 1111). I don't think we will get any greater precision off the Sky Survey prints - the galaxy is anyway about 6 arc sec in diameter. There is also another faint image in the radio structure, probably diffuse and somewhat xxxx bluer than the 3C288 galaxy. I measured this at the same time on the Mann engine, and got position of $\alpha(1950) = 13\ 36\ 37.99\pm0.04$, $\delta(1950) = +39\ 06\ 25.4\pm0.4$. This is towards the back of the North lobe. I enclose a copy of the 6cm map with both positions marked. The position of the identification is consistent with either radio peak, or the gap between them, as the 'radio core'. Purely from the radio, the more northern peak is my guess - it's less resolved, and appears to have less polarization than the southern. We would need a 2cm map to check this, and probably should propose an observation with the A configuration.

I'm not sure what the next step should be. To do a really good job, I should get the maps back in digital form here, and try a self-calibration. This will take a little while, due to pressure of other projects. Alternatively, we could try to get the graphics department to produce displays using the ~~the~~ IMPS copies we still have. This has been a continuing problem with the older VLA data, as there was no high-quality plotter at the VLA itself. We should anyway put in a 2cm proposal by the April 15 deadline, to locate the nuclear core.

Regarding NGC4869, I estimate that to obtain a 10:1 signal to noise ratio at 50 MHz bandwidth on the bottom contour of the WSRT 610 MHz map would need about 6 minutes of integration time in the D array. This will produce a map that is more sensitive than, but no better resolved than, the map in your draft proposal. I am not sure that this will improve the solution for the galaxy dynamics, because of the low resolution. Furthermore, a snapshot observation (as this implies) will not deal well with all the confusion in the Coma region. It would be better to propose both D and C configurations, then combine the data, to map the whole region at 14 arc sec resolution. This would map the extended emission with better resolution than the WSRT 21cm map. To get the right C-configuration sensitivity (10:1 signal-to-noise) on the very large structure would require about 6 hrs of integration, and would be a reasonable project. Trouble is, I am very heavily committed at present and feel very uneasy about taking it on. As with 3C288, I could slow you down considerably. I think it would be better if you made the proposal entirely your own, for that reason only.

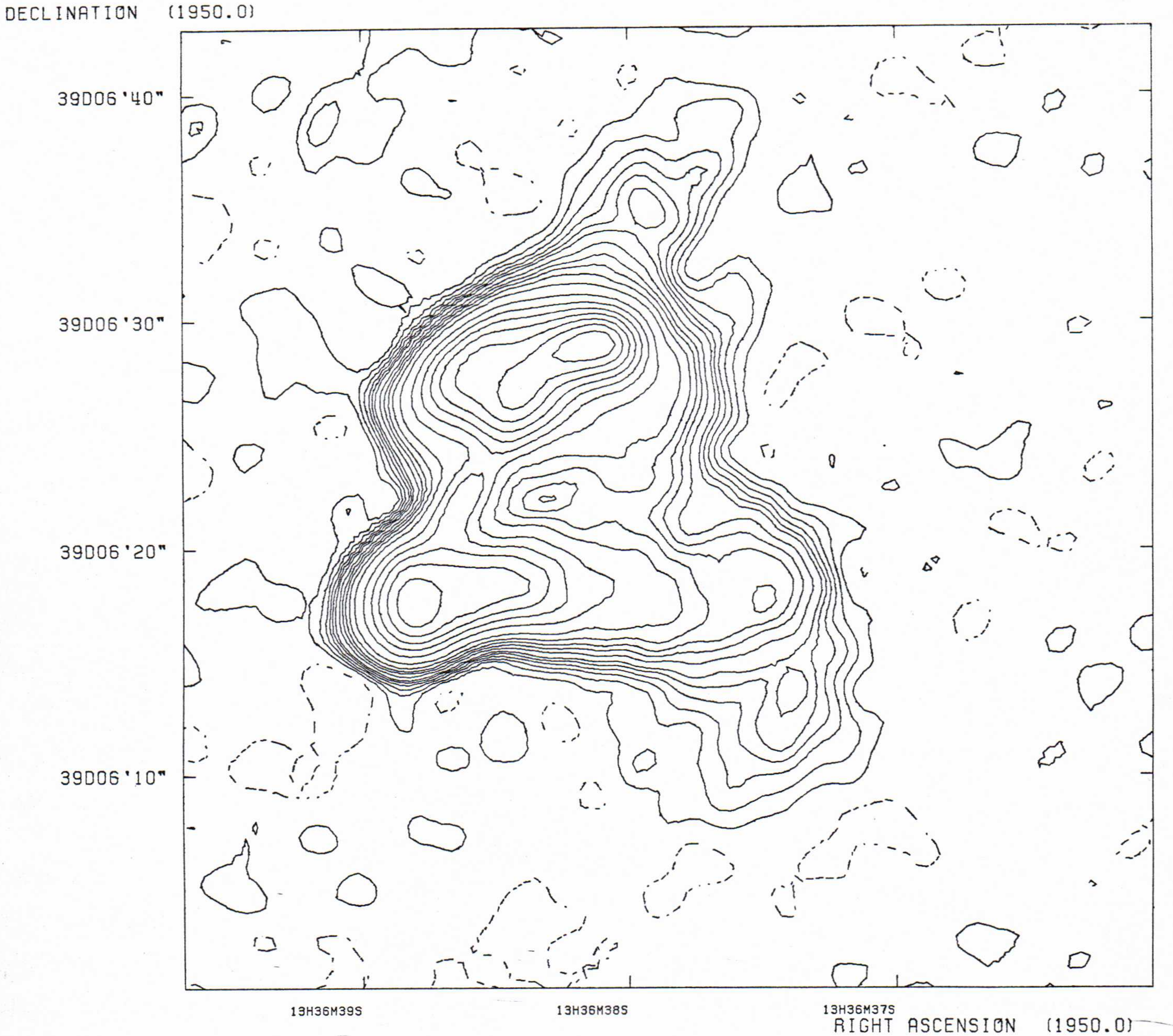
One of my worries about doing orbital dynamics with these trails is the possibility that they deflect due to buoyancy in the IGM pressure gradient, or under gravity (the 'light' and 'heavy' options, respectively). Can we ever be sure that we can get the orbit shapes out of the radio shapes ?

I will work up a 2cm proposal on 3C288, and talk that over a bit with Ed. In the meanwhile I will try recovering the maps from the data tape I have here.

With best wishes,

Alan B.

Alan Bridle



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2.00% (0.00266JY)	30.00% (0.03991JY)
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5.00% (0.00665JY)	60.00% (0.07982JY)
6.00% (0.00798JY)	70.00% (0.09312JY)
8.00% (0.01064JY)	80.00% (0.10642JY)
10.00% (0.01330JY)	90.00% (0.11972JY)
12.00% (0.01596JY)	

PLOTTED AREA SIZE (IN PIXELS) AND BOUNDS (IN IMPS PIXEL COORDS):
WINDOW: 95 X 95 LOWER LEFT: (100, 81) UPPER RIGHT: (194, 175)
IMPS PIXEL COORDS OF ORIGINAL PHASE TRACKING CENTER: (128.00, 129.00)
TAPER: NONE
CONVOLUTION: GAUSSIAN 0.50 0.50
WEIGHTING: UNIFORM
MAPPING PHASE CENTER (1950.0): 13H36M38.55S 39D06'22.20"
MAPPING PHASE CENTER (OBS DATE): 13H37M58.66S 38D57'06.17"
ORIGINAL PHASE TRACKING CENTER (1950.0): 13H36M38.59S 39D06'22.20"
ORIGINAL PHASE TRACKING CENTER (OBS DATE): 13H37M58.70S 38D57'06.17"
MAP ROTATION: 0D00'00"
PLOT SCALE: 0.20000002 RELATIVE ARC SECONDS PER MILLIMETER
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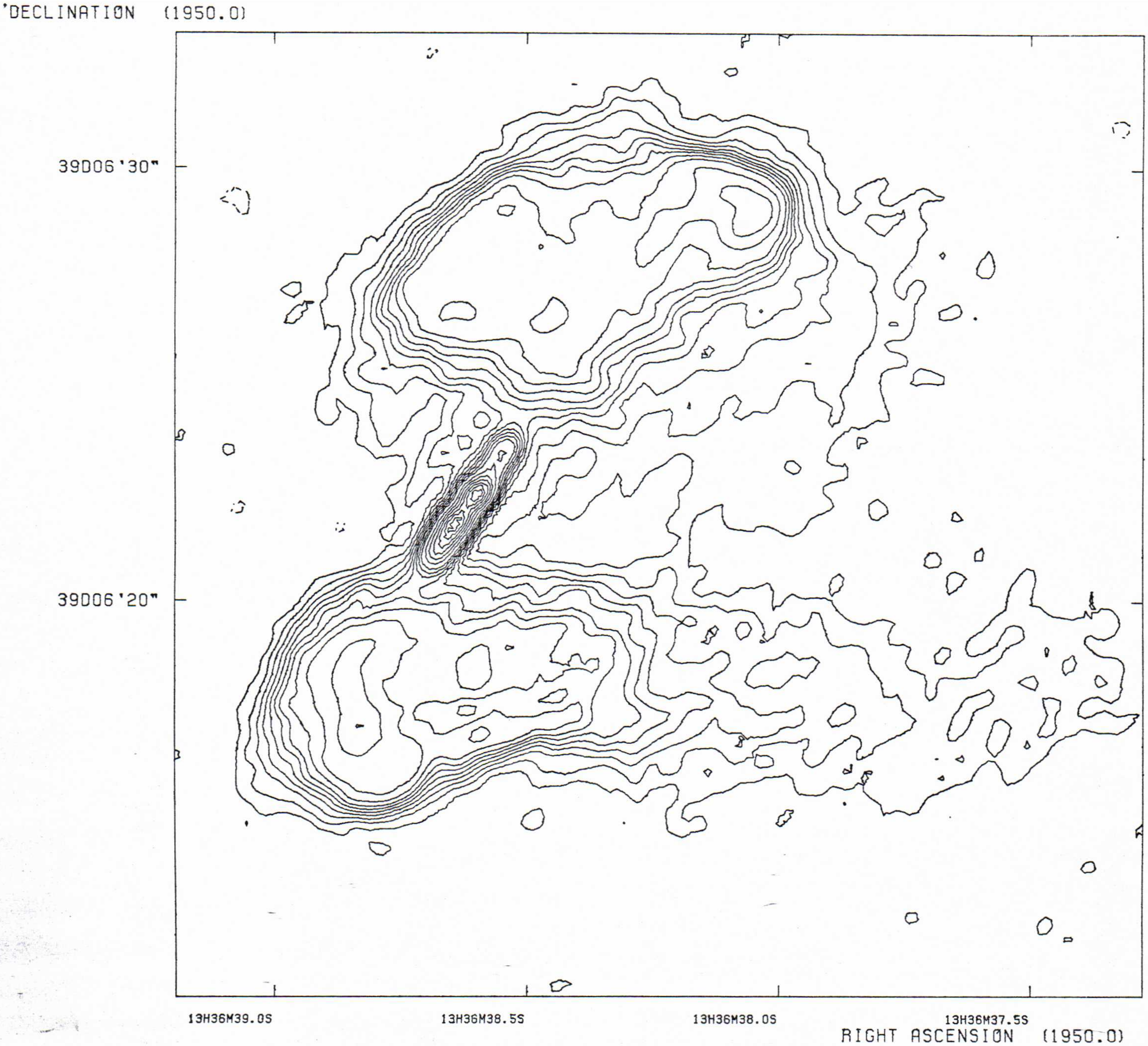

HCIC.16 3C288:-1 6 MAP:I 80MAR29 512 512 I

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6.00% (0.00070JY)	60.00% (0.00699JY)
9.00% (0.00105JY)	70.00% (0.00815JY)
12.00% (0.00140JY)	80.00% (0.00931JY)
15.00% (0.00175JY)	90.00% (0.01048JY)
18.00% (0.00210JY)	
21.00% (0.00244JY)	
25.00% (0.00291JY)	
30.00% (0.00349JY)	

PLOTTED AREA SIZE (IN PIXELS) AND BOUNDS (IN IMPS PIXEL COORDS):
WINDOW: 150 X 150 LOWER LEFT: (209, 181) UPPER RIGHT: (358, 330)
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TAPER: NONE
CONVOLUTION: GAUSSIAN 0.50 0.50
WEIGHTING: UNIFORM
MAPPING PHASE CENTER (1950.0): 13H36M38.58S 39D06'22.20"
MAPPING PHASE CENTER (OBS DATE): 13H37M58.68S 38D57'06.17"
ORIGINAL PHASE TRACKING CENTER (1950.0): 13H36M38.59S 39D06'22.20"
ORIGINAL PHASE TRACKING CENTER (OBS DATE): 13H37M58.70S 38D57'06.17"
MAP ROTATION: 0D00'00"
PLOT SCALE: 0.10000000 RELATIVE ARC SECONDS PER MILLIMETER
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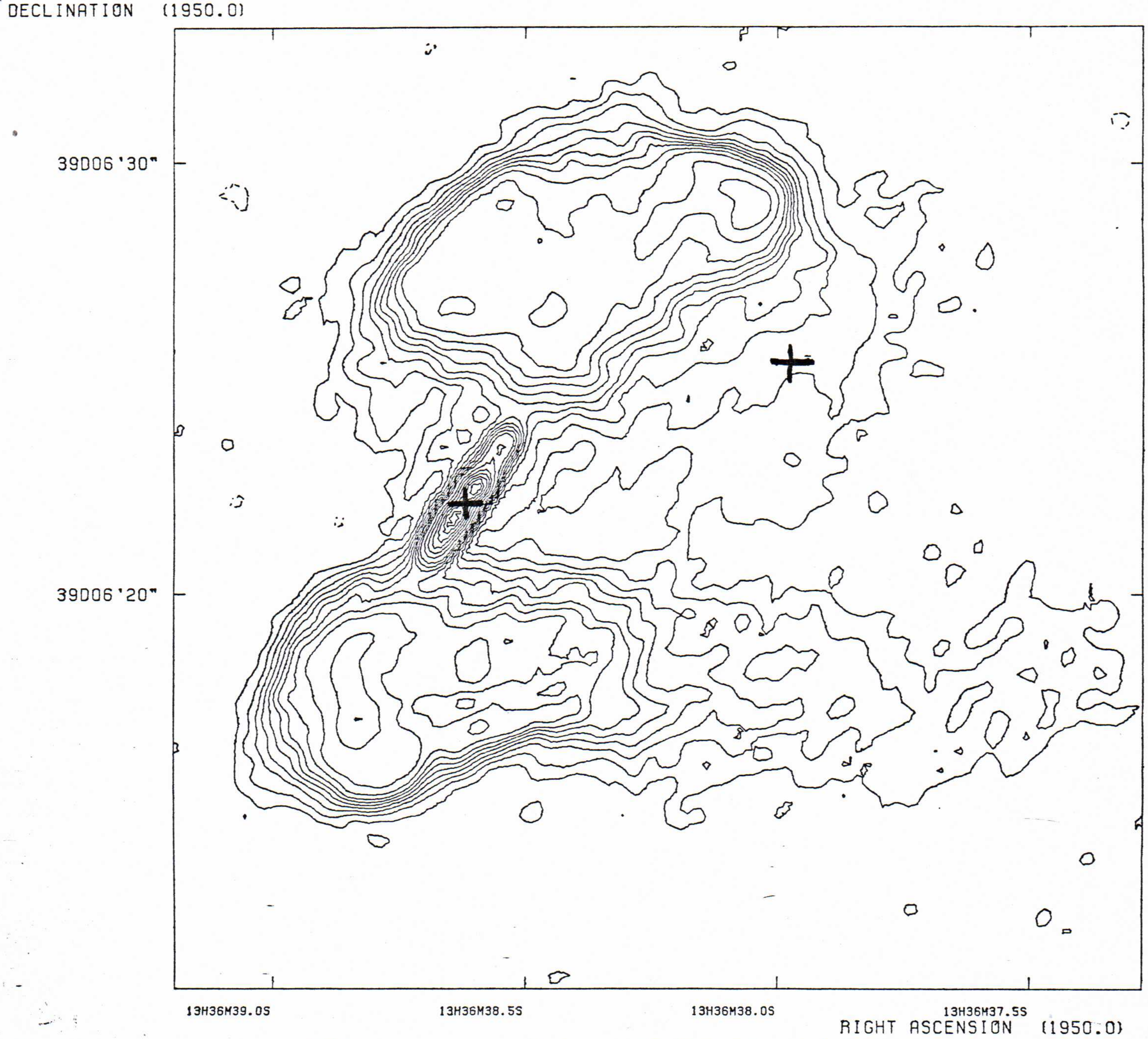

HCIC.I6 3C288:-1 6 MAP:I 80MAR29 512 512 I

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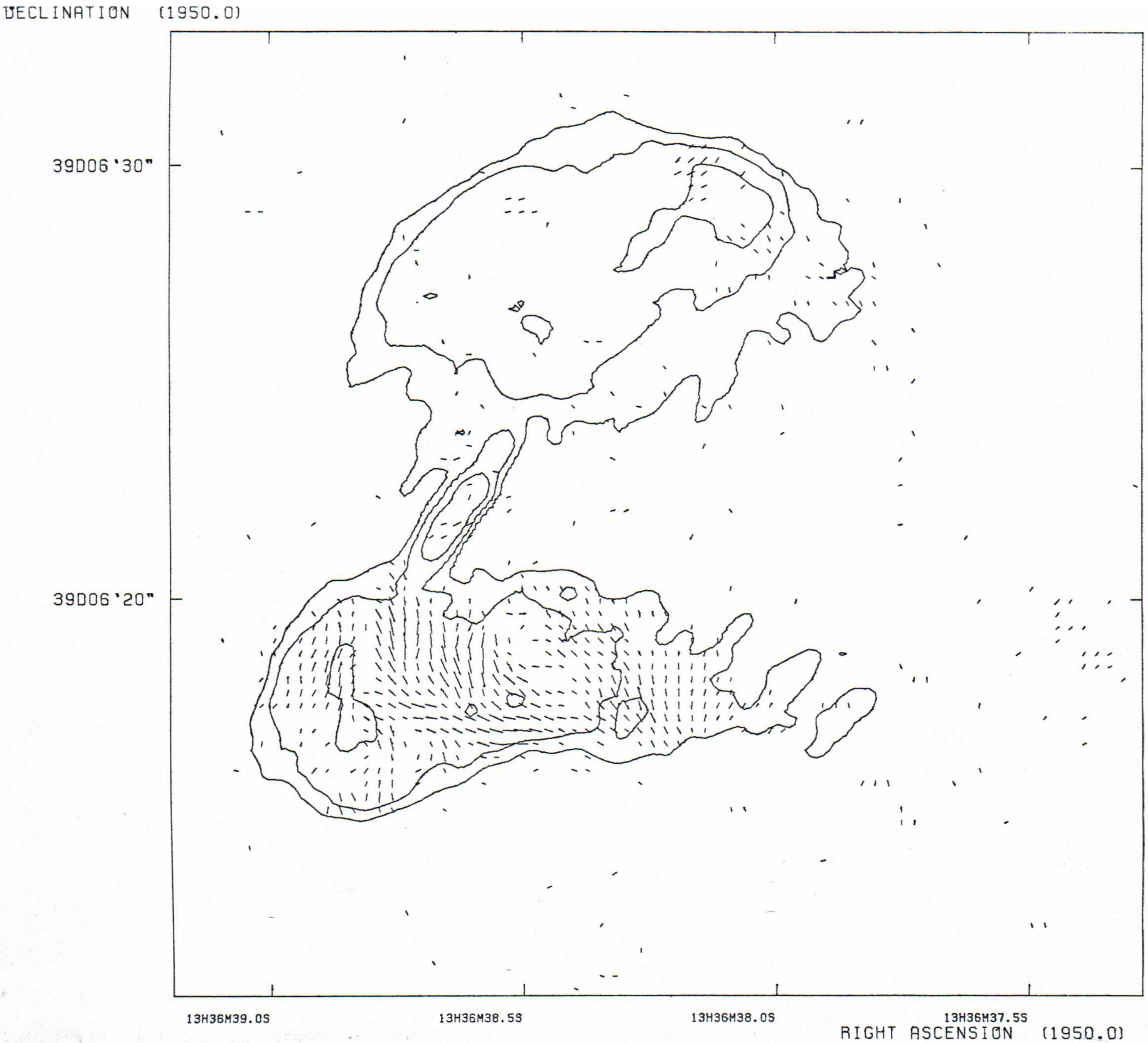
6.00% (0.00070JY)	60.00% (0.00699JY)
9.00% (0.00105JY)	70.00% (0.00815JY)
12.00% (0.00140JY)	80.00% (0.00931JY)
15.00% (0.00175JY)	90.00% (0.01048JY)
18.00% (0.00210JY)	
21.00% (0.00244JY)	
25.00% (0.00291JY)	
30.00% (0.00349JY)	

PLOTTED AREA SIZE (IN PIXELS) AND BOUNDS (IN IMPS PIXEL COORDS):
WINDOW: 150 X 150 LOWER LEFT: (209, 181) UPPER RIGHT: (358, 330)
IMPS PIXEL COORDS OF ORIGINAL PHASE TRACKING CENTER: (256.01, 257.01)
TAPER: NONE
CONVOLUTION: GAUSSIAN 0.50 0.50
WEIGHTING: UNIFORM
MAPPING PHASE CENTER (1950.0): 13H36M38.58S 39D06'22.20"
MAPPING PHASE CENTER (OBS DATE): 13H37M58.68S 38D57'06.17"
ORIGINAL PHASE TRACKING CENTER (1950.0): 13H36M38.59S 39D06'22.20"
ORIGINAL PHASE TRACKING CENTER (OBS DATE): 13H37M58.70S 38D57'06.17"
MAP ROTATION: 0D00'00"
PLOT SCALE: 0.10000000 RELATIVE ARC SECONDS PER MILLIMETER
0.00859092 RIGHT ASCENSION SECONDS PER MILLIMETER
0.10000498 DECLINATION SECONDS PER MILLIMETER

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POLARIZATION VECTOR SKIP FACTOR:  2                MIN POL VALUE PLOTTED: 0.00030000
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  18.00% (0.00199JY)
  40.00% (0.00441JY)
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PLOTTED AREA SIZE (IN PIXELS) AND BOUNDS (IN IMPS PIXEL COORDS):
    WINDOW: 150 X 150   LOWER LEFT: (209, 181)   UPPER RIGHT: (358, 330)
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TAPER:         NONE
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WEIGHTING:     UNIFORM
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MAP ROTATION:       0D00'00"
PLOT SCALE:                       0.10000000 RELATIVE ARC SECONDS PER MILLIMETER
                                  0.00859092 RIGHT ASCENSION SECONDS PER MILLIMETER
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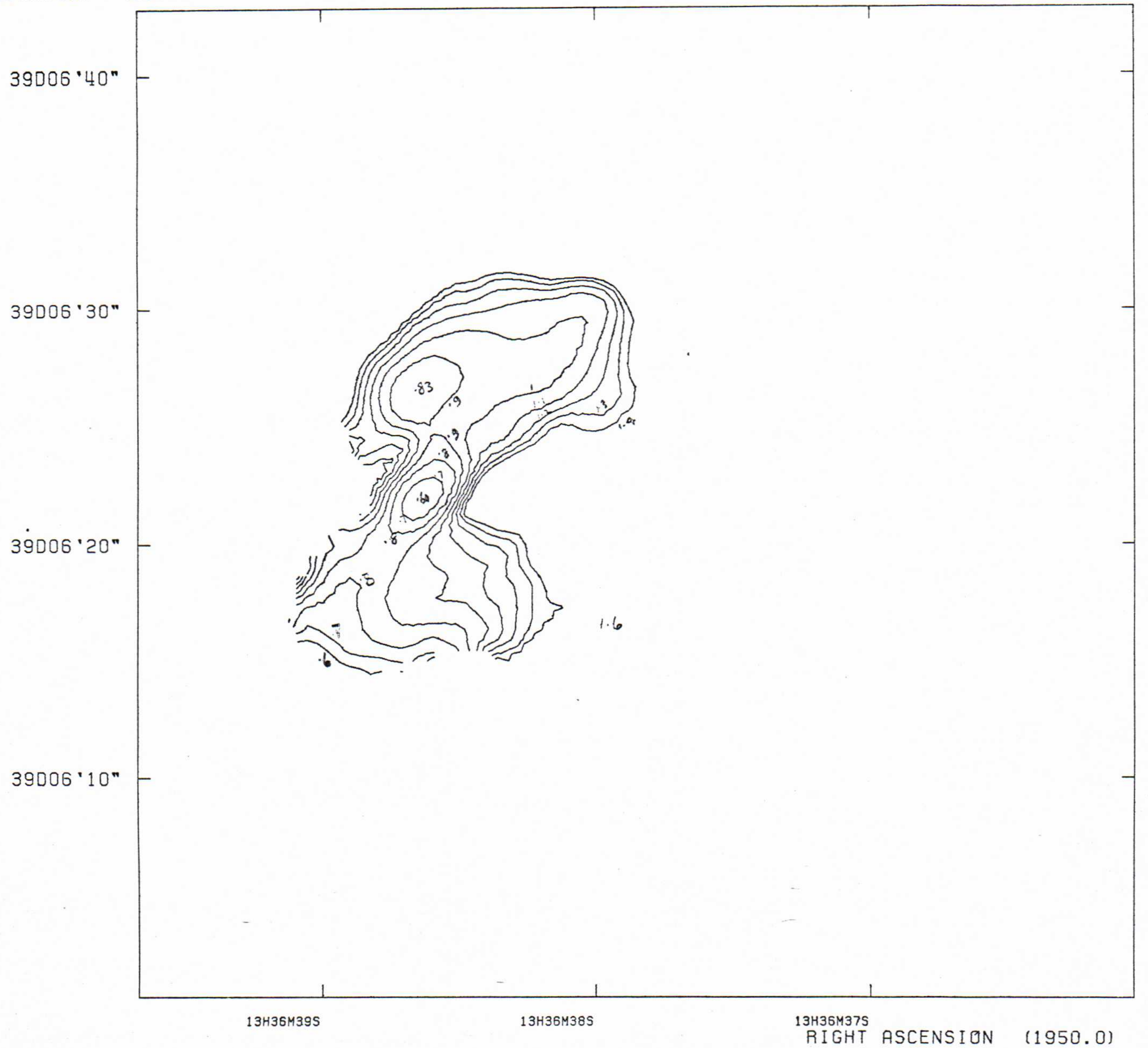
DECLINATION (1950.0)



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PLOTTED AREA SIZE (IN PIXELS) AND BOUNDS (IN IMPS PIXEL COORDS):
WINDOW: 95 X 95 LOWER LEFT: (100, 81) UPPER RIGHT: (194, 175)
IMPS PIXEL COORDS OF ORIGINAL PHASE TRACKING CENTER: (128.00, 129.00)
TAPER: NONE
CONVOLUTION: GAUSSIAN 0.50 0.50
WEIGHTING: UNIFORM
MAPPING PHASE CENTER (1950.0): 13H36M38.55S 39D06'22.20"
MAPPING PHASE CENTER (OBS DATE): 13H37M58.66S 38D57'06.17"
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0.01718115 RIGHT ASCENSION SECONDS PER MILLIMETER
0.19996470 DECLINATION SECONDS PER MILLIMETER

Tape 4447
Export Tape in CV

THE UNIVERSITY OF ALABAMA
College of Arts and Sciences

Department of Physics & Astronomy

January 28, 1983

Dear Alan,

Here is the first draft of the 3C288 paper. We have had a number of questions develop during the time we wrote it.

First, can you determine the location of the visual galaxy better than the Cambridge group. The Cambridge position is consistent with the galaxy being on the jet but the error is several times the jet width so we can't be sure.

Second, do you have the information for table I Section II about the parameters of the observations i.e. beam widths x orientations at 6 and 20 cm, what are the levels of the spectral index map, and the scale for the lines in the polarization map. We presume the VLA antennae configuration was "A" with antennas 2--10, 12, 13, 15 - 25 working should the integrated intensities of the two lobes be calculated and should the equipartition partition parameters be calculated?

Third, what are your thoughts on how the authors should be listed. Also, what authors are involved i.e. Vallee was on your 3C288 proposal along with you and Ed. Is he still on? } OK

We got this from the NRAO newsletter. → Finally, we are thinking of proposing to observe NGC4869 with the VLA. Do you know the dates and future configurations of the VLA? Would you be interested in participating with us. A copy of the "scientific justification" part of the proposal is enclosed.

Here's the letter, we had typed before our phone conversation with you Thursday. I'm enclosing it in case we weren't clear in the phone conversation.

Gene

P.S. If you are interested in participating in the NGC 4869/5C4.8 proposal and the enclosed copy of it looks OK, please forward it to the director. Also, what do you think about presenting the 3C288 article ~~paper~~ at the Minnesota AAS meeting in June as a poster paper? I'll be attending that meeting or you or Ed could present it.

Gene

THE UNIVERSITY OF ALABAMA
COLLEGE OF ARTS AND SCIENCES
DEPARTMENT OF PHYSICS AND ASTRONOMY
P. O. BOX 1921
UNIVERSITY, ALABAMA 35486

TELEPHONE: 348-5050

FREIGHT, EXPRESS AND TELEGRAPH
ADDRESS: TUSCALOOSA, ALABAMA

May 5, 1980

To Ed Fomalont and Alan Bridle

To Ed:
I just got a reply from Mauri regarding the 3C288 article. He is happy with the idea of having one article with an observation section and two interpretation sections. I'm enclosing Alan Bridle's letter and xeroxes of the two remaining IMPS maps in case you haven't made them yet. Let me know what is needed on the 3C288 article which I can help on ~~the~~ such as drawing illustrations etc. I'll be writing Mauri about the effect of the observations on our previous slingshot model of 3C288 and I'll be working with the tape of the maps to see if we can get them out on our plotter.

To Alan:
Thanks for your letter. As you see above, Mauri and I think a combined article is a good idea. I agree with your remark that the difference in polarization between the two lobes says something about the structure of the source. Does the sketch on the next page correspond to the precessing jet explanation in your letter? Sorry for the delay in answering. I was waiting for the reply from Mauri Valtonen!

Hen...