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Microwave Spectra of Molecules of Astrophysical Interest.

XVI. Methyl Formate

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The microwave spectrum of methyl formate is critically reviewed for information applicable to radio astronomy. The review is based on new laboratory measurements in the frequency range from 8 GHz to 58 GHz. Molecular data such as the derived rotational constants, centrifugal distortion parameters, internal rotation parameters, electric dipole moment and molecular structure are tabulated. Since the primary objective is to provide microwave spectral transitions applicable to radio astronomy observations, the review encompasses only the ground state rotational spectrum of the most abundant isotopic form of methyl formate, $H^{12}C^{16}O_2{}^{12}CH_3$. While all measured transitions are included, the predicted transitions were limited to $J \leq 12$ in the range of 900 MHz to 250 GHz.

Key words: Internal rotation; interstellar molecules; line strengths; methyl formate; microwave spectrum; radio astronomy; rotational transitions.

Contents

1. Introduction

The present work is part of a series of critical reviews which are intended to update, revise, and augment the existing literature on molecules that have been identified in interstellar molecular clouds. In order to provide complete coverage of the spectral regions where present and anticipated radio telescope receivers operate, all measured and predicted rotational transitions of methyl formate ($H^{12}C^{16}O_2{}^{12}CH_3$) are listed from 900 MHz to 250 GHz. The predicted transitions are limited to those between rotational levels with $J \leq 12$. We estimate that radiative relaxation from higher rotational levels will generally be much faster than the collisional excitation rates which have been derived for the interstellar molecular clouds in which large organic molecules, like methyl formate, have been observed. Spectral data on the less abundant isotopic forms and for excited vibrational states of methyl formate have not been included in this review. However, the references provided in section 3.1 cover all of the relevant literature.

2. Organization of Tables

The predicted rotational spectrum of methyl formate presented in tables 4 to 6 is based entirely on new laboratory measurements for reasons explained in the next section. The open literature has been searched for additional information relating to the microwave spectrum of methyl formate and all pertinent data have been summarized in the molecular parameter tables 1 and 3. In order to prevent transcription errors, the tables 4 to 6 have been directly reproduced from the computer printouts.

2.1. Molecular Parameter Tables

The microwave spectrum of methyl formate was first reported by Curl [1].[1] The small number of measured transition frequencies and their limited accuracy were not sufficient for predictions of rotational transitions outside the measured range. Therefore, the microwave spectrum of methyl formate was remeasured. A large number of new transitions were assigned in the frequency range from 8 to 58 GHz. The microwave spectrometer was operated under computer control [2]. Accurate center frequencies of individual transitions were determined by fitting a parabola to the central portion of the digitally recorded transition [3].

The rotational constants, centrifugal distortion constants, and internal rotation parameters in table 1 were obtained from nonlinear least-squares fits of measured transition frequencies in the vibrational and torsional ground state of methyl formate ($H^{12}C^{16}O_2{}^{12}CH_3$). The internal axis method (IAM) [4] was selected for the calculation of transition frequencies of a rotating molecule with a symmetric internal rotor. Woods [5] presented a convenient scheme for this calculation and introduced suitable approximations for the high barrier limit. The scheme involves first a division of the Hamiltonian into an over-all rotational part and an internal rotation part. The latter includes the coupling between internal and over-all rotation. The matrix elements of the two parts are set up separately, each in the most convenient basis, and the matrices are diagonalized. The internal rotation part is then transformed to a common basis in which the over-all rotational part is diagonal. The small off-diagonal elements from the internal rotation part are treated by perturbation theory considering only connections between two nearly degenerate rotational states. The efficient computer program of Woods [5] was modified and extended by the inclusion of the centrifugal distortion correction for a nonplanar asymmetric rotor in the form given by Watson [6]. However, centrifugal distortion due to internal rotation was completely neglected. Finite differences of transition frequencies were calculated for individual variations of all eleven molecular parameters. These parameters were simultaneously adjusted iteratively in a nonlinear least-squares fit.

It was found that much smaller residual deviations between measured and calculated frequencies approaching the estimated accuracy of the measurements could be obtained if the A and E symmetry states were fitted independently using only a small number of transitions of the other symmetry state. It is believed that the differences between the adjusted parameters of the two symmetry states reflect the interactions with other low frequency normal vibrations which were completely neglected in the semi-rigid model employed for internal and over-all rotation. A total of 81 measured A state transitions up to $J = 20$ were included in the fit of the A symmetry state, and 70 measured E state transitions up to $J = 20$ were included likewise in the fit of the E symmetry state. Mean residual errors between measured and calculated transition frequencies of 35 kHz and 54 kHz were finally obtained for the A and E symmetry state, respectively. Slightly different sets of molecular parameters were thus determined for the A and E symmetry states as shown in table 1. It is believed that this procedure provides more accurate predictions of transition frequencies. Standard deviations given in table 1 and correlation coefficients given in table 2 were calculated for all parameters.

The dipole moment components in table 1 were taken directly from the literature cited. The parameters which were determined from fitting the measured transition frequencies were transformed to alternative molecular constants for the over-all rotation and the internal rotation problem of methyl formate. Since the A and E symmetry states were fitted separately, the molecular constants collected in table 3 exhibit slightly different values between A and E state outside the combined uncertainties. The largest differences were found for the potential barrier and the moment of inertia of the top. The structural parameters were taken again from the literature cited.

2.2. Microwave Spectral Tables

The results of the statistical analysis of the rotational spectrum of methyl formate ($H^{12}C^{16}O_2{}^{12}CH_3$) in the ground vibrational and torsional state are given in tables 4 and 5. For each rotational transition the first columns of tables 4 and 5 contain the quantum numbers of the upper and lower state in the form J, K_-, K_+ for the asymmetric rotor plus a symmetry label S for the internal rotation substate. The quantum numbers are followed by the observed transition frequency and the estimated uncertainty in MHz. In the next column the calculated transition frequencies are listed, which were evaluated from the molecular parameters of table 1. The calculated transition frequencies are followed by their calculated uncertainties. The latter are twice the standard deviations from the least-squares analysis and represent approximately 95 percent confidence levels. The standard deviations were calculated from finite differences of transition frequencies upon variations of molecular parameters and the variance-covariance matrix as described by Kirchhoff [7].

The next three columns provide information on the line strengths of the torsionally allowed transitions. The first column shows the calculated relative intensity of the A and E symmetry states. The absolute nuclear-spin statistical weight factors were suppressed. The second column gives the product of the rigid rotor line strength, ${}^xS_{J';J''}$, and the square of the dipole moment component, $\mu_x{}^2$, for the rotational transition. The rigid rotor line strength is cal-

[1] Numbers in brackets indicate references in section 2.4.

culated as the expectation value of the electric dipole transition moment for polarized microwave radiation

$$|<J',K'_-,K'_+|\mu_Z|J'',K''_-,K''_+>|^2$$
$$=\Sigma_{M'}|<J',K'_-,K'_+,M'|\mu_Z|J'',K''_-,K''_+,M''>|^2$$
$$=\mu_x^2\,{}^xS\,(J',K'_-,K'_+;J'',K''_-,K''_+),$$

where the subscript Z refers to the direction of polarization and the superscript x to the a or b principal axis and μ_x represents the corresponding dipole moment component [8]. Thus, the line strengths as defined in the tables 4 and 5 clearly depend on the square of the dipole moment. In the third column, the total line strength was approximated as the product of the relative intensity of the torsionally allowed transitions and of the corresponding product $\mu_x^2\,{}^xS_{J';J''}$. Spectral lines were omitted from the tables if the total line strengths fell below 0.1 D^2.

The total line strength may be related to the Einstein coefficient, A, in the following manner. The probability, $A(J',K'_-,K'_+,S;J'',K''_-,K''_+,S)$, of a spontaneous transition in one second from the upper state J',K'_-,K'_+,S to the lower state J'',K''_-,K''_+,S is

$$A(J',K'_-,K'_+,S;J'',K''_-,K''_+,S)=1.1639\times10^{-20}\nu^3$$
$$|<J',K'_-,K'_+,S|\mu_Z|J'',K''_-,K''_+,S>|^2/(2J'+1),$$

where ν is the transition frequency in MHz and $|<J',K'_-,K'_+,S|\mu_Z|J'',K''_-,K''_+,S>|^2$ the total line strength.

The total rotational and torsional energy of upper and lower state are shown in the last two columns. These energies are given in cm^{-1} equivalents. The torsional zero-point energy of 69.714 cm^{-1} with respect to the minimum of the potential barrier was subtracted from all energy levels.

As a convenience to the user the calculated transition frequencies from tables 4 and 5 have been listed according to increasing frequency in table 6. Rotational transitions with J values from 13 to 20 that were included in the least-squares fit of the molecular parameters are listed with their measured frequencies in table 7. Additional rotational transitions were assigned with J values ranging up to 40. They were, however, not used during the least-squares analysis. They exhibited progressively increasing systematic deviations due to the approximations introduced during the calculations. The measured frequencies of these additional transitions are also collected in table 7.

2.3. List of Symbols and Conversion Factors

a. Symbols

A, B, C	Rotational constants (MHz). $A \geqq B \geqq C$. ($A = h/8\pi^2 I_a$, etc.).
I_a, I_b, I_c	Moments of inertia in the principal axes system (u Å^2).
I_τ	Moment of inertia of the methyl top around internal rotation axis (u Å^2).
a, b, c	Principal axes corresponding to I_a, I_b, I_c, respectively.
$\Delta_J, \Delta_{JK}, \Delta_K, \delta_J, \delta_K$	Quartic centrifugal distortion constants (kHz) defined according to Watson [6].
ρ	Internal rotation interaction constant [4, 5] $\rho = \Sigma_x [(\lambda_x I_\tau/I_x)^2]^{1/2}$.
β	Second Eulerian angle for transformation from the principal axes system to the internal rotational axes system [5].
Δ_0	Internal rotation interaction constant (MHz). $\Delta_0 = 3F a_1(s)/2 =$ energy difference between 0 (0, 0) A and 0 (0, 0) E state [5].
$\lambda_a, \lambda_b, \lambda_c$	Direction cosines between the internal rotation axis and the principal axes a, b, c, respectively.
φ	Angle between the internal rotation axis and the a principal axis. $\varphi = \arccos \lambda_a$.
τ	Angle of rotation around internal rotation axis.
F	Internal rotation dynamical constant (GHz) [4, 5] $F = h/8\pi^2 r I_\tau$.
V_3	Threefold component of torsional barrier potential (cm^{-1}). $V = V_3(1-\cos 3\tau)/2$.
s	Reduced barrier height. $s = 4V_3/9F$.
r	$r = 1 - \Sigma_x (\lambda_x^2 I_\tau/I_x)$.
$a_1(s)$	Fourier coefficient [4].
μ_a, μ_b, μ_c	Components of the electric dipole moment (D) along the principal axes a, b, c, respectively.
D	Abbreviation for Debye units (1D = 3.33564×10^{-30} C m).
J	Total rotational angular momentum quantum number.
K_-	Projection of J on the symmetry axis in the limiting prolate symmetric top.
K_+	Projection of J on the symmetry axis in the limiting oblate symmetric top.
A, E	Torsional symmetry substates representing irreducible representations of the symmetry group of the rotation-internal rotation Hamiltonian.
r (X–Y)	Distance between nuclei X and Y (Å).
∠X–Y–Z	Angle formed by nuclei X, Y, and Z (degrees).
(...)	Parentheses in the numerical listings contain measured or estimated uncertainties. These should be interpreted as: 1.409(0.083) = = 1.409(83) = 1.409 ± 0.083.

b. Conversion Factors

The following conversion factors have been used:

$A \cdot I_a = 5.0537905(85) \times 10^5$ MHz u Å^2,
$h = 6.626176(36) \times 10^{-34}$ J s,
$c = 2.99792458(1) \times 10^8$ m s^{-1},
1 cm^{-1} $= 1.986478(11) \times 10^{-23}$ J $= 11.96266$ J mol^{-1},

1 u = 1.6605655(86) × 10^{-27} kg,
1 Å = 10^{-10} m.

2.4. References

[1] Curl, R. F., Jr., J. Chem. Phys. **30**, 1529 (1959). "Microwave Spectrum, Barrier to Internal Rotation, and Structure of Methyl Formate."

[2] Bauder, A. and Günthard, Hs. H., J. Mol. Spectrosc. **60**, 290 (1976). "Internal Rotation in Acetaldehyde."

[3] Porchet, J. P., and Günthard, Hs. H., J. Phys. E: Sci. Instr. **3**, 261 (1970). "Optimum Sampling and Smoothing Conditions for Digitally Recorded Spectra."
Savitzky, A., and Golay, M. J. E., Anal. Chem. **36**, 1627 (1964). "Smoothing and Differentiation of Data by Simplified Least Squares Procedures."

[4] Lin, C. C., and Swalen, J. D., Rev. Mod. Phys. **31**, 841 (1959). "Internal Rotation and Microwave Spectroscopy."

[5] Woods, R. C., J. Mol. Spectrosc. **21**, 4 (1966). "A General Program for the Calculation of Internal Rotation Splittings in Microwave Spectroscopy."

[6] Watson, J. K. G., J. Chem. Phys. **46**, 1935 (1967). "Determination of Centrifugal Distortion Coefficients of Asymmetric-Top Molecules."

[7] Kirchhoff, W. H., J. Mol. Spectrosc. **41**, 333 (1972). "On the Calculation and Interpretation of Centrifugal Distortion Constants: A Statistical Basis for Model Testing: The Calculation of the Force Field."

[8] Townes, C. H., and Schawlow, A. L., "*Microwave Spectroscopy*," (McGraw Hill, New York) 1955, pp. 95.

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3. Methyl Formate Spectral Tables

Table 1. Molecular parameters for the ground state of methyl formate ($H^{12}C^{16}O_2{}^{12}CH_3$).[a]

Rotational constants	A State	E State
A (MHz)	19982.23889(499)	19982.21949(685)
B (MHz)	6914.01332(130)	6914.05905(330)
C (MHz)	5304.47963(129)	5304.50944(333)
Centrifugal distortion constants	**A State**	**E State**
Δ_J (kHz)	6.0589(164)	6.0600(862)
Δ_{JK} (kHz)	-21.2897(423)	-21.443(155)
Δ_K (kHz)	79.133(154)	81.68(148)
δ_J (kHz)	1.87101(188)	1.90756(414)
δ_K (kHz)	3.9508(619)	3.276(131)
Internal rotation parameters	**A State**	**E State**
ε	0.083259(222)	0.086058(149)
Δ_0 (MHz)	-421.29(198)	-397.539(996)
β (rad)	0.430600(180)	0.430791(283)
Dipole moment Ref. [59A]		
μ_a (D)	1.63	
μ_b (D)	0.68	

[a] The number of significant figures quoted are necessary to reproduce all the calculated frequencies without round-off errors. The standard deviations are given in parentheses.

2. Correlation coefficients.[a]

A	B	C	Δ_J	Δ_{JK}	Δ_K	δ_J	δ_K	ρ	Δ_0	β
	0.5229	0.2094	0.1736	0.5136	0.2933	0.1743	0.2238	-0.4881	-0.3869	0.5136
0.3797		0.8147	0.6921	0.2081	0.2829	0.1269	0.1234	-0.2425	-0.2149	0.0061
0.3123	0.9686		0.7723	-0.1492	0.2993	-0.1065	-0.0098	0.1877	0.1893	-0.0463
0.2716	0.8711	0.8776		-0.2024	0.5541	-0.1188	0.1054	0.0046	0.0265	0.0639
-0.2741	0.1576	0.1234	0.0313		-0.2593	0.7186	-0.2277	-0.3891	-0.3590	0.1802
0.4959	-0.1354	-0.1528	-0.0590	-0.9222		-0.1610	0.1828	-0.0924	-0.0994	-0.0586
-0.2427	0.1756	0.1026	0.0484	0.8308	-0.6848		-0.7674	-0.1892	-0.1845	0.0794
0.3666	-0.1312	-0.1220	-0.0490	-0.7483	0.6871	-0.9466		-0.3265	-0.3164	0.0105
-0.0116	0.0629	0.0298	0.0420	0.0745	-0.0785	0.1169	-0.1047		0.9838	-0.2342
-0.0262	0.0610	0.0306	0.0319	0.0660	-0.0694	0.1236	-0.1174	0.9580		-0.0952
0.0373	0.0017	-0.0224	-0.0568	-0.0803	0.1304	-0.0467	0.0609	-0.6289	-0.4978	

he upper right triangle refers to the least-squares fit of the A symmetry state, the lower left triangle to that of the symmetry state.

Table 3. Additional molecular parameters for the ground state of methyl formate ($H^{12}C^{16}O_2{}^{12}CH_3$) .

Moments of inertia	A State	E State
I_a (uÅ^2)	25.291413(6)	25.291437(9)
I_b (uÅ^2)	73.094891(15)	73.094399(36)
I_c (uÅ^2)	95.274011(23)	95.273475(60)
I_τ (uÅ^2)	3.180368	3.288040
Internal rotation parameters	**A State**	**E State**
λ_a	0.60167	0.60147
λ_b	0.79875	0.79889
φ (^{o})	53.01	53.02
s	31.558	31.738
F (GHz)	171.471	166.298
V_3 (cm^{-1})	406.1	396.1

Structural parameters [a] Ref. [50A]		
r (C_1 = O_1)		1.200(10) Å
r (C_1 - O_2)	carboxyl	1.334(10) Å
r (C_2 - O_2)	methoxyl	1.437(10) Å
r (C_1 - H_1)	carboxyl	1.101(10) Å
r (C_2 - H)	methyl	1.086(15) Å
∠ O_1 = C_1 - O_2		125.9(10)^o
∠ C_1 - O_2 - C_2		114.8(10)^o
∠ H_1 - C_1 - O_2	carboxyl	109.3(10)^o
∠ H - C_2 - H	methyl	110.7(15)^o

[a] r_s structure, methyl group assumed to be symmetric.

Table 4. The microwave spectrum for the A symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$.

QUANTUM NUMBERS J K+ K-	- J′ K+ K-	S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
1(0, 1)	- 0(0, 0)	A	12219.209	(.020)	12219.211	(.005)	1.000	2.657	2.657	.408	0.000
1(1, 1)	- 0(0, 0)	A	25290.161	(.020)	25290.190	(.009)	1.000	.462	.462	.844	0.000
1(1, 0)	- 1(1, 1)	A	1610.249	(.003)[a]	1610.245	(.001)	1.000	3.985	3.985	.897	.844
1(1, 0)	- 1(0, 1)	A	14681.231	(.020)	14681.225	(.007)	1.000	.694	.694	.897	.408
2(0, 2)	- 1(0, 1)	A	24298.476	(.020)	24298.488	(.009)	1.000	5.300	5.300	1.218	.408
2(1, 1)	- 1(1, 0)	A	26048.515	(.020)	26048.539	(.010)	1.000	3.985	3.985	1.766	.897
2(1, 2)	- 1(1, 1)	A	22828.131	(.020)	22828.143	(.009)	1.000	3.985	3.985	1.605	.844
2(2, 0)	- 1(1, 1)	A			67010.773	(.022)	1.000	.652	.652	3.079	.844
2(0, 2)	- 1(1, 1)	A	11227.499	(.020)	11227.509	(.010)	1.000	.272	.272	1.218	.844
2(1, 2)	- 1(0, 1)	A	35899.116	(.020)	35899.122	(.012)	1.000	.694	.694	1.605	.408
2(2, 1)	- 1(1, 0)	A			65260.744	(.022)	1.000	.694	.694	3.074	.897
2(1, 1)	- 2(1, 2)	A			4830.641	(.003)	1.000	2.214	2.214	1.766	1.605
2(1, 1)	- 2(0, 2)	A	16431.284	(.020)	16431.275	(.007)	1.000	1.087	1.087	1.766	1.218
2(2, 0)	- 2(1, 1)	A			39351.989	(.018)	1.000	.454	.454	3.079	1.766
2(2, 1)	- 2(1, 2)	A	44042.843	(.020)	44042.846	(.019)	1.000	.385	.385	3.074	1.605
3(2, 1)	- 2(2, 0)	A	37209.637	(.020)	37209.670	(.013)	1.000	4.429	4.429	4.320	3.079
3(0, 3)	- 2(0, 2)	A	36104.845	(.020)	36104.812	(.013)	1.000	7.919	7.919	2.422	1.218
3(1, 2)	- 2(1, 1)	A	38980.815	(.020)	38980.840	(.013)	1.000	7.079	7.079	3.066	1.766
3(1, 3)	- 2(1, 2)	A	34158.103	(.020)	34158.098	(.013)	1.000	7.080	7.080	2.744	1.605
3(2, 2)	- 2(2, 1)	A	36657.456	(.020)	36657.447	(.013)	1.000	4.428	4.428	4.297	3.074
3(2, 1)	- 2(1, 2)	A			81392.300	(.024)	1.000	.636	.636	4.320	1.605
3(3, 0)	- 2(2, 1)	A			106125.365	(.033)	1.000	1.138	1.138	6.614	3.074
3(0, 3)	- 2(1, 2)	A	24504.165	(.020)	24504.179	(.013)	1.000	.597	.597	2.422	1.605
3(3, 1)	- 2(2, 0)	A			105977.962	(.033)	1.000	1.139	1.139	6.614	3.079
3(1, 3)	- 2(0, 2)	A	45758.761	(.020)	45758.732	(.015)	1.000	.951	.951	2.744	1.218
3(2, 2)	- 2(1, 1)	A			75869.652	(.024)	1.000	.771	.771	4.297	1.766
3(1, 2)	- 3(1, 3)	A	9653.385	(.020)	9653.384	(.006)	1.000	1.555	1.555	3.066	2.744
3(3, 0)	- 3(2, 1)	A			68775.911	(.030)	1.000	.436	.436	6.614	4.320
3(1, 2)	- 3(0, 3)	A	19307.307	(.020)	19307.303	(.008)	1.000	1.382	1.382	3.066	2.422
3(2, 1)	- 3(1, 2)	A	37580.838	(.020)	37580.819	(.017)	1.000	.879	.879	4.320	3.066
3(2, 2)	- 3(1, 3)	A	46542.205	(.020)	46542.196	(.019)	1.000	.646	.646	4.297	2.744
3(3, 1)	- 3(2, 2)	A			69460.299	(.030)	1.000	.433	.433	6.614	4.297
4(2, 2)	- 3(2, 1)	A	50105.020	(.020)	50105.073	(.015)	1.000	7.971	7.971	5.991	4.320
4(0, 4)	- 3(0, 3)	A	47536.992	(.020)	47536.949	(.015)	1.000	10.510	10.510	4.008	2.422
4(3, 1)	- 3(3, 0)	A	49180.133	(.020)	49180.127	(.015)	1.000	4.652	4.652	8.255	6.614
4(1, 3)	- 3(1, 2)	A			51791.972	(.015)	1.000	9.942	9.942	4.794	3.066
4(3, 2)	- 3(3, 1)	A	49134.704	(.020)	49134.652	(.015)	1.000	4.652	4.652	8.253	6.614
4(1, 4)	- 3(1, 3)	A	45397.442	(.020)	45397.404	(.015)	1.000	9.947	9.947	4.259	2.744
4(2, 3)	- 3(2, 2)	A	48767.021	(.020)	48767.016	(.015)	1.000	7.965	7.965	5.924	4.297
4(4, 0)	- 3(3, 1)	A			146023.043	(.053)	1.000	1.602	1.602	11.485	6.614
4(2, 2)	- 3(1, 3)	A			97339.275	(.027)	1.000	.590	.590	5.991	2.744
4(3, 1)	- 3(2, 2)	A			118648.044	(.034)	1.000	1.153	1.153	8.255	4.297
4(0, 4)	- 3(1, 3)	A	37883.017	(.020)	37883.030	(.014)	1.000	.983	.983	4.008	2.744
4(1, 3)	- 3(2, 2)	A	14903.145	(.020)	14903.160	(.019)	1.000	.234	.234	4.794	4.297
4(3, 2)	- 3(2, 1)	A			117902.944	(.034)	1.000	1.161	1.161	8.253	4.320
4(1, 4)	- 3(0, 3)	A	55051.256	(.020)	55051.323	(.017)	1.000	1.253	1.253	4.259	2.422
4(4, 1)	- 3(3, 0)	A			146015.080	(.053)	1.000	1.602	1.602	11.485	6.614
4(2, 3)	- 3(1, 2)	A			85655.828	(.025)	1.000	.881	.881	5.924	3.066
3(2, 1)	- 4(1, 4)	A			1836.798	(.021)	1.000	.125	.125	4.320	4.259
4(1, 3)	- 4(1, 4)	A	16047.957	(.020)	16047.952	(.009)	1.000	1.211	1.211	4.794	4.259
4(2, 2)	- 4(2, 3)	A			2030.064	(.003)	1.000	4.625	4.625	5.991	5.924
4(2, 3)	- 4(0, 4)	A	57426.140	(.020)	57426.182	(.023)	1.000	.163	.163	5.924	4.008
4(3, 1)	- 4(2, 2)	A			67850.965	(.028)	1.000	.802	.802	8.255	5.991
4(1, 3)	- 4(0, 4)	A	23562.327	(.020)	23562.326	(.009)	1.000	1.553	1.553	4.794	4.008
4(4, 0)	- 4(3, 1)	A			96835.298	(.052)	1.000	.445	.445	11.485	8.255
4(2, 2)	- 4(1, 3)	A	35893.926	(.020)	35893.919	(.016)	1.000	1.355	1.355	5.991	4.794
4(4, 1)	- 4(3, 2)	A			96888.046	(.052)	1.000	.445	.445	11.485	8.253
4(2, 3)	- 4(1, 4)	A	49911.833	(.020)	49911.807	(.019)	1.000	.849	.849	5.924	4.259
4(3, 2)	- 4(2, 3)	A			69827.936	(.028)	1.000	.787	.787	8.253	5.924
5(4, 1)	- 4(4, 0)	A			61408.850	(.018)	1.000	4.786	4.786	13.533	11.485

Table 4. The microwave spectrum for the A symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K-	-	J´ K+ K-	S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
5(2, 3)	-	4(2, 2)	A			63305.348	(.016)	1.000	11.164	11.164	8.103	5.991
5(0, 5)	-	4(0, 4)	A			58568.461	(.017)	1.000	13.083	13.083	5.962	4.008
5(3, 2)	-	4(3, 1)	A			61657.502	(.016)	1.000	8.506	8.506	10.311	8.255
5(1, 4)	-	4(1, 3)	A			64423.617	(.017)	1.000	12.700	12.700	6.943	4.794
5(3, 3)	-	4(3, 2)	A			61500.038	(.016)	1.000	8.506	8.506	10.304	8.253
5(1, 5)	-	4(1, 4)	A	56531.706	(.020)	56531.744	(.016)	1.000	12.720	12.720	6.144	4.259
5(4, 2)	-	4(4, 1)	A			61406.107	(.018)	1.000	4.786	4.786	13.533	11.485
5(2, 4)	-	4(2, 3)	A			60783.484	(.016)	1.000	11.142	11.142	7.951	5.924
5(2, 3)	-	4(0, 4)	A			122761.593	(.032)	1.000	.129	.129	8.103	4.008
5(4, 1)	-	4(3, 2)	A			158297.241	(.055)	1.000	1.614	1.614	13.533	8.253
5(2, 3)	-	4(1, 4)	A			115247.219	(.030)	1.000	.510	.510	8.103	4.259
5(5, 0)	-	4(4, 1)	A			185978.072	(.100)	1.000	2.065	2.065	17.688	11.485
5(3, 2)	-	4(2, 3)	A			131538.531	(.036)	1.000	1.172	1.172	10.311	5.924
4(3, 2)	-	5(2, 3)	A			4492.524	(.027)	1.000	.148	.148	8.253	8.103
5(0, 5)	-	4(1, 4)	A	51054.043	(.020)	51054.087	(.016)	1.000	1.424	1.424	5.962	4.259
5(1, 4)	-	4(2, 3)	A			30559.762	(.019)	1.000	.413	.413	6.943	5.924
5(5, 1)	-	4(4, 0)	A			185977.714	(.100)	1.000	2.065	2.065	17.688	11.485
5(3, 3)	-	4(2, 2)	A			129297.910	(.036)	1.000	1.199	1.199	10.304	5.991
5(1, 5)	-	4(0, 4)	A			64046.119	(.019)	1.000	1.608	1.608	6.144	4.008
5(4, 2)	-	4(3, 1)	A			158241.060	(.055)	1.000	1.614	1.614	13.533	8.255
5(2, 4)	-	4(1, 3)	A			94647.340	(.027)	1.000	1.019	1.019	7.951	4.794
5(1, 5)	-	4(2, 2)	A			4589.874	(.020)	1.000	.155	.155	6.144	5.991
4(3, 1)	-	5(2, 4)	A			9097.544	(.027)	1.000	.141	.141	8.255	7.951
5(1, 4)	-	5(1, 5)	A	23939.830	(.020)	23939.825	(.013)	1.000	1.008	1.008	6.943	6.144
5(2, 3)	-	5(2, 4)	A			4551.927	(.006)	1.000	3.639	3.639	8.103	7.951
5(2, 4)	-	5(0, 5)	A			59641.205	(.022)	1.000	.277	.277	7.951	5.962
5(5, 0)	-	5(4, 1)	A			124568.878	(.099)	1.000	.452	.452	17.688	13.533
5(3, 2)	-	5(2, 3)	A			66203.119	(.027)	1.000	1.158	1.158	10.311	8.103
5(1, 4)	-	5(0, 5)	A	29417.481	(.020)	29417.482	(.011)	1.000	1.607	1.607	6.943	5.962
5(4, 1)	-	5(3, 2)	A			96586.646	(.049)	1.000	.825	.825	13.533	10.311
5(2, 3)	-	5(1, 4)	A			34775.649	(.014)	1.000	1.874	1.874	8.103	6.943
5(4, 2)	-	5(3, 3)	A			96794.115	(.049)	1.000	.825	.825	13.533	10.304
5(2, 4)	-	5(1, 5)	A	54163.498	(.020)	54163.547	(.019)	1.000	1.007	1.007	7.951	6.144
5(5, 1)	-	5(4, 2)	A			124571.952	(.099)	1.000	.452	.452	17.688	13.533
5(3, 3)	-	5(2, 4)	A			70544.490	(.026)	1.000	1.107	1.107	10.304	7.951
6(4, 2)	-	5(4, 1)	A			73796.793	(.020)	1.000	8.863	8.863	15.995	13.533
6(2, 4)	-	5(2, 3)	A			76711.160	(.020)	1.000	14.193	14.193	10.662	8.103
6(0, 6)	-	5(0, 5)	A			69272.189	(.020)	1.000	15.661	15.661	8.272	5.962
6(5, 1)	-	5(5, 0)	A			73665.736	(.025)	1.000	4.875	4.875	20.145	17.688
6(3, 3)	-	5(3, 2)	A			74296.755	(.019)	1.000	11.960	11.960	12.790	10.311
6(1, 5)	-	5(1, 4)	A			76804.010	(.021)	1.000	15.393	15.393	9.505	6.943
6(5, 2)	-	5(5, 1)	A			73665.596	(.025)	1.000	4.875	4.875	20.145	17.688
6(3, 4)	-	5(3, 3)	A			73885.096	(.019)	1.000	11.960	11.960	12.769	10.304
6(1, 6)	-	5(1, 5)	A			67557.618	(.020)	1.000	15.444	15.444	8.398	6.144
6(4, 3)	-	5(4, 2)	A			73784.523	(.020)	1.000	8.863	8.863	15.994	13.533
6(2, 5)	-	5(2, 4)	A			72685.581	(.020)	1.000	14.135	14.135	10.376	7.951
6(2, 4)	-	5(0, 5)	A			140904.292	(.036)	1.000	.154	.154	10.662	5.962
6(6, 0)	-	5(5, 1)	A			225928.544	(.183)	1.000	2.528	2.528	25.224	17.688
6(4, 2)	-	5(3, 3)	A			170593.996	(.059)	1.000	1.640	1.640	15.995	10.304
6(2, 4)	-	5(1, 5)	A			135426.634	(.035)	1.000	.414	.414	10.662	6.144
6(5, 1)	-	5(4, 2)	A			198237.701	(.103)	1.000	2.071	2.071	20.145	13.533
6(3, 3)	-	5(2, 4)	A			145051.801	(.039)	1.000	1.174	1.174	12.790	7.951
6(2, 4)	-	5(3, 3)	A	10718.577	(.020)	10718.598	(.023)	1.000	.250	.250	10.662	10.304
6(0, 6)	-	5(1, 5)	A			63794.531	(.019)	1.000	1.901	1.901	8.272	6.144
5(4, 2)	-	6(3, 3)	A			22286.804	(.043)	1.000	.122	.122	13.533	12.790
6(1, 5)	-	5(2, 4)	A	46580.275	(.020)	46580.288	(.020)	1.000	.640	.640	9.505	7.951
6(5, 2)	-	5(4, 1)	A			198234.460	(.103)	1.000	2.071	2.071	20.145	13.533
6(3, 4)	-	5(2, 3)	A			139877.659	(.040)	1.000	1.242	1.242	12.769	8.103
6(1, 6)	-	5(0, 5)	A			73035.275	(.021)	1.000	2.014	2.014	8.398	5.962
6(6, 1)	-	5(5, 0)	A			225928.529	(.183)	1.000	2.528	2.528	25.224	17.688

Table 4. The microwave spectrum for the A symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K-	-	J′ K+ K-	S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
6(4, 3)	-	5(3, 2)	A			170368.081	(.059)	1.000	1.642	1.642	15.994	10.311
6(2, 5)	-	5(1, 4)	A			102909.303	(.030)	1.000	1.189	1.189	10.376	6.943
5(4, 1)	-	6(3, 4)	A			22912.106	(.043)	1.000	.122	.122	13.533	12.769
6(1, 6)	-	5(2, 3)	A	8842.105	(.020)	8842.143	(.021)	1.000	.154	.154	8.398	8.103
6(2, 5)	-	5(3, 2)	A			1930.534	(.021)	1.000	.223	.223	10.376	10.311
6(1, 5)	-	6(1, 6)	A	33186.219	(.020)	33186.217	(.016)	1.000	.883	.883	9.505	8.398
6(2, 4)	-	6(2, 5)	A	8577.501	(.020)	8577.507	(.009)	1.000	2.934	2.934	10.662	10.376
6(2, 5)	-	6(0, 6)	A			63054.597	(.022)	1.000	.397	.397	10.376	8.272
6(3, 4)	-	6(1, 5)	A			97849.298	(.037)	1.000	.102	.102	12.769	9.505
6(5, 1)	-	6(4, 2)	A			124437.820	(.096)	1.000	.847	.847	20.145	15.995
6(3, 3)	-	6(2, 4)	A			63788.714	(.026)	1.000	1.538	1.538	12.790	10.662
6(1, 5)	-	6(0, 6)	A	36949.301	(.020)	36949.304	(.014)	1.000	1.579	1.579	9.505	8.272
6(6, 0)	-	6(5, 1)	A			152262.794	(.180)	1.000	.458	.458	25.224	20.145
6(4, 2)	-	6(3, 3)	A			96086.684	(.047)	1.000	1.177	1.177	15.995	12.790
6(2, 4)	-	6(1, 5)	A	34682.823	(.020)	34682.800	(.012)	1.000	2.381	2.381	10.662	9.505
6(6, 1)	-	6(5, 2)	A			152262.948	(.180)	1.000	.458	.458	25.224	20.145
6(4, 3)	-	6(3, 4)	A			96693.542	(.047)	1.000	1.174	1.174	15.994	12.769
6(2, 5)	-	6(1, 6)	A			59291.510	(.020)	1.000	1.126	1.126	10.376	8.398
6(5, 2)	-	6(4, 3)	A			124453.024	(.096)	1.000	.847	.847	20.145	15.994
6(3, 4)	-	6(2, 5)	A			71744.005	(.025)	1.000	1.403	1.403	12.769	10.376
7(6, 1)	-	6(6, 0)	A			85927.210	(.039)	1.000	4.938	4.938	28.091	25.224
7(4, 3)	-	6(4, 2)	A			86250.551	(.028)	1.000	12.534	12.534	18.872	15.995
7(2, 5)	-	6(2, 4)	A			90156.476	(.029)	1.000	17.129	17.129	13.669	10.662
7(0, 7)	-	6(0, 6)	A			79783.893	(.029)	1.000	18.260	18.260	10.934	8.272
7(5, 2)	-	6(5, 1)	A			86030.189	(.032)	1.000	9.116	9.116	23.015	20.145
7(3, 4)	-	6(3, 3)	A			07161.205	(.027)	1.000	15.105	15.105	15.697	12.790
7(1, 6)	-	6(1, 5)	A			88851.610	(.029)	1.000	18.031	18.031	12.469	9.505
7(5, 3)	-	6(5, 2)	A			86029.422	(.032)	1.000	9.116	9.116	23.015	20.145
7(3, 5)	-	6(3, 4)	A			86265.798	(.027)	1.000	15.182	15.182	15.646	12.769
7(1, 7)	-	6(1, 6)	A			78481.394	(.028)	1.000	18.140	18.140	11.016	8.398
7(6, 2)	-	6(6, 1)	A			85927.204	(.039)	1.000	4.938	4.938	28.091	25.224
7(4, 4)	-	6(4, 3)	A			86210.053	(.028)	1.000	12.534	12.534	18.870	15.994
7(2, 6)	-	6(2, 5)	A			84454.758	(.028)	1.000	17.019	17.019	13.193	10.376
7(2, 5)	-	6(0, 6)	A			161788.580	(.045)	1.000	.154	.154	13.669	8.272
7(3, 4)	-	6(1, 5)	A			185632.798	(.057)	1.000	.113	.113	15.697	9.505
7(6, 1)	-	6(5, 2)	A			238190.158	(.190)	1.000	2.530	2.530	28.091	20.145
7(4, 3)	-	6(3, 4)	A			182959.451	(.067)	1.000	1.669	1.669	18.872	12.769
7(2, 5)	-	6(1, 6)	A			158025.493	(.044)	1.000	.322	.322	13.669	8.398
7(5, 2)	-	6(4, 3)	A			210483.367	(.111)	1.000	2.094	2.094	23.015	15.994
7(3, 4)	-	6(2, 5)	A			159527.505	(.047)	1.000	1.144	1.144	15.697	10.376
6(5, 2)	-	7(4, 3)	A			38187.115	(.084)	1.000	.105	.105	20.145	18.872
7(2, 5)	-	6(3, 4)	A			26989.978	(.024)	1.000	.368	.368	13.669	12.769
7(0, 7)	-	6(1, 6)	A			76020.807	(.028)	1.000	2.393	2.393	10.934	8.398
6(4, 3)	-	7(3, 4)	A	8910.032	(.020)	8910.041	(.033)	1.000	.208	.208	15.994	15.697
7(1, 6)	-	6(2, 5)	A			62746.317	(.028)	1.000	.925	.925	12.469	10.376
7(5, 3)	-	6(4, 2)	A			210467.088	(.111)	1.000	2.094	2.094	23.015	15.995
7(3, 5)	-	6(2, 4)	A			149432.296	(.049)	1.000	1.294	1.294	15.646	10.662
7(1, 7)	-	6(0, 6)	A			82244.481	(.029)	1.000	2.456	2.456	11.016	8.272
7(6, 2)	-	6(5, 1)	A			238189.997	(.190)	1.000	2.530	2.530	28.091	20.145
7(4, 4)	-	6(3, 3)	A			182281.380	(.068)	1.000	1.674	1.674	18.870	12.790
7(2, 6)	-	6(1, 5)	A			110560.051	(.037)	1.000	1.401	1.401	13.193	9.505
6(4, 2)	-	7(3, 5)	A	10442.968	(.020)	10443.102	(.033)	1.000	.206	.206	15.995	15.646
7(1, 7)	-	6(2, 4)	A	10612.391	(.020)	10612.378	(.028)	1.000	.133	.133	11.016	10.662
6(5, 1)	-	7(4, 4)	A			38243.125	(.084)	1.000	.105	.105	20.145	18.870
7(2, 6)	-	6(3, 3)	A	12088.515	(.020)	12088.538	(.020)	1.000	.295	.295	13.193	12.790
7(3, 4)	-	7(3, 5)	A			1517.702	(.004)	1.000	6.133	6.133	15.697	15.646
7(1, 6)	-	7(1, 7)	A	43556.415	(.020)	43556.432	(.020)	1.000	.807	.807	12.469	11.016
7(2, 5)	-	7(2, 6)	A	14279.226	(.020)	14279.225	(.013)	1.000	2.415	2.415	13.669	13.193
7(2, 6)	-	7(0, 7)	A			67725.462	(.024)	1.000	.504	.504	13.193	10.934
7(3, 5)	-	7(1, 6)	A			95263.487	(.035)	1.000	.184	.184	15.646	12.469

Table 4. The microwave spectrum for the A symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ – Continued.

QUANTUM NUMBERS J K+ K-	– J´ K+ K-	S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
7(7, 0)	– 7(6, 1)	A			179942.524	(.301)	1.000	.462	.462	34.093	28.091
7(5, 2)	– 7(4, 3)	A			124217.458	(.093)	1.000	1.211	1.211	23.015	18.872
7(3, 4)	– 7(2, 5)	A			60793.522	(.025)	1.000	1.970	1.970	15.697	13.669
7(1, 6)	– 7(0, 7)	A	46017.048	(.020)	46017.020	(.019)	1.000	1.517	1.517	12.469	10.934
7(6, 1)	– 7(5, 2)	A			152159.816	(.176)	1.000	.863	.863	28.091	23.015
7(4, 3)	– 7(3, 4)	A			95175.951	(.045)	1.000	1.519	1.519	18.872	15.697
7(2, 5)	– 7(1, 6)	A	35987.664	(.020)	35987.667	(.011)	1.000	2.805	2.805	13.669	12.469
7(6, 2)	– 7(5, 3)	A			152160.730	(.176)	1.000	.863	.863	28.091	23.015
7(4, 4)	– 7(3, 5)	A			96637.797	(.044)	1.000	1.509	1.509	18.870	15.646
7(2, 6)	– 7(1, 7)	A			65264.874	(.023)	1.000	1.213	1.213	13.193	11.016
7(7, 1)	– 7(6, 2)	A			179942.531	(.301)	1.000	.462	.462	34.093	28.091
7(5, 3)	– 7(4, 4)	A			124272.392	(.093)	1.000	1.211	1.211	23.015	18.870
7(3, 5)	– 7(2, 6)	A			73555.045	(.023)	1.000	1.675	1.675	15.646	13.193
8(6, 2)	– 7(6, 1)	A			98279.743	(.051)	1.000	9.307	9.307	31.369	28.091
8(4, 4)	– 7(4, 3)	A			98792.267	(.043)	1.000	15.951	15.951	22.167	18.872
8(2, 6)	– 7(2, 5)	A			103478.641	(.044)	1.000	19.992	19.992	17.121	13.669
8(0, 8)	– 7(0, 7)	A			90229.612	(.044)	1.000	20.882	20.882	13.943	10.934
8(7, 1)	– 7(7, 0)	A			98190.603	(.060)	1.000	4.986	4.986	37.368	34.093
8(5, 3)	– 7(5, 2)	A			98435.776	(.045)	1.000	12.962	12.962	26.299	23.015
8(3, 5)	– 7(3, 4)	A			100308.158	(.043)	1.000	18.270	18.270	19.043	15.697
8(1, 7)	– 7(1, 6)	A			100490.661	(.045)	1.000	20.621	20.621	15.821	12.469
8(7, 2)	– 7(7, 1)	A			98190.602	(.060)	1.000	4.986	4.986	37.368	34.093
8(5, 4)	– 7(5, 3)	A			98432.729	(.045)	1.000	12.962	12.962	26.298	23.015
8(3, 6)	– 7(3, 5)	A			98611.142	(.043)	1.000	18.259	18.259	18.936	15.646
8(1, 8)	– 7(1, 7)	A			89316.632	(.044)	1.000	20.818	20.818	13.995	11.016
8(6, 3)	– 7(6, 2)	A			98279.702	(.051)	1.000	9.307	9.307	31.369	28.091
8(4, 5)	– 7(4, 4)	A			98682.588	(.043)	1.000	15.951	15.951	22.161	18.870
8(2, 7)	– 7(2, 6)	A			96076.826	(.043)	1.000	19.831	19.831	16.398	13.193
8(2, 6)	– 7(0, 7)	A			185483.328	(.060)	1.000	.136	.136	17.121	10.934
8(3, 5)	– 7(1, 6)	A			197089.347	(.068)	1.000	.172	.172	19.043	12.469
8(6, 2)	– 7(5, 3)	A			250440.480	(.201)	1.000	2.548	2.548	31.369	23.015
8(4, 4)	– 7(3, 5)	A			195485.920	(.081)	1.000	1.691	1.691	22.167	15.646
8(2, 6)	– 7(1, 7)	A			183022.740	(.060)	1.000	.245	.245	17.121	11.016
8(5, 3)	– 7(4, 4)	A			222709.090	(.124)	1.000	2.124	2.124	26.299	18.870
8(3, 5)	– 7(2, 6)	A			175380.905	(.061)	1.000	1.074	1.074	19.043	13.193
7(5, 3)	– 8(4, 4)	A			25424.269	(.071)	1.000	.183	.183	23.015	22.167
8(2, 6)	– 7(3, 5)	A	44202.823	(.020)	44202.821	(.036)	1.000	.506	.506	17.121	15.646
8(0, 8)	– 7(1, 7)	A			87769.024	(.044)	1.000	2.884	2.884	13.943	11.016
8(3, 5)	– 7(4, 4)	A			5188.063	(.028)	1.000	.301	.301	19.043	18.870
8(1, 7)	– 7(2, 6)	A			78782.219	(.043)	1.000	1.276	1.276	15.821	13.193
8(5, 4)	– 7(4, 3)	A			222649.265	(.125)	1.000	2.124	2.124	26.298	18.872
8(3, 6)	– 7(2, 5)	A			157886.962	(.063)	1.000	1.363	1.363	18.936	13.669
8(1, 8)	– 7(0, 7)	A			91777.220	(.044)	1.000	2.917	2.917	13.995	10.934
8(6, 3)	– 7(5, 2)	A			250439.510	(.201)	1.000	2.548	2.548	31.369	23.015
8(4, 5)	– 7(3, 4)	A			193802.683	(.082)	1.000	1.704	1.704	22.161	15.697
8(2, 7)	– 7(1, 6)	A			117785.267	(.050)	1.000	1.663	1.663	16.398	12.469
8(3, 6)	– 7(4, 3)	A			1917.489	(.027)	1.000	.296	.296	18.936	18.872
8(1, 8)	– 7(2, 5)	A	9772.544	(.020)	9772.533	(.044)	1.000	.105	.105	13.995	13.669
7(5, 2)	– 8(4, 5)	A			25590.725	(.071)	1.000	.182	.182	23.015	22.161
8(2, 7)	– 7(3, 4)	A			21004.079	(.032)	1.000	.345	.345	16.398	15.697
8(3, 5)	– 8(3, 6)	A			3214.718	(.007)	1.000	5.244	5.244	19.043	18.936
8(1, 7)	– 8(1, 8)	A			54730.461	(.028)	1.000	.766	.766	15.821	13.995
8(2, 6)	– 8(2, 7)	A	21681.041	(.020)	21681.040	(.016)	1.000	2.036	2.036	17.121	16.398
8(2, 7)	– 8(0, 8)	A			73572.675	(.031)	1.000	.589	.589	16.398	13.943
8(3, 6)	– 8(1, 7)	A			93383.968	(.035)	1.000	.302	.302	18.936	15.821
8(7, 1)	– 8(6, 2)	A			179853.383	(.297)	1.000	.876	.876	37.368	31.369
8(5, 3)	– 8(4, 4)	A			123860.967	(.091)	1.000	1.558	1.558	26.299	22.167
8(3, 5)	– 8(2, 6)	A	57623.048	(.020)	57623.039	(.024)	1.000	2.475	2.475	19.043	17.121
8(1, 7)	– 8(0, 8)	A			56278.069	(.027)	1.000	1.457	1.457	15.821	13.943
8(8, 0)	– 8(7, 1)	A			207609.367	(.470)	1.000	.465	.465	44.293	37.368

Table 4. The microwave spectrum for the A symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K-	–	J´ K+ K-	S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
8(6, 2)	–	8(5, 3)	A			152003.783	(.173)	1.000	1.239	1.239	31.369	26.299
8(4, 4)	–	8(3, 5)	A			93660.060	(.044)	1.000	1.862	1.862	22.167	19.043
8(2, 6)	–	8(1, 7)	A	38975.670	(.020)	38975.647	(.012)	1.000	3.090	3.090	17.121	15.821
8(8, 1)	–	8(7, 2)	A			207609.367	(.470)	1.000	.465	.465	44.293	37.368
8(6, 3)	–	8(5, 4)	A			152007.703	(.173)	1.000	1.239	1.239	31.369	26.298
8(4, 5)	–	8(3, 6)	A			96709.243	(.043)	1.000	1.836	1.836	22.161	18.936
8(2, 7)	–	8(1, 8)	A			72025.068	(.030)	1.000	1.273	1.273	16.398	13.995
8(7, 2)	–	8(6, 3)	A			179853.432	(.297)	1.000	.876	.876	37.368	31.369
8(5, 4)	–	8(4, 5)	A			124022.533	(.090)	1.000	1.557	1.557	26.298	22.161
8(3, 6)	–	8(2, 7)	A			76089.362	(.024)	1.000	1.919	1.919	18.936	16.398
9(8, 1)	–	8(8, 0)	A			110455.273	(.091)	1.000	5.023	5.023	47.978	44.293
9(6, 3)	–	8(6, 2)	A			110663.387	(.070)	1.000	13.295	13.295	35.060	31.369
9(4, 5)	–	8(4, 4)	A			111453.252	(.065)	1.000	19.198	19.198	25.885	22.167
9(2, 7)	–	8(2, 6)	A			116557.788	(.067)	1.000	22.789	22.789	21.009	17.121
9(0, 9)	–	8(0, 8)	A			100683.331	(.067)	1.000	23.520	23.520	17.302	13.943
9(7, 2)	–	8(7, 1)	A			110535.111	(.079)	1.000	9.454	9.454	41.055	37.368
9(5, 4)	–	8(5, 3)	A			110890.204	(.066)	1.000	16.544	16.544	29.997	26.299
9(3, 6)	–	8(3, 5)	A			113756.562	(.065)	1.000	21.267	21.267	22.837	19.043
9(1, 8)	–	8(1, 7)	A			111682.141	(.067)	1.000	23.175	23.175	19.546	15.821
9(7, 3)	–	8(7, 2)	A			110535.109	(.079)	1.000	9.454	9.454	41.055	37.368
9(5, 5)	–	8(5, 4)	A			110880.395	(.066)	1.000	16.544	16.544	29.997	26.298
9(3, 7)	–	8(3, 6)	A			110887.043	(.066)	1.000	21.235	21.235	22.634	18.936
9(1, 9)	–	8(1, 8)	A			100080.564	(.067)	1.000	23.486	23.486	17.333	13.995
9(8, 2)	–	8(8, 1)	A			110455.273	(.091)	1.000	5.023	5.023	47.978	44.293
9(6, 4)	–	8(6, 3)	A			110663.193	(.070)	1.000	13.295	13.295	35.060	31.369
9(4, 6)	–	8(4, 5)	A			111195.913	(.065)	1.000	19.198	19.198	25.871	22.161
9(2, 8)	–	8(2, 7)	A			107543.664	(.066)	1.000	22.593	22.593	19.985	16.398
9(2, 7)	–	8(0, 8)	A			211811.503	(.085)	1.000	.112	.112	21.009	13.943
9(3, 6)	–	8(1, 7)	A			210355.248	(.087)	1.000	.234	.234	22.837	15.821
9(4, 5)	–	8(3, 6)	A			208328.030	(.102)	1.000	1.698	1.698	25.885	18.936
9(2, 7)	–	8(1, 8)	A			210263.895	(.085)	1.000	.188	.188	21.009	13.995
9(5, 4)	–	8(4, 5)	A			234916.706	(.144)	1.000	2.154	2.154	29.997	22.161
9(3, 6)	–	8(2, 7)	A			193060.642	(.082)	1.000	.964	.964	22.837	16.398
8(5, 4)	–	9(4, 5)	A			12403.746	(.061)	1.000	.269	.269	26.298	25.885
9(2, 7)	–	8(3, 6)	A			62149.466	(.059)	1.000	.676	.676	21.009	18.936
9(0, 9)	–	8(1, 8)	A			99135.723	(.068)	1.000	3.369	3.369	17.302	13.995
8(6, 3)	–	9(5, 4)	A			41113.530	(.142)	1.000	.163	.163	31.369	29.997
9(3, 6)	–	8(4, 5)	A			20262.037	(.042)	1.000	.399	.399	22.837	22.161
9(1, 8)	–	8(2, 7)	A			94387.534	(.066)	1.000	1.692	1.692	19.546	16.398
9(5, 5)	–	8(4, 4)	A			234737.393	(.145)	1.000	2.155	2.155	29.997	22.167
9(3, 7)	–	8(2, 6)	A			165295.365	(.083)	1.000	1.457	1.457	22.634	17.121
9(1, 9)	–	8(0, 8)	A			101628.112	(.067)	1.000	3.387	3.387	17.333	13.943
9(4, 6)	–	8(3, 5)	A			204690.438	(.104)	1.000	1.729	1.729	25.871	19.043
9(2, 8)	–	8(1, 7)	A			124838.270	(.070)	1.000	1.983	1.983	19.985	15.821
8(6, 2)	–	9(5, 5)	A			41127.357	(.142)	1.000	.163	.163	31.369	29.997
9(3, 7)	–	8(4, 4)	A	14012.303	(.020)	14012.266	(.041)	1.000	.384	.384	22.634	22.167
8(5, 3)	–	9(4, 6)	A	12830.601	(.020)	12830.588	(.061)	1.000	.269	.269	26.299	25.871
9(2, 8)	–	8(3, 5)	A			28239.584	(.055)	1.000	.365	.365	19.985	19.043
9(3, 6)	–	9(3, 7)	A			6084.237	(.011)	1.000	4.491	4.491	22.837	22.634
9(1, 8)	–	9(1, 9)	A			66332.098	(.043)	1.000	.748	.748	19.546	17.333
9(2, 7)	–	9(2, 8)	A	30695.162	(.020)	30695.164	(.018)	1.000	1.764	1.764	21.009	19.985
9(4, 6)	–	9(2, 7)	A			145755.690	(.068)	1.000	.113	.113	25.871	21.009
9(2, 8)	–	9(0, 9)	A			80433.008	(.044)	1.000	.650	.650	19.985	17.302
9(3, 7)	–	9(1, 8)	A			92588.871	(.036)	1.000	.455	.455	22.634	19.546
9(9, 0)	–	9(8, 1)	A			235262.404	(.693)	1.000	.467	.467	55.825	47.978
9(7, 2)	–	9(6, 3)	A			179725.108	(.293)	1.000	1.261	1.261	41.055	35.060
9(5, 4)	–	9(4, 5)	A			123297.919	(.089)	1.000	1.898	1.898	29.997	25.885
9(3, 6)	–	9(2, 7)	A	54821.929	(.020)	54821.814	(.025)	1.000	3.043	3.043	22.837	21.009
9(1, 8)	–	9(0, 9)	A			67276.879	(.042)	1.000	1.415	1.415	19.546	17.302
9(8, 1)	–	9(7, 2)	A			207529.529	(.465)	1.000	.887	.887	47.978	41.055

Table 4. The microwave spectrum for the A symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K-	-	J′ K+ K-	S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
9(6, 3)	-	9(5, 4)	A			151776.965	(.170)	1.000	1.595	1.595	35.060	29.997
9(4, 5)	-	9(3, 6)	A			91356.749	(.046)	1.000	2.220	2.220	25.885	22.837
9(2, 7)	-	9(1, 8)	A	43851.266	(.020)	43851.294	(.014)	1.000	3.216	3.216	21.009	19.546
9(8, 2)	-	9(7, 3)	A			207529.531	(.465)	1.000	.887	.887	47.978	41.055
9(6, 4)	-	9(5, 5)	A			151790.501	(.170)	1.000	1.595	1.595	35.060	29.997
9(4, 6)	-	9(3, 7)	A			97018.113	(.044)	1.000	2.156	2.156	25.871	22.634
9(2, 8)	-	9(1, 9)	A			79488.227	(.044)	1.000	1.313	1.313	19.985	17.333
9(9, 1)	-	9(8, 2)	A			235262.404	(.693)	1.000	.467	.467	55.825	47.978
9(7, 3)	-	9(6, 4)	A			179725.348	(.293)	1.000	1.261	1.261	41.055	35.060
9(5, 5)	-	9(4, 6)	A			123707.014	(.089)	1.000	1.896	1.896	29.997	25.871
9(3, 7)	-	9(2, 8)	A			79432.741	(.026)	1.000	2.128	2.128	22.634	19.985
10(8, 2)	-	9(8, 1)	A			122793.793	(.115)	1.000	9.573	9.573	52.074	47.978
10(6, 4)	-	9(6, 3)	A			123082.382	(.098)	1.000	17.017	17.017	39.166	35.060
10(4, 6)	-	9(4, 5)	A			124276.057	(.095)	1.000	22.327	22.327	30.030	25.885
10(2, 8)	-	9(2, 7)	A			129310.076	(.098)	1.000	25.519	25.519	25.322	21.009
10(0,10)	-	9(0, 9)	A			111171.563	(.099)	1.000	26.166	26.166	21.010	17.302
10(9, 1)	-	9(9, 0)	A			122720.991	(.130)	1.000	5.052	5.052	59.919	55.825
10(7, 3)	-	9(7, 2)	A			122904.655	(.104)	1.000	13.561	13.561	45.155	41.055
10(5, 5)	-	9(5, 4)	A			123403.280	(.095)	1.000	19.941	19.941	34.114	29.997
10(3, 7)	-	9(3, 6)	A			127452.398	(.096)	1.000	24.214	24.214	27.089	22.837
10(1, 9)	-	9(1, 8)	A			122458.185	(.097)	1.000	25.715	25.715	23.631	19.546
10(9, 2)	-	9(9, 1)	A			122720.991	(.130)	1.000	5.052	5.052	59.919	55.825
10(7, 4)	-	9(7, 3)	A			122904.644	(.104)	1.000	13.561	13.561	45.155	41.055
10(5, 6)	-	9(5, 5)	A			123376.177	(.095)	1.000	19.940	19.940	34.112	29.997
10(3, 8)	-	9(3, 7)	A			123060.239	(.096)	1.000	24.136	24.136	26.739	22.634
10(1,10)	-	9(1, 9)	A			110790.456	(.099)	1.000	26.148	26.148	21.029	17.333
10(8, 3)	-	9(8, 2)	A			122793.793	(.115)	1.000	9.573	9.573	52.074	47.978
10(6, 5)	-	9(6, 4)	A			123081.661	(.098)	1.000	17.017	17.017	39.166	35.060
10(4, 7)	-	9(4, 6)	A			123736.373	(.095)	1.000	22.326	22.326	29.998	25.871
10(2, 9)	-	9(2, 8)	A			118854.560	(.096)	1.000	25.319	25.319	23.949	19.985
10(3, 7)	-	9(1, 8)	A			226125.505	(.115)	1.000	.283	.283	27.089	19.546
10(4, 6)	-	9(3, 7)	A			221717.043	(.131)	1.000	1.683	1.683	30.030	22.634
10(2, 8)	-	9(1, 9)	A			239493.468	(.122)	1.000	.146	.146	25.322	17.333
10(5, 5)	-	9(4, 6)	A			247124.072	(.172)	1.000	2.182	2.182	34.114	25.871
10(3, 7)	-	9(2, 8)	A			212969.376	(.112)	1.000	.826	.826	27.089	19.985
9(7, 3)	-	10(6, 4)	A			56642.724	(.252)	1.000	.147	.147	41.055	39.166
10(4, 6)	-	9(5, 5)	A			991.916	(.066)	1.000	.360	.360	30.030	29.997
10(2, 8)	-	9(3, 7)	A			80572.499	(.091)	1.000	.887	.887	25.322	22.634
10(0,10)	-	9(1, 9)	A			110226.782	(.099)	1.000	3.848	3.848	21.010	17.333
9(6, 4)	-	10(5, 5)	A			28373.443	(.129)	1.000	.243	.243	35.060	34.114
10(3, 7)	-	9(4, 6)	A			36518.522	(.072)	1.000	.502	.502	27.089	25.871
10(1, 9)	-	9(2, 8)	A			109302.055	(.097)	1.000	2.161	2.161	23.631	19.985
10(5, 6)	-	9(4, 5)	A			246660.318	(.172)	1.000	2.185	2.185	34.112	25.885
10(3, 8)	-	9(2, 7)	A			171797.816	(.111)	1.000	1.588	1.588	26.739	21.009
10(1,10)	-	9(0, 9)	A			111735.237	(.099)	1.000	3.858	3.858	21.029	17.302
10(4, 7)	-	9(3, 6)	A			214670.249	(.133)	1.000	1.751	1.751	29.998	22.837
10(2, 9)	-	9(1, 8)	A			132010.690	(.098)	1.000	2.361	2.361	23.949	19.546
9(6, 3)	-	10(5, 6)	A			28414.566	(.129)	1.000	.243	.243	35.060	34.112
10(3, 8)	-	9(4, 5)	A			25619.253	(.071)	1.000	.466	.466	26.739	25.885
9(7, 2)	-	10(6, 5)	A			56643.689	(.252)	1.000	.147	.147	41.055	39.166
10(2, 9)	-	9(3, 6)	A			33337.582	(.087)	1.000	.352	.352	23.949	22.837
10(3, 7)	-	10(3, 8)	A	10476.396	(.020)	10476.395	(.015)	1.000	3.845	3.845	27.089	26.739
10(1, 9)	-	10(1,10)	A			77999.826	(.065)	1.000	.744	.744	23.631	21.029
10(4, 6)	-	10(4, 7)	A			962.558	(.004)	1.000	7.736	7.736	30.030	29.998
10(2, 8)	-	10(2, 9)	A			41150.681	(.021)	1.000	1.575	1.575	25.322	23.949
10(4, 7)	-	10(2, 8)	A			140181.987	(.072)	1.000	.178	.178	29.998	25.322
10(2, 9)	-	10(0,10)	A			88116.006	(.064)	1.000	.693	.693	23.949	21.010
10(3, 8)	-	10(1, 9)	A			93196.925	(.040)	1.000	.629	.629	26.739	23.631
10(9, 1)	-	10(8, 2)	A			235189.601	(.687)	1.000	.895	.895	59.919	52.074
10(7, 3)	-	10(6, 4)	A			179547.381	(.290)	1.000	1.626	1.626	45.155	39.166

Table 4. The microwave spectrum for the A symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ – Continued.

QUANTUM NUMBERS J K+ K- – J′ K+ K- S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
10(5, 5) – 10(4, 6) A			122425.142	(.090)	1.000	2.236	2.236	34.114	30.030
10(3, 7) – 10(2, 8) A	52964.135	(.020)	52964.135	(.026)	1.000	3.633	3.633	27.089	25.322
10(1, 9) – 10(0,10) A			78563.501	(.064)	1.000	1.392	1.392	23.631	21.010
10(8, 2) – 10(7, 3) A			207418.668	(.460)	1.000	1.280	1.280	52.074	45.155
10(6, 4) – 10(5, 5) A			151456.067	(.169)	1.000	1.940	1.940	39.166	34.114
10(4, 6) – 10(3, 7) A			88180.409	(.049)	1.000	2.610	2.610	30.030	27.089
10(2, 8) – 10(1, 9) A	50703.109	(.020)	50703.185	(.017)	1.000	3.207	3.207	25.322	23.631
10(8, 3) – 10(7, 4) A			207418.681	(.460)	1.000	1.280	1.280	52.074	45.155
10(6, 5) – 10(5, 6) A			151495.985	(.169)	1.000	1.940	1.940	39.166	34.112
10(4, 7) – 10(3, 8) A			97694.247	(.047)	1.000	2.468	2.468	29.998	26.739
10(2, 9) – 10(1,10) A			87552.331	(.065)	1.000	1.340	1.340	23.949	21.029
10(9, 2) – 10(8, 3) A			235189.601	(.687)	1.000	.895	.895	59.919	52.074
10(7, 4) – 10(6, 5) A			179548.331	(.290)	1.000	1.626	1.626	45.155	39.166
10(5, 6) – 10(4, 7) A			123346.819	(.090)	1.000	2.231	2.231	34.112	29.998
10(3, 8) – 10(2, 9) A			83638.420	(.032)	1.000	2.302	2.302	26.739	23.949
11(10, 1) – 10(10, 0) A			134987.689	(.180)	1.000	5.076	5.076	73.191	68.688
11(8, 3) – 10(8, 2) A			135153.105	(.148)	1.000	13.779	13.779	56.582	52.074
11(6, 5) – 10(6, 4) A			135541.358	(.134)	1.000	20.546	20.546	43.687	39.166
11(4, 7) – 10(4, 6) A			137313.203	(.133)	1.000	25.370	25.370	34.610	30.030
11(2, 9) – 10(2, 8) A			141666.868	(.137)	1.000	28.184	28.184	30.048	25.322
11(0,11) – 10(0,10) A			121695.259	(.138)	1.000	28.816	28.816	25.069	21.010
11(9, 2) – 10(9, 1) A			135054.757	(.161)	1.000	9.669	9.669	64.424	59.919
11(7, 4) – 10(7, 3) A			135302.140	(.139)	1.000	17.405	17.405	49.668	45.155
11(5, 6) – 10(5, 5) A			135988.364	(.133)	1.000	23.203	23.203	38.650	34.114
11(3, 8) – 10(3, 7) A			141260.282	(.135)	1.000	27.128	27.128	31.801	27.089
11(1,10) – 10(1, 9) A			132928.604	(.135)	1.000	28.267	28.267	28.065	23.631
11(9, 3) – 10(9, 2) A			135054.757	(.161)	1.000	9.669	9.669	64.424	59.919
11(7, 5) – 10(7, 4) A			135302.094	(.139)	1.000	17.405	17.405	49.668	45.155
11(5, 7) – 10(5, 6) A			135921.821	(.133)	1.000	23.203	23.203	38.646	34.112
11(3, 9) – 10(3, 8) A			135101.491	(.135)	1.000	26.980	26.980	31.246	26.739
11(1,11) – 10(1,10) A			121461.883	(.138)	1.000	28.807	28.807	25.080	21.029
11(10, 2) – 10(10, 1) A			134987.689	(.180)	1.000	5.076	5.076	73.191	68.688
11(8, 4) – 10(8, 3) A			135153.104	(.148)	1.000	13.779	13.779	56.582	52.074
11(6, 6) – 10(6, 5) A			135539.073	(.134)	1.000	20.546	20.546	43.687	39.166
11(4, 8) – 10(4, 7) A			136282.465	(.133)	1.000	25.366	25.366	34.544	29.998
11(2,10) – 10(2, 9) A			130016.658	(.135)	1.000	28.018	28.018	28.286	23.949
11(3, 8) – 10(1, 9) A			244927.602	(.153)	1.000	.301	.301	31.801	23.631
11(4, 7) – 10(3, 8) A			235970.007	(.167)	1.000	1.636	1.636	34.610	26.739
11(3, 8) – 10(2, 9) A			235375.098	(.151)	1.000	.681	.681	31.801	23.949
10(7, 4) – 11(6, 5) A			44006.010	(.234)	1.000	.222	.222	45.155	43.687
11(4, 7) – 10(5, 6) A			14928.942	(.093)	1.000	.455	.455	34.610	34.112
11(2, 9) – 10(3, 8) A			99179.128	(.131)	1.000	1.151	1.151	30.048	26.739
11(0,11) – 10(1,10) A			121131.584	(.138)	1.000	4.323	4.323	25.069	21.029
10(8, 3) – 11(7, 4) A			72116.527	(.406)	1.000	.133	.133	52.074	49.668
10(6, 5) – 11(5, 6) A			15466.740	(.125)	1.000	.330	.330	39.166	38.650
11(3, 8) – 10(4, 7) A			54042.431	(.113)	1.000	.615	.615	31.801	29.998
11(1,10) – 10(2, 9) A			123376.099	(.136)	1.000	2.661	2.661	28.065	23.949
11(3, 9) – 10(2, 8) A			177589.230	(.147)	1.000	1.762	1.762	31.246	25.322
11(1,11) – 10(0,10) A			122025.558	(.138)	1.000	4.328	4.328	25.080	21.010
11(4, 8) – 10(3, 7) A			223500.317	(.170)	1.000	1.774	1.774	34.544	27.089
11(2,10) – 10(1, 9) A			139569.163	(.135)	1.000	2.788	2.788	28.286	23.631
10(8, 2) – 11(7, 5) A			72116.587	(.406)	1.000	.133	.133	52.074	49.668
10(6, 4) – 11(5, 7) A			15575.127	(.125)	1.000	.330	.330	39.166	38.646
11(3, 9) – 10(4, 6) A			36444.686	(.112)	1.000	.533	.533	31.246	30.030
10(7, 3) – 11(6, 6) A			44009.271	(.234)	1.000	.222	.222	45.155	43.687
11(4, 8) – 10(5, 5) A			12894.766	(.093)	1.000	.452	.452	34.544	34.114
11(2,10) – 10(3, 7) A			35901.842	(.126)	1.000	.313	.313	28.286	27.089
11(3, 8) – 11(3, 9) A	16635.189	(.020)	16635.187	(.018)	1.000	3.298	3.298	31.801	31.246
11(1,10) – 11(1,11) A			89466.547	(.095)	1.000	.749	.749	28.065	25.080
11(4, 7) – 11(4, 8) A			1993.295	(.007)	1.000	6.894	6.894	34.610	34.544

Table 4. The microwave spectrum for the A symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K-	- J´ K+ K-	S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
11(2, 9)	- 11(2,10)	A	52800.900	(.020)	52800.891	(.029)	1.000	1.451	1.451	30.048	28.286
11(4, 8)	- 11(2, 9)	A			134797.584	(.080)	1.000	.273	.273	34.544	30.048
11(2,10)	- 11(0,11)	A			96437.405	(.093)	1.000	.723	.723	28.286	25.069
11(3, 9)	- 11(1,10)	A			95363.812	(.048)	1.000	.805	.805	31.246	28.065
11(9, 2)	- 11(8, 3)	A			235091.253	(.681)	1.000	1.296	1.296	64.424	56.582
11(7, 4)	- 11(6, 5)	A			179308.163	(.288)	1.000	1.978	1.978	49.668	43.687
11(5, 6)	- 11(4, 7)	A			121100.303	(.093)	1.000	2.577	2.577	38.650	34.610
11(3, 8)	- 11(2, 9)	A	52557.587	(.020)	52557.549	(.028)	1.000	4.170	4.170	31.801	30.048
11(1,10)	- 11(0,11)	A			89796.846	(.095)	1.000	1.382	1.382	28.065	25.069
11(8, 3)	- 11(7, 4)	A			207269.632	(.456)	1.000	1.653	1.653	56.582	49.668
11(6, 5)	- 11(5, 6)	A			151009.061	(.169)	1.000	2.280	2.280	43.687	38.650
11(4, 7)	- 11(3, 8)	A			84233.330	(.054)	1.000	3.052	3.052	34.610	31.801
11(2, 9)	- 11(1,10)	A			59441.450	(.026)	1.000	3.115	3.115	30.048	28.065
11(8, 4)	- 11(7, 5)	A			207269.691	(.456)	1.000	1.653	1.653	56.582	49.668
11(6, 6)	- 11(5, 7)	A			151113.237	(.169)	1.000	2.279	2.279	43.687	38.646
11(4, 8)	- 11(3, 9)	A			98875.222	(.052)	1.000	2.764	2.764	34.544	31.246
11(2,10)	- 11(1,11)	A			96107.106	(.093)	1.000	1.356	1.356	28.286	25.080
11(9, 3)	- 11(8, 4)	A			235091.254	(.681)	1.000	1.296	1.296	64.424	56.582
11(7, 5)	- 11(6, 6)	A			179311.352	(.288)	1.000	1.978	1.978	49.668	43.687
11(5, 7)	- 11(4, 8)	A			122986.174	(.092)	1.000	2.565	2.565	38.646	34.544
11(3, 9)	- 11(2,10)	A			88723.253	(.043)	1.000	2.439	2.439	31.246	28.286
12(10, 2)	- 11(10, 1)	A			147317.502	(.218)	1.000	9.750	9.750	78.105	73.191
12(8, 4)	- 11(8, 3)	A			147535.349	(.190)	1.000	17.727	17.727	61.503	56.582
12(6, 6)	- 11(6, 5)	A			148045.648	(.180)	1.000	23.930	23.930	48.625	43.687
12(4, 8)	- 11(4, 7)	A			150618.100	(.180)	1.000	28.350	28.350	39.634	34.610
12(2,10)	- 11(2, 9)	A			153566.721	(.184)	1.000	30.789	30.789	35.170	30.048
12(0,12)	- 11(0,11)	A			132246.559	(.187)	1.000	31.469	31.469	29.481	25.069
12(11, 1)	- 11(11, 0)	A			147255.392	(.241)	1.000	5.097	5.097	87.793	82.882
12(9, 3)	- 11(9, 2)	A			147406.155	(.202)	1.000	13.960	13.960	69.341	64.424
12(7, 5)	- 11(7, 4)	A			147730.580	(.183)	1.000	21.050	21.050	54.596	49.668
12(5, 7)	- 11(5, 6)	A			148664.344	(.179)	1.000	26.364	26.364	43.609	38.650
12(3, 9)	- 11(3, 8)	A			155002.095	(.183)	1.000	30.011	30.011	36.971	31.801
12(1,11)	- 11(1,10)	A			143240.314	(.182)	1.000	30.846	30.846	32.843	28.065
12(11, 2)	- 11(11, 1)	A			147255.392	(.241)	1.000	5.097	5.097	87.793	82.882
12(9, 4)	- 11(9, 3)	A			147406.155	(.202)	1.000	13.960	13.960	69.341	64.424
12(7, 6)	- 11(7, 5)	A			147730.415	(.183)	1.000	21.050	21.050	54.596	49.668
12(5, 8)	- 11(5, 7)	A			148515.859	(.180)	1.000	26.364	26.364	43.600	38.646
12(3,10)	- 11(3, 9)	A			146987.852	(.182)	1.000	29.778	29.778	36.149	31.246
12(1,12)	- 11(1,11)	A			132107.034	(.187)	1.000	31.465	31.465	29.487	25.080
12(10, 3)	- 11(10, 2)	A			147317.502	(.218)	1.000	9.750	9.750	78.105	73.191
12(8, 5)	- 11(8, 4)	A			147535.346	(.190)	1.000	17.727	17.727	61.503	56.582
12(6, 7)	- 11(6, 6)	A			148039.253	(.180)	1.000	23.930	23.930	48.625	43.687
12(4, 9)	- 11(4, 8)	A			148805.755	(.181)	1.000	28.337	28.337	39.508	34.544
12(2,11)	- 11(2,10)	A			141044.161	(.182)	1.000	30.699	30.699	32.991	28.286
12(4, 8)	- 11(3, 9)	A			251486.617	(.213)	1.000	1.550	1.550	39.634	31.246
11(9, 3)	- 12(8, 4)	A			87555.905	(.611)	1.000	.122	.122	64.424	61.503
11(7, 5)	- 12(6, 6)	A			31262.456	(.224)	1.000	.304	.304	49.668	48.625
12(4, 8)	- 11(5, 7)	A			29625.221	(.137)	1.000	.551	.551	39.634	38.646
12(2,10)	- 11(3, 9)	A			117644.358	(.181)	1.000	1.479	1.479	35.170	31.246
12(0,12)	- 11(1,11)	A			131916.260	(.187)	1.000	4.794	4.794	29.481	25.080
11(8, 4)	- 12(7, 5)	A			59539.051	(.384)	1.000	.204	.204	56.582	54.596
11(6, 6)	- 12(5, 7)	A			2341.468	(.141)	1.000	.421	.421	43.687	43.609
12(3, 9)	- 11(4, 8)	A			72762.060	(.163)	1.000	.744	.744	36.971	34.544
12(1,11)	- 11(2,10)	A			136599.755	(.183)	1.000	3.173	3.173	32.843	28.286
12(3,10)	- 11(2, 9)	A			182910.214	(.192)	1.000	1.991	1.991	36.149	30.048
12(1,12)	- 11(0,11)	A			132437.333	(.187)	1.000	4.797	4.797	29.487	25.069
12(4, 9)	- 11(3, 8)	A			231045.790	(.216)	1.000	1.809	1.809	39.508	31.801
12(2,11)	- 11(1,10)	A			147684.720	(.182)	1.000	3.247	3.247	32.991	28.065
11(8, 3)	- 12(7, 6)	A			59539.277	(.384)	1.000	.204	.204	56.582	54.596
11(6, 5)	- 12(5, 8)	A			2600.626	(.141)	1.000	.421	.421	43.687	43.600

Table 4. The microwave spectrum for the A symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K- - J' K+ K- S	MEASURED FREQUENCY	TRANSITION UNCERTAINTY	CALCULATED FREQUENCY	TRANSITION UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY UPPER	LEVELS LOWER
12(3,10) - 11(4, 7) A			46119.335	(.162)	1.000	.578	.578	36.149	34.610
11(9, 2) - 12(8, 5) A			87555.908	(.611)	1.000	.122	.122	64.424	61.503
11(7, 4) - 12(6, 7) A			31272.159	(.224)	1.000	.304	.304	49.668	48.625
12(4, 9) - 11(5, 6) A			25712.157	(.138)	1.000	.544	.544	39.508	38.650
12(2,11) - 11(3, 8) A			35685.721	(.176)	1.000	.260	.260	32.991	31.801
12(3, 9) - 12(3,10) A	24649.431	(.020)	24649.430	(.019)	1.000	2.851	2.851	36.971	36.149
12(1,11) - 12(1,12) A			100599.827	(.134)	1.000	.758	.758	32.843	29.487
12(4, 8) - 12(4, 9) A			3805.640	(.012)	1.000	6.136	6.136	39.634	39.508
12(2,10) - 12(2,11) A			65323.450	(.047)	1.000	1.377	1.377	35.170	32.991
12(4, 9) - 12(2,10) A			130036.619	(.088)	1.000	.405	.405	39.508	35.170
12(2,11) - 12(0,12) A			105235.007	(.130)	1.000	.745	.745	32.991	29.481
12(5, 8) - 12(3, 9) A			198739.973	(.154)	1.000	.125	.125	43.600	36.971
12(3,10) - 12(1,11) A			99111.350	(.061)	1.000	.962	.962	36.149	32.843
12(9, 3) - 12(8, 4) A			234962.060	(.676)	1.000	1.676	1.676	69.341	61.503
12(7, 5) - 12(6, 6) A			178993.096	(.287)	1.000	2.322	2.322	54.596	48.625
12(5, 7) - 12(4, 8) A			119146.547	(.099)	1.000	2.928	2.928	43.609	39.634
12(3, 9) - 12(2,10) A	53992.864	(.020)	53992.924	(.031)	1.000	4.580	4.580	36.971	35.170
12(1,11) - 12(0,12) A			100790.601	(.133)	1.000	1.379	1.379	32.843	29.481
12(8, 4) - 12(7, 5) A			207074.401	(.453)	1.000	2.012	2.012	61.503	54.596
12(6, 6) - 12(5, 7) A			150390.364	(.171)	1.000	2.617	2.617	48.625	43.609
12(4, 8) - 12(3, 9) A			79849.335	(.059)	1.000	3.569	3.569	39.634	36.971
12(2,10) - 12(1,11) A			69767.856	(.044)	1.000	2.998	2.998	35.170	32.843
12(8, 5) - 12(7, 6) A			207074.622	(.453)	1.000	2.012	2.012	61.503	54.596
12(6, 7) - 12(5, 8) A			150636.630	(.170)	1.000	2.616	2.616	48.625	43.600
12(4, 9) - 12(3,10) A			100693.125	(.059)	1.000	3.040	3.040	39.508	36.149
12(2,11) - 12(1,12) A			105044.233	(.130)	1.000	1.366	1.366	32.991	29.487
12(9, 4) - 12(8, 5) A			234962.063	(.676)	1.000	1.676	1.676	69.341	61.503
12(7, 6) - 12(6, 7) A			179002.514	(.287)	1.000	2.322	2.322	54.596	48.625
12(5, 8) - 12(4, 9) A			122696.278	(.097)	1.000	2.899	2.899	43.600	39.508
12(3,10) - 12(2,11) A			94666.944	(.059)	1.000	2.543	2.543	36.149	32.991

[a] Reference [75A]

Table 5. The microwave spectrum for the E symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$.

QUANTUM NUMBERS J K+ K-	– J′ K+ K-	S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
1(0, 1)	– 0(0, 0)	E	12218.155	(.020)	12218.171	(.013)	1.000	2.657	2.657	.421	.013
1(1, 1)	– 0(0, 0)	E	25284.035	(.020)	25284.040	(.017)	.999	.462	.462	.857	.013
1(1, 0)	– 1(1, 1)	E	1610.906	(.003)[a]	1610.884	(.006)	.998	3.985	3.977	.910	.857
1(1, 0)	– 1(0, 1)	E	14676.764	(.020)	14676.753	(.013)	.999	.694	.693	.910	.421
2(0, 2)	– 1(0, 1)	E	24296.523	(.020)	24296.552	(.022)	1.000	5.300	5.300	1.231	.421
2(1, 1)	– 1(1, 0)	E	26044.834	(.020)	26044.814	(.022)	1.000	3.985	3.984	1.779	.910
2(1, 2)	– 1(1, 1)	E	22827.767	(.020)	22827.772	(.022)	1.000	3.985	3.984	1.618	.857
2(2, 0)	– 1(1, 1)	E			67026.239	(.114)	.827	.652	.540	3.092	.857
2(2, 1)	– 1(1, 1)	E			66823.390	(.105)	.173	.652	.113	3.086	.857
2(0, 2)	– 1(1, 1)	E	11230.657	(.020)	11230.683	(.027)	.999	.272	.272	1.231	.857
2(1, 2)	– 1(0, 1)	E	35893.643	(.020)	35893.641	(.024)	1.000	.694	.694	1.618	.421
2(2, 1)	– 1(1, 0)	E			65212.506	(.110)	.827	.694	.574	3.086	.910
2(2, 0)	– 1(1, 0)	E			65415.355	(.109)	.173	.694	.120	3.092	.910
2(1, 1)	– 2(1, 2)	E			4827.926	(.006)	1.000	2.214	2.214	1.779	1.618
2(1, 1)	– 2(0, 2)	E	16425.070	(.020)	16425.015	(.014)	1.000	1.087	1.087	1.779	1.231
2(2, 0)	– 2(1, 1)	E			39370.541	(.109)	.850	.454	.386	3.092	1.779
2(2, 1)	– 2(1, 2)	E			43995.618	(.104)	.850	.385	.327	3.086	1.618
3(2, 1)	– 2(2, 0)	E	37182.133	(.020)	37182.120	(.080)	.911	4.429	4.036	4.333	3.092
3(2, 2)	– 2(2, 0)	E			36475.727	(.131)	.089	4.429	.393	4.309	3.092
3(0, 3)	– 2(0, 2)	E	36102.287	(.020)	36102.256	(.025)	1.000	7.919	7.919	2.436	1.231
3(1, 2)	– 2(1, 1)	E	38976.132	(.020)	38976.084	(.025)	1.000	7.079	7.079	3.079	1.779
3(1, 3)	– 2(1, 2)	E	34156.907	(.020)	34156.897	(.025)	1.000	7.080	7.080	2.757	1.618
3(2, 2)	– 2(2, 1)	E	36678.594	(.020)	36678.576	(.077)	.911	4.428	4.036	4.309	3.086
3(2, 1)	– 2(2, 1)	E			37384.969	(.129)	.089	4.428	.392	4.333	3.086
3(2, 1)	– 2(1, 2)	E			81380.587	(.052)	.988	.636	.628	4.333	1.618
3(3, 0)	– 2(2, 1)	E			106234.494	(.367)	.150	1.138	.170	6.629	3.086
3(3, 1)	– 2(2, 1)	E			106018.772	(.196)	.850	1.138	.967	6.622	3.086
3(0, 3)	– 2(1, 2)	E	24505.103	(.020)	24505.167	(.029)	1.000	.597	.597	2.436	1.618
3(3, 1)	– 2(2, 0)	E			105815.923	(.363)	.150	1.139	.171	6.622	3.092
3(3, 0)	– 2(2, 0)	E			106031.644	(.201)	.850	1.139	.969	6.629	3.092
3(1, 3)	– 2(0, 2)	E	45754.045	(.020)	45753.986	(.027)	1.000	.951	.951	2.757	1.231
3(2, 2)	– 2(1, 1)	E			75846.268	(.049)	.988	.771	.761	4.309	1.779
3(1, 2)	– 3(1, 3)	E	9647.158	(.020)	9647.113	(.010)	1.000	1.555	1.555	3.079	2.757
3(3, 0)	– 3(2, 1)	E			68849.524	(.257)	.620	.436	.270	6.629	4.333
3(3, 1)	– 3(2, 1)	E			68633.803	(.295)	.380	.436	.166	6.622	4.333
3(1, 2)	– 3(0, 3)	E	19298.933	(.020)	19298.843	(.015)	1.000	1.382	1.382	3.079	2.436
3(2, 1)	– 3(1, 2)	E	37576.548	(.020)	37576.577	(.043)	.990	.879	.870	4.333	3.079
3(2, 2)	– 3(1, 3)	E	46517.293	(.020)	46517.297	(.043)	.990	.646	.640	4.309	2.757
3(3, 1)	– 3(2, 2)	E			69340.196	(.251)	.620	.433	.268	6.622	4.309
3(3, 0)	– 3(2, 2)	E			69555.917	(.302)	.380	.433	.165	6.629	4.309
4(2, 2)	– 3(2, 1)	E	50094.974	(.020)	50094.922	(.031)	.995	7.971	7.933	6.004	4.333
4(0, 4)	– 3(0, 3)	E	47534.170	(.020)	47534.132	(.025)	1.000	10.510	10.510	4.021	2.436
4(3, 1)	– 3(3, 0)	E	49155.331	(.020)	49155.218	(.030)	.989	4.652	4.602	8.269	6.629
4(1, 3)	– 3(1, 2)	E			51785.973	(.025)	1.000	9.942	9.942	4.807	3.079
4(3, 2)	– 3(3, 1)	E	49151.652	(.020)	49151.779	(.029)	.989	4.652	4.602	8.262	6.622
4(1, 4)	– 3(1, 3)	E	45395.830	(.020)	45395.810	(.025)	1.000	9.947	9.947	4.272	2.757
4(2, 3)	– 3(2, 2)	E	48768.242	(.020)	48768.257	(.030)	.995	7.965	7.928	5.936	4.309
4(4, 1)	– 3(3, 1)	E			145951.888	(.427)	1.000	1.602	1.602	11.490	6.622
4(2, 2)	– 3(1, 3)	E			97318.612	(.045)	.999	.590	.589	6.004	2.757
4(3, 1)	– 3(2, 2)	E			118711.135	(.291)	.519	1.153	.598	8.269	4.309
4(3, 2)	– 3(2, 2)	E			118491.975	(.242)	.481	1.153	.555	8.262	4.309
4(0, 4)	– 3(1, 3)	E	37882.362	(.020)	37882.402	(.028)	1.000	.983	.983	4.021	2.757
4(1, 3)	– 3(2, 2)	E	14915.870	(.020)	14915.789	(.044)	.989	.234	.231	4.807	4.309
4(3, 2)	– 3(2, 1)	E			117785.582	(.287)	.519	1.161	.602	8.262	4.333
4(3, 1)	– 3(2, 1)	E			118004.742	(.246)	.481	1.161	.559	8.269	4.333
4(1, 4)	– 3(0, 3)	E	55047.553	(.020)	55047.540	(.029)	1.000	1.253	1.253	4.272	2.436
4(4, 0)	– 3(3, 0)	E			146014.191	(.423)	1.000	1.602	1.602	11.500	6.629
4(2, 3)	– 3(1, 2)	E			85638.441	(.042)	.999	.881	.879	5.936	3.079
3(2, 1)	– 4(1, 4)	E			1827.880	(.050)	.989	.125	.123	4.333	4.272
4(1, 3)	– 4(1, 4)	E	16037.314	(.020)	16037.277	(.015)	1.000	1.211	1.211	4.807	4.272

Table 5. The microwave spectrum for the E symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K-	-	J′ K+ K-	S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
4(2, 2)	-	4(2, 3)	E			2033.058	(.018)	.995	4.625	4.603	6.004	5.936
4(2, 3)	-	4(0, 4)	E			57403.153	(.041)	.999	.163	.163	5.936	4.021
4(3, 1)	-	4(2, 2)	E			67909.820	(.261)	.655	.802	.525	8.269	6.004
4(3, 2)	-	4(2, 2)	E			67690.660	(.270)	.345	.802	.277	8.262	6.004
4(1, 3)	-	4(0, 4)	E	23550.758	(.020)	23550.684	(.017)	1.000	1.553	1.553	4.807	4.021
4(4, 0)	-	4(3, 1)	E			96858.973	(.437)	.985	.445	.439	11.500	8.269
4(2, 2)	-	4(1, 3)	E	35885.475	(.020)	35885.526	(.030)	.999	1.355	1.354	6.004	4.807
4(4, 1)	-	4(3, 2)	E			96800.109	(.441)	.985	.445	.438	11.490	8.262
4(2, 3)	-	4(1, 4)	E	49889.711	(.020)	49889.745	(.034)	.999	.849	.848	5.936	4.272
4(3, 2)	-	4(2, 3)	E			69723.717	(.256)	.655	.787	.515	8.262	5.936
4(3, 1)	-	4(2, 3)	E			69942.878	(.277)	.345	.787	.272	8.269	5.936
5(4, 1)	-	4(4, 0)	E			61400.976	(.059)	1.000	4.786	4.786	13.548	11.500
5(2, 3)	-	4(2, 2)	E			63296.981	(.042)	1.000	11.164	11.160	8.115	6.004
5(0, 5)	-	4(0, 4)	E			58565.716	(.042)	1.000	13.083	13.083	5.975	4.021
5(3, 2)	-	4(3, 1)	E			61612.349	(.086)	.928	8.506	7.891	10.324	8.269
5(3, 3)	-	4(3, 1)	E			61316.049	(.394)	.072	8.506	.616	10.314	8.269
5(1, 4)	-	4(1, 3)	E			64416.524	(.042)	1.000	12.700	12.700	6.955	4.807
5(3, 3)	-	4(3, 2)	E			61535.209	(.083)	.928	8.506	7.891	10.314	8.262
5(3, 2)	-	4(3, 2)	E			61831.509	(.390)	.072	8.506	.616	10.324	8.262
5(1, 5)	-	4(1, 4)	E	56529.919	(.020)	56529.914	(.042)	1.000	12.720	12.720	6.157	4.272
5(4, 2)	-	4(4, 1)	E			61405.369	(.058)	1.000	4.786	4.786	13.539	11.490
5(2, 4)	-	4(2, 3)	E			60780.332	(.042)	1.000	11.142	11.138	7.963	5.936
5(2, 3)	-	4(0, 4)	E			122733.191	(.063)	1.000	.129	.129	8.115	4.021
5(4, 2)	-	4(3, 2)	E			158205.478	(.408)	.984	1.614	1.588	13.539	8.262
5(2, 3)	-	4(1, 4)	E			115219.784	(.057)	1.000	.510	.510	8.115	4.272
5(5, 1)	-	4(4, 1)	E			185905.644	(.921)	1.000	2.065	2.065	17.692	11.490
5(3, 2)	-	4(2, 3)	E			131555.226	(.210)	.029	1.172	.972	10.324	5.936
5(3, 3)	-	4(2, 3)	E			131258.926	(.194)	.171	1.172	.200	10.314	5.936
5(0, 5)	-	4(1, 4)	E	51052.202	(.020)	51052.308	(.042)	1.000	1.424	1.424	5.975	4.272
5(1, 4)	-	4(2, 3)	E			30564.055	(.045)	.999	.413	.412	6.955	5.936
5(5, 0)	-	4(4, 0)	E			185960.444	(.911)	1.000	2.065	2.065	17.703	11.500
5(3, 3)	-	4(2, 2)	E			129225.868	(.207)	.829	1.199	.994	10.314	6.004
5(3, 2)	-	4(2, 2)	E			129522.168	(.196)	.171	1.199	.204	10.324	6.004
5(1, 5)	-	4(0, 4)	E			64043.321	(.046)	1.000	1.608	1.608	6.157	4.021
5(4, 1)	-	4(3, 1)	E			158259.949	(.404)	.984	1.614	1.588	13.548	8.269
5(2, 4)	-	4(1, 3)	E			94632.800	(.056)	1.000	1.019	1.018	7.963	4.807
5(1, 5)	-	4(2, 2)	E			4607.111	(.050)	.999	.155	.154	6.157	6.004
5(1, 4)	-	5(1, 5)	E	23923.885	(.020)	23923.887	(.020)	1.000	1.008	1.008	6.955	6.157
5(2, 3)	-	5(2, 4)	E			4549.707	(.013)	.999	3.639	3.636	8.115	7.963
5(2, 4)	-	5(0, 5)	E			59617.769	(.041)	1.000	.277	.277	7.963	5.975
5(5, 0)	-	5(4, 1)	E			124559.468	(.947)	1.000	.452	.452	17.703	13.548
5(3, 2)	-	5(2, 3)	E			66225.188	(.198)	.865	1.158	1.002	10.324	8.115
5(3, 3)	-	5(2, 3)	E			65928.888	(.198)	.135	1.158	.156	10.314	8.115
5(1, 4)	-	5(0, 5)	E	29401.529	(.020)	29401.492	(.022)	1.000	1.607	1.607	6.955	5.975
5(4, 1)	-	5(3, 2)	E			96647.601	(.443)	.856	.825	.707	13.548	10.324
5(4, 2)	-	5(3, 2)	E			96373.969	(.647)	.144	.825	.119	13.539	10.324
5(2, 3)	-	5(1, 4)	E			34765.983	(.025)	1.000	1.874	1.874	8.115	6.955
5(4, 2)	-	5(3, 3)	E			96670.269	(.448)	.856	.825	.706	13.539	10.314
5(4, 1)	-	5(3, 3)	E			96943.901	(.640)	.144	.825	.119	13.548	10.314
5(2, 4)	-	5(1, 5)	E	54140.188	(.020)	54140.163	(.033)	1.000	1.007	1.006	7.963	6.157
5(5, 1)	-	5(4, 2)	E			124500.274	(.957)	1.000	.452	.452	17.692	13.539
5(3, 3)	-	5(2, 4)	E			70478.594	(.195)	.865	1.107	.958	10.314	7.963
5(3, 2)	-	5(2, 4)	E			70774.894	(.205)	.135	1.107	.149	10.324	7.963
6(4, 2)	-	5(4, 1)	E			73782.907	(.102)	.999	8.863	8.858	16.009	13.548
6(2, 4)	-	5(2, 3)	E			76701.834	(.087)	1.000	14.193	14.193	10.674	8.115
6(0, 6)	-	5(0, 5)	E			69269.709	(.088)	1.000	15.661	15.661	8.285	5.975
6(5, 1)	-	5(5, 0)	E			73658.206	(.120)	1.000	4.875	4.875	20.160	17.703
6(3, 3)	-	5(3, 2)	E			74263.583	(.130)	.947	11.960	11.325	12.801	10.324
6(3, 4)	-	5(3, 2)	E			73609.607	(.247)	.053	11.960	.635	12.779	10.324
6(1, 5)	-	5(1, 4)	E			76796.094	(.088)	1.000	15.393	15.393	9.517	6.955

Table 5. The microwave spectrum for the E symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K- -	J´ K+ K-	S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
6(5, 2) -	5(5, 1)	E			73664.379	(.120)	1.000	4.875	4.875	20.149	17.692
6(3, 4) -	5(3, 3)	E			73905.907	(.128)	.947	11.960	11.325	12.779	10.314
6(3, 3) -	5(3, 3)	E			74559.883	(.243)	.053	11.960	.635	12.801	10.314
6(1, 6) -	5(1, 5)	E			67555.663	(.087)	1.000	15.444	15.444	8.411	6.157
6(4, 3) -	5(4, 2)	E			73787.883	(.101)	.999	8.863	8.858	16.000	13.539
6(2, 5) -	5(2, 4)	E			72680.848	(.088)	1.000	14.135	14.134	10.388	7.963
6(2, 4) -	5(0, 5)	E			140869.309	(.103)	1.000	.154	.154	10.674	5.975
6(6, 1) -	5(5, 1)	E			225052.806	(1.706)	1.000	2.520	2.520	25.225	17.692
6(4, 2) -	5(3, 3)	E			170726.808	(.621)	.169	1.640	.277	16.009	10.314
6(4, 3) -	5(3, 3)	E			170458.153	(.418)	.831	1.640	1.364	16.000	10.314
6(2, 4) -	5(1, 5)	E			135391.704	(.098)	1.000	.414	.414	10.674	6.157
6(5, 2) -	5(4, 2)	E			198164.654	(.886)	1.000	2.071	2.071	20.149	13.539
6(3, 3) -	5(2, 4)	E			145038.477	(.153)	.970	1.174	1.139	12.801	7.963
6(2, 4) -	5(3, 3)	E			10772.947	(.215)	.849	.250	.212	10.674	10.314
6(0, 6) -	5(1, 5)	E			63792.104	(.087)	1.000	1.901	1.901	8.285	6.157
6(1, 5) -	5(2, 4)	E	46579.827	(.020)	46579.817	(.085)	1.000	.640	.639	9.517	7.963
6(5, 1) -	5(4, 1)	E			198217.673	(.875)	1.000	2.071	2.071	20.160	13.548
6(3, 4) -	5(2, 3)	E			139834.795	(.150)	.970	1.242	1.205	12.779	8.115
6(1, 6) -	5(0, 5)	E			73033.268	(.090)	1.000	2.014	2.014	8.411	5.975
6(6, 0) -	5(5, 0)	E			225898.614	(1.689)	1.000	2.528	2.528	25.238	17.703
6(4, 3) -	5(3, 2)	E			170161.853	(.631)	.169	1.642	.277	16.000	10.324
6(4, 2) -	5(3, 2)	E			170430.508	(.413)	.831	1.642	1.365	16.009	10.324
6(2, 5) -	5(1, 4)	E			102897.125	(.099)	1.000	1.189	1.189	10.388	6.955
6(1, 6) -	5(2, 3)	E			8865.793	(.090)	1.000	.154	.154	8.411	8.115
6(2, 5) -	5(3, 2)	E			1905.954	(.226)	.849	.223	.190	10.388	10.324
6(1, 5) -	6(1, 6)	E	33164.244	(.020)	33164.318	(.027)	1.000	.883	.883	9.517	8.411
6(2, 4) -	6(2, 5)	E	8570.747	(.020)	8570.692	(.018)	1.000	2.934	2.933	10.674	10.388
6(2, 5) -	6(0, 6)	E			63028.908	(.047)	1.000	.397	.397	10.388	8.285
6(5, 1) -	6(4, 2)	E			124434.767	(.918)	.999	.847	.846	20.160	16.009
6(3, 3) -	6(2, 4)	E			63786.936	(.123)	.977	1.538	1.503	12.801	10.674
6(1, 5) -	6(0, 6)	E	36927.862	(.020)	36927.877	(.030)	1.000	1.579	1.579	9.517	8.285
6(6, 0) -	6(5, 1)	E			152240.408	(1.765)	1.000	.458	.458	25.238	20.160
6(4, 2) -	6(3, 3)	E			96166.925	(.471)	.683	1.177	.804	16.009	12.801
6(4, 3) -	6(3, 3)	E			95898.270	(.568)	.317	1.177	.374	16.000	12.801
6(2, 4) -	6(1, 5)	E	34671.762	(.020)	34671.723	(.022)	1.000	2.381	2.381	10.674	9.517
6(6, 1) -	6(5, 2)	E			152188.507	(1.781)	1.000	.458	.458	25.225	20.149
6(4, 3) -	6(3, 4)	E			96552.245	(.478)	.683	1.174	.802	16.000	12.779
6(4, 2) -	6(3, 4)	E			96820.900	(.561)	.317	1.174	.373	16.009	12.779
6(2, 5) -	6(1, 6)	E			59265.349	(.039)	1.000	1.126	1.126	10.388	8.411
6(5, 2) -	6(4, 3)	E			124376.770	(.928)	.999	.847	.846	20.149	16.000
6(3, 4) -	6(2, 5)	E			71703.653	(.125)	.977	1.403	1.371	12.779	10.388
7(6, 1) -	6(6, 0)	E			85919.123	(.216)	1.000	4.938	4.938	28.104	25.238
7(4, 3) -	6(4, 2)	E			86223.529	(.173)	.994	12.534	12.460	18.885	16.009
7(2, 5) -	6(2, 4)	E			90145.738	(.161)	1.000	17.129	17.129	13.680	10.674
7(0, 7) -	6(0, 6)	E			79781.712	(.161)	1.000	18.260	18.260	10.946	8.285
7(5, 2) -	6(5, 1)	E			86020.999	(.189)	1.000	9.116	9.116	23.029	20.160
7(3, 4) -	6(3, 3)	E			87143.400	(.169)	.991	15.185	15.053	15.708	12.801
7(3, 5) -	6(3, 3)	E			85614.759	(.192)	.009	15.185	.133	15.657	12.801
7(1, 6) -	6(1, 5)	E			88843.242	(.162)	1.000	18.031	18.031	12.480	9.517
7(5, 3) -	6(5, 2)	E			86028.240	(.189)	1.000	9.116	9.116	23.018	20.149
7(3, 5) -	6(3, 4)	E			86268.735	(.169)	.991	15.182	15.050	15.657	12.779
7(3, 4) -	6(3, 4)	E			87797.375	(.189)	.009	15.182	.133	15.708	12.779
7(1, 7) -	6(1, 6)	E			78479.407	(.161)	1.000	18.140	18.140	11.029	8.411
7(6, 2) -	6(6, 1)	E			85927.218	(.215)	1.000	4.938	4.938	28.091	25.225
7(4, 4) -	6(4, 3)	E			86224.527	(.172)	.994	12.534	12.460	18.876	16.000
7(2, 6) -	6(2, 5)	E			84449.186	(.162)	1.000	17.019	17.018	13.205	10.388
7(2, 5) -	6(0, 6)	E			161745.338	(.174)	1.000	.154	.154	13.680	8.285
7(3, 4) -	6(1, 5)	E			185602.060	(.194)	.996	.113	.112	15.708	9.517
7(6, 2) -	6(5, 2)	E			238115.725	(1.654)	1.000	2.530	2.530	28.091	20.149
7(4, 3) -	6(3, 4)	E			183044.429	(.547)	.447	1.669	.745	18.885	12.779

Table 5. The microwave spectrum for the E symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K- -	J′ K+ K- S	MEASURED FREQUENCY	TRANSITION UNCERTAINTY	CALCULATED FREQUENCY	TRANSITION UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
7(4, 4) -	6(3, 4) E			182776.772	(.462)	.553	1.669	.923	18.876	12.779
7(2, 5) -	6(1, 6) E			157981.779	(.171)	1.000	.322	.322	13.680	8.411
7(5, 3) -	6(4, 3) E			210405.011	(.852)	.999	2.094	2.092	23.018	16.000
7(3, 4) -	6(2, 5) E			159501.028	(.185)	.995	1.144	1.138	15.708	10.388
6(5, 2) -	7(4, 4) E			38152.243	(1.002)	.989	.105	.104	20.149	18.876
7(2, 5) -	6(3, 4) E			27012.777	(.200)	.974	.368	.358	13.680	12.779
7(0, 7) -	6(1, 6) E			76018.152	(.160)	1.000	2.393	2.393	10.946	8.411
6(4, 3) -	7(3, 5) E			10283.510	(.552)	.536	.208	.111	16.000	15.657
7(1, 6) -	6(2, 5) E			62742.211	(.157)	1.000	.925	.925	12.480	10.388
7(5, 2) -	6(4, 2) E			210455.766	(.842)	.999	2.094	2.092	23.029	16.009
7(3, 5) -	6(2, 4) E			149401.695	(.186)	.995	1.294	1.287	15.657	10.674
7(1, 7) -	6(0, 6) E			82242.966	(.163)	1.000	2.456	2.456	11.029	8.285
7(6, 1) -	6(5, 1) E			238159.531	(1.637)	1.000	2.530	2.530	28.104	20.160
7(4, 4) -	6(3, 3) E			182122.797	(.555)	.447	1.674	.748	18.876	12.801
7(4, 3) -	6(3, 3) E			182390.454	(.455)	.553	1.674	.926	18.885	12.801
7(2, 6) -	6(1, 5) E			110550.217	(.172)	1.000	1.401	1.401	13.205	9.517
6(4, 2) -	7(3, 4) E			9023.525	(.544)	.536	.206	.111	16.009	15.708
7(1, 7) -	6(2, 4) E			10643.366	(.162)	1.000	.133	.133	11.029	10.674
6(5, 1) -	7(4, 3) E			38211.238	(.992)	.989	.105	.104	20.160	18.885
7(2, 6) -	6(3, 3) E			12091.558	(.210)	.974	.295	.288	13.205	12.801
7(3, 4) -	7(3, 5) E			1528.641	(.057)	.983	6.133	6.031	15.708	15.657
7(1, 6) -	7(1, 7) E	43528.061	(.020)	43528.152	(.039)	1.000	.807	.807	12.480	11.029
7(2, 5) -	7(2, 6) E	14267.298	(.020)	14267.244	(.024)	1.000	2.415	2.415	13.680	13.205
7(2, 6) -	7(0, 7) E			67696.383	(.062)	1.000	.504	.504	13.205	10.946
7(3, 5) -	7(1, 6) E			95230.177	(.091)	.996	.184	.183	15.657	12.480
7(7, 0) -	7(6, 1) E			179908.632	(2.954)	1.000	.462	.462	34.105	28.104
7(5, 2) -	7(4, 3) E			124232.237	(.886)	.989	1.211	1.198	23.029	18.885
7(3, 4) -	7(2, 5) E			60784.598	(.090)	.996	1.970	1.963	15.708	13.680
7(1, 6) -	7(0, 7) E	45989.383	(.020)	45989.407	(.043)	1.000	1.517	1.517	12.480	10.946
7(6, 1) -	7(5, 2) E			152138.532	(1.724)	1.000	.863	.863	28.104	23.029
7(4, 3) -	7(3, 4) E			95247.054	(.474)	.666	1.519	1.012	18.885	15.708
7(4, 4) -	7(3, 4) E			94979.397	(.521)	.334	1.519	.507	18.876	15.708
7(2, 5) -	7(1, 6) E	35974.324	(.020)	35974.220	(.020)	1.000	2.805	2.805	13.680	12.480
7(6, 2) -	7(5, 3) E			152087.485	(1.740)	1.000	.863	.863	28.091	23.018
7(4, 4) -	7(3, 5) E			96508.038	(.483)	.666	1.509	1.006	18.876	15.657
7(4, 3) -	7(3, 5) E			96775.695	(.514)	.334	1.509	.503	18.885	15.657
7(2, 6) -	7(1, 7) E			65235.128	(.054)	1.000	1.213	1.213	13.205	11.029
7(7, 1) -	7(6, 2) E			179865.075	(2.976)	1.000	.462	.462	34.091	28.091
7(5, 3) -	7(4, 4) E			124180.483	(.897)	.989	1.211	1.198	23.018	18.876
7(3, 5) -	7(2, 6) E			73523.201	(.094)	.996	1.675	1.669	15.657	13.205
8(6, 2) -	7(6, 1) E			98270.406	(.314)	1.000	9.307	9.307	31.382	28.104
8(4, 4) -	7(4, 3) E			98747.878	(.279)	.967	15.951	15.421	22.179	18.885
8(4, 5) -	7(4, 3) E			98444.620	(.697)	.033	15.951	.530	22.169	18.885
8(2, 6) -	7(2, 5) E			103466.601	(.265)	1.000	19.992	19.992	17.132	13.680
8(0, 8) -	7(0, 7) E			90227.675	(.265)	1.000	20.882	20.882	13.956	10.946
8(7, 1) -	7(7, 0) E			98182.315	(.349)	1.000	4.986	4.986	37.380	34.105
8(5, 3) -	7(5, 2) E			98424.067	(.290)	1.000	12.962	12.962	26.312	23.029
8(3, 5) -	7(3, 4) E			100294.689	(.268)	.999	18.270	18.247	19.053	15.708
8(1, 7) -	7(1, 6) E			100482.273	(.266)	1.000	20.621	20.621	15.832	12.480
8(7, 2) -	7(7, 1) E			98192.370	(.349)	1.000	4.986	4.986	37.366	34.091
8(5, 4) -	7(5, 3) E			98432.365	(.289)	1.000	12.962	12.962	26.302	23.018
8(3, 6) -	7(3, 5) E			98606.869	(.269)	.999	18.259	18.236	18.946	15.657
8(1, 8) -	7(1, 7) E			89314.683	(.264)	1.000	20.818	20.818	14.008	11.029
8(6, 3) -	7(6, 2) E			98279.651	(.313)	1.000	9.307	9.307	31.370	28.091
8(4, 5) -	7(4, 4) E			98712.277	(.279)	.967	15.951	15.421	22.169	18.876
8(4, 4) -	7(4, 4) E			99015.535	(.700)	.033	15.951	.530	22.179	18.876
8(2, 7) -	7(2, 6) E			96070.738	(.266)	1.000	19.830	19.830	16.409	13.205
8(2, 6) -	7(0, 7) E			185430.228	(.279)	1.000	.136	.136	17.132	10.946
8(3, 5) -	7(1, 6) E			197053.507	(.282)	.999	.172	.172	19.053	12.480
8(6, 3) -	7(5, 3) E			250367.135	(1.603)	1.000	2.548	2.548	31.370	23.018

Table 5. The microwave spectrum for the E symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K-	- J' K+ K-	S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
8(4, 4)	7(3, 5)	E			195523.572	(.506)	.716	1.691	1.211	22.179	15.657
8(4, 5)	7(3, 5)	E			195220.314	(.478)	.284	1.691	.480	22.169	15.657
8(2, 6)	7(1, 7)	E			182968.973	(.276)	1.000	.245	.245	17.132	11.029
8(5, 4)	7(4, 4)	E			222612.848	(.831)	.988	2.124	2.098	26.302	18.876
8(3, 5)	7(2, 6)	E			175346.531	(.275)	.999	1.074	1.073	19.053	13.205
7(5, 3)	8(4, 5)	E			25468.207	(1.015)	.918	.183	.168	23.018	22.169
8(2, 6)	7(3, 5)	E			44210.643	(.277)	.995	.506	.504	17.132	15.657
8(0, 8)	7(1, 7)	E			87766.421	(.264)	1.000	2.884	2.884	13.956	11.029
8(3, 5)	7(4, 4)	E			5315.292	(.600)	.575	.301	.173	19.053	18.876
8(3, 6)	7(4, 4)	E			2098.832	(.589)	.425	.301	.128	18.946	18.876
8(1, 7)	7(2, 6)	E			78775.297	(.261)	1.000	1.276	1.276	15.832	13.205
8(5, 3)	7(4, 3)	E			222656.304	(.821)	.988	2.124	2.098	26.312	18.885
8(3, 6)	7(2, 5)	E			157862.827	(.278)	.999	1.363	1.361	18.946	13.680
8(1, 8)	7(0, 7)	E			91775.937	(.266)	1.000	2.917	2.917	14.008	10.946
8(6, 2)	7(5, 2)	E			250408.938	(1.586)	1.000	2.548	2.548	31.382	23.029
8(4, 5)	7(3, 4)	E			193691.674	(.511)	.716	1.704	1.220	22.169	15.708
8(4, 4)	7(3, 4)	E			193994.932	(.473)	.284	1.704	.484	22.179	15.708
8(2, 7)	7(1, 6)	E			117777.713	(.275)	1.000	1.663	1.663	16.409	12.480
8(3, 6)	7(4, 3)	E			1831.175	(.594)	.575	.296	.170	18.946	18.885
8(3, 5)	7(4, 3)	E			5047.635	(.576)	.425	.296	.126	19.053	18.885
8(1, 8)	7(2, 5)	E			9812.310	(.267)	1.000	.105	.105	14.008	13.680
7(5, 2)	8(4, 4)	E			25484.359	(1.000)	.918	.182	.168	23.029	22.179
8(2, 7)	7(3, 4)	E			21018.895	(.285)	.995	.345	.344	16.409	15.708
8(3, 5)	8(3, 6)	E			3216.461	(.027)	.997	5.244	5.226	19.053	18.946
8(1, 7)	8(1, 8)	E			54695.742	(.062)	1.000	.766	.766	15.832	14.008
8(2, 6)	8(2, 7)	E	21663.139	(.020)	21663.107	(.029)	1.000	2.036	2.036	17.132	16.409
8(2, 7)	8(0, 8)	E			73539.445	(.087)	1.000	.589	.589	16.409	13.956
8(3, 6)	8(1, 7)	E			93354.774	(.069)	.999	.302	.302	18.946	15.832
8(7, 1)	8(6, 2)	E			179820.541	(2.898)	1.000	.876	.876	37.380	31.382
8(5, 3)	8(4, 4)	E			123908.426	(.856)	.923	1.558	1.437	26.312	22.179
8(5, 4)	8(4, 4)	E			123597.314	(1.165)	.077	1.558	.121	26.302	22.179
8(3, 5)	8(2, 6)	E	57612.663	(.020)	57612.687	(.069)	.999	2.475	2.473	19.053	17.132
8(1, 7)	8(0, 8)	E			56244.004	(.066)	1.000	1.457	1.457	15.832	13.956
8(8, 0)	8(7, 1)	E			207564.260	(4.580)	1.000	.465	.465	44.304	37.380
8(6, 2)	8(5, 3)	E			151984.871	(1.677)	1.000	1.239	1.238	31.382	26.312
8(4, 4)	8(3, 5)	E			93700.242	(.429)	.797	1.862	1.484	22.179	19.053
8(4, 5)	8(3, 5)	E			93396.984	(.453)	.203	1.862	.378	22.169	19.053
8(2, 6)	8(1, 7)	E	38958.634	(.020)	38958.548	(.022)	1.000	3.090	3.090	17.132	15.832
8(8, 1)	8(7, 2)	E			207529.927	(4.609)	1.000	.465	.465	44.289	37.366
8(6, 3)	8(5, 4)	E			151934.770	(1.693)	1.000	1.239	1.238	31.370	26.302
8(4, 5)	8(3, 6)	E			96613.445	(.439)	.797	1.836	1.463	22.169	18.946
8(4, 4)	8(3, 6)	E			96916.703	(.447)	.203	1.836	.373	22.179	18.946
8(2, 7)	8(1, 8)	E			71991.183	(.081)	1.000	1.273	1.273	16.409	14.008
8(7, 2)	8(6, 3)	E			179777.795	(2.920)	1.000	.876	.876	37.366	31.370
8(5, 4)	8(4, 5)	E			123900.572	(.872)	.923	1.557	1.437	26.302	22.169
8(5, 3)	8(4, 5)	E			124211.684	(1.126)	.077	1.557	.121	26.312	22.169
8(3, 6)	8(2, 7)	E			76059.333	(.074)	.999	1.919	1.917	18.946	16.409
9(8, 1)	8(8. 0)	E			110447.280	(.526)	1.000	5.023	5.023	47.988	44.304
9(6, 3)	8(6, 2)	E			110652.713	(.447)	1.000	13.295	13.295	35.073	31.382
9(4, 5)	8(4, 4)	E			111408.685	(.428)	.946	19.198	18.168	25.895	22.179
9(4, 6)	8(4, 4)	E			110920.211	(.623)	.054	19.198	1.031	25.879	22.179
9(2, 7)	8(2, 6)	E			116544.741	(.404)	1.000	22.789	22.789	21.019	17.132
9(0, 9)	8(0, 8)	E			100681.578	(.402)	1.000	23.520	23.520	17.314	13.956
9(7, 2)	8(7, 1)	E			110525.722	(.480)	1.000	9.454	9.454	41.067	37.380
9(5, 4)	8(5, 3)	E			110873.805	(.425)	1.000	16.544	16.539	30.010	26.312
9(3, 6)	8(3, 5)	E			113743.168	(.405)	1.000	21.267	21.263	22.848	19.053
9(1, 8)	8(1, 7)	E			111674.136	(.404)	1.000	23.175	23.175	19.557	15.832
9(7, 3)	8(7, 2)	E			110536.988	(.479)	1.000	9.454	9.454	41.054	37.366
9(5, 5)	8(5, 4)	E			110882.928	(.424)	1.000	16.544	16.539	30.000	26.302
9(3, 7)	8(3, 6)	E			110879.787	(.406)	1.000	21.235	21.230	22.645	18.946

Table 5. The microwave spectrum for the E symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K- -	J´ K+ K- S	MEASURED TRANSITION FREQUENCY	UNCERTAINTY	CALCULATED TRANSITION FREQUENCY	UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY UPPER	LEVELS LOWER
9(1, 9) -	8(1, 8) E			100078.644	(.402)	1.000	23.486	23.486	17.346	14.008
9(8, 2) -	8(8, 1) E			110459.213	(.526)	1.000	5.023	5.023	47.973	44.289
9(6, 4) -	8(6, 3) E			110663.098	(.446)	1.000	13.295	13.295	35.061	31.370
9(4, 6) -	8(4, 5) E			111223.469	(.430)	.946	19.198	18.168	25.879	22.169
9(4, 5) -	8(4, 5) E			111711.943	(.628)	.054	19.198	1.031	25.895	22.169
9(2, 8) -	8(2, 7) E			107537.268	(.404)	1.000	22.593	22.593	19.996	16.409
9(2, 7) -	8(0, 8) E			211747.293	(.422)	1.000	.112	.112	21.019	13.956
9(3, 6) -	8(1, 7) E			210314.403	(.413)	1.000	.234	.234	22.848	15.832
9(4, 5) -	8(3, 6) E			208325.388	(.508)	.917	1.698	1.556	25.895	18.946
9(4, 6) -	8(3, 6) E			207836.914	(.501)	.083	1.698	.141	25.879	18.946
9(2, 7) -	8(1, 8) E			210199.031	(.419)	1.000	.188	.188	21.019	14.008
9(5, 4) -	8(4, 5) E			235085.489	(1.117)	.094	2.154	.202	30.010	22.169
9(5, 5) -	8(4, 5) E			234783.500	(.847)	.906	2.154	1.953	30.000	22.169
9(3, 6) -	8(2, 7) E			193018.962	(.407)	1.000	.964	.963	22.848	16.409
8(5, 4) -	9(4, 6) E			12677.103	(1.073)	.746	.269	.201	26.302	25.879
9(2, 7) -	8(3, 6) E			62148.515	(.405)	.999	.676	.675	21.019	18.946
9(0, 9) -	8(1, 8) E			99133.316	(.401)	1.000	3.369	3.369	17.314	14.008
8(6, 3) -	9(5, 5) E			41051.842	(1.871)	.999	.163	.163	31.370	30.000
9(3, 6) -	8(4, 5) E			20346.184	(.630)	.760	.399	.303	22.848	22.169
9(1, 8) -	8(2, 7) E			94378.696	(.399)	1.000	1.692	1.692	19.557	16.409
9(5, 5) -	8(4, 4) E			234480.242	(1.152)	.094	2.155	.202	30.000	22.179
9(5, 4) -	8(4, 4) E			234782.231	(.835)	.906	2.155	1.953	30.010	22.179
9(3, 7) -	8(2, 6) E			165276.013	(.413)	1.000	1.457	1.457	22.645	17.132
9(1, 9) -	8(0, 8) E			101626.906	(.402)	1.000	3.387	3.387	17.346	13.956
9(4, 6) -	8(3, 5) E			204620.454	(.509)	.917	1.729	1.585	25.879	19.053
9(4, 5) -	8(3, 5) E			205108.927	(.499)	.083	1.729	.144	25.895	19.053
9(2, 8) -	8(1, 7) E			124832.708	(.412)	1.000	1.983	1.983	19.996	15.832
8(6, 2) -	9(5, 4) E			41111.066	(1.855)	.999	.163	.163	31.382	30.010
9(3, 7) -	8(4, 4) E			13963.084	(.626)	.760	.384	.292	22.645	22.179
8(5, 3) -	9(4, 5) E			12499.741	(1.049)	.746	.269	.200	26.312	25.895
9(2, 8) -	8(3, 5) E			28261.474	(.412)	.999	.365	.365	19.996	19.053
9(3, 6)	9(3, 7) E			6079.042	(.022)	.999	4.491	4.407	22.040	22.645
9(1, 8) -	9(1, 9) E			66291.234	(.100)	1.000	.748	.748	19.557	17.346
9(2, 7) -	9(2, 8) E	30670.575	(.020)	30670.580	(.032)	1.000	1.764	1.764	21.019	19.996
9(4, 6) -	9(2, 7) E			145688.399	(.382)	.931	.113	.105	25.879	21.019
9(2, 8) -	9(0, 9) E			80395.135	(.126)	1.000	.650	.650	19.996	17.314
9(3, 7) -	9(1, 8) E			92560.425	(.058)	1.000	.455	.455	22.645	19.557
9(9, 0) -	9(8, 1) E			235206.433	(6.713)	1.000	.467	.467	55.833	47.988
9(7, 2) -	9(6, 3) E			179693.551	(2.836)	1.000	1.261	1.261	41.067	35.073
9(5, 4) -	9(4, 5) E			123373.546	(.849)	.771	1.898	1.463	30.010	25.895
9(5, 5) -	9(4, 5) E			123071.557	(1.061)	.229	1.898	.435	30.000	25.895
9(3, 6) -	9(2, 7) E	54810.958	(.020)	54811.114	(.053)	1.000	3.043	3.043	22.848	21.019
9(1, 8) -	9(0, 9) E			67236.562	(.103)	1.000	1.415	1.415	19.557	17.314
9(8, 1) -	9(7, 2) E			207485.818	(4.508)	1.000	.887	.887	47.988	41.067
9(6, 3) -	9(5, 4) E			151763.779	(1.624)	1.000	1.595	1.594	35.073	30.010
9(4, 5) -	9(3, 6) E			91365.759	(.335)	.939	2.220	2.086	25.895	22.848
9(4, 6) -	9(3, 6) E			90877.285	(.347)	.061	2.220	.134	25.879	22.848
9(2, 7) -	9(1, 8) E	43829.185	(.020)	43829.153	(.026)	1.000	3.216	3.216	21.019	19.557
9(8, 2) -	9(7, 3) E			207452.152	(4.537)	1.000	.887	.887	47.973	41.054
9(6, 4) -	9(5, 5) E			151714.940	(1.641)	1.000	1.595	1.594	35.061	30.000
9(4, 6) -	9(3, 7) E			96957.127	(.347)	.939	2.156	2.026	25.879	22.645
9(4, 5) -	9(3, 7) E			97445.601	(.345)	.061	2.156	.130	25.895	22.645
9(2, 8) -	9(1, 9) E			79449.807	(.122)	1.000	1.313	1.313	19.996	17.346
9(9, 1) -	9(8, 2) E			235182.022	(6.748)	1.000	.467	.467	55.818	47.973
9(7, 3) -	9(6, 4) E			179651.684	(2.858)	1.000	1.261	1.261	41.054	35.061
9(5, 5) -	9(4, 6) E			123560.031	(.874)	.771	1.896	1.461	30.000	25.879
9(5, 4) -	9(4, 6) E			123862.020	(1.023)	.229	1.896	.435	30.010	25.879
9(3, 7) -	9(2, 8) E			79401.852	(.057)	1.000	2.128	2.128	22.645	19.996
10(8, 2) -	9(8, 1) E			122784.850	(.692)	1.000	9.573	9.573	52.083	47.988
10(6, 4) -	9(6, 3) E			123070.154	(.618)	1.000	17.017	17.017	39.178	35.073

Table 5. The microwave spectrum for the E symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K- - J´ K+ K-	S	MEASURED FREQUENCY	TRANSITION UNCERTAINTY	CALCULATED FREQUENCY	TRANSITION UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
10(4, 6) - 9(4, 5)	E			124247.047	(.592)	.980	22.327	21.873	30.040	25.895
10(4, 7) - 9(4, 5)	E			123257.402	(.638)	.020	22.327	.455	30.007	25.895
10(2, 8) - 9(2, 7)	E			129296.406	(.500)	1.000	25.519	25.519	25.332	21.019
10(0,10) - 9(0, 9)	E			111169.960	(.576)	1.000	26.166	26.166	21.023	17.314
10(9, 1) - 9(9, 0)	E			122713.845	(.751)	1.000	5.052	5.052	59.927	55.833
10(7, 3) - 9(7, 2)	E			122894.142	(.649)	1.000	13.561	13.561	45.166	41.067
10(5, 5) - 9(5, 4)	E			123377.861	(.598)	.998	19.941	19.897	34.126	30.010
10(3, 7) - 9(3, 6)	E			127437.708	(.580)	1.000	24.214	24.213	27.098	22.848
10(1, 9) - 9(1, 8)	E			122450.820	(.580)	1.000	25.715	25.715	23.642	19.557
10(9, 2) - 9(9, 1)	E			122727.452	(.751)	1.000	5.052	5.052	59.912	55.818
10(7, 4) - 9(7, 3)	E			122906.596	(.648)	1.000	13.561	13.561	45.153	41.054
10(5, 6) - 9(5, 5)	E			123385.835	(.597)	.998	19.940	19.897	34.116	30.000
10(3, 8) - 9(3, 7)	E			123051.465	(.581)	1.000	24.136	24.135	26.749	22.645
10(1,10) - 9(1, 9)	E			110788.722	(.576)	1.000	26.148	26.148	21.042	17.346
10(8, 3) - 9(8, 2)	E			122798.026	(.692)	1.000	9.573	9.573	52.070	47.973
10(6, 5) - 9(6, 4)	E			123081.666	(.617)	1.000	17.017	17.017	39.167	35.061
10(4, 7) - 9(4, 6)	E			123745.875	(.594)	.980	22.326	21.871	30.007	25.879
10(4, 6) - 9(4, 6)	E			124735.521	(.643)	.020	22.326	.455	30.040	25.879
10(2, 9) - 9(2, 8)	E			118848.021	(.579)	1.000	25.319	25.319	23.961	19.996
10(3, 7) - 9(1, 8)	E			226077.975	(.587)	1.000	.283	.283	27.098	19.557
10(4, 6) - 9(3, 7)	E			221692.648	(.618)	.982	1.683	1.652	30.040	22.645
10(2, 8) - 9(1, 9)	E			239416.793	(.605)	1.000	.146	.146	25.332	17.346
10(5, 5) - 9(4, 6)	E			247239.881	(1.085)	.311	2.182	.679	34.126	25.879
10(5, 6) - 9(4, 6)	E			246945.867	(.934)	.689	2.182	1.503	34.116	25.879
10(3, 7) - 9(2, 8)	E			212919.402	(.580)	1.000	.826	.826	27.098	19.996
9(7, 3) - 10(6, 5)	E			56570.018	(3.130)	1.000	.147	.147	41.054	39.167
10(4, 6) - 9(5, 5)	E			1175.490	(1.239)	.403	.360	.145	30.040	30.000
10(2, 8) - 9(3, 7)	E			80565.133	(.577)	1.000	.887	.887	25.332	22.645
10(0,10) - 9(1, 9)	E			110224.632	(.576)	1.000	3.848	3.848	21.023	17.346
9(6, 4) - 10(5, 6)	E			28329.105	(1.889)	.995	.243	.242	35.061	34.116
10(3, 7) - 9(4, 6)	E			36560.423	(.700)	.928	.502	.466	27.098	25.879
10(1, 9) - 9(2, 8)	E			109292.248	(.574)	1.000	2.161	2.161	23.642	19.996
10(5, 6) - 9(4, 5)	E			246457.393	(1.111)	.311	2.185	.680	34.116	25.895
10(5, 5) - 9(4, 5)	E			246751.408	(.919)	.689	2.185	1.505	34.126	25.895
10(3, 8) - 9(2, 7)	E			171782.738	(.589)	1.000	1.588	1.587	26.749	21.019
10(1,10) - 9(0, 9)	E			111734.050	(.577)	1.000	3.858	3.858	21.042	17.314
10(4, 7) - 9(3, 6)	E			214623.160	(.620)	.982	1.751	1.719	30.007	22.848
10(2, 9) - 9(1, 8)	E			132006.594	(.586)	1.000	2.361	2.361	23.961	19.557
9(6, 3) - 10(5, 5)	E			28385.918	(1.873)	.995	.243	.242	35.073	34.126
10(3, 8) - 9(4, 5)	E			25605.865	(.701)	.928	.466	.432	26.749	25.895
9(7, 2) - 10(6, 4)	E			56623.397	(3.109)	1.000	.147	.147	41.067	39.178
10(2, 9) - 9(3, 6)	E			33366.327	(.583)	1.000	.352	.352	23.961	22.848
10(3, 7) - 10(3, 8)	E	10466.111	(.020)	10466.084	(.028)	1.000	3.845	3.844	27.098	26.749
10(1, 9) - 10(1,10)	E			77953.333	(.157)	1.000	.744	.744	23.642	21.042
10(4, 6) - 10(4, 7)	E			989.646	(.168)	.943	7.736	7.298	30.040	30.007
10(2, 8) - 10(2, 9)	E			41118.965	(.035)	1.000	1.575	1.575	25.332	23.961
10(4, 7) - 10(2, 8)	E			140137.869	(.302)	.985	.178	.176	30.007	25.332
10(2, 9) - 10(0,10)	E			88073.196	(.180)	1.000	.693	.693	23.961	21.023
10(3, 8) - 10(1, 9)	E			93161.070	(.062)	1.000	.629	.629	26.749	23.642
10(9, 1) - 10(8, 2)	E			235135.428	(6.622)	1.000	.895	.895	59.927	52.083
10(7, 3) - 10(6, 4)	E			179517.538	(2.767)	1.000	1.626	1.626	45.166	39.178
10(5, 5) - 10(4, 6)	E			122504.360	(.846)	.685	2.236	1.532	34.126	30.040
10(5, 6) - 10(4, 6)	E			122210.345	(.973)	.315	2.236	.704	34.116	30.040
10(3, 7) - 10(2, 8)	E	52952.379	(.020)	52952.416	(.043)	1.000	3.633	3.632	27.098	25.332
10(1, 9) - 10(0,10)	E			78517.423	(.159)	1.000	1.392	1.392	23.642	21.023
10(8, 2) - 10(7, 3)	E			207376.527	(4.429)	1.000	1.280	1.280	52.083	45.166
10(6, 4) - 10(5, 5)	E			151456.072	(1.566)	.995	1.940	1.931	39.178	34.126
10(4, 6) - 10(3, 7)	E			88175.099	(.267)	.987	2.610	2.577	30.040	27.098
10(2, 8) - 10(1, 9)	E	50674.718	(.020)	50674.738	(.036)	1.000	3.207	3.207	25.332	23.642
10(8, 3) - 10(7, 4)	E			207343.583	(4.457)	1.000	1.280	1.280	52.070	45.153

Table 5. The microwave spectrum for the E symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS	MEASURED TRANSITION		CALCULATED TRANSITION		LINE STRENGTH			ENERGY LEVELS	
J K+ K- - J' K+ K- S	FREQUENCY	UNCERTAINTY	FREQUENCY	UNCERTAINTY	RELATIVE	RIG.ROTOR	TOTAL	UPPER	LOWER
10(6, 5) - 10(5, 6) E			151410.771	(1.584)	.995	1.940	1.931	39.167	34.116
10(4, 7) - 10(3, 8) E			97651.537	(.281)	.987	2.468	2.437	30.007	26.749
10(2, 9) - 10(1,10) E			87509.106	(.177)	1.000	1.340	1.340	23.961	21.042
10(9, 2) - 10(8, 3) E			235111.449	(6.656)	1.000	.895	.895	59.912	52.070
10(7, 4) - 10(6, 5) E			179476.614	(2.789)	1.000	1.626	1.626	45.153	39.167
10(5, 6) - 10(4, 7) E			123199.991	(.878)	.685	2.231	1.529	34.116	30.007
10(5, 5) - 10(4, 7) E			123494.006	(.935)	.315	2.231	.702	34.126	30.007
10(3, 8) - 10(2, 9) E			83605.297	(.051)	1.000	2.302	2.302	26.749	23.961
11(10, 1) - 10(10, 0) E			134981.979	(1.030)	1.000	5.076	5.076	73.196	68.694
11(8, 3) - 10(8, 2) E			135143.195	(.902)	1.000	13.779	13.779	56.591	52.083
11(6, 5) - 10(6, 4) E			135527.033	(.833)	1.000	20.546	20.546	43.699	39.178
11(4, 7) - 10(4, 6) E			137293.450	(.803)	.996	25.370	25.266	34.619	30.040
11(4, 8) - 10(4, 6) E			135290.357	(.812)	.004	25.370	.104	34.552	30.040
11(2, 9) - 10(2, 8) E			141653.026	(.798)	1.000	28.184	28.184	30.057	25.332
11(0,11) - 10(0,10) E			121693.796	(.792)	1.000	28.816	28.816	25.082	21.023
11(9, 2) - 10(9, 1) E			135046.827	(.958)	1.000	9.669	9.669	64.431	59.927
11(7, 4) - 10(7, 3) E			135290.469	(.861)	1.000	17.405	17.405	49.679	45.166
11(5, 6) - 10(5, 5) E			135948.912	(.814)	.987	23.203	22.905	38.661	34.126
11(5, 7) - 10(5, 5) E			135649.483	(1.264)	.013	23.203	.298	38.651	34.126
11(3, 8) - 10(3, 7) E			141244.035	(.797)	1.000	27.128	27.128	31.810	27.098
11(1,10) - 10(1, 9) E			132921.922	(.796)	1.000	28.267	28.267	28.076	23.642
11(9, 3) - 10(9, 2) E			135061.680	(.958)	1.000	9.669	9.669	64.417	59.912
11(7, 5) - 10(7, 4) E			135304.085	(.860)	1.000	17.405	17.405	49.667	45.153
11(5, 7) - 10(5, 6) E			135943.497	(.814)	.987	23.203	22.905	38.651	34.116
11(5, 6) - 10(5, 6) E			136242.926	(1.286)	.013	23.203	.298	38.661	34.116
11(3, 9) - 10(3, 8) E			135091.830	(.799)	1.000	26.980	26.980	31.255	26.749
11(1,11) - 10(1,10) E			121460.300	(.792)	1.000	28.807	28.807	25.093	21.042
11(10, 2) - 10(10, 1) E			134996.942	(1.031)	1.000	5.076	5.076	73.182	68.679
11(8, 4) - 10(8, 3) E			135157.583	(.901)	1.000	13.779	13.779	56.578	52.070
11(6, 6) - 10(6, 5) E			135539.641	(.831)	1.000	20.546	20.546	43.688	39.167
11(4, 8) - 10(4, 7) E			136280.003	(.805)	.996	25.366	25.262	34.552	30.007
11(4, 7) - 10(4, 7) E			138283.095	(.813)	.004	25.366	.104	34.619	30.007
11(2,10) - 10(2, 9) E			130010.109	(.795)	1.000	28.018	28.018	28.297	23.961
11(3, 8) - 10(1, 9) E			244871.189	(.804)	1.000	.301	.301	31.810	23.642
11(4, 7) - 10(3, 8) E			235934.632	(.810)	.996	1.636	1.629	34.619	26.749
11(3, 8) - 10(2, 9) E			235315.416	(.798)	1.000	.681	.681	31.810	23.961
10(7, 4) - 11(6, 6) E			43936.973	(3.142)	1.000	.222	.222	45.153	43.688
11(4, 7) - 10(5, 6) E			15083.104	(1.322)	.514	.455	.234	34.619	34.116
11(4, 8) - 10(5, 6) E			13080.011	(1.290)	.486	.455	.221	34.552	34.116
11(2, 9) - 10(3, 8) E			99166.694	(.792)	1.000	1.151	1.151	30.057	26.749
11(0,11) - 10(1,10) E			121129.706	(.792)	1.000	4.323	4.323	25.082	21.042
10(8, 3) - 11(7, 5) E			72039.498	(4.852)	1.000	.133	.133	52.070	49.667
10(6, 5) - 11(5, 7) E			15467.273	(1.942)	.966	.330	.319	39.167	38.651
11(3, 8) - 10(4, 7) E			54058.583	(.863)	.984	.615	.605	31.810	30.007
11(1,10) - 10(2, 9) E			123366.148	(.792)	1.000	2.661	2.661	28.076	23.961
11(3, 9) - 10(2, 8) E			177578.162	(.807)	1.000	1.762	1.762	31.255	25.332
11(1,11) - 10(0,10) E			122024.390	(.792)	1.000	4.328	4.328	25.093	21.023
11(4, 8) - 10(3, 7) E			223465.455	(.813)	.996	1.774	1.767	34.552	27.098
11(2,10) - 10(1, 9) E			139565.882	(.801)	1.000	2.788	2.788	28.297	23.642
10(8, 2) - 11(7, 4) E			72086.058	(4.824)	1.000	.133	.133	52.083	49.679
10(6, 4) - 11(5, 6) E			15507.160	(1.922)	.966	.330	.319	39.178	38.661
11(3, 9) - 10(4, 6) E			36450.647	(.869)	.984	.533	.525	31.255	30.040
10(7, 3) - 11(6, 5) E			43990.506	(3.120)	1.000	.222	.222	45.166	43.699
11(4, 8) - 10(5, 5) E			12785.997	(1.284)	.514	.452	.232	34.552	34.126
11(4, 7) - 10(5, 5) E			14789.089	(1.254)	.486	.452	.220	34.619	34.126
11(2,10) - 10(3, 7) E			35938.728	(.797)	1.000	.313	.313	28.297	27.098
11(3, 8) - 11(3, 9) E	16618.312	(.020)	16618.290	(.034)	1.000	3.298	3.297	31.810	31.255
11(1,10) - 11(1,11) E			89414.954	(.232)	1.000	.749	.749	28.076	25.093
11(4, 7) - 11(4, 8) E			2003.093	(.080)	.987	6.894	6.808	34.619	34.552
11(2, 9) - 11(2,10) E	52761.823	(.020)	52761.881	(.050)	1.000	1.451	1.451	30.057	28.297

Table 5. The microwave spectrum for the E symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K- - J´ K+ K- S	MEASURED FREQUENCY	TRANSITION UNCERTAINTY	CALCULATED FREQUENCY	TRANSITION UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY UPPER	LEVELS LOWER
11(4, 8) - 11(2, 9) E			134764.846	(.247)	.997	.273	.272	34.552	30.057
11(2,10) - 11(0,11) E			96389.509	(.252)	1.000	.723	.723	28.297	25.082
11(3, 9) - 11(1,10) E			95330.978	(.084)	1.000	.805	.805	31.255	28.076
11(9, 2) - 11(8, 3) E			235039.060	(6.523)	1.000	1.296	1.296	64.431	56.591
11(7, 4) - 11(6, 5) E			179280.975	(2.691)	1.000	1.978	1.978	49.679	43.699
11(5, 6) - 11(4, 7) E			121159.822	(.813)	.730	2.577	1.882	38.661	34.619
11(5, 7) - 11(4, 7) E			120860.393	(.895)	.270	2.577	.695	38.651	34.619
11(3, 8) - 11(2, 9) E	52543.396	(.020)	52543.426	(.041)	1.000	4.170	4.170	31.810	30.057
11(1,10) - 11(0,11) E			89745.549	(.234)	1.000	1.382	1.382	28.076	25.082
11(8, 3) - 11(7, 4) E			207229.253	(4.341)	1.000	1.653	1.653	56.591	49.679
11(6, 5) - 11(5, 6) E			151034.192	(1.505)	.969	2.280	2.208	43.699	38.661
11(4, 7) - 11(3, 8) E			84224.513	(.222)	.997	3.052	3.044	34.619	31.810
11(2, 9) - 11(1,10) E			59405.842	(.055)	1.000	3.115	3.115	30.057	28.076
11(8, 4) - 11(7, 5) E			207197.081	(4.369)	1.000	1.653	1.653	56.578	49.667
11(6, 6) - 11(5, 7) E			151006.914	(1.526)	.969	2.279	2.208	43.688	38.651
11(4, 8) - 11(3, 9) E			98839.710	(.238)	.997	2.764	2.757	34.552	31.255
11(2,10) - 11(1,11) E			96058.915	(.250)	1.000	1.356	1.356	28.297	25.093
11(9, 3) - 11(8, 4) E			235015.545	(6.556)	1.000	1.296	1.296	64.417	56.578
11(7, 5) - 11(6, 6) E			179241.058	(2.714)	1.000	1.978	1.978	49.667	43.688
11(5, 7) - 11(4, 8) E			122863.486	(.849)	.730	2.565	1.873	38.651	34.552
11(5, 6) - 11(4, 8) E			123162.915	(.857)	.270	2.565	.692	38.661	34.552
11(3, 9) - 11(2,10) E			88687.017	(.068)	1.000	2.439	2.439	31.255	28.297
12(10, 2) - 11(10, 1) E			147311.182	(1.281)	1.000	9.750	9.750	78.110	73.196
12(8, 4) - 11(8, 3) E			147524.455	(1.158)	1.000	17.727	17.727	61.512	56.591
12(6, 6) - 11(6, 5) E			148027.971	(1.093)	1.000	23.930	23.927	48.636	43.699
12(4, 8) - 11(4, 7) E			150600.947	(1.065)	.999	28.350	28.327	39.643	34.619
12(2,10) - 11(2, 9) E			153553.206	(1.061)	1.000	30.789	30.789	35.179	30.057
12(0,12) - 11(0,11) E			132245.244	(1.054)	1.000	31.469	31.469	29.493	25.082
12(11, 1) - 11(11, 0) E			147251.714	(1.368)	1.000	5.097	5.097	87.796	82.885
12(9, 3) - 11(9, 2) E			147397.423	(1.211)	1.000	13.960	13.960	69.348	64.431
12(7, 5) - 11(7, 4) E			147717.688	(1.120)	1.000	21.050	21.050	54.606	49.679
12(5, 7) - 11(5, 6) E			148615.149	(1.079)	.961	26.364	25.337	43.618	38.661
12(5, 8) - 11(5, 6) E			148245.697	(1.361)	.039	26.364	1.027	43.606	38.661
12(3, 9) - 11(3, 8) E			154984.528	(1.061)	1.000	30.011	30.011	36.980	31.810
12(1,11) - 11(1,10) E			143234.191	(1.058)	1.000	30.846	30.846	32.853	28.076
12(11, 2) - 11(11, 1) E			147267.604	(1.371)	1.000	5.097	5.097	87.782	82.870
12(9, 4) - 11(9, 3) E			147413.484	(1.211)	1.000	13.960	13.960	69.334	64.417
12(7, 6) - 11(7, 5) E			147732.433	(1.119)	1.000	21.050	21.050	54.594	49.667
12(5, 8) - 11(5, 7) E			148545.126	(1.083)	.961	26.364	25.337	43.606	38.651
12(5, 7) - 11(5, 7) E			148914.578	(1.388)	.039	26.364	1.027	43.618	38.651
12(3,10) - 11(3, 9) E			146977.660	(1.062)	1.000	29.778	29.778	36.158	31.255
12(1,12) - 11(1,11) E			132105.622	(1.054)	1.000	31.465	31.465	29.500	25.093
12(10, 3) - 11(10, 2) E			147327.362	(1.282)	1.000	9.750	9.750	78.096	73.182
12(8, 5) - 11(8, 4) E			147540.019	(1.158)	1.000	17.727	17.727	61.499	56.578
12(6, 7) - 11(6, 6) E			148041.547	(1.092)	1.000	23.930	23.927	48.626	43.688
12(4, 9) - 11(4, 8) E			148797.776	(1.067)	.999	28.337	28.315	39.516	34.552
12(2,11) - 11(2,10) E			141037.707	(1.057)	1.000	30.699	30.699	33.002	28.297
12(4, 8) - 11(3, 9) E			251443.750	(1.061)	.999	1.550	1.549	39.643	31.255
11(9, 3) - 12(8, 5) E			87475.526	(7.106)	1.000	.122	.122	64.417	61.499
11(7, 5) - 12(6, 7) E			31199.511	(3.181)	1.000	.304	.304	49.667	48.626
12(4, 8) - 11(5, 7) E			29740.554	(1.465)	.653	.551	.360	39.643	38.651
12(4, 9) - 11(5, 7) E			25934.289	(1.454)	.347	.551	.191	39.516	38.651
12(2,10) - 11(3, 9) E			117628.070	(1.055)	1.000	1.479	1.479	35.179	31.255
12(0,12) - 11(1,11) E			131914.649	(1.054)	1.000	4.794	4.794	29.493	25.093
11(8, 4) - 12(7, 6) E			59464.648	(4.858)	1.000	.204	.204	56.578	54.594
11(6, 6) - 12(5, 8) E			2461.788	(2.053)	.858	.421	.361	43.688	43.606
12(3, 9) - 11(4, 8) E			72763.108	(1.099)	.997	.744	.742	36.980	34.552
12(1,11) - 11(2,10) E			136590.231	(1.055)	1.000	3.173	3.173	32.853	28.297
12(3,10) - 11(2, 9) E			182902.796	(1.071)	1.000	1.991	1.991	36.158	30.057
12(1,12) - 11(0,11) E			132436.217	(1.054)	1.000	4.797	4.797	29.500	25.082

Table 5. The microwave spectrum for the E symmetry state of $H^{12}C^{16}O_2{}^{12}CH_3$ - Continued.

QUANTUM NUMBERS J K+ K- - J K+ K-	S	MEASURED FREQUENCY	TRANSITION UNCERTAINTY	CALCULATED FREQUENCY	TRANSITION UNCERTAINTY	LINE STRENGTH RELATIVE	RIG.ROTOR	TOTAL	ENERGY LEVELS UPPER	LOWER
12(4, 9) - 11(3, 8)	E			231019.195	(1.067)	.999	1.809	1.807	39.516	31.810
12(2,11) - 11(1,10)	E			147681.668	(1.062)	1.000	3.247	3.247	33.002	28.076
11(8, 3) - 12(7, 5)	E			59511.565	(4.831)	1.000	.204	.204	56.591	54.606
11(6, 5) - 12(5, 7)	E			2419.043	(2.022)	.858	.421	.361	43.699	43.618
12(3,10) - 11(4, 7)	E			46134.856	(1.108)	.997	.578	.576	36.158	34.619
11(9, 2) - 12(8, 4)	E			87514.605	(7.072)	1.000	.122	.122	64.431	61.512
11(7, 4) - 12(6, 6)	E			31253.004	(3.160)	1.000	.304	.304	49.679	48.636
12(4, 9) - 11(5, 6)	E			25634.860	(1.429)	.653	.544	.355	39.516	38.661
12(4, 8) - 11(5, 6)	E			29441.125	(1.416)	.347	.544	.189	39.643	38.661
12(2,11) - 11(3, 8)	E			35732.400	(1.058)	1.000	.260	.260	33.002	31.810
12(3, 9) - 12(3,10)	E	24625.169	(.020)	24625.157	(.037)	1.000	2.851	2.850	36.980	36.158
12(1,11) - 12(1,12)	E			100543.523	(.328)	1.000	.758	.758	32.853	29.500
12(4, 8) - 12(4, 9)	E			3806.264	(.042)	.997	6.136	6.117	39.643	39.516
12(2,10) - 12(2,11)	E			65277.381	(.084)	1.000	1.377	1.377	35.179	33.002
12(4, 9) - 12(2,10)	E			130009.415	(.205)	.999	.405	.404	39.516	35.179
12(2,11) - 12(0,12)	E			105181.972	(.343)	1.000	.745	.745	33.002	29.493
12(5, 8) - 12(3, 9)	E			198645.504	(.927)	.844	.125	.105	43.606	36.980
12(3,10) - 12(1,11)	E			99074.447	(.122)	1.000	.962	.962	36.158	32.853
12(9, 3) - 12(8, 4)	E			234912.028	(6.415)	1.000	1.676	1.676	69.348	61.512
12(7, 5) - 12(6, 6)	E			178970.692	(2.610)	1.000	2.323	2.322	54.606	48.636
12(5, 7) - 12(4, 8)	E			119174.025	(.725)	.865	2.928	2.533	43.618	39.643
12(5, 8) - 12(4, 8)	E			118804.572	(.777)	.135	2.928	.394	43.606	39.643
12(3, 9) - 12(2,10)	E	53974.704	(.020)	53974.747	(.045)	1.000	4.580	4.580	36.980	35.179
12(1,11) - 12(0,12)	E			100734.496	(.329)	1.000	1.379	1.379	32.853	29.493
12(8, 4) - 12(7, 5)	E			207036.020	(4.246)	1.000	2.012	2.012	61.512	54.606
12(6, 6) - 12(5, 7)	E			150447.014	(1.451)	.872	2.617	2.281	48.636	43.618
12(6, 7) - 12(5, 7)	E			150133.882	(1.820)	.128	2.617	.336	48.626	43.618
12(4, 8) - 12(3, 9)	E			79840.932	(.185)	.999	3.569	3.567	39.643	36.980
12(2,10) - 12(1,11)	E			69724.857	(.090)	1.000	2.998	2.998	35.179	32.853
12(8, 5) - 12(7, 6)	E			207004.667	(4.274)	1.000	2.012	2.012	61.499	54.594
12(6, 7) - 12(5, 8)	E			150503.334	(1.485)	.872	2.616	2.280	48.626	43.606
12(6, 6) - 12(5, 8)	E			150816.466	(1.731)	.128	2.616	.336	48.636	43.606
12(4, 9) - 12(3,10)	E			100659.825	(.203)	.999	3.040	3.038	39.516	36.158
12(2,11) - 12(1,12)	E			104990.999	(.342)	1.000	1.366	1.366	33.002	29.500
12(9, 4) - 12(8, 5)	E			234889.010	(6.448)	1.000	1.676	1.676	69.334	61.499
12(7, 6) - 12(6, 7)	E			178931.944	(2.632)	1.000	2.322	2.322	54.594	48.626
12(5, 8) - 12(4, 9)	E			122610.837	(.758)	.865	2.899	2.509	43.606	39.516
12(5, 7) - 12(4, 9)	E			122980.289	(.743)	.135	2.899	.390	43.618	39.516
12(3,10) - 12(2,11)	E			94626.971	(.108)	1.000	2.543	2.543	36.158	33.002

[a] Reference [75A]

Table 6. Microwave transitions of $H^{12}C^{16}O_2{}^{12}CH_3$ in order of frequency.

FREQUENCY	UNCERTAINTY	J	K+	K-	J´	K+	K-	S
962.558	(.004)	10	4	6	10	4	7	A
989.646	(.168)	10	4	6	10	4	7	E
991.916	(.066)	10	4	6	9	5	5	A
1175.490	(1.239)	10	4	6	9	5	5	E
1517.702	(.004)	7	3	4	7	3	5	A
1528.641	(.057)	7	3	4	7	3	5	E
1610.245	(.001)	1	1	0	1	1	1	A
1610.884	(.006)	1	1	0	1	1	1	E
1827.880	(.050)	3	2	1	4	1	4	E
1831.175	(.594)	8	3	6	7	4	3	E
1836.798	(.021)	3	2	1	4	1	4	A
1905.954	(.226)	6	2	5	5	3	2	E
1917.489	(.027)	8	3	6	7	4	3	A
1930.534	(.021)	6	2	5	5	3	2	A
1993.295	(.007)	11	4	7	11	4	8	A
2003.093	(.080)	11	4	7	11	4	8	E
2030.064	(.003)	4	2	2	4	2	3	A
2033.058	(.018)	4	2	2	4	2	3	E
2098.832	(.589)	8	3	6	7	4	4	E
2341.468	(.141)	11	6	6	12	5	7	A
2419.043	(2.022)	11	6	5	12	5	7	E
2461.788	(2.053)	11	6	6	12	5	8	E
2600.626	(.141)	11	6	5	12	5	8	A
3214.718	(.007)	8	3	5	8	3	6	A
3216.461	(.027)	8	3	5	8	3	6	E
3805.640	(.012)	12	4	8	12	4	9	A
3806.264	(.042)	12	4	8	12	4	9	E
4492.524	(.027)	4	3	2	5	2	3	A
4549.707	(.013)	5	2	3	5	2	4	E
4551.927	(.006)	5	2	3	5	2	4	A
4589.874	(.020)	5	1	5	4	2	2	A
4607.111	(.050)	5	1	5	4	2	2	E
4827.926	(.006)	2	1	1	2	1	2	E
4830.641	(.003)	2	1	1	2	1	2	A
5047.635	(.576)	8	3	5	7	4	3	E
5188.063	(.028)	8	3	5	7	4	4	A
5315.292	(.600)	8	3	5	7	4	4	E
6079.842	(.022)	9	3	6	9	3	7	E
6084.237	(.011)	9	3	6	9	3	7	A
8570.692	(.018)	6	2	4	6	2	5	E
8577.507	(.009)	6	2	4	6	2	5	A
8842.143	(.021)	6	1	6	5	2	3	A
8865.793	(.090)	6	1	6	5	2	3	E
8910.041	(.033)	6	4	3	7	3	4	A
9023.525	(.544)	6	4	2	7	3	4	E
9097.544	(.027)	4	3	1	5	2	4	A
9647.113	(.010)	3	1	2	3	1	3	E
9653.384	(.006)	3	1	2	3	1	3	A
9772.533	(.044)	8	1	8	7	2	5	A
9812.310	(.267)	8	1	8	7	2	5	E
10283.510	(.552)	6	4	3	7	3	5	E
10443.102	(.033)	6	4	2	7	3	5	A
10466.084	(.028)	10	3	7	10	3	8	E
10476.395	(.015)	10	3	7	10	3	8	A
10612.378	(.028)	7	1	7	6	2	4	A
10643.366	(.162)	7	1	7	6	2	4	E
10718.598	(.023)	6	2	4	5	3	3	A
10772.947	(.215)	6	2	4	5	3	3	E
11227.509	(.010)	2	0	2	1	1	1	A
11230.683	(.027)	2	0	2	1	1	1	E
12088.538	(.020)	7	2	6	6	3	3	A
12091.558	(.210)	7	2	6	6	3	3	E
12218.171	(.013)	1	0	1	0	0	0	E
12219.211	(.005)	1	0	1	0	0	0	A
12403.746	(.061)	8	5	4	9	4	5	A
12499.741	(1.049)	8	5	3	9	4	5	E
12677.103	(1.073)	8	5	4	9	4	6	E
12785.997	(1.284)	11	4	8	10	5	5	E
12830.588	(.061)	8	5	3	9	4	6	A
12894.766	(.093)	11	4	8	10	5	5	A
13080.011	(1.290)	11	4	8	10	5	6	E
13963.084	(.626)	9	3	7	8	4	4	E
14012.266	(.041)	9	3	7	8	4	4	A
14267.244	(.024)	7	2	5	7	2	6	E
14279.225	(.013)	7	2	5	7	2	6	A
14676.753	(.013)	1	1	0	1	0	1	E
14681.225	(.007)	1	1	0	1	0	1	A
14789.089	(1.254)	11	4	7	10	5	5	E
14903.160	(.019)	4	1	3	3	2	2	A
14915.789	(.044)	4	1	3	3	2	2	E
14928.942	(.093)	11	4	7	10	5	6	A
15083.104	(1.322)	11	4	7	10	5	6	E
15466.740	(.125)	10	6	5	11	5	6	A
15467.273	(1.942)	10	6	5	11	5	7	E
15507.160	(1.922)	10	6	4	11	5	6	E
15575.127	(.125)	10	6	4	11	5	7	A
16037.277	(.015)	4	1	3	4	1	4	E
16047.952	(.009)	4	1	3	4	1	4	A
16425.015	(.014)	2	1	1	2	0	2	E
16431.275	(.007)	2	1	1	2	0	2	A
16618.290	(.034)	11	3	8	11	3	9	E
16635.187	(.018)	11	3	8	11	3	9	A
19298.843	(.015)	3	1	2	3	0	3	E
19307.303	(.008)	3	1	2	3	0	3	A
20262.037	(.042)	9	3	6	8	4	5	A
20346.184	(.630)	9	3	6	8	4	5	E
21004.079	(.032)	8	2	7	7	3	4	A
21018.895	(.285)	8	2	7	7	3	4	E
21663.107	(.029)	8	2	6	8	2	7	E
21681.040	(.016)	8	2	6	8	2	7	A
22286.804	(.043)	5	4	2	6	3	3	A
22827.772	(.022)	2	1	2	1	1	1	E
22828.143	(.009)	2	1	2	1	1	1	A
22912.106	(.043)	5	4	1	6	3	4	A
23550.684	(.017)	4	1	3	4	0	4	E
23562.326	(.009)	4	1	3	4	0	4	A
23923.887	(.020)	5	1	4	5	1	5	E
23939.825	(.013)	5	1	4	5	1	5	A
24296.552	(.022)	2	0	2	1	0	1	E
24298.488	(.009)	2	0	2	1	0	1	A
24504.179	(.013)	3	0	3	2	1	2	A
24505.167	(.029)	3	0	3	2	1	2	E
24625.157	(.037)	12	3	9	12	3	10	E
24649.430	(.019)	12	3	9	12	3	10	A
25284.040	(.017)	1	1	1	0	0	0	E
25290.190	(.009)	1	1	1	0	0	0	A
25424.269	(.071)	7	5	3	8	4	4	A
25468.207	(1.015)	7	5	3	8	4	5	E
25484.359	(1.000)	7	5	2	8	4	4	E
25590.725	(.071)	7	5	2	8	4	5	A
25605.865	(.701)	10	3	8	9	4	5	E
25619.253	(.071)	10	3	8	9	4	5	A

Table 6. *Microwave transitions of* $H^{12}C^{16}O_2{}^{12}CH_3$ *in order of frequency - Continued.*

FREQUENCY	UNCERTAINTY	J K+ K-	-	J´ K+ K-	S
25634.860	(1.429)	12(4, 9)	-	11(5, 6)	E
25712.157	(.138)	12(4, 9)	-	11(5, 6)	A
25934.289	(1.454)	12(4, 9)	-	11(5, 7)	E
26044.814	(.022)	2(1, 1)	-	1(1, 0)	E
26048.539	(.010)	2(1, 1)	-	1(1, 0)	A
26989.978	(.024)	7(2, 5)	-	6(3, 4)	A
27012.777	(.200)	7(2, 5)	-	6(3, 4)	E
28239.584	(.055)	9(2, 8)	-	8(3, 5)	A
28261.474	(.412)	9(2, 8)	-	8(3, 5)	E
28329.105	(1.889)	9(6, 4)	-	10(5, 6)	E
28373.443	(.129)	9(6, 4)	-	10(5, 5)	A
28385.918	(1.873)	9(6, 3)	-	10(5, 5)	E
28414.566	(.129)	9(6, 3)	-	10(5, 6)	A
29401.492	(.022)	5(1, 4)	-	5(0, 5)	E
29417.482	(.011)	5(1, 4)	-	5(0, 5)	A
29441.125	(1.416)	12(4, 8)	-	11(5, 6)	E
29625.221	(.137)	12(4, 8)	-	11(5, 7)	A
29740.554	(1.465)	12(4, 8)	-	11(5, 7)	E
30559.762	(.019)	5(1, 4)	-	4(2, 3)	A
30564.055	(.045)	5(1, 4)	-	4(2, 3)	E
30670.580	(.032)	9(2, 7)	-	9(2, 8)	E
30695.164	(.018)	9(2, 7)	-	9(2, 8)	A
31199.511	(3.181)	11(7, 5)	-	12(6, 7)	E
31253.004	(3.160)	11(7, 4)	-	12(6, 6)	E
31262.456	(.224)	11(7, 5)	-	12(6, 6)	A
31272.159	(.224)	11(7, 4)	-	12(6, 7)	A
33164.318	(.027)	6(1, 5)	-	6(1, 6)	E
33186.217	(.016)	6(1, 5)	-	6(1, 6)	A
33337.582	(.087)	10(2, 9)	-	9(3, 6)	A
33366.327	(.583)	10(2, 9)	-	9(3, 6)	E
34156.897	(.025)	3(1, 3)	-	2(1, 2)	E
34158.098	(.013)	3(1, 3)	-	2(1, 2)	A
34671.723	(.022)	6(2, 4)	-	6(1, 5)	E
34682.800	(.012)	6(2, 4)	-	6(1, 5)	A
34765.983	(.025)	5(2, 3)	-	5(1, 4)	E
34775.649	(.014)	5(2, 3)	-	5(1, 4)	A
35685.721	(.176)	12(2,11)	-	11(3, 8)	A
35732.400	(1.058)	12(2,11)	-	11(3, 8)	E
35885.526	(.030)	4(2, 2)	-	4(1, 3)	E
35893.641	(.024)	2(1, 2)	-	1(0, 1)	E
35893.919	(.016)	4(2, 2)	-	4(1, 3)	A
35899.122	(.012)	2(1, 2)	-	1(0, 1)	A
35901.842	(.126)	11(2,10)	-	10(3, 7)	A
35938.728	(.797)	11(2,10)	-	10(3, 7)	E
35974.220	(.020)	7(2, 5)	-	7(1, 6)	E
35987.667	(.011)	7(2, 5)	-	7(1, 6)	A
36102.256	(.025)	3(0, 3)	-	2(0, 2)	E
36104.812	(.013)	3(0, 3)	-	2(0, 2)	A
36444.686	(.112)	11(3, 9)	-	10(4, 6)	A
36450.647	(.869)	11(3, 9)	-	10(4, 6)	E
36475.727	(.131)	3(2, 2)	-	2(2, 0)	E
36518.522	(.072)	10(3, 7)	-	9(4, 6)	A
36560.423	(.700)	10(3, 7)	-	9(4, 6)	E
36657.447	(.013)	3(2, 2)	-	2(2, 1)	A
36678.576	(.077)	3(2, 2)	-	2(2, 1)	E
36927.877	(.030)	6(1, 5)	-	6(0, 6)	E
36949.304	(.014)	6(1, 5)	-	6(0, 6)	A
37182.120	(.080)	3(2, 1)	-	2(2, 0)	E
37209.670	(.013)	3(2, 1)	-	2(2, 0)	A
37384.969	(.129)	3(2, 1)	-	2(2, 1)	E
37576.577	(.043)	3(2, 1)	-	3(1, 2)	E
37580.819	(.017)	3(2, 1)	-	3(1, 2)	A
37882.402	(.028)	4(0, 4)	-	3(1, 3)	E
37883.030	(.014)	4(0, 4)	-	3(1, 3)	A
38152.243	(1.002)	6(5, 2)	-	7(4, 4)	E
38187.115	(.084)	6(5, 2)	-	7(4, 3)	A
38211.238	(.992)	6(5, 1)	-	7(4, 3)	E
38243.125	(.084)	6(5, 1)	-	7(4, 4)	A
38958.548	(.022)	8(2, 6)	-	8(1, 7)	E
38975.647	(.012)	8(2, 6)	-	8(1, 7)	A
38976.084	(.025)	3(1, 2)	-	2(1, 1)	E
38980.840	(.013)	3(1, 2)	-	2(1, 1)	A
39351.989	(.018)	2(2, 0)	-	2(1, 1)	A
39370.541	(.109)	2(2, 0)	-	2(1, 1)	E
41051.842	(1.871)	8(6, 3)	-	9(5, 5)	E
41111.066	(1.855)	8(6, 2)	-	9(5, 4)	E
41113.530	(.142)	8(6, 3)	-	9(5, 4)	A
41118.965	(.035)	10(2, 8)	-	10(2, 9)	E
41127.357	(.142)	8(6, 2)	-	9(5, 5)	A
41150.681	(.021)	10(2, 8)	-	10(2, 9)	A
43528.152	(.039)	7(1, 6)	-	7(1, 7)	E
43556.432	(.020)	7(1, 6)	-	7(1, 7)	A
43829.153	(.026)	9(2, 7)	-	9(1, 8)	E
43851.294	(.014)	9(2, 7)	-	9(1, 8)	A
43936.973	(3.142)	10(7, 4)	-	11(6, 6)	E
43990.506	(3.120)	10(7, 3)	-	11(6, 5)	E
43995.618	(.104)	2(2, 1)	-	2(1, 2)	E
44006.010	(.234)	10(7, 4)	-	11(6, 5)	A
44009.271	(.234)	10(7, 3)	-	11(6, 6)	A
44042.846	(.019)	2(2, 1)	-	2(1, 2)	A
44202.821	(.036)	8(2, 6)	-	7(3, 5)	A
44210.643	(.277)	8(2, 6)	-	7(3, 5)	E
45395.810	(.025)	4(1, 4)	-	3(1, 3)	E
45397.404	(.015)	4(1, 4)	-	3(1, 3)	A
45753.986	(.027)	3(1, 3)	-	2(0, 2)	E
45758.732	(.015)	3(1, 3)	-	2(0, 2)	A
45989.407	(.043)	7(1, 6)	-	7(0, 7)	E
46017.020	(.019)	7(1, 6)	-	7(0, 7)	A
46119.335	(.162)	12(3,10)	-	11(4, 7)	A
46134.858	(1.108)	12(3,10)	-	11(4, 7)	E
46517.297	(.043)	3(2, 2)	-	3(1, 3)	E
46542.196	(.019)	3(2, 2)	-	3(1, 3)	A
46579.817	(.085)	6(1, 5)	-	5(2, 4)	E
46580.288	(.020)	6(1, 5)	-	5(2, 4)	A
47534.132	(.025)	4(0, 4)	-	3(0, 3)	E
47536.949	(.015)	4(0, 4)	-	3(0, 3)	A
48767.016	(.015)	4(2, 3)	-	3(2, 2)	A
48768.257	(.030)	4(2, 3)	-	3(2, 2)	E
49134.652	(.015)	4(3, 2)	-	3(3, 1)	A
49151.779	(.029)	4(3, 2)	-	3(3, 1)	E
49155.218	(.030)	4(3, 1)	-	3(3, 0)	E
49180.127	(.015)	4(3, 1)	-	3(3, 0)	A
49889.745	(.034)	4(2, 3)	-	4(1, 4)	E
49911.807	(.019)	4(2, 3)	-	4(1, 4)	A
50094.922	(.031)	4(2, 2)	-	3(2, 1)	E
50105.073	(.015)	4(2, 2)	-	3(2, 1)	A
50674.738	(.036)	10(2, 8)	-	10(1, 9)	E
50703.185	(.017)	10(2, 8)	-	10(1, 9)	A
51052.308	(.042)	5(0, 5)	-	4(1, 4)	E
51054.087	(.016)	5(0, 5)	-	4(1, 4)	A
51785.973	(.025)	4(1, 3)	-	3(1, 2)	E
51791.972	(.015)	4(1, 3)	-	3(1, 2)	A

Table 6. Microwave transitions of $H^{12}C^{16}O_2{}^{12}CH_3$ in order of frequency - Continued.

FREQUENCY	UNCERTAINTY	J (K+, K-)	–	J′ (K+, K-)	S
52543.426	(.041)	11(3, 8)	–	11(2, 9)	E
52557.549	(.028)	11(3, 8)	–	11(2, 9)	A
52761.881	(.050)	11(2, 9)	–	11(2,10)	E
52800.891	(.029)	11(2, 9)	–	11(2,10)	A
52952.416	(.043)	10(3, 7)	–	10(2, 8)	E
52964.135	(.026)	10(3, 7)	–	10(2, 8)	A
53974.747	(.045)	12(3, 9)	–	12(2,10)	E
53992.924	(.031)	12(3, 9)	–	12(2,10)	A
54042.431	(.113)	11(3, 8)	–	10(4, 7)	A
54058.583	(.863)	11(3, 8)	–	10(4, 7)	E
54140.163	(.033)	5(2, 4)	–	5(1, 5)	E
54163.547	(.019)	5(2, 4)	–	5(1, 5)	A
54695.742	(.062)	8(1, 7)	–	8(1, 8)	E
54730.461	(.028)	8(1, 7)	–	8(1, 8)	A
54811.114	(.053)	9(3, 6)	–	9(2, 7)	E
54821.814	(.025)	9(3, 6)	–	9(2, 7)	A
55047.540	(.029)	4(1, 4)	–	3(0, 3)	E
55051.323	(.017)	4(1, 4)	–	3(0, 3)	A
56244.004	(.066)	8(1, 7)	–	8(0, 8)	E
56278.069	(.027)	8(1, 7)	–	8(0, 8)	A
56529.914	(.042)	5(1, 5)	–	4(1, 4)	E
56531.744	(.016)	5(1, 5)	–	4(1, 4)	A
56570.018	(3.130)	9(7, 3)	–	10(6, 5)	E
56623.397	(3.109)	9(7, 2)	–	10(6, 4)	E
56642.724	(.252)	9(7, 3)	–	10(6, 4)	A
56643.689	(.252)	9(7, 2)	–	10(6, 5)	A
57403.153	(.041)	4(2, 3)	–	4(0, 4)	E
57426.182	(.023)	4(2, 3)	–	4(0, 4)	A
57612.687	(.069)	8(3, 5)	–	8(2, 6)	E
57623.039	(.024)	8(3, 5)	–	8(2, 6)	A
58565.716	(.042)	5(0, 5)	–	4(0, 4)	E
58568.461	(.017)	5(0, 5)	–	4(0, 4)	A
59265.349	(.039)	6(2, 5)	–	6(1, 6)	E
59291.510	(.020)	6(2, 5)	–	6(1, 6)	A
59405.842	(.055)	11(2, 9)	–	11(1,10)	E
59441.450	(.026)	11(2, 9)	–	11(1,10)	A
59464.648	(4.858)	11(8, 4)	–	12(7, 6)	E
59511.565	(4.831)	11(8, 3)	–	12(7, 5)	E
59539.051	(.384)	11(8, 4)	–	12(7, 5)	A
59539.277	(.384)	11(8, 3)	–	12(7, 6)	A
59617.769	(.041)	5(2, 4)	–	5(0, 5)	E
59641.205	(.022)	5(2, 4)	–	5(0, 5)	A
60780.332	(.042)	5(2, 4)	–	4(2, 3)	E
60783.484	(.016)	5(2, 4)	–	4(2, 3)	A
60784.598	(.090)	7(3, 4)	–	7(2, 5)	E
60793.522	(.025)	7(3, 4)	–	7(2, 5)	A
61316.049	(.394)	5(3, 3)	–	4(3, 1)	E
61400.976	(.059)	5(4, 1)	–	4(4, 0)	E
61405.369	(.058)	5(4, 2)	–	4(4, 1)	E
61406.107	(.018)	5(4, 2)	–	4(4, 1)	A
61408.850	(.018)	5(4, 1)	–	4(4, 0)	A
61500.038	(.016)	5(3, 3)	–	4(3, 2)	A
61535.209	(.083)	5(3, 3)	–	4(3, 2)	E
61612.349	(.086)	5(3, 2)	–	4(3, 1)	E
61657.502	(.016)	5(3, 2)	–	4(3, 1)	A
61831.509	(.390)	5(3, 2)	–	4(3, 2)	E
62148.515	(.405)	9(2, 7)	–	8(3, 6)	E
62149.466	(.059)	9(2, 7)	–	8(3, 6)	A
62742.211	(.157)	7(1, 6)	–	6(2, 5)	E
62746.317	(.028)	7(1, 6)	–	6(2, 5)	A
63028.908	(.047)	6(2, 5)	–	6(0, 6)	E
63054.597	(.022)	6(2, 5)	–	6(0, 6)	A
63296.981	(.042)	5(2, 3)	–	4(2, 2)	E
63305.348	(.016)	5(2, 3)	–	4(2, 2)	A
63786.936	(.123)	6(3, 3)	–	6(2, 4)	E
63788.714	(.026)	6(3, 3)	–	6(2, 4)	A
63792.104	(.087)	6(0, 6)	–	5(1, 5)	E
63794.531	(.019)	6(0, 6)	–	5(1, 5)	A
64043.321	(.046)	5(1, 5)	–	4(0, 4)	E
64046.119	(.019)	5(1, 5)	–	4(0, 4)	A
64416.524	(.042)	5(1, 4)	–	4(1, 3)	E
64423.617	(.017)	5(1, 4)	–	4(1, 3)	A
65212.506	(.110)	2(2, 1)	–	1(1, 0)	E
65235.128	(.054)	7(2, 6)	–	7(1, 7)	E
65260.744	(.022)	2(2, 1)	–	1(1, 0)	A
65264.874	(.023)	7(2, 6)	–	7(1, 7)	A
65277.381	(.084)	12(2,10)	–	12(2,11)	E
65323.450	(.047)	12(2,10)	–	12(2,11)	A
65415.355	(.109)	2(2, 0)	–	1(1, 0)	E
65928.888	(.198)	5(3, 3)	–	5(2, 3)	E
66203.119	(.027)	5(3, 2)	–	5(2, 3)	A
66225.188	(.198)	5(3, 2)	–	5(2, 3)	E
66291.234	(.100)	9(1, 8)	–	9(1, 9)	E
66332.098	(.043)	9(1, 8)	–	9(1, 9)	A
66823.390	(.105)	2(2, 1)	–	1(1, 1)	E
67010.773	(.022)	2(2, 0)	–	1(1, 1)	A
67026.239	(.114)	2(2, 0)	–	1(1, 1)	E
67236.562	(.103)	9(1, 8)	–	9(0, 9)	E
67276.879	(.042)	9(1, 8)	–	9(0, 9)	A
67555.663	(.087)	6(1, 6)	–	5(1, 5)	E
67557.618	(.020)	6(1, 6)	–	5(1, 5)	A
67690.660.	(.270)	4(3, 2)	–	4(2, 2)	E
67696.383	(.062)	7(2, 6)	–	7(0, 7)	E
67725.462	(.024)	7(2, 6)	–	7(0, 7)	A
67850.965	(.028)	4(3, 1)	–	4(2, 2)	A
67909.820	(.261)	4(3, 1)	–	4(2, 2)	E
68633.803	(.295)	3(3, 1)	–	3(2, 1)	E
68775.911	(.030)	3(3, 0)	–	3(2, 1)	A
68849.524	(.257)	3(3, 0)	–	3(2, 1)	E
69269.709	(.088)	6(0, 6)	–	5(0, 5)	E
69272.189	(.020)	6(0, 6)	–	5(0, 5)	A
69340.196	(.251)	3(3, 1)	–	3(2, 2)	E
69460.299	(.030)	3(3, 1)	–	3(2, 2)	A
69555.917	(.302)	3(3, 0)	–	3(2, 2)	E
69723.717	(.256)	4(3, 2)	–	4(2, 3)	E
69724.857	(.090)	12(2,10)	–	12(1,11)	E
69767.856	(.044)	12(2,10)	–	12(1,11)	A
69827.936	(.028)	4(3, 2)	–	4(2, 3)	A
69942.878	(.277)	4(3, 1)	–	4(2, 3)	E
70478.594	(.195)	5(3, 3)	–	5(2, 4)	E
70544.490	(.026)	5(3, 3)	–	5(2, 4)	A
70774.894	(.205)	5(3, 2)	–	5(2, 4)	E
71703.653	(.125)	6(3, 4)	–	6(2, 5)	E
71744.005	(.025)	6(3, 4)	–	6(2, 5)	A
71991.183	(.081)	8(2, 7)	–	8(1, 8)	E
72025.068	(.030)	8(2, 7)	–	8(1, 8)	A
72039.498	(4.852)	10(8, 3)	–	11(7, 5)	E
72086.058	(4.824)	10(8, 2)	–	11(7, 4)	E
72116.527	(.406)	10(8, 3)	–	11(7, 4)	A
72116.587	(.406)	10(8, 2)	–	11(7, 5)	A
72680.848	(.088)	6(2, 5)	–	5(2, 4)	E
72685.581	(.020)	6(2, 5)	–	5(2, 4)	A

Table 6. Microwave transitions of $H^{12}C^{16}O_2{}^{12}CH_3$ in order of frequency - Continued.

FREQUENCY	UNCERTAINTY	J	K+	K-	J´	K+	K-	S
72762.060	(.163)	12	3	9	11	4	8	A
72763.108	(1.099)	12	3	9	11	4	8	E
73033.268	(.090)	6	1	6	5	0	5	E
73035.275	(.021)	6	1	6	5	0	5	A
73523.201	(.094)	7	3	5	7	2	6	E
73539.445	(.087)	8	2	7	8	0	8	E
73555.045	(.023)	7	3	5	7	2	6	A
73572.675	(.031)	8	2	7	8	0	8	A
73609.607	(.247)	6	3	4	5	3	2	E
73658.206	(.120)	6	5	1	5	5	0	E
73664.379	(.120)	6	5	2	5	5	1	E
73665.596	(.025)	6	5	2	5	5	1	A
73665.736	(.025)	6	5	1	5	5	0	A
73782.907	(.102)	6	4	2	5	4	1	E
73784.523	(.020)	6	4	3	5	4	2	A
73787.883	(.101)	6	4	3	5	4	2	E
73796.793	(.020)	6	4	2	5	4	1	A
73885.096	(.019)	6	3	4	5	3	3	A
73905.907	(.128)	6	3	4	5	3	3	E
74263.583	(.130)	6	3	3	5	3	2	E
74296.755	(.019)	6	3	3	5	3	2	A
74559.883	(.243)	6	3	3	5	3	3	E
75846.268	(.049)	3	2	2	2	1	1	E
75869.652	(.024)	3	2	2	2	1	1	A
76018.152	(.160)	7	0	7	6	1	6	E
76020.807	(.028)	7	0	7	6	1	6	A
76059.333	(.074)	8	3	6	8	2	7	E
76089.362	(.024)	8	3	6	8	2	7	A
76701.834	(.087)	6	2	4	5	2	3	E
76711.160	(.020)	6	2	4	5	2	3	A
76796.094	(.088)	6	1	5	5	1	4	E
76804.010	(.021)	6	1	5	5	1	4	A
77953.333	(.157)	10	1	9	10	1	10	E
77999.826	(.065)	10	1	9	10	1	10	A
78479.407	(.161)	7	1	7	6	1	6	E
78481.394	(.028)	7	1	7	6	1	6	A
78517.423	(.159)	10	1	9	10	0	10	E
78563.501	(.064)	10	1	9	10	0	10	A
78775.297	(.261)	8	1	7	7	2	6	E
78782.219	(.043)	8	1	7	7	2	6	A
79401.852	(.057)	9	3	7	9	2	8	E
79432.741	(.026)	9	3	7	9	2	8	A
79449.807	(.122)	9	2	8	9	1	9	E
79488.227	(.044)	9	2	8	9	1	9	A
79781.712	(.161)	7	0	7	6	0	6	E
79783.893	(.029)	7	0	7	6	0	6	A
79840.932	(.185)	12	4	8	12	3	9	E
79849.335	(.059)	12	4	8	12	3	9	A
80395.135	(.126)	9	2	8	9	0	9	E
80433.008	(.044)	9	2	8	9	0	9	A
80565.133	(.577)	10	2	8	9	3	7	E
80572.499	(.091)	10	2	8	9	3	7	A
81380.587	(.052)	3	2	1	2	1	2	E
81392.300	(.024)	3	2	1	2	1	2	A
82242.966	(.163)	7	1	7	6	0	6	E
82244.481	(.029)	7	1	7	6	0	6	A
83605.297	(.051)	10	3	8	10	2	9	E
83638.420	(.032)	10	3	8	10	2	9	A
84224.513	(.222)	11	4	7	11	3	8	E
84233.330	(.054)	11	4	7	11	3	8	A
84449.186	(.162)	7	2	6	6	2	5	E
84454.758	(.028)	7	2	6	6	2	5	A
85614.759	(.192)	7	3	5	6	3	3	E
85638.441	(.042)	4	2	3	3	1	2	E
85655.828	(.025)	4	2	3	3	1	2	A
85919.123	(.216)	7	6	1	6	6	0	E
85927.204	(.039)	7	6	2	6	6	1	A
85927.210	(.039)	7	6	1	6	6	0	A
85927.218	(.215)	7	6	2	6	6	1	E
86020.999	(.189)	7	5	2	6	5	1	E
86028.240	(.189)	7	5	3	6	5	2	E
86029.422	(.032)	7	5	3	6	5	2	A
86030.189	(.032)	7	5	2	6	5	1	A
86210.053	(.028)	7	4	4	6	4	3	A
86223.529	(.173)	7	4	3	6	4	2	E
86224.527	(.172)	7	4	4	6	4	3	E
86250.551	(.028)	7	4	3	6	4	2	A
86265.798	(.027)	7	3	5	6	3	4	A
86268.735	(.169)	7	3	5	6	3	4	E
87143.400	(.169)	7	3	4	6	3	3	E
87161.285	(.027)	7	3	4	6	3	3	A
87475.526	(7.106)	11	9	3	12	8	5	E
87509.106	(.177)	10	2	9	10	1	10	E
87514.605	(7.072)	11	9	2	12	8	4	E
87552.331	(.065)	10	2	9	10	1	10	A
87555.905	(.611)	11	9	3	12	8	4	A
87555.908	(.611)	11	9	2	12	8	5	A
87766.421	(.264)	8	0	8	7	1	7	E
87769.024	(.044)	8	0	8	7	1	7	A
87797.375	(.189)	7	3	4	6	3	4	E
88073.196	(.180)	10	2	9	10	0	10	E
88116.006	(.064)	10	2	9	10	0	10	A
88175.099	(.267)	10	4	6	10	3	7	E
88180.409	(.049)	10	4	6	10	3	7	A
88687.017	(.068)	11	3	9	11	2	10	E
88723.253	(.043)	11	3	9	11	2	10	A
88843.242	(.162)	7	1	6	6	1	5	E
88851.610	(.029)	7	1	6	6	1	5	A
89314.683	(.264)	8	1	8	7	1	7	E
89316.632	(.044)	8	1	8	7	1	7	A
89414.954	(.232)	11	1	10	11	1	11	E
89466.547	(.095)	11	1	10	11	1	11	A
89745.549	(.234)	11	1	10	11	0	11	E
89796.846	(.095)	11	1	10	11	0	11	A
90145.738	(.161)	7	2	5	6	2	4	E
90156.476	(.029)	7	2	5	6	2	4	A
90227.675	(.265)	8	0	8	7	0	7	E
90229.612	(.044)	8	0	8	7	0	7	A
90877.285	(.347)	9	4	6	9	3	6	E
91356.749	(.046)	9	4	5	9	3	6	A
91365.759	(.335)	9	4	5	9	3	6	E
91775.937	(.266)	8	1	8	7	0	7	E
91777.220	(.044)	8	1	8	7	0	7	A
92560.425	(.058)	9	3	7	9	1	8	E
92588.871	(.036)	9	3	7	9	1	8	A
93161.070	(.062)	10	3	8	10	1	9	E
93190.925	(.040)	10	3	8	10	1	9	A
93354.774	(.069)	8	3	6	8	1	7	E
93383.968	(.035)	8	3	6	8	1	7	A
93396.984	(.453)	8	4	5	8	3	5	E
93660.060	(.044)	8	4	4	8	3	5	A
93700.242	(.429)	8	4	4	8	3	5	E

Table 6. Microwave transitions of $H^{12}C^{16}O_2{}^{12}CH_3$ in order of frequency - Continued.

FREQUENCY	UNCERTAINTY	J K+ K-	-	J´ K+ K-	S
94378.696	(.399)	9(1, 8)	-	8(2, 7)	E
94387.534	(.066)	9(1. 8)	-	8(2. 7)	A
94626.971	(.108)	12(3,10)	-	12(2,11)	E
94632.800	(.056)	5(2, 4)	-	4(1, 3)	E
94647.340	(.027)	5(2, 4)	-	4(1, 3)	A
94666.944	(.059)	12(3,10)	-	12(2,11)	A
94979.397	(.521)	7(4, 4)	-	7(3, 4)	E
95175.951	(.045)	7(4, 3)	-	7(3, 4)	A
95230.177	(.091)	7(3, 5)	-	7(1, 6)	E
95247.054	(.474)	7(4, 3)	-	7(3, 4)	E
95263.487	(.035)	7(3, 5)	-	7(1, 6)	A
95330.978	(.084)	11(3, 9)	-	11(1,10)	E
95363.812	(.048)	11(3, 9)	-	11(1,10)	A
95898.270	(.568)	6(4, 3)	-	6(3, 3)	E
96058.915	(.250)	11(2,10)	-	11(1,11)	E
96070.738	(.266)	8(2, 7)	-	7(2, 6)	E
96076.826	(.043)	8(2, 7)	-	7(2, 6)	A
96086.684	(.047)	6(4, 2)	-	6(3, 3)	A
96107.106	(.093)	11(2,10)	-	11(1,11)	A
96166.925	(.471)	6(4, 2)	-	6(3, 3)	E
96373.969	(.647)	5(4, 2)	-	5(3, 2)	E
96389.509	(.252)	11(2,10)	-	11(0,11)	E
96437.405	(.093)	11(2,10)	-	11(0,11)	A
96508.038	(.483)	7(4, 4)	-	7(3, 5)	E
96552.245	(.478)	6(4, 3)	-	6(3, 4)	E
96586.646	(.049)	5(4, 1)	-	5(3, 2)	A
96613.445	(.439)	8(4, 5)	-	8(3, 6)	E
96637.797	(.044)	7(4, 4)	-	7(3, 5)	A
96647.601	(.443)	5(4, 1)	-	5(3, 2)	E
96670.269	(.448)	5(4, 2)	-	5(3, 3)	E
96693.542	(.047)	6(4, 3)	-	6(3, 4)	A
96709.243	(.043)	8(4, 5)	-	8(3, 6)	A
96775.695	(.514)	7(4, 3)	-	7(3, 5)	E
96794.115	(.049)	5(4, 2)	-	5(3, 3)	A
96800.109	(.441)	4(4, 1)	-	4(3, 2)	E
96820.900	(.561)	6(4, 2)	-	6(3, 4)	E
96835.298	(.052)	4(4, 0)	-	4(3, 1)	A
96858.973	(.437)	4(4, 0)	-	4(3, 1)	E
96888.046	(.052)	4(4, 1)	-	4(3, 2)	A
96916.703	(.447)	8(4, 4)	-	8(3, 6)	E
96943.901	(.640)	5(4, 1)	-	5(3, 3)	E
96957.127	(.347)	9(4, 6)	-	9(3, 7)	E
97018.113	(.044)	9(4, 6)	-	9(3, 7)	A
97318.612	(.045)	4(2, 2)	-	3(1, 3)	E
97339.275	(.027)	4(2, 2)	-	3(1, 3)	A
97445.601	(.345)	9(4, 5)	-	9(3, 7)	E
97651.537	(.281)	10(4, 7)	-	10(3, 8)	E
97694.247	(.047)	10(4, 7)	-	10(3, 8)	A
97849.298	(.037)	6(3, 4)	-	6(1, 5)	A
98182.315	(.349)	8(7, 1)	-	7(7, 0)	E
98190.602	(.060)	8(7, 2)	-	7(7, 1)	A
98190.603	(.060)	8(7, 1)	-	7(7, 0)	A
98192.370	(.349)	8(7, 2)	-	7(7, 1)	E
98270.406	(.314)	8(6, 2)	-	7(6, 1)	E
98279.651	(.313)	8(6, 3)	-	7(6, 2)	E
98279.702	(.051)	8(6, 3)	-	7(6, 2)	A
98279.743	(.051)	8(6, 2)	-	7(6, 1)	A
98424.067	(.290)	8(5, 3)	-	7(5, 2)	E
98432.365	(.289)	8(5, 4)	-	7(5, 3)	E
98432.729	(.045)	8(5, 4)	-	7(5, 3)	A
98435.776	(.045)	8(5, 3)	-	7(5, 2)	A
98444.620	(.697)	8(4, 5)	-	7(4, 3)	E
98606.869	(.269)	8(3. 6)	-	7(3. 5)	E
98611.142	(.043)	8(3, 6)	-	7(3, 5)	A
98682.588	(.043)	8(4, 5)	-	7(4, 4)	A
98712.277	(.279)	8(4, 5)	-	7(4, 4)	E
98747.878	(.279)	8(4, 4)	-	7(4, 3)	E
98792.267	(.043)	8(4, 4)	-	7(4, 3)	A
98839.710	(.238)	11(4, 8)	-	11(3, 9)	E
98875.222	(.052)	11(4, 8)	-	11(3, 9)	A
99015.535	(.700)	8(4, 4)	-	7(4, 4)	E
99074.447	(.122)	12(3,10)	-	12(1,11)	E
99111.350	(.061)	12(3,10)	-	12(1,11)	A
99133.316	(.401)	9(0, 9)	-	8(1, 8)	E
99135.723	(.068)	9(0, 9)	-	8(1, 8)	A
99166.694	(.792)	11(2, 9)	-	10(3, 8)	E
99179.128	(.131)	11(2, 9)	-	10(3, 8)	A
100078.644	(.402)	9(1, 9)	-	8(1, 8)	E
100080.504	(.067)	9(1, 9)	-	8(1, 8)	A
100294.689	(.268)	8(3, 5)	-	7(3, 4)	E
100308.158	(.043)	8(3, 5)	-	7(3, 4)	A
100482.273	(.266)	8(1, 7)	-	7(1, 6)	E
100490.661	(.045)	8(1, 7)	-	7(1, 6)	A
100543.523	(.328)	12(1,11)	-	12(1,12)	E
100599.827	(.134)	12(1,11)	-	12(1,12)	A
100659.825	(.203)	12(4, 9)	-	12(3,10)	E
100681.578	(.402)	9(0, 9)	-	8(0, 8)	E
100683.331	(.067)	9(0, 9)	-	8(0, 8)	A
100693.125	(.059)	12(4, 9)	-	12(3,10)	A
100734.496	(.329)	12(1,11)	-	12(0,12)	E
100790.601	(.133)	12(1,11)	-	12(0,12)	A
101626.906	(.402)	9(1, 9)	-	8(0, 8)	E
101628.112	(.067)	9(1, 9)	-	8(0, 8)	A
102897.125	(.099)	6(2, 5)	-	5(1, 4)	E
102909.303	(.030)	6(2, 5)	-	5(1, 4)	A
103466.601	(.265)	8(2, 6)	-	7(2, 5)	E
103478.641	(.044)	8(2, 6)	-	7(2, 5)	A
104990.999	(.342)	12(2,11)	-	12(1,12)	E
105044.233	(.130)	12(2,11)	-	12(1,12)	A
105181.972	(.343)	12(2,11)	-	12(0,12)	E
105235.007	(.130)	12(2,11)	-	12(0,12)	A
105815.923	(.363)	3(3, 1)	-	2(2, 0)	E
105977.962	(.033)	3(3, 1)	-	2(2, 0)	A
106018.772	(.196)	3(3, 1)	-	2(2, 1)	E
106031.644	(.201)	3(3, 0)	-	2(2, 0)	E
106125.365	(.033)	3(3, 0)	-	2(2, 1)	A
106234.494	(.367)	3(3, 0)	-	2(2, 1)	E
107537.268	(.404)	9(2, 8)	-	8(2, 7)	E
107543.664	(.066)	9(2, 8)	-	8(2, 7)	A
109292.248	(.574)	10(1, 9)	-	9(2, 8)	E
109302.055	(.097)	10(1, 9)	-	9(2, 8)	A
110224.632	(.576)	10(0,10)	-	9(1, 9)	E
110226.782	(.099)	10(0,10)	-	9(1, 9)	A
110447.280	(.526)	9(8, 1)	-	8(8, 0)	E
110455.273	(.091)	9(8, 2)	-	8(8, 1)	A
110455.273	(.091)	9(8, 1)	-	8(8, 0)	A
110459.213	(.526)	9(8, 2)	-	8(8, 1)	E
110525.722	(.480)	9(7, 2)	-	8(7, 1)	E
110535.109	(.079)	9(7, 3)	-	8(7, 2)	A
110535.111	(.079)	9(7, 2)	-	8(7, 1)	A
110536.988	(.479)	9(7, 3)	-	8(7, 2)	E
110550.217	(.172)	7(2, 6)	-	6(1, 5)	E

Table 6. Microwave transitions of $H^{12}C^{16}O_2{}^{12}CH_3$ in order of frequency - Continued.

FREQUENCY	UNCERTAINTY	J K+ K-	-	J′ K+ K-	S
110560.051	(.037)	7(2, 6)	-	6(1, 5)	A
110652.713	(.447)	9(6, 3)	-	8(6, 2)	E
110663.098	(.446)	9(6, 4)	-	8(6, 3)	E
110663.193	(.070)	9(6, 4)	-	8(6, 3)	A
110663.387	(.070)	9(6, 3)	-	8(6, 2)	A
110788.722	(.576)	10(1,10)	-	9(1, 9)	E
110790.456	(.099)	10(1,10)	-	9(1, 9)	A
110873.805	(.425)	9(5, 4)	-	8(5, 3)	E
110879.787	(.406)	9(3, 7)	-	8(3, 6)	E
110880.395	(.066)	9(5, 5)	-	8(5, 4)	A
110882.928	(.424)	9(5, 5)	-	8(5, 4)	E
110887.043	(.066)	9(3, 7)	-	8(3, 6)	A
110890.204	(.066)	9(5, 4)	-	8(5, 3)	A
110920.211	(.623)	9(4, 6)	-	8(4, 4)	E
111169.960	(.576)	10(0,10)	-	9(0, 9)	E
111171.563	(.099)	10(0,10)	-	9(0, 9)	A
111195.913	(.065)	9(4, 6)	-	8(4, 5)	A
111223.469	(.430)	9(4, 6)	-	8(4, 5)	E
111408.685	(.428)	9(4, 5)	-	8(4, 4)	E
111453.252	(.065)	9(4, 5)	-	8(4, 4)	A
111674.136	(.404)	9(1, 8)	-	8(1, 7)	E
111682.141	(.067)	9(1, 8)	-	8(1, 7)	A
111711.943	(.628)	9(4, 5)	-	8(4, 5)	E
111734.050	(.577)	10(1,10)	-	9(0, 9)	E
111735.237	(.099)	10(1,10)	-	9(0, 9)	A
113743.168	(.405)	9(3, 6)	-	8(3, 5)	E
113756.562	(.065)	9(3, 6)	-	8(3, 5)	A
115219.784	(.057)	5(2, 3)	-	4(1, 4)	E
115247.219	(.030)	5(2, 3)	-	4(1, 4)	A
116544.741	(.404)	9(2, 7)	-	8(2, 6)	E
116557.788	(.067)	9(2, 7)	-	8(2, 6)	A
117628.070	(1.055)	12(2,10)	-	11(3, 9)	E
117644.358	(.181)	12(2,10)	-	11(3, 9)	A
117777.713	(.275)	8(2, 7)	-	7(1, 6)	E
117785.267	(.050)	8(2, 7)	-	7(1, 6)	A
117785.582	(.287)	4(3, 2)	-	3(2, 1)	E
117902.944	(.034)	4(3, 2)	-	3(2, 1)	A
118004.742	(.246)	4(3, 1)	-	3(2, 1)	E
118491.975	(.242)	4(3, 2)	-	3(2, 2)	E
118648.044	(.034)	4(3, 1)	-	3(2, 2)	A
118711.135	(.291)	4(3, 1)	-	3(2, 2)	E
118804.572	(.777)	12(5, 8)	-	12(4, 8)	E
118848.021	(.579)	10(2, 9)	-	9(2, 8)	E
118854.560	(.096)	10(2, 9)	-	9(2, 8)	A
119146.547	(.099)	12(5, 7)	-	12(4, 8)	A
119174.025	(.725)	12(5, 7)	-	12(4, 8)	E
120860.393	(.895)	11(5, 7)	-	11(4, 7)	E
121100.303	(.093)	11(5, 6)	-	11(4, 7)	A
121129.706	(.792)	11(0,11)	-	10(1,10)	E
121131.584	(.138)	11(0,11)	-	10(1,10)	A
121159.822	(.813)	11(5, 6)	-	11(4, 7)	E
121460.300	(.792)	11(1,11)	-	10(1,10)	E
121461.883	(.138)	11(1,11)	-	10(1,10)	A
121693.796	(.792)	11(0,11)	-	10(0,10)	E
121695.259	(.138)	11(0,11)	-	10(0,10)	A
122024.390	(.792)	11(1,11)	-	10(0,10)	E
122025.558	(.138)	11(1,11)	-	10(0,10)	A
122210.345	(.973)	10(5, 6)	-	10(4, 6)	E
122425.142	(.090)	10(5, 5)	-	10(4, 6)	A
122450.820	(.580)	10(1, 9)	-	9(1, 8)	E
122458.185	(.097)	10(1, 9)	-	9(1, 8)	A
122504.360	(.846)	10(5, 5)	-	10(4, 6)	E
122610.837	(.758)	12(5, 8)	-	12(4, 9)	E
122696.278	(.097)	12(5, 8)	-	12(4, 9)	A
122713.845	(.751)	10(9, 1)	-	9(9, 0)	E
122720.991	(.130)	10(9, 2)	-	9(9, 1)	A
122720.991	(.130)	10(9, 1)	-	9(9, 0)	A
122727.452	(.751)	10(9, 2)	-	9(9, 1)	E
122733.191	(.063)	5(2, 3)	-	4(0, 4)	E
122761.593	(.032)	5(2, 3)	-	4(0, 4)	A
122784.850	(.692)	10(8, 2)	-	9(8, 1)	E
122793.793	(.115)	10(8, 2)	-	9(8, 1)	A
122793.793	(.115)	10(8, 3)	-	9(8, 2)	A
122798.026	(.692)	10(8, 3)	-	9(8, 2)	E
122863.486	(.849)	11(5, 7)	-	11(4, 8)	E
122894.142	(.649)	10(7, 3)	-	9(7, 2)	E
122904.644	(.104)	10(7, 4)	-	9(7, 3)	A
122904.655	(.104)	10(7, 3)	-	9(7, 2)	A
122906.596	(.648)	10(7, 4)	-	9(7, 3)	E
122980.289	(.743)	12(5, 7)	-	12(4, 9)	E
122986.174	(.092)	11(5, 7)	-	11(4, 8)	A
123051.465	(.581)	10(3, 8)	-	9(3, 7)	E
123060.239	(.096)	10(3, 8)	-	9(3, 7)	A
123070.154	(.618)	10(6, 4)	-	9(6, 3)	E
123071.557	(1.061)	9(5, 5)	-	9(4, 5)	E
123081.661	(.098)	10(6, 5)	-	9(6, 4)	A
123081.666	(.617)	10(6, 5)	-	9(6, 4)	E
123082.382	(.098)	10(6, 4)	-	9(6, 3)	A
123162.915	(.857)	11(5, 6)	-	11(4, 8)	E
123199.991	(.878)	10(5, 6)	-	10(4, 7)	E
123257.402	(.638)	10(4, 7)	-	9(4, 5)	E
123297.919	(.089)	9(5, 4)	-	9(4, 5)	A
123346.819	(.090)	10(5, 6)	-	10(4, 7)	A
123366.148	(.792)	11(1,10)	-	10(2, 9)	E
123373.546	(.849)	9(5, 4)	-	9(4, 5)	E
123376.099	(.136)	11(1,10)	-	10(2, 9)	A
123376.177	(.095)	10(5, 6)	-	9(5, 5)	A
123377.861	(.598)	10(5, 5)	-	9(5, 4)	E
123385.835	(.597)	10(5, 6)	-	9(5, 5)	E
123403.280	(.095)	10(5, 5)	-	9(5, 4)	A
123494.006	(.935)	10(5, 5)	-	10(4, 7)	E
123560.031	(.874)	9(5, 5)	-	9(4, 6)	E
123597.314	(1.165)	8(5, 4)	-	8(4, 4)	E
123707.014	(.089)	9(5, 5)	-	9(4, 6)	A
123736.373	(.095)	10(4, 7)	-	9(4, 6)	A
123745.875	(.594)	10(4, 7)	-	9(4, 6)	E
123860.967	(.091)	8(5, 3)	-	8(4, 4)	A
123862.020	(1.023)	9(5, 4)	-	9(4, 6)	E
123900.572	(.872)	8(5, 4)	-	8(4, 5)	E
123908.426	(.856)	8(5, 3)	-	8(4, 4)	E
124022.533	(.090)	8(5, 4)	-	8(4, 5)	A
124180.483	(.897)	7(5, 3)	-	7(4, 4)	E
124211.684	(1.126)	8(5, 3)	-	8(4, 5)	E
124217.458	(.093)	7(5, 2)	-	7(4, 3)	A
124232.237	(.886)	7(5, 2)	-	7(4, 3)	E
124247.047	(.592)	10(4, 6)	-	9(4, 5)	E
124272.392	(.093)	7(5, 3)	-	7(4, 4)	A
124276.057	(.095)	10(4, 6)	-	9(4, 5)	A
124376.770	(.928)	6(5, 2)	-	6(4, 3)	E
124434.767	(.918)	6(5, 1)	-	6(4, 2)	E
124437.820	(.096)	6(5, 1)	-	6(4, 2)	A
124453.024	(.096)	6(5, 2)	-	6(4, 3)	A

Table 6. Microwave transitions of $H^{12}C^{16}O_2{}^{12}CH_3$ in order of frequency - Continued.

FREQUENCY	UNCERTAINTY	J K+ K-	-	J´ K+ K-	S
124500.274	(.957)	5(5, 1)	-	5(4, 2)	E
124559.468	(.947)	5(5, 0)	-	5(4, 1)	E
124568.878	(.099)	5(5, 0)	-	5(4, 1)	A
124571.952	(.099)	5(5, 1)	-	5(4, 2)	A
124735.521	(.643)	10(4, 6)	-	9(4, 6)	E
124832.708	(.412)	9(2, 8)	-	8(1, 7)	E
124838.270	(.070)	9(2, 8)	-	8(1, 7)	A
127437.708	(.580)	10(3, 7)	-	9(3, 6)	E
127452.398	(.096)	10(3, 7)	-	9(3, 6)	A
129225.868	(.207)	5(3, 3)	-	4(2, 2)	E
129296.406	(.580)	10(2, 8)	-	9(2, 7)	E
129297.910	(.036)	5(3, 3)	-	4(2, 2)	A
129310.076	(.098)	10(2, 8)	-	9(2, 7)	A
129522.168	(.196)	5(3, 2)	-	4(2, 2)	E
130009.415	(.205)	12(4, 9)	-	12(2,10)	E
130010.109	(.795)	11(2,10)	-	10(2, 9)	E
130016.658	(.135)	11(2,10)	-	10(2, 9)	A
130036.619	(.088)	12(4, 9)	-	12(2,10)	A
131258.926	(.194)	5(3, 3)	-	4(2, 3)	E
131538.531	(.036)	5(3, 2)	-	4(2, 3)	A
131555.226	(.210)	5(3, 2)	-	4(2, 3)	E
131914.649	(1.054)	12(0,12)	-	11(1,11)	E
131916.260	(.187)	12(0,12)	-	11(1,11)	A
132006.594	(.586)	10(2, 9)	-	9(1, 8)	E
132010.690	(.098)	10(2, 9)	-	9(1, 8)	A
132105.622	(1.054)	12(1,12)	-	11(1,11)	E
132107.034	(.187)	12(1,12)	-	11(1,11)	A
132245.244	(1.054)	12(0,12)	-	11(0,11)	E
132246.559	(.187)	12(0,12)	-	11(0,11)	A
132436.217	(1.054)	12(1,12)	-	11(0,11)	E
132437.333	(.187)	12(1,12)	-	11(0,11)	A
132921.922	(.796)	11(1,10)	-	10(1, 9)	E
132928.604	(.135)	11(1,10)	-	10(1, 9)	A
134764.846	(.247)	11(4, 8)	-	11(2, 9)	E
134797.584	(.080)	11(4, 8)	-	11(2, 9)	A
134981.979	(1.030)	11(10, 1)	-	10(10, 0)	E
134987.609	(.100)	11(10, 1)	-	10(10, 0)	A
134987.689	(.180)	11(10, 2)	-	10(10, 1)	A
134996.942	(1.031)	11(10, 2)	-	10(10, 1)	E
135046.827	(.958)	11(9, 2)	-	10(9, 1)	E
135054.757	(.161)	11(9, 2)	-	10(9, 1)	A
135054.757	(.161)	11(9, 3)	-	10(9, 2)	A
135061.680	(.958)	11(9, 3)	-	10(9, 2)	E
135091.830	(.799)	11(3, 9)	-	10(3, 8)	E
135101.491	(.135)	11(3, 9)	-	10(3, 8)	A
135143.195	(.902)	11(8, 3)	-	10(8, 2)	E
135153.104	(.148)	11(8, 4)	-	10(8, 3)	A
135153.105	(.148)	11(8, 3)	-	10(8, 2)	A
135157.583	(.901)	11(8, 4)	-	10(8, 3)	E
135290.357	(.812)	11(4, 8)	-	10(4, 6)	E
135290.469	(.861)	11(7, 4)	-	10(7, 3)	E
135302.094	(.139)	11(7, 5)	-	10(7, 4)	A
135302.140	(.139)	11(7, 4)	-	10(7, 3)	A
135304.085	(.860)	11(7, 5)	-	10(7, 4)	E
135391.704	(.098)	6(2, 4)	-	5(1, 5)	E
135426.634	(.035)	6(2, 4)	-	5(1, 5)	A
135527.033	(.833)	11(6, 5)	-	10(6, 4)	E
135539.073	(.134)	11(6, 6)	-	10(6, 5)	A
135539.641	(.831)	11(6, 6)	-	10(6, 5)	E
135541.358	(.134)	11(6, 5)		10(6, 4)	A
135649.483	(1.264)	11(5, 7)	-	10(5, 5)	E
135921.821	(.133)	11(5, 7)	-	10(5, 6)	A
135943.497	(.814)	11(5. 7)	-	10(5. 6)	E
135948.912	(.814)	11(5, 6)	-	10(5, 5)	E
135988.364	(.133)	11(5, 6)	-	10(5, 5)	A
136242.926	(1.286)	11(5, 6)	-	10(5, 6)	E
136280.003	(.805)	11(4, 8)	-	10(4, 7)	E
136282.465	(.133)	11(4, 8)	-	10(4, 7)	A
136590.231	(1.055)	12(1,11)	-	11(2,10)	E
136599.755	(.183)	12(1,11)	-	11(2,10)	A
137293.450	(.803)	11(4, 7)	-	10(4, 6)	E
137313.203	(.133)	11(4, 7)	-	10(4, 6)	A
138283.095	(.813)	11(4, 7)	-	10(4, 7)	E
139565.882	(.801)	11(2,10)	-	10(1, 9)	E
139569.163	(.135)	11(2,10)	-	10(1, 9)	A
139834.795	(.150)	6(3, 4)	-	5(2, 3)	E
139877.659	(.040)	6(3, 4)	-	5(2, 3)	A
140137.869	(.302)	10(4, 7)	-	10(2, 8)	E
140181.987	(.072)	10(4, 7)	-	10(2, 8)	A
140869.309	(.103)	6(2, 4)	-	5(0, 5)	E
140904.292	(.036)	6(2, 4)	-	5(0, 5)	A
141037.707	(1.057)	12(2,11)	-	11(2,10)	E
141044.161	(.182)	12(2,11)	-	11(2,10)	A
141244.035	(.797)	11(3, 8)	-	10(3, 7)	E
141260.282	(.135)	11(3, 8)	-	10(3, 7)	A
141653.026	(.798)	11(2, 9)	-	10(2, 8)	E
141666.868	(.137)	11(2, 9)	-	10(2, 8)	A
143234.191	(1.058)	12(1,11)	-	11(1,10)	E
143240.314	(.182)	12(1,11)	-	11(1,10)	A
145038.477	(.153)	6(3, 3)	-	5(2, 4)	E
145051.801	(.039)	6(3, 3)	-	5(2, 4)	A
145688.399	(.382)	9(4, 6)	-	9(2, 7)	E
145755.690	(.068)	9(4, 6)	-	9(2, 7)	A
145951.888	(.427)	4(4, 1)	-	3(3, 1)	E
146014.191	(.423)	4(4, 0)	-	3(3, 0)	E
146015.080	(.053)	4(4, 1)	-	3(3, 0)	A
146023.043	(.053)	4(4, 0)	-	3(3, 1)	A
146977.660	(1.062)	12(3,10)	-	11(3, 9)	E
146987.852	(.182)	12(3,10)	-	11(3, 9)	A
147251.714	(1.368)	12(11, 1)	-	11(11, 0)	E
147255.392	(.241)	12(11, 2)	-	11(11, 1)	A
147255.392	(.241)	12(11, 1)	-	11(11, 0)	A
147267.604	(1.371)	12(11, 2)	-	11(11, 1)	E
147311.182	(1.281)	12(10, 2)	-	11(10, 1)	E
147317.502	(.218)	12(10, 3)	-	11(10, 2)	A
147317.502	(.218)	12(10, 2)	-	11(10, 1)	A
147327.362	(1.282)	12(10, 3)	-	11(10, 2)	E
147397.423	(1.211)	12(9, 3)	-	11(9, 2)	E
147406.155	(.202)	12(9, 3)	-	11(9, 2)	A
147406.155	(.202)	12(9, 4)	-	11(9, 3)	A
147413.484	(1.211)	12(9, 4)	-	11(9, 3)	E
147524.455	(1.158)	12(8, 4)	-	11(8, 3)	E
147535.346	(.190)	12(8, 5)	-	11(8, 4)	A
147535.349	(.190)	12(8, 4)	-	11(8, 3)	A
147540.019	(1.158)	12(8, 5)	-	11(8, 4)	E
147681.668	(1.062)	12(2,11)	-	11(1,10)	E
147684.720	(.182)	12(2,11)	-	11(1,10)	A
147717.688	(1.120)	12(7, 5)	-	11(7, 4)	E
147730.415	(.183)	12(7, 6)	-	11(7, 5)	A
147730.580	(.183)	12(7, 5)	-	11(7, 4)	A
147732.433	(1.119)	12(7, 6)	-	11(7, 5)	E
148027.971	(1.093)	12(6, 6)	-	11(6, 5)	E

Table 6. Microwave transitions of $H^{12}C^{16}O_2{}^{12}CH_3$ in order of frequency - Continued

FREQUENCY	UNCERTAINTY	J K+ K-	-	J′ K+ K-	S
148039.253	(.180)	12(6, 7)	-	11(6, 6)	A
148041.547	(1.092)	12(6, 7)	-	11(6, 6)	E
148045.648	(.180)	12(6, 6)	-	11(6, 5)	A
148245.697	(1.361)	12(5, 8)	-	11(5, 6)	E
148515.859	(.180)	12(5, 8)	-	11(5, 7)	A
148545.126	(1.083)	12(5, 8)	-	11(5, 7)	E
148615.149	(1.079)	12(5, 7)	-	11(5, 6)	E
148664.344	(.179)	12(5, 7)	-	11(5, 6)	A
148797.776	(1.067)	12(4, 9)	-	11(4, 8)	E
148805.755	(.181)	12(4, 9)	-	11(4, 8)	A
148914.578	(1.388)	12(5, 7)	-	11(5, 7)	E
149401.695	(.186)	7(3, 5)	-	6(2, 4)	E
149432.296	(.049)	7(3, 5)	-	6(2, 4)	A
150133.882	(1.820)	12(6, 7)	-	12(5, 7)	E
150390.364	(.171)	12(6, 6)	-	12(5, 7)	A
150447.014	(1.451)	12(6, 6)	-	12(5, 7)	E
150503.334	(1.485)	12(6, 7)	-	12(5, 8)	E
150600.947	(1.065)	12(4, 8)	-	11(4, 7)	E
150618.100	(.180)	12(4, 8)	-	11(4, 7)	A
150636.630	(.170)	12(6, 7)	-	12(5, 8)	A
150816.466	(1.731)	12(6, 6)	-	12(5, 8)	E
151006.914	(1.526)	11(6, 6)	-	11(5, 7)	E
151009.061	(.169)	11(6, 5)	-	11(5, 6)	A
151034.192	(1.505)	11(6, 5)	-	11(5, 6)	E
151113.237	(.169)	11(6, 6)	-	11(5, 7)	A
151410.771	(1.584)	10(6, 5)	-	10(5, 6)	E
151456.067	(.169)	10(6, 4)	-	10(5, 5)	A
151456.072	(1.566)	10(6, 4)	-	10(5, 5)	E
151495.985	(.169)	10(6, 5)	-	10(5, 6)	A
151714.940	(1.641)	9(6, 4)	-	9(5, 5)	E
151763.779	(1.624)	9(6, 3)	-	9(5, 4)	E
151776.965	(.170)	9(6, 3)	-	9(5, 4)	A
151790.501	(.170)	9(6, 4)	-	9(5, 5)	A
151934.770	(1.693)	8(6, 3)	-	8(5, 4)	E
151984.871	(1.677)	8(6, 2)	-	8(5, 3)	E
152003.783	(.173)	8(6, 2)	-	8(5, 3)	A
152007.703	(.173)	8(6, 3)	-	8(5, 4)	A
152087.485	(1.740)	7(6, 2)	-	7(5, 3)	E
152138.532	(1.724)	7(6, 1)	-	7(5, 2)	E
152159.816	(.176)	7(6, 1)	-	7(5, 2)	A
152160.730	(.176)	7(6, 2)	-	7(5, 3)	A
152188.507	(1.781)	6(6, 1)	-	6(5, 2)	E
152240.408	(1.765)	6(6, 0)	-	6(5, 1)	E
152262.794	(.180)	6(6, 0)	-	6(5, 1)	A
152262.948	(.180)	6(6, 1)	-	6(5, 2)	A
153553.206	(1.061)	12(2,10)	-	11(2, 9)	E
153566.721	(.184)	12(2,10)	-	11(2, 9)	A
154984.528	(1.061)	12(3, 9)	-	11(3, 8)	E
155002.095	(.183)	12(3, 9)	-	11(3, 8)	A
157862.827	(.278)	8(3, 6)	-	7(2, 5)	E
157886.962	(.063)	8(3, 6)	-	7(2, 5)	A
157981.779	(.171)	7(2, 5)	-	6(1, 6)	E
158025.493	(.044)	7(2, 5)	-	6(1, 6)	A
158205.478	(.408)	5(4, 2)	-	4(3, 2)	E
158241.060	(.055)	5(4, 2)	-	4(3, 1)	A
158259.949	(.404)	5(4, 1)	-	4(3, 1)	E
158297.241	(.055)	5(4, 1)	-	4(3, 2)	A
159501.028	(.185)	7(3, 4)	-	6(2, 5)	E
159527.505	(.047)	7(3, 4)	-	6(2, 5)	A
161745.338	(.174)	7(2, 5)	-	6(0, 6)	E
161788.580	(.045)	7(2, 5)	-	6(0, 6)	A
165276.013	(.413)	9(3, 7)	-	8(2, 6)	E
165295.365	(.083)	9(3, 7)	-	8(2, 6)	A
170161.853	(.631)	6(4, 3)	-	5(3, 2)	E
170368.081	(.059)	6(4, 3)	-	5(3, 2)	A
170430.508	(.413)	6(4, 2)	-	5(3, 2)	E
170458.153	(.418)	6(4, 3)	-	5(3, 3)	E
170593.996	(.059)	6(4, 2)	-	5(3, 3)	A
170726.808	(.621)	6(4, 2)	-	5(3, 3)	E
171782.738	(.589)	10(3, 8)	-	9(2, 7)	E
171797.816	(.111)	10(3, 8)	-	9(2, 7)	A
175346.531	(.275)	8(3, 5)	-	7(2, 6)	E
175380.905	(.061)	8(3, 5)	-	7(2, 6)	A
177578.162	(.807)	11(3, 9)	-	10(2, 8)	E
177589.230	(.147)	11(3, 9)	-	10(2, 8)	A
178931.944	(2.632)	12(7, 6)	-	12(6, 7)	E
178970.692	(2.610)	12(7, 5)	-	12(6, 6)	E
178993.096	(.287)	12(7, 5)	-	12(6, 6)	A
179002.514	(.287)	12(7, 6)	-	12(6, 7)	A
179241.058	(2.714)	11(7, 5)	-	11(6, 6)	E
179280.975	(2.691)	11(7, 4)	-	11(6, 5)	E
179308.163	(.288)	11(7, 4)	-	11(6, 5)	A
179311.352	(.288)	11(7, 5)	-	11(6, 6)	A
179476.614	(2.789)	10(7, 4)	-	10(6, 5)	E
179517.538	(2.767)	10(7, 3)	-	10(6, 4)	E
179547.381	(.290)	10(7, 3)	-	10(6, 4)	A
179548.331	(.290)	10(7, 4)	-	10(6, 5)	A
179651.684	(2.858)	9(7, 3)	-	9(6, 4)	E
179693.551	(2.836)	9(7, 2)	-	9(6, 3)	E
179725.108	(.293)	9(7, 2)	-	9(6, 3)	A
179725.348	(.293)	9(7, 3)	-	9(6, 4)	A
179777.795	(2.920)	8(7, 2)	-	8(6, 3)	E
179820.541	(2.898)	8(7, 1)	-	8(6, 2)	E
179853.383	(.297)	8(7, 1)	-	8(6, 2)	A
179853.432	(.297)	8(7, 2)	-	8(6, 3)	A
179865.075	(2.976)	7(7, 1)	-	7(6, 2)	E
179908.632	(2.954)	7(7, 0)	-	7(6, 1)	E
179942.524	(.301)	7(7, 0)	-	7(6, 1)	A
179942.531	(.301)	7(7, 1)	-	7(6, 2)	A
182122.797	(.555)	7(4, 4)	-	6(3, 3)	E
182281.380	(.068)	7(4, 4)	-	6(3, 3)	A
182390.454	(.455)	7(4, 3)	-	6(3, 3)	E
182776.772	(.462)	7(4, 4)	-	6(3, 4)	E
182902.796	(1.071)	12(3,10)	-	11(2, 9)	E
182910.214	(.192)	12(3,10)	-	11(2, 9)	A
182959.451	(.067)	7(4, 3)	-	6(3, 4)	A
182968.973	(.276)	8(2, 6)	-	7(1, 7)	E
183022.740	(.060)	8(2, 6)	-	7(1, 7)	A
183044.429	(.547)	7(4, 3)	-	6(3, 4)	E
185430.228	(.279)	8(2, 6)	-	7(0, 7)	E
185483.328	(.060)	8(2, 6)	-	7(0, 7)	A
185602.060	(.194)	7(3, 4)	-	6(1, 5)	E
185632.798	(.057)	7(3, 4)	-	6(1, 5)	A
185905.644	(.921)	5(5, 1)	-	4(4, 1)	E
185960.444	(.911)	5(5, 0)	-	4(4, 0)	E
185977.714	(.100)	5(5, 1)	-	4(4, 0)	A
185978.072	(.100)	5(5, 0)	-	4(4, 1)	A
193018.962	(.407)	9(3, 6)	-	8(2, 7)	E
193060.642	(.082)	9(3, 6)	-	8(2, 7)	A
193691.674	(.511)	8(4, 5)	-	7(3, 4)	E
193802.683	(.082)	8(4, 5)	-	7(3, 4)	A
193994.932	(.473)	8(4, 4)	-	7(3, 4)	E

Table 6. Microwave transitions of $H^{12}C^{16}O_2{}^{12}CH_3$ in order of frequency - Continued.

FREQUENCY	UNCERTAINTY	J K+ K- - J´ K+ K-	S
195220.314	(.478)	8(4, 5) - 7(3, 5)	E
195485.920	(.081)	8(4, 4) - 7(3, 5)	A
195523.572	(.506)	8(4, 4) - 7(3, 5)	E
197053.507	(.282)	8(3, 5) - 7(1, 6)	E
197089.347	(.068)	8(3, 5) - 7(1, 6)	A
198164.654	(.886)	6(5, 2) - 5(4, 2)	E
198217.673	(.875)	6(5, 1) - 5(4, 1)	E
198234.460	(.103)	6(5, 2) - 5(4, 1)	A
198237.701	(.103)	6(5, 1) - 5(4, 2)	A
198645.504	(.927)	12(5, 8) - 12(3, 9)	E
198739.973	(.154)	12(5, 8) - 12(3, 9)	A
204620.454	(.509)	9(4, 6) - 8(3, 5)	E
204690.438	(.104)	9(4, 6) - 8(3, 5)	A
205108.927	(.499)	9(4, 5) - 8(3, 5)	E
207004.667	(4.274)	12(8, 5) - 12(7, 6)	E
207036.020	(4.246)	12(8, 4) - 12(7, 5)	E
207074.401	(.453)	12(8, 4) - 12(7, 5)	A
207074.622	(.453)	12(8, 5) - 12(7, 6)	A
207197.081	(4.369)	11(8, 4) - 11(7, 5)	E
207229.253	(4.341)	11(8, 3) - 11(7, 4)	E
207269.632	(.456)	11(8, 3) - 11(7, 4)	A
207269.691	(.456)	11(8, 4) - 11(7, 5)	A
207343.583	(4.457)	10(8, 3) - 10(7, 4)	E
207376.527	(4.429)	10(8, 2) - 10(7, 3)	E
207418.668	(.460)	10(8, 2) - 10(7, 3)	A
207418.681	(.460)	10(8, 3) - 10(7, 4)	A
207452.152	(4.537)	9(8, 2) - 9(7, 3)	E
207485.818	(4.508)	9(8, 1) - 9(7, 2)	E
207529.529	(.465)	9(8, 1) - 9(7, 2)	A
207529.531	(.465)	9(8, 2) - 9(7, 3)	A
207529.927	(4.609)	8(8, 1) - 8(7, 2)	E
207564.260	(4.580)	8(8, 0) - 8(7, 1)	E
207609.367	(.470)	8(8, 0) - 8(7, 1)	A
207609.367	(.470)	8(8, 1) - 8(7, 2)	A
207836.914	(.501)	9(4, 6) - 8(3, 6)	E
208325.388	(.508)	9(4, 5) - 8(3, 6)	E
208328.030	(.102)	9(4, 5) - 8(3, 6)	A
210199.031	(.419)	9(2, 7) - 8(1, 8)	E
210263.895	(.085)	9(2, 7) - 8(1, 8)	A
210314.403	(.413)	9(3, 6) - 8(1, 7)	E
210355.248	(.087)	9(3, 6) - 8(1, 7)	A
210405.011	(.852)	7(5, 3) - 6(4, 3)	E
210455.766	(.842)	7(5, 2) - 6(4, 2)	E
210467.088	(.111)	7(5, 3) - 6(4, 2)	A
210483.367	(.111)	7(5, 2) - 6(4, 3)	A
211747.293	(.422)	9(2, 7) - 8(0, 8)	E
211811.503	(.085)	9(2, 7) - 8(0, 8)	A
212919.402	(.580)	10(3, 7) - 9(2, 8)	E
212969.376	(.112)	10(3, 7) - 9(2, 8)	A
214623.160	(.620)	10(4, 7) - 9(3, 6)	E
214670.249	(.133)	10(4, 7) - 9(3, 6)	A
221692.648	(.618)	10(4, 6) - 9(3, 7)	E
221717.043	(.131)	10(4, 6) - 9(3, 7)	A
222612.848	(.831)	8(5, 4) - 7(4, 4)	E
222649.265	(.125)	8(5, 4) - 7(4, 3)	A
222656.304	(.821)	8(5, 3) - 7(4, 3)	E
222709.090	(.124)	8(5, 3) - 7(4, 4)	A
223465.455	(.813)	11(4, 8) - 10(3, 7)	E
223500.317	(.170)	11(4, 8) - 10(3, 7)	A
225852.886	(1.706)	6(6, 1) - 5(5, 1)	E
225898.614	(1.689)	6(6, 0) - 5(5, 0)	E
225928.529	(.183)	6(6, 1) - 5(5, 0)	A
225928.544	(.183)	6(6, 0) - 5(5, 1)	A
226077.975	(.587)	10(3, 7) - 9(1, 8)	E
226125.505	(.115)	10(3, 7) - 9(1, 8)	A
231019.195	(1.067)	12(4, 9) - 11(3, 8)	E
231045.790	(.216)	12(4, 9) - 11(3, 8)	A
234480.242	(1.152)	9(5, 5) - 8(4, 4)	E
234737.393	(.145)	9(5, 5) - 8(4, 4)	A
234782.231	(.835)	9(5, 4) - 8(4, 4)	E
234783.500	(.847)	9(5, 5) - 8(4, 5)	E
234889.010	(6.448)	12(9, 4) - 12(8, 5)	E
234912.028	(6.415)	12(9, 3) - 12(8, 4)	E
234916.706	(.144)	9(5, 4) - 8(4, 5)	A
234962.060	(.676)	12(9, 3) - 12(8, 4)	A
234962.063	(.676)	12(9, 4) - 12(8, 5)	A
235015.545	(6.556)	11(9, 3) - 11(8, 4)	E
235039.060	(6.523)	11(9, 2) - 11(8, 3)	E
235085.489	(1.117)	9(5, 4) - 8(4, 5)	E
235091.253	(.681)	11(9, 2) - 11(8, 3)	A
235091.254	(.681)	11(9, 3) - 11(8, 4)	A
235111.449	(6.656)	10(9, 2) - 10(8, 3)	E
235135.428	(6.622)	10(9, 1) - 10(8, 2)	E
235182.022	(6.748)	9(9, 1) - 9(8, 2)	E
235189.601	(.687)	10(9, 1) - 10(8, 2)	A
235189.601	(.687)	10(9, 2) - 10(8, 3)	A
235206.433	(6.713)	9(9, 0) - 9(8, 1)	E
235262.404	(.693)	9(9, 0) - 9(8, 1)	A
235262.404	(.693)	9(9, 1) - 9(8, 2)	A
235315.416	(.798)	11(3, 8) - 10(2, 9)	E
235375.098	(.151)	11(3, 8) - 10(2, 9)	A
235934.632	(.810)	11(4, 7) - 10(3, 8)	E
235970.007	(.167)	11(4, 7) - 10(3, 8)	A
238115.725	(1.654)	7(6, 2) - 6(5, 2)	E
238159.531	(1.637)	7(6, 1) - 6(5, 1)	E
238189.997	(.190)	7(6, 2) - 6(5, 1)	A
238190.158	(.190)	7(6, 1) - 6(5, 2)	A
239416.793	(.605)	10(2, 8) - 9(1, 9)	E
239493.468	(.122)	10(2, 8) - 9(1, 9)	A
244871.189	(.804)	11(3, 8) - 10(1, 9)	E
244927.602	(.153)	11(3, 8) - 10(1, 9)	A
246457.393	(1.111)	10(5, 6) - 9(4, 5)	E
246660.318	(.172)	10(5, 6) - 9(4, 5)	A
246751.408	(.919)	10(5, 5) - 9(4, 5)	E
246945.867	(.934)	10(5, 6) - 9(4, 6)	E
247124.072	(.172)	10(5, 5) - 9(4, 6)	A
247239.881	(1.085)	10(5, 5) - 9(4, 6)	E
250367.135	(1.603)	8(6, 3) - 7(5, 3)	E
250408.938	(1.586)	8(6, 2) - 7(5, 2)	E
250439.510	(.201)	8(6, 3) - 7(5, 2)	A
250440.480	(.201)	8(6, 2) - 7(5, 3)	A
251443.750	(1.061)	12(4, 8) - 11(3, 9)	E
251486.617	(.213)	12(4, 8) - 11(3, 9)	A

Table 7. Additionally measured transition frequencies (MHz) of methyl formate.

$J'\ K'_-\ K'_+$ - $J''\ K''_-\ K''_+$	S	Frequency	Uncertainty
13(3,10) - 13(2,11)	A	57537.987	(0.020)
13(3,10) - 13(2,11)	E	57514.088	(0.020)
13(3,10) - 13(3,11)	A	34458.792	(0.020)
13(3,10) - 13(3,11)	E	34426.526	(0.020)
14(3,11) - 14(3,12)	A	45887.909	(0.020)
14(3,11) - 14(3,12)	E	45847.350	(0.020)
14(4,10) - 14(4,11)	A	11216.260	(0.020)
14(4,10) - 14(4,11)	E	11203.192	(0.020)
15(4,11) - 15(4,12)	A	17493.929	(0.020)
15(4,11) - 15(4,12)	E	17473.126	(0.020)
16(4,12) - 16(4,13)	A	25759.832	(0.020)
16(4,12) - 16(4,13)	E	25730.386	(0.020)
17(4,13) - 17(4,14)	A	36017.448	(0.020)
17(4,13) - 17(4,14)	E	35978.769	(0.020)
18(4,14) - 18(4,15)	A	48120.276	(0.020)
18(4,14) - 18(4,15)	E	48072.223	(0.020)
18(5,13) - 18(5,14)	A	11189.171	(0.020)
18(5,13) - 18(5,14)	E	11174.063	(0.020)
19(5,14) - 19(5,15)	A	17325.514	(0.020)
19(5,14) - 19(5,15)	E	17301.946	(0.020)
20(5,15) - 20(5,16)	A	25530.745	(0.020)
20(5,15) - 20(5,16)	E	25497.551	(0.020)
21(5,16) - 21(5,17)	A	35898.153	(0.020)
21(5,16) - 21(5,17)	E	35854.561	(0.020)
22(5,17) - 22(5,18)	A	48345.707	(0.020)
22(5,17) - 22(5,18)	E	48291.688	(0.020)
22(6,16) - 22(6,17)	A	10664.468	(0.020)
22(6,16) - 22(6,17)	E	10648.062	(0.020)
23(6,17) - 23(6,18)	A	16468.866	(0.020)
23(6,17) - 23(6,18)	E	16443.766	(0.020)
26(6,20) - 26(6,21)	A	46978.529	(0.020)
26(7,19) - 26(7,20)	A	9836.160	(0.020)
26(7,19) - 26(7,20)	E	9819.330	(0.020)
27(7,20) - 27(7,21)	A	15180.057	(0.020)
27(7,20) - 27(7,21)	E	15154.794	(0.020)
30(7,23) - 30(7,24)	A	44394.225	(0.020)
30(8,22) - 30(8,23)	A	8844.515	(0.020)
30(8,22) - 30(8,23)	E	8828.415	(0.020)
31(8,23) - 31(8,24)	A	13652.665	(0.020)
31(8,23) - 31(8,24)	E	13628.716	(0.020)
35(8,27) - 35(8,28)	A	55049.417	(0.020)
35(9,26) - 35(9,27)	A	12029.804	(0.020)
35(9,26) - 35(9,27)	E	12008.790	(0.020)
36(9,27) - 36(9,28)	A	18040.836	(0.020)
36(9,27) - 36(9,28)	E	18010.377	(0.020)
39(10,29) - 39(10,30)	A	10413.575	(0.020)
39(10,29) - 39(10,30)	E	10397.132	(0.020)
40(10,30) - 40(10,31)	A	15677.131	(0.020)
40(10,30) - 40(10,31)	E	15651.956	(0.020)

3.1. Methyl Formate References

a. References to the Tables

[59A] Curl, R. F., Jr., J. Chem. Phys. **30**, 1529 (1959). "Microwave Spectrum, Barrier to Internal Rotation, and Structure of Methyl Formate."

[75A] Brown, R. D., Crofts, J. G., Gardner, F. F., Godfrey, P. D., Robinson, B. J., and Whiteoak, J. B., Astrophys. J. **197**, 29 (1975). "Discovery of Interstellar Methyl Formate."

b. Other References

O'Gorman, J. M., Shand, W., and Schomaker, V., J. Am. Chem. Soc. **72**, 4222 (1950). "An Electron Diffraction Investigation of Methyl Formate, Methyl Acetate and Methyl Chloroformate."

Wang, J. H. S., and Flygare, W. H., J. Chem. Phys. **53**, 4479 (1970). "Molecular Zeeman Effect and the Determination of the Molecular Magnetic Moments (g Values), Magnetic Susceptibilities, and Molecular Quadrupole Moments in Methyl Formate and Glycolaldehyde."

Wang, J. H. S., and Flygare, W. H., J. Chem. Phys. **55**, 3616 (1971). "Erratum."

Popov, E. M., Kogan, G. A., Struchova, M. I. and Zheltova, V. N., Zh.Strukt. Khim. **12**, 61 (1971). "Vibrational Spectra and Force Fields of Methyl Formate and Methyl Acetate."

Churchwell, E., and Winnewisser, G., Astron. Astrophys. **45**, 229 (1975). "Observations of Methyl Formate in the Galactic Center."