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CALCULATED ABSORPTION COEFFICIENTS FOR LO-VIBRATIONAL CO LASER FREQUENCIES

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Ohio State University

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CO lasers operating on the lower vibrational bands (4-3, 3-2, 2-1, 1-0) will suffer less atmospheric absorption loss than higher band CO lasers due mainly to operation further from the 6.3μ water vapor band.

In this report the AFCRL absorption line-data tape is used to compute the CO, CO_2, and H_2O absorption coefficients for the mid-

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LATITUDE summer model and 115 laser frequencies of the 5-4 to 1-0 CO bands for altitudes of sea level, 3 km, and 6 km.

It is found that at sea level 17 of these lines have a lower absorption coefficient than the P(20) CO_2 laser line for the same atmospheric model.

The calculated results are being used to guide the selection of lines to be investigated in a laboratory measurement program utilizing either a CO laser or PbSSe laser diodes having output in the same frequency range as the CO laser.

CALCULATED ABSORPTION COEFFICIENTS FOR LO-VIBRATIONAL CO LASER FREQUENCIES

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FOREWORD

This report, Ohio State University Research Foundation Report 3271-8 (eighth Quarterly Report), was prepared by the Ohio State University ElectroScience Laboratory, Department of Electrical Engineering at Columbus, Ohio. Research was conducted under Contract F30602-72-C-0016. Mr. James W. Cusack, RADC-OCSE, of Rome Air Development Center, Griffiss Air Force Base, New York, is the Project Engineer.

This technical report has been reviewed and is approved.

James W. Cusack
RADC Project Engineer

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I. INTRODUCTION

This report presents calculations based on the AFCRL line-data tape[1] at 115 lines of the CO laser. Specifically, the lines studied are: (a) 5-4 J = 1 to 20; (b) 4-3 J = 1 to 25; (c) 3-2 J = 1 to 25; (d) 2-1 J = 1 to 25; and (e) 1-0 J = 6 to J = 25.

The laser frequencies were computed from molecular constants given by Rao et. al.[2].

The atmospheric model was the AFCRL mid-latitude summer model[3] which is given in Table I.

The method of calculation has been described in detail in a recent report[4]. The only difference is that for this work both a Lorentz and a super-Lorentz line shape were used in the calculation of the water vapor absorption coefficients. The particular form of this line shape has been described in an earlier report[5] and is based upon comparison with experimental absorption coefficients obtained with a CO laser which operated on the higher vibrational bands[6].

The AFCRL data tape includes data on absorption lines of seven gases (H_2O, CO_2, CO, O_3, H_2O, CH_4, and O_2) but in the wavelength band of interest here, only CO, CO_2, and H_2O cause significant absorption. Ozone in sea level concentration can cause an absorption coefficient of 0.003 km^{-1} at some of the frequencies studied but this is insignificant in comparison with the water vapor absorption.

Hence only CO, CO_2, and H_2O absorption coefficients were included in the tabulations. No water vapor continuum absorption coefficient has as yet been identified for this region.

The lowest pressure used was 365 torr corresponding to an altitude of 6 km. At this pressure it is not necessary to use a Voigt line shape[1].

II. TABULATED RESULTS

The results are presented in Tables II-VI and IX-XVIII and are largely self-explanatory. The coefficients are in km^{-1}. Water vapor coefficients and total coefficients have been given for both the Lorentz and super-Lorentz line shapes. Thus the reader may see the magnitude of the change introduced by the altered line shape and may choose to use either result. Based on experimental work to date at Ohio State University, we believe that for this wavelength region the enhanced wing line shape for water vapor gives a calculated result which will be in better agreement with experimental measurement than that obtained using the Lorentz shape. Calculations have been included for horizontal paths at three altitudes: sea level, 3 km, and 6 km.

One way to examine the results is to compare them with the absorption coefficient for the P(20) CO_2 laser line for the same atmospheric condition. The 10.59μ CO_2 absorption coefficient for the summer sea level model is approximately 0.3 km^{-1}. Assuming that the calculations using the super-Lorentz line shape most nearly represent true values, one can list the CO laser lines which have a predicted coefficient which is lower than 0.3 km^{-1}. The 17 CO lines which satisfy this condition are listed in Table VII.

Recent work by Dr. John Daiber at Calspan Inc. with electrically excited supersonic CO lasers has shown that it is possible to achieve significant power output at high efficiency on certain lines of the 5-4, 4-3, 3-2, and 2-1 CO bands[7]. These lines are listed in Table VIII together with the sea level CO_2 and H_2O absorption coefficients from Tables II through V. It is seen that CO_2 absorption is significant for only one line (2-1 10). Also by comparing Tables VII and VIII it is seen that five of the lines obtained in the Calspan laser are among the best CO lines in the group of 115 studied. For completeness it should be said that the 2-1 lines have not yet been observed in actual devices at Calspan but, based on calculations, they are expected in the next generation of lasers now under construction. Of course the absorption coefficients for all lines are much less for the higher altitude paths as can be seen from an examination of Tables IX-XVIII.

A recent experimental study of CO laser absorption by H_2O[8] found that the lowest absorption occurred for the 5-4 15 line and had a measured value of 0.66 km^{-1} for a laboratory condition which approximated the mid-latitude summer sea level model. The calculated result from Table II is 0.437 km^{-1} even with the super-Lorentz line shape. Using the 0.437 km^{-1} condition there are 30 lines in Tables II-VI which have a coefficient lower than 0.437 km^{-1} and an additional 19 lines having a coefficient lower than 0.66 km^{-1}.

W. Q. Jeffers et. al.[8,9] have reported a cw O/CS_2 CO chemical laser using N_2O as a diluent which has more than 50 percent of its output in the 6-5 to 2-1 vibrational bands. More recent results[10] indicate that it is possible to achieve operation on any lines from J = 2 to J = 25 of the 2-1 and higher bands.

Thus it appears that it may be possible to achieve efficient laser operation on lines which have low atmospheric absorption coefficients. Further work on both devices and propagation seems indicated.

III. SPECTRAL PLOTS

Sixty-nine spectral plots have been made for the 1970-2115 cm^{-1} range which includes all but seven of the lines in Tables II-VI. The approximate frequency of each of the laser lines is noted on the plots.

Separate plots are given for water vapor, carbon dioxide and carbon monoxide absorbers, and for a composite of the three. All of the plots assume sea level pressure and 294 °K temperature. A Lorentz line shape was used throughout.

Figures 1-16 are for water vapor. A path length of one km and water vapor pressures of 1.5 to 10 torr were used, with the absorber concentration selected for an on-scale plot in each wavenumber region.

Figures 17-34 are for CO_2 absorber. Partial pressures of 0.27 to 10. torr were used so that the absorption lines would be clearly visible in each region.

Figures 35-50 are for CO absorber and partial pressures of 10^{-4} to 1.0 torr. One can observe the coincidence of 1-0 band laser lines with atmospheric CO absorption lines in this region.

Figures 51-69 are plots for a composite atmosphere consisting of CO, H_2O, and CO_2 absorbers at the sea level concentrations given in Table I. A one kilometer path was assumed.

IV. CONCLUSIONS

Sufficient tabulated and plotted data has been presented to enable evaluation of practical applications employing the low vibrational CO laser. The plots should also be useful in planning high resolution spectroscopic studies using either conventional techniques or tunable lasers. An experimental investigation is underway to measure some of the coefficients using a one km laboratory absorption cell and a tunable laser diode source.

REFERENCES

1. R.A. McClatchey, et. al., AFCRL-TR-73-0096, January 1973.
2. Rao, K.N., et. al., J. Mol. Spec., Vol. 39, p. 180, 1971.
3. R.A. McClatchey, et. al., AFCRL-72-0497, August 1972.
4. R.K. Long, et. al., RADC-TR-73-389, November 1973.
5. R.K. Long, et. al., RADC-TR-73-126, March 1973.
6. C. Freed, Appl. Phys. Ltrs., Vol. 18, No. 10, P. 458, 15 May 1971.
7. J. Daiber, Private Communication.
8. W.Q. Jeffers, McDonnell Douglas Research Labs, Report MDC-Q-0495, 23 May 1973.
9. W.Q. Jeffers and C.E. Wiswall, "Efficient, Low Band Operation of a CO Chemical Laser," Preprint.
10. W.Q. Jeffers, Private Communication.

TABLE I

Parameters of the AFCRL Mid-Latitude Summer Model for Three Altitudes

	Altitude in Kilometers		
	0	3	6
Temperature (°K)	294	279	261
Pressure (torr)	759.8	532.5	365.3
P_{H_2O} (torr)	14.26	3.19	.551
P_{CO_2} (torr)	.251	.176	.121
P_{CO} (torr)	5.7E-5	3.99E-5	2.74E-5
P_{N_2O} (torr)	2.13E-4	1.49E-4	1.02E-4
P_{CH_4} (torr)	1.216E-3	8.52E-4	5.84E-4
P_{O_3} (torr)	2.31E-5	3.22E-5	4.88E-5

TABLE II

Calculated 5-4 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Sea Level Model

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
1957.199	5-4 20	2.01E-10	7.42E -3	1.69E 0	1.70E 0	2.19E 0	2.20E 0
1961.541	5-4 19	5.18E-10	4.85E -4	8.06E 0	8.06E 0	8.37E 0	8.37E 0
1965.851	5-4 18	1.11E -9	2.32E -4	1.67E 1	1.67E 1	1.85E 1	1.85E 1
1970.129	5-4 17	2.67E -9	3.61E -3	1.56E 0	1.56E 0	2.31E 0	2.31E 0
1974.374	5-4 16	9.97E -9	9.77E -5	3.23E -1	3.23E -1	6.02E -1	6.02E -1
1978.586	5-4 15	2.34E -8	3.90E -4	2.14E -1	2.14E -1	4.37E -1	4.37E -1
1982.766	5-4 14	6.49E -8	4.53E -5	3.93E -1	3.93E -1	6.72E -1	6.72E -1
1986.913	5-4 13	1.11E -7	1.58E -4	1.96E 0	1.96E 0	2.84E 0	2.84E 0
1991.026	5-4 12	2.01E -6	1.24E -5	1.01E 1	1.01E 1	1.35E 1	1.35E 1
1995.107	5-4 11	1.63E -6	1.21E -4	1.28E 0	1.28E 0	2.09E 0	2.09E 0
1999.154	5-4 10	1.00E -4	2.14E -4	1.42E 1	1.42E 1	1.39E 1	1.39E 1
2003.167	5-4 9	5.22E -6	1.79E -4	2.95E -1	2.95E -1	4.95E -1	4.95E -1
2007.147	5-4 8	1.89E -6	1.91E -3	1.40E 0	1.40E 0	1.69E 0	1.69E 0
2011.093	5-4 7	1.52E -6	6.76E -5	7.76E -1	7.76E -1	9.99E -1	9.99E -1
2015.005	5-4 6	1.82E -6	1.67E -3	1.31E 0	1.31E 0	1.99E 0	1.99E 0
2018.983	5-4 5	5.25E -6	2.54E -4	1.93E 1	1.93E 1	1.94E 1	1.94E 1
2022.726	5-4 4	8.69E -5	3.74E -4	3.86E 0	3.86E 0	4.05E 0	4.05E 0
2026.535	5-4 3	7.99E -6	1.45E -3	2.25E 1	2.25E 1	2.17E 1	2.17E 1
2030.310	5-4 2	1.02E -5	3.51E -4	1.43E -1	1.43E -1	2.35E -1	2.35E -1
2034.050	5-4 1	4.34E -5	4.35E -3	1.07E 1	1.07E 1	1.03E 1	1.03E 1

TABLE III

Calculated 4-3 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Sea Level Model

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
1960.410	4-3 25	3.93E-10	1.22E -2	2.04E 0	2.05E 0	2.63E 0	2.64E 0
1964.946	4-3 24	9.43E-10	4.95E -4	2.72E 0	2.72E 0	3.96E 0	3.96E 0
1969.451	4-3 23	2.32E -9	1.46E -4	2.46E 0	2.46E 0	3.51E 0	3.51E 0
1973.924	4-3 22	7.89E -9	1.37E -4	3.05E -1	3.05E -1	5.97E -1	5.97E -1
1978.365	4-3 21	2.40E -8	1.23E -3	2.26E -1	2.27E -1	4.50E -1	4.51E -1
1987.152	4-3 20	6.50E -8	4.58E -5	3.97E -1	3.97E -1	6.75E -1	6.75E -1
1987.152	4-3 19	9.93E -8	2.87E -5	2.98E 0	2.98E 0	3.96E 0	3.96E 0
1991.497	4-3 18	4.77E -7	5.52E -5	4.24E 1	4.24E 1	4.78E 1	4.78E 1
1995.816	4-3 17	1.18E -6	7.34E -5	8.93E -1	8.93E -1	1.53E 0	1.53E 0
2000.090	4-3 16	3.90E -6	2.49E -5	1.24E 0	1.24E 0	1.58E 0	1.58E 0
2004.337	4-3 15	2.33E -5	9.06E -5	2.41E -1	2.41E -1	4.35E -1	4.35E -1
2008.552	4-3 14	2.80E -4	2.85E -4	1.14E 0	1.14E 0	1.46E 0	1.46E 0
2012.734	4-3 13	1.70E -5	8.75E -5	4.83E -1	4.83E -1	7.71E -1	7.71E -1
2016.882	4-3 12	1.72E -5	5.12E -4	4.68E 2	4.68E 2	4.49E 2	4.49E 2
2020.998	4-3 11	4.70E -5	2.79E -4	6.87E -1	6.87E -1	1.07E 0	1.07E 0
2025.080	4-3 10	4.79E -4	6.94E -4	3.96E -1	3.99E -1	6.04E -1	6.05E -1
2029.126	4-3 9	2.10E -4	8.74E -4	1.41E -1	1.42E -1	2.52E -1	2.53E -1
2033.143	4-3 8	7.28E -5	4.94E -4	1.39E -1	1.40E -1	2.30E -1	2.31E -1
2037.124	4-3 7	1.23E -3	9.31E -3	4.51E -1	4.62E -1	5.66E -1	5.77E -1
2041.071	4-3 6	8.64E -5	3.86E -3	1.71E 1	1.71E 1	1.74E 1	1.74E 1
2044.984	4-3 5	4.32E -5	4.25E -3	6.03E -1	6.07E -1	8.34E -1	8.36E -1
2048.862	4-3 4	3.74E -5	3.27E -2	1.66E -1	2.21E -1	2.55E -1	2.88E -1
2052.706	4-3 3	4.61E -5	8.04E -3	6.80E -2	7.61E -2	1.20E -1	1.28E -1
2056.516	4-3 2	1.05E -4	5.46E -2	6.74E -2	1.22E -1	1.31E -1	1.86E -1
2060.291	4-3 1	7.97E -4	1.30E -2	1.07E 1	1.07E 1	1.03E 1	1.03E 1

TABLE IV

Calculated 3-2 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Sea Level Model

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
1985.880	3-2 25	6.47E -6	3.45E -5	8.30E -1	8.30E -1	1.39E 0	1.39E 0
1990.452	3-2 24	3.30E -6	2.69E -5	4.48E 0	4.48E 0	6.61E 0	6.61E 0
1994.991	3-2 23	2.73E -6	8.51E -5	1.33E 0	1.33E 0	2.19E 0	2.19E 0
1999.499	3-2 22	3.11E -6	7.03E -5	2.75E 0	2.75E 0	3.15E 0	3.15E 0
2003.976	3-2 21	7.39E -6	1.28E -3	2.37E -1	2.33E -1	4.31E -1	4.32E -1
2008.420	3-2 20	5.59E -5	1.34E -4	1.36E 0	1.36E 0	1.68E 0	1.68E 0
2012.832	3-2 19	5.29E -5	8.42E -5	5.88E -1	5.88E -1	8.78E -1	8.78E -1
2017.212	3-2 18	4.52E -5	1.28E -4	2.21E 1	2.21E 1	2.43E 1	2.43E 1
2021.561	3-2 17	1.72E -5	8.90E -4	5.91E -1	5.92E -1	9.35E -1	9.36E -1
2025.875	3-2 16	1.31E -5	6.18E -4	8.91E -1	8.92E -1	1.09E 0	1.09E 0
2030.158	3-2 15	1.29E -5	5.29E -4	2.49E -1	2.50E -1	3.38E -1	3.39E -1
2034.406	3-2 14	1.48E -5	1.04E -3	6.90E -1	6.91E -1	7.65E -1	7.66E -1
2038.624	3-2 13	1.96E -5	6.09E -3	2.93E -1	3.04E -1	4.83E -1	4.89E -1
2042.808	3-2 12	3.27E -5	2.03E -2	1.17E 0	1.19E 0	1.61E 0	1.63E 0
2046.958	3-2 11	9.28E -5	5.05E -3	6.80E -1	6.85E -1	7.95E -1	8.00E -1
2051.075	3-2 10	1.03E -3	8.78E -3	2.81E -1	2.91E -1	3.27E -1	3.37E -1
2055.159	3-2 9	1.26E -3	3.68E -1	9.57E -2	4.85E -1	1.46E -1	5.37E -1
2059.209	3-2 8	2.46E -4	1.09E -2	4.35E -1	4.46E -1	5.76E -1	5.87E -1
2063.225	3-2 7	1.52E -4	2.07E -2	6.20E -1	6.41E -1	9.20E -1	9.41E -1
2067.206	3-2 6	1.33E -4	2.69E -2	5.13E -1	5.40E -1	7.63E -1	7.90E -1
2071.154	3-2 5	1.43E -4	7.67E -3	9.12E -2	9.92E -2	1.61E -1	1.69E -1
2075.063	3-2 4	1.90E -4	8.76E -3	2.54E -1	2.63E -1	3.36E -1	3.45E -1
2078.947	3-2 3	3.31E -4	1.34E -1	3.96E -1	5.30E -1	4.35E -1	5.69E -1
2082.792	3-2 2	9.01E -4	5.16E -3	7.84E -2	8.45E -2	1.20E -1	1.26E -1
2086.601	3-2 1	7.80E -3	3.65E -3	3.01E -1	3.12E -1	3.98E -1	4.09E -1

TABLE V

Calculated 2-1 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Sea Level Model

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
2011.419	2-1 25	2.37E -6	1.03E -4	3.27E -1	3.27E -1	5.72E -1	5.72E -1
2016.025	2-1 24	6.88E -6	1.69E -4	5.81E 0	5.81E 0	7.41E 0	7.41E 0
2020.600	2-1 23	5.07E -5	3.67E -4	1.67E 0	1.67E 0	2.07E 0	2.07E 0
2025.143	2-1 22	1.75E -4	5.31E -4	4.28E -1	4.29E -1	6.32E -1	6.33E -1
2029.655	2-1 21	1.31E -4	7.12E -4	1.70E -1	1.71E -1	2.69E -1	2.70E -1
2034.134	2-1 20	2.86E -5	2.04E -3	5.49E 0	5.49E 0	5.34E 0	5.34E 0
2038.581	2-1 19	2.07E -5	8.99E -3	2.94E -1	3.03E -1	4.76E -1	4.85E -1
2042.996	2-1 18	2.64E -5	1.03E -1	1.14E 0	1.24E 0	1.56E 0	1.66E 0
2047.379	2-1 17	4.42E -5	4.20E -2	2.57E -1	2.99E -1	3.68E -1	4.10E -1
2051.729	2-1 16	8.59E -5	1.43E -2	8.24E -1	8.38E -1	8.44E -1	8.58E -1
2056.047	2-1 15	2.08E -4	9.18E -3	1.09E -1	1.18E -1	1.66E -1	1.75E -1
2060.332	2-1 14	6.61E -4	1.18E -2	1.57E 1	1.57E 1	1.51E 1	1.51E 1
2064.583	2-1 13	4.26E -3	6.98E -2	1.02E 1	1.03E 1	1.12E 1	1.13E 1
2068.802	2-1 12	3.93E -2	2.09E -2	1.49E -1	2.09E -1	2.66E -1	3.26E -1
2072.986	2-1 11	3.71E -3	1.71E -2	2.73E -1	2.94E -1	3.48E -1	3.69E -1
2077.140	2-1 10	1.89E -3	7.07E -1	1.57E -1	8.66E -1	2.01E -1	9.10E -1
2081.258	2-1 9	2.19E -3	8.82E -3	1.13E -1	1.24E -1	1.57E -1	1.68E -1
2085.343	2-1 8	9.23E -4	1.37E -2	1.40E -1	1.55E -1	1.91E -1	2.06E -1
2089.394	2-1 7	7.77E -4	4.19E -3	1.25E 0	1.25E 0	1.54E 0	1.54E 0
2093.411	2-1 6	6.61E -4	2.74E -1	6.27E -1	9.02E -1	6.51E -1	9.26E -1
2097.394	2-1 5	6.31E -4	3.64E -3	1.04E 1	1.04E 1	1.00E 1	1.00E 1
2101.342	2-1 4	6.53E -4	7.01E -3	8.92E -2	9.69E -2	1.20E -1	1.28E -1
2105.256	2-1 3	7.17E -4	4.27E -3	8.70E -2	9.20E -2	1.11E -1	1.16E -1
2109.136	2-1 2	8.32E -4	1.21E -2	3.17E -2	4.46E -2	4.91E -2	6.20E -2
2112.981	2-1 1	1.06E -3	5.15E -3	7.24E -2	7.86E -2	1.11E -1	1.17E -1

TABLE VI

Calculated 1-0 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Sea Level Model

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
2037.026	1-0 25	5.87E -3	2.16E -2	3.42E -1	3.69E -1	4.62E -1	4.89E -1
2041.567	1-0 24	1.04E -2	9.03E -3	3.74E 1	3.74E 1	3.67E 1	3.67E 1
2046.277	1-0 23	1.28E -2	1.26E -2	1.80E 0	1.83E 0	1.86E 0	1.89E 0
2050.855	1-0 22	1.87E -2	2.06E -2	8.76E -2	1.27E -1	1.42E -1	1.81E -1
2055.401	1-0 21	2.61E -2	3.97E -2	5.90E -2	1.25E -1	1.14E -1	1.80E -1
2059.915	1-0 20	3.69E -2	1.22E -1	1.50E 0	1.66E 0	1.69E 0	1.85E 0
2064.398	1-0 19	4.93E -2	3.16E -1	4.37E 0	4.74E 0	5.30E 0	5.67E 0
2068.848	1-0 18	6.58E -2	2.53E -2	1.4[illegible]E -1	2.39E -1	2.63E -1	3.54E -1
2073.266	1-0 17	8.60E -2	2.07E -2	3.90E -1	4.97E -1	4.70E -1	5.77E -1
2077.651	1-0 16	1.10E -1	4.69E -1	1.67E -1	7.66E -1	2.14E -1	8.13E -1
2082.003	1-0 15	1.36E -1	1.01E -2	2.64E 0	2.79E 0	2.56E 0	2.71E 0
2086.323	1-0 14	1.69E -1	9.66E -3	1.83E -1	3.62E -1	2.65E -1	4.44E -1
2090.610	1-0 13	2.01E -1	2.60E -3	1.81E 0	2.01E 0	2.14E 0	2.34E 0
2094.864	1-0 12	2.33E -1	1.42E -2	2.51E -1	4.98E -1	2.78E -1	5.25E -1
2099.084	1-0 11	2.65E -1	3.60E -3	6.77E -2	3.36E -1	1.00E -1	3.69E -1
2103.271	1-0 10	2.92E -1	1.95E -3	2.16E -1	5.10E -1	2.27E -1	5.21E -1
2107.425	1-0 9	3.12E -1	1.27E -2	1.34E 0	1.66E 0	1.31E 0	1.63E 0
2111.544	1-0 8	3.24E -1	5.20E -3	1.66E -1	4.95E -1	1.82E -1	5.11E -1
2115.630	1-0 7	3.25E -1	6.31E -3	4.80E -1	8.11E -1	5.88E -1	9.19E -1
2119.682	1-0 6	3.05E -1	2.04E -2	3.41E -2	3.63E -1	4.99E -2	3.79E -1

TABLE VII

Absorption Coefficient for Mid-latitude Summer Sea Level Model and Super Lorentz Line Shape for CO Laser Lines Having a Predicted Coefficient of Less Than 0.30 km^{-1}

IDEN			ABSORPTION COEFFICIENT km^{-1}
5-4	2	2030.310	.235
4-3	9	2029.128	.253
	8	2033.143	.231
	4	2048.162	.288
	3	2052.706	.128
	2	2056.516	.186
3-2	5	2071.154	.169
	[illegible]	2082.792	.126
2-1	21	2029.655	.270
	15	2056.047	.175
	9	2081.258	.168
	8	2085.343	.206
	4	2101.342	.128
	3	2105.256	.116
	2	2109.136	.062
1-0	22	2050.855	.181
	21	2055.401	.180

TABLE VIII

Calculated Mid-latitude Summer Sea Level Absorption Coefficients for the CO Laser Lines Observed in the Calspan Inc. Laser

IDEN		ν_0	k_{CO_2}	$k^{SL}_{H_2O}$	TOTAL
5-4	8	2007.147	.0019	1.69	1.69
	7	2011.093	.000068	.999	.999
	6	2015.005	.00167	1.99	1.99
	5	2018.883	.00025	19.4	19.4
	4	2022.726	.000374	4.05	4.05
4-3	8	2033.143	.00049	.230	.231
	7	2037.124	.0093	.566	.577
	6	2041.071	.00386	1.74×10^1	1.74×10^1
	5	2044.984	.00425	.834	.834
	4	2048.862	.0327	.255	.288
3-2	8	2059.209	.0109	.576	.587
	7	2063.225	.0207	.920	.941
	6	2067.206	.0269	.763	.790
	5	2071.154	.00787	.161	.169
	4	2075.068	.00876	.336	.345
2-1	10	2077.140	.707	.201	.910
	9	2081.258	.00882	.157	.168
	8	2085.343	.0137	.191	.206

TABLE IX

Calculated 5-4 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Model at 3 km Altitude

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
1957.199	5-4 20	7.10E-11	5.49E -3	2.91E -1	2.96E -1	3.92E -1	3.97E -1
1961.541	5-4 19	1.83E-10	2.49E -4	1.21E 0	1.21E 0	1.33E 0	1.33E 0
1965.851	5-4 18	4.05E-10	1.09E -4	2.43E 0	2.43E 0	2.90E 0	2.90E 0
1970.129	5-4 17	9.55E-10	2.07E -3	2.14E -1	2.16E -1	3.48E -1	3.50E -1
1974.374	5-4 16	3.64E -9	4.35E -5	4.76E -2	4.76E -2	9.54E -2	9.54E -2
1978.586	5-4 15	8.65E -9	1.76E -4	3.08E -2	3.10E -2	6.85E -2	6.87E -2
1982.766	5-4 14	2.26E -8	2.25E -5	5.81E -2	5.81E -2	1.05E -1	1.05E -1
1986.913	5-4 13	4.16E -8	1.10E -4	2.75E -1	2.76E -1	4.33E -1	4.33E -1
1991.026	5-4 12	8.5[illegible] -7	5.04E -6	1.45E 0	1.45E 0	2.11E 0	2.11E 0
1995.107	5-4 11	6.64E -7	9.53E -5	1.81E -1	1.81E -1	3.24E -1	3.24E -1
1999.154	5-4 10	6.99E -5	1.06E -4	2.40E 0	2.40E 0	2.38E 0	2.38E 0
2003.167	5-4 9	2.11E -6	1.01E -4	4.07E -2	4.08E -2	7.44E -2	7.45E -2
2007.147	5-4 8	7.90E -7	1.45E -3	1.86E -1	1.87E -1	2.44E -1	2.45E -1
2011.093	5-4 7	6.42E -7	3.36E -5	1.71E -1	1.71E -1	2.06E -1	2.06E -1
2015.006	5-4 6	7.58E -7	1.05E -3	1.80E -1	1.81E -1	2.98E -1	2.99E -1
2018.883	5-4 5	2.03E -6	1.64E -4	2.82E 0	2.82E 0	2.92E 0	2.92E 0
2022.726	5-4 4	3.32E -5	2.03E -4	4.88E -1	4.88E -1	5.49E -1	5.49E -1
2026.535	5-4 3	3.33E -6	6.78E -4	4.76E 0	4.76E 0	4.59E 0	4.59E 0
2030.310	5-4 2	4.62E -5	1.49E -4	1.90E -2	1.92E -2	3.42E -2	3.44E -2
2034.050	5-4 1	2.15E -5	1.98E -3	2.47E 0	2.47E 0	2.38E 0	2.38E 0

TABLE X

Calculated 4-3 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Model at 3 km Altitude

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
1960.410	4-3 25	1.43E-10	1.11E -2	2.98E -1	3.09E -1	4.17E -1	4.28E -1
1964.946	4-3 24	3.44E-10	2.37E -4	3.92E -1	3.92E -1	6.21E -1	6.21E -1
1969.451	4-3 23	8.53E-10	6.96E -5	3.51E -1	3.51E -1	5.43E -1	5.43E -1
1973.924	4-3 22	2.91E -9	5.97E -5	4.42E -2	4.43E -2	9.40E -2	9.41E -2
1978.365	4-3 21	8.89E -9	6.45E -4	3.26E -2	3.32E -2	7.06E -2	7.12E -2
1982.774	4-3 20	2.26E -8	2.33E -5	5.83E -2	5.83E -2	1.05E -1	1.05E -1
1987.152	4-3 19	3.63E -8	1.21E -5	4.37E -1	4.37E -1	6.17E -1	6.17E -1
1991.497	4-3 18	1.92E -7	2.26E -5	6.16E 0	6.16E 0	7.51E 0	7.51E 0
1995.810	4-3 17	4.02E -7	4.36E -5	1.27E -1	1.27E -1	2.38E -1	2.38E -1
2000.090	4-3 16	1.73E -6	1.15E -5	1.96E -1	1.96E -1	2.62E -1	2.62E -1
2004.337	4-3 15	1.30E -5	4.30E -5	3.24E -2	3.25E -2	6.47E -2	6.48E -2
2008.552	4-3 14	1.51E -4	1.46E -4	1.57E -1	1.57E -1	2.19E -1	2.19E -1
2012.734	4-3 13	7.69E -6	4.44E -5	7.44E -2	7.45E -2	1.22E -1	1.22E -1
2016.882	4-3 12	7.35E -6	2.79E -4	6.16E 1	6.16E 1	7.82E 1	7.82E 1
2020.998	4-3 11	2.25E -5	1.63E -4	9.60E -2	9.62E -2	1.61E -1	1.61E -1
2025.080	4-3 10	3.18E -4	3.02E -4	5.43E -2	5.49E -2	8.96E -2	9.02E -2
2029.128	4-3 9	1.11E -4	4.44E -4	2.01E -2	2.07E -2	3.89E -2	3.95E -2
2033.143	4-3 8	3.47E -5	2.20E -4	1.76E -2	1.79E -2	3.24E -2	3.27E -2
2037.124	4-3 7	5.50E -4	5.56E -3	5.92E -2	6.53E -2	8.03E -2	8.64E -2
2041.071	4-3 6	3.78E -5	1.83E -3	2.31E 0	2.31E 0	2.51E 0	2.51E 0
2044.984	4-3 5	1.99E -5	2.00E -3	8.72E -2	8.92E -2	1.30E -1	1.32E -1
2048.862	4-3 4	1.75E -5	1.69E -2	2.41E -2	4.10E -2	3.50E -2	5.19E -2
2052.706	4-3 3	2.15E -5	4.08E -3	8.90E -3	1.30E -2	1.73E -2	2.14E -2
2056.516	4-3 2	4.93E -5	3.02E -2	9.29E -3	3.95E -2	1.95E -2	4.97E -2
2060.291	4-3 1	3.65E -4	6.92E -3	1.66E 0	1.67E 0	1.63E 0	1.64E 0

TABLE XI

Calculated 3-2 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Model at 3 km Altitude

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
1985.880	3-2 25	2.75E -6	1.75E -5	1.16E -1	1.16E -1	2.13E -1	2.13E -1
1990.452	3-2 24	1.35E -6	9.22E -6	6.40E -1	6.40E -1	1.03E 0	1.03E 0
1994.991	3-2 23	1.12E -6	4.30E -5	1.89E -1	1.89E -1	3.41E -1	3.41E -1
1999.499	3-2 22	1.27E -6	3.21E -5	4.39E -1	4.39E -1	5.36E -1	5.36E -1
2003.976	3-2 21	2.82E -6	8.90E -4	3.18E -2	3.27E -2	6.44E -2	6.53E -2
2008.420	3-2 20	2.11E -5	6.83E -5	1.84E -1	1.84E -1	2.48E -1	2.48E -1
2012.832	3-2 19	3.11E -5	4.23E -5	1.13E -1	1.13E -1	1.60E -1	1.60E -1
2017.212	3-2 18	2.46E -5	6.54E -5	3.09E 0	3.09E 0	3.67E 0	3.67E 0
2021.560	3-2 17	8.11E -6	5.15E -4	7.81E -2	7.86E -2	1.36E -1	1.37E -1
2025.875	3-2 16	6.08E -6	4.41E -4	1.33E -1	1.33E -1	1.74E -1	1.74E -1
2030.158	3-2 15	5.98E -6	3.50E -4	3.65E -2	3.69E -2	5.13E -2	5.17E -2
2034.408	3-2 14	6.84E -6	6.42E -4	9.67E -2	9.73E -2	1.12E -1	1.13E -1
2038.624	3-2 13	8.95E -6	2.77E -3	3.95E -2	4.23E -2	6.98E -2	7.26E -2
2042.808	3-2 12	1.46E -5	9.98E -3	1.61E -1	1.71E -1	2.41E -1	2.51E -1
2046.958	3-2 11	4.05E -5	2.47E -3	8.57E -2	8.82E -2	1.09E -1	1.12E -1
2051.075	3-2 10	4.57E -4	4.48E -3	6.38E -2	6.87E -2	7.02E -2	7.51E -2
2055.159	3-2 9	5.73E -4	3.62E -1	1.88E -2	3.81E -1	2.70E -2	3.90E -1
2059.209	3-2 8	1.13E -4	5.75E -3	6.53E -2	7.12E -2	9.10E -2	9.69E -2
2063.225	3-2 7	7.14E -5	1.14E -2	8.46E -2	9.61E -2	1.34E -1	1.45E -1
2067.206	3-2 6	6.35E -5	1.43E -2	6.85E -2	8.29E -2	1.10E -1	1.24E -1
2071.154	3-2 5	6.94E -5	4.04E -3	1.22E -2	1.63E -2	2.35E -2	2.76E -2
2075.063	3-2 4	9.29E -5	4.58E -3	3.60E -2	4.07E -2	5.15E -2	5.62E -2
2078.947	3-2 3	1.63E -4	1.03E -1	4.71E -2	1.50E -1	5.59E -2	1.59E -1
2082.792	3-2 2	4.49E -4	2.58E -3	1.02E -2	1.32E -2	1.70E -2	2.00E -2
2086.601	3-2 1	4.01E -3	1.82E -3	3.62E -2	4.20E -2	5.24E -2	5.82E -2

TABLE XII

Calculated 2-1 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Model at 3 km Altitude

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
2011.419	2-1 25	1.02E -6	5.22E -5	4.54E -2	4.55E -2	8.62E -2	8.63E -2
2016.025	2-1 24	3.09E -6	9.01E -5	8.09E -1	8.09E -1	1.12E 0	1.12E 0
2020.600	2-1 23	2.44E -5	1.70E -4	2.91E -1	2.91E -1	3.58E -1	3.58E -1
2025.143	2-1 22	9.21E -5	3.03E -4	5.86E -2	5.90E -2	9.37E -2	9.41E -2
2029.655	2-1 21	7.83E -5	2.99E -4	2.38E -2	2.42E -2	4.06E -2	4.10E -2
2034.134	2-1 20	1.38E -5	8.82E -4	8.74E -1	8.75E -1	8.51E -1	8.52E -1
2038.581	2-1 19	9.46E -6	4.17E -3	3.89E -2	4.31E -2	6.87E -2	7.29E -2
2042.996	2-1 18	1.18E -5	7.62E -2	1.60E -1	2.36E -1	2.37E -1	3.13E -1
2047.379	2-1 17	1.05E -5	2.20E -2	3.39E -2	5.59E -2	5.28E -2	7.48E -2
2051.729	2-1 16	3.81E -5	7.25E -3	1.49E -1	1.56E -1	1.51E -1	1.58E -1
2056.047	2-1 15	9.33E -5	4.74E -3	1.56E -2	2.04E -2	2.48E -2	2.96E -2
2060.332	2-1 14	3.03E -4	6.28E -3	2.54E 0	2.55E 0	2.45E 0	2.46E 0
2064.583	2-1 13	2.05E -3	4.15E -2	1.36E 0	1.40E 0	1.62E 0	1.66E 0
2068.802	2-1 12	2.60E -2	1.14E -2	1.96E -2	5.70E -2	3.81E -2	7.55E -2
2072.986	2-1 11	1.92E -3	8.62E -3	4.04E -2	5.10E -2	5.48E -2	6.54E -2
2077.140	2-1 10	9.67E -4	5.45E -1	1.93E -2	5.65E -1	2.66E -2	5.73E -1
2081.258	2-1 9	1.35E -3	4.32E -3	1.49E -2	2.06E -2	2.22E -2	2.79E -2
2085.343	2-1 8	5.01E -4	8.02E -3	1.90E -2	2.75E -2	2.69E -2	3.54E -2
2089.394	2-1 7	4.37E -4	2.24E -3	1.58E -1	1.61E -1	2.11E -1	2.14E -1
2093.411	2-1 6	3.48E -4	2.03E -1	9.84E -2	3.02E -1	1.02E -1	3.05E -1
2097.394	2-1 5	3.32E -4	1.79E -3	2.74E 0	2.74E 0	2.63E 0	2.63E 0
2101.342	2-1 4	3.46E -4	4.00E -3	1.23E -2	1.66E -2	1.80E -2	2.23E -2
2105.256	2-1 3	3.83E -4	2.60E -3	1.34E -2	1.58E -2	1.83E -2	2.07E -2
2109.136	2-1 2	4.47E -4	7.95E -3	3.98E -3	1.24E -2	6.70E -3	1.51E -2
2112.981	2-1 1	5.74E -4	2.49E -3	8.57E -3	1.16E -2	1.44E -2	1.75E -2

TABLE XIII

Calculated 1-0 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Model at 3 km Altitude

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
2037.026	1-0 25	4.55E -3	1.43E -2	4.50E -2	6.38E -2	6.60E -2	8.48E -2
2041.667	1-0 24	8.31E -3	4.30E -3	5.42E 0	5.43E 0	5.42E 0	5.43E 0
2046.277	1-0 23	1.05E -2	6.13E -3	2.33E -1	2.50E -1	2.54E -1	2.71E -1
2050.855	1-0 22	1.57E -2	1.06E -2	1.15E -2	3.78E -2	2.03E -2	4.66E -2
2055.401	1-0 21	2.24E -2	2.13E -2	8.03E -3	5.17E -2	1.69E -2	6.06E -2
2059.915	1-0 20	3.22E -2	7.33E -2	2.20E -1	3.25E -1	2.67E -1	3.72E -1
2064.398	1-0 19	4.40E -2	2.90E -1	5.80E -1	9.14E -1	7.65E -1	1.10E 0
2068.848	1-0 18	5.98E -2	1.42E -2	1.98E -2	9.38E -2	3.79E -2	1.12E -1
2073.266	1-0 17	7.95E -2	1.22E -2	5.81E -2	1.50E -1	7.32E -2	1.65E -1
2077.651	1-0 16	1.03E -1	4.14E -1	2.12E -2	5.38E -1	2.91E -2	5.46E -1
2082.003	1-0 15	1.30E -1	5.12E -3	4.24E -1	5.59E -1	4.11E -1	5.46E -1
2086.323	1-0 14	1.64E -1	5.68E -3	2.22E -2	1.92E -1	3.52E -2	2.05E -1
2090.610	1-0 13	1.98E -1	1.16E -3	2.33E -1	4.32E -1	2.98E -1	4.97E -1
2094.864	1-0 12	2.33E -1	7.47E -3	4.04E -2	2.81E -1	4.48E -2	2.85E -1
2099.084	1-0 11	2.68E -1	1.58E -3	9.23E -3	2.79E -1	1.48E -2	2.84E -1
2103.271	1-0 10	2.98E -1	8.85E -4	4.69E -2	3.46E -1	4.81E -2	3.47E -1
2107.425	1-0 9	3.23E -1	6.30E -3	1.85E -1	5.14E -1	1.82E -1	5.11E -1
2111.544	1-0 8	3.37E -1	2.42E -3	2.61E -2	3.66E -1	2.83E -2	3.68E -1
2115.630	1-0 7	3.41E -1	3.40E -3	5.79E -2	4.02E -1	7.70E -2	4.21E -1
2119.682	1-0 6	3.27E -1	1.22E -2	4.25E -3	3.43E -1	6.78E -3	3.46E -1

TABLE XIV

Calculated 5-4 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Model at 6 km Altitude

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
1957.199	5-4 20	2.16E-11	3.57E -3	2.54E -2	2.90E -2	3.83E -2	4.19E -2
1961.541	5-4 19	5.62E-11	1.13E -4	1.36E -1	1.36E -1	1.60E -1	1.60E -1
1965.851	5-4 18	1.30E-10	4.81E -5	2.68E -1	2.68E -1	3.45E -1	3.45E -1
1970.129	5-4 17	3.18E-10	1.01E -3	2.20E -2	2.30E -2	3.96E -2	4.06E -2
1974.374	5-4 16	1.17E -9	1.70E -5	5.36E -3	5.38E -3	1.15E -2	1.15E -2
1978.586	5-4 15	2.79E -9	6.83E -5	3.40E -3	3.47E -3	8.16E -3	8.23E -3
1982.766	5-4 14	6.83E -9	9.84E -6	6.38E -3	6.39E -3	1.23E -2	1.23E -2
1986.913	5-4 13	1.37E -8	7.23E -5	2.92E -2	2.93E -2	4.97E -2	4.98E -2
1991.026	5-4 12	3.19E -7	1.83E -6	1.55E -1	1.58E -1	2.49E -1	2.49E -1
1995.107	5-4 11	2.41E -7	7.42E -5	1.95E -2	1.96E -2	3.82E -2	3.83E -2
1999.154	5-4 10	4.10E -5	4.60E -5	3.07E -1	3.07E -1	3.20E -1	3.20E -1
2003.167	5-4 9	7.66E -7	4.99E -5	4.14E -3	4.19E -3	6.42E -3	6.47E -3
2007.147	5-4 8	3.00E -7	9.59E -4	1.82E -2	1.92E -2	2.61E -2	2.71E -2
2011.093	5-4 7	2.48E -7	1.59E -5	2.92E -2	2.92E -2	3.32E -2	3.32E -2
2015.005	5-4 6	2.09E -7	5.94E -4	1.84E -2	1.90E -2	3.33E -2	3.39E -2
2018.883	5-4 5	7.00E -7	1.06E -4	3.00E -1	3.00E -1	3.26E -1	3.26E -1
2022.726	5-4 4	1.09E -5	1.07E -4	4.40E -2	4.41E -2	5.37E -2	5.38E -2
2026.535	5-4 3	1.27E -6	2.83E -4	6.87E -1	6.87E -1	6.63E -1	6.63E -1
2030.310	5-4 2	1.97E -6	6.38E -5	1.88E -3	1.95E -3	3.75E -3	3.82E -3
2034.050	5-4 1	1.01E -5	7.97E -4	3.82E -1	3.83E -1	3.68E -1	3.69E -1

TABLE XV

Calculated 4-3 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Model at 6 km Altitude

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
1960.410	4-3 25	4.54E-11	9.57E -3	3.31E -2	4.27E -2	5.03E -2	5.99E -2
1964.946	4-3 24	1.09E-10	1.06E -4	4.30E -2	4.31E -2	7.39E -2	7.40E -2
1969.451	4-3 23	2.73E-10	3.04E -3	3.72E -2	3.72E -2	6.28E -2	6.28E -2
1973.924	4-3 22	9.33E-10	2.36E -5	4.91E -3	4.93E -3	1.13E -2	1.13E -2
1978.365	4-3 21	2.87E -9	2.76E -4	3.61E -3	3.89E -3	8.44E -3	8.72E -3
1982.774	4-3 20	6.83E -9	1.06E -5	6.38E -3	6.39E -3	1.23E -2	1.23E -2
1987.152	4-3 19	1.18E -8	4.62E -6	4.87E -2	4.87E -2	7.27E -2	7.27E -2
1991.497	4-3 18	6.87E -8	7.99E -6	6.78E -1	6.78E -1	8.93E -1	8.93E -1
1995.810	4-3 17	1.84E -7	2.59E -5	1.38E -2	1.38E -2	2.81E -2	2.81E -2
2000.090	4-3 16	6.80E -7	4.30E -6	2.38E -2	2.38E -2	3.36E -2	3.36E -2
2004.337	4-3 15	6.11E -6	1.89E -5	3.27E -3	3.30E -3	7.30E -3	7.33E -3
2008.552	4-3 14	6.34E -5	6.98E -5	1.63E -2	1.64E -2	2.46E -2	2.47E -2
2012.734	4-3 13	3.17E -6	2.12E -5	8.36E -3	8.40E -3	1.42E -2	1.42E -2
2016.882	4-3 12	3.31E -6	1.44E -4	9.66E 0	9.66E 0	9.28E 0	9.28E 0
2020.996	4-3 11	9.07E -6	9.03E -5	1.04E -2	1.05E -2	1.83E -2	1.84E -2
2025.080	4-3 10	1.90E -4	1.18E -4	5.62E -3	5.92E -3	1.01E -2	1.04E -2
2029.128	4-3 9	5.35E -5	2.24E -4	2.23E -3	2.51E -3	4.59E -3	4.87E -3
2033.143	4-3 8	1.56E -5	9.21E -5	1.65E -3	1.76E -3	3.39E -3	3.50E -3
2037.124	4-3 7	2.10E -4	3.27E -5	5.65E -3	9.13E -3	8.37E -3	1.18E -2
2041.071	4-3 6	1.53E -5	8.12E -4	2.29E -1	2.30E -1	2.67E -1	2.68E -1
2044.964	4-3 5	8.59E -6	8.78E -4	9.67E -3	1.06E -2	1.55E -2	1.64E -2
2048.862	4-3 4	7.72E -6	8.05E -3	2.14E -3	1.02E -2	3.46E -3	1.15E -2
2052.706	4-3 3	9.44E -6	1.99E -3	8.73E -4	2.87E -3	1.86E -3	3.86E -3
2056.516	4-3 2	2.17E -5	1.57E -2	9.64E -4	1.67E -2	2.19E -3	1.79E -2
2060.291	4-3 1	1.54E -4	3.58E -3	1.92E -1	1.96E -1	1.97E -1	2.01E -1

TABLE XVI

Calculated 3-2 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Model at 6 km Altitude

LINE	ID		CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
1985.860	3-2	25	9.85E -7	7.88E -6	1.23E -2	1.23E -2	2.45E -2	2.45E -2
1990.452	3-2	24	4.80E -7	3.70E -6	6.93E -2	6.93E -2	1.21E -1	1.21E -1
1994.991	3-2	23	4.08E -7	1.78E -5	2.07E -2	2.07E -2	4.04E -2	4.04E -2
1999.499	3-2	22	4.67E -7	1.33E -5	5.44E -2	5.44E -2	7.10E -2	7.10E -2
2003.976	3-2	21	9.60E -7	5.29E -4	3.23E -3	3.76E -3	7.32E -3	7.85E -3
2008.420	3-2	20	6.64E -6	3.27E -5	1.86E -2	1.86E -2	2.73E -2	2.73E -2
2012.832	3-2	19	1.57E -5	2.03E -5	1.72E -2	1.72E -2	2.27E -2	2.27E -2
2017.212	3-2	18	1.17E -5	3.24E -5	3.23E -1	3.23E -1	4.15E -1	4.15E -1
2021.560	3-2	17	3.54E -6	2.81E -4	7.68E -3	7.96E -3	1.46E -2	1.49E -2
2025.875	3-2	16	2.64E -6	3.38E -4	1.50E -2	1.53E -2	2.08E -2	2.11E -2
2030.158	3-2	15	2.60E -6	2.36E -4	3.79E -3	4.03E -3	5.62E -3	5.86E -3
2034.408	3-2	14	2.97E -6	4.55E -4	9.90E -3	1.04E -2	1.19E -2	1.24E -2
2038.624	3-2	13	3.04E -6	1.13E -3	3.87E -3	5.00E -3	7.46E -3	8.59E -3
2042.808	3-2	12	6.05E -6	4.42E -3	1.67E -2	2.11E -2	2.70E -2	3.14E -2
2046.958	3-2	11	1.62E -5	1.15E -3	7.85E -3	9.02E -3	1.10E -2	1.22E -2
2051.075	3-2	10	1.83E -4	2.20E -3	1.08E -2	1.32E -2	1.14E -2	1.38E -2
2055.159	3-2	9	2.36E -4	3.20E -1	2.97E -3	3.23E -1	3.90E -3	3.24E -1
2059.209	3-2	8	4.79E -5	2.95E -3	7.33E -3	1.04E -2	1.08E -2	1.38E -2
2063.225	3-2	7	3.14E -5	6.07E -3	8.50E -3	1.46E -2	1.45E -2	2.06E -2
2067.206	3-2	6	2.87E -5	7.21E -3	6.73E -3	1.40E -2	1.15E -2	1.87E -2
2071.154	3-2	5	3.19E -5	2.02E -3	1.25E -3	3.30E -3	2.59E -3	4.64E -3
2075.068	3-2	4	4.31E -5	2.31E -3	3.88E -3	6.23E -3	5.97E -3	8.32E -3
2078.947	3-2	3	7.64E -5	7.72E -2	3.94E -3	8.12E -2	5.12E -3	8.24E -2
2082.792	3-2	2	2.13E -4	1.25E -3	9.71E -4	2.43E -3	1.74E -3	3.20E -3
2086.601	3-2	1	1.96E -3	8.60E -4	3.12E -3	5.95E -3	4.93E -3	7.76E -3

TABLE XVII

Calculated 2-1 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Model at 6 km Altitude

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
2011.419	2-1 25	4.00E -7	2.49E -3	4.71E -3	4.74E -3	9.74E -3	9.77E -3
2016.025	2-1 24	1.28E -6	4.66E -3	8.45E -2	8.45E -2	1.27E -1	1.27E -1
2020.600	2-1 23	1.08E -5	6.35E -5	3.64E -2	3.65E -2	4.45E -2	4.46E -2
2025.143	2-1 22	4.35E -5	1.82E -4	6.03E -3	6.26E -3	1.05E -2	1.07E -2
2029.655	2-1 21	4.17E -5	1.15E -4	2.52E -3	2.68E -3	4.64E -3	4.80E -3
2034.134	2-1 20	6.27E -6	3.43E -4	8.89E -2	8.92E -2	8.69E -2	8.72E -2
2038.581	2-1 19	4.67E -6	1.71E -3	3.80E -3	5.51E -3	7.35E -3	5.06E -3
2042.296	2-1 18	4.98E -6	4.82E -2	1.71E -2	6.53E -2	2.71E -2	7.53E -2
2047.379	2-1 17	7.07E -6	1.05E -2	3.29E -3	1.38E -2	5.59E -3	1.61E -2
2051.729	2-1 16	1.56E -5	3.49E -3	1.67E -2	2.02E -2	1.75E -2	2.05E -2
2056.047	2-1 15	3.86E -5	2.37E -3	1.46E -3	3.87E -3	2.56E -3	4.37E -3
2060.332	2-1 14	1.09E -4	3.25E -3	2.98E -1	3.01E -1	2.95E -1	2.99E -1
2064.583	2-1 13	9.03E -6	2.34E -2	1.34E -1	1.58E -1	1.73E -1	1.97E -1
2068.802	2-1 12	1.46E -2	6.02E -3	1.89E -3	2.26E -2	4.00E -3	2.46E -2
2072.988	2-1 11	8.33E -4	4.00E -3	4.64E -3	9.51E -3	6.67E -3	1.15E -2
2077.140	2-1 10	4.71E -4	3.99E -1	1.47E -3	4.01E -1	2.55E -3	4.02E -1
2081.259	2-1 9	7.65E -4	2.00E -3	1.43E -3	4.21E -3	3.32E -3	5.10E -3
2085.343	2-1 8	2.65E -4	4.48E -3	1.79E -3	6.53E -3	2.65E -3	7.39E -3
2089.394	2-1 7	2.44E -4	1.06E -3	1.48E -2	1.57E -2	2.05E -2	2.22E -2
2093.411	2-1 6	1.76E -4	1.43E -1	9.57E -3	1.51E -1	1.00E -2	1.50E -1
2097.394	2-1 5	1.69E -4	7.92E -4	4.83E -1	4.84E -1	4.63E -1	4.64E -1
2101.342	2-1 4	1.78E -4	2.07E -3	1.28E -3	3.53E -3	2.01E -3	4.26E -3
2105.256	2-1 3	1.09E -4	8.40E -4	1.63E -3	2.57E -3	2.35E -3	3.39E -3
2109.136	2-1 2	2.35E -4	4.57E -3	3.68E -4	5.17E -3	6.82E -4	5.49E -3
2112.981	2-1 1	5.05E -4	1.06E -3	7.29E -4	2.07E -3	1.34E -3	2.58E -3

TABLE XVIII

Calculated 1-0 Band Absorption Coefficients (in km^{-1}) for Mid-latitude Summer Model at 6 km Altitude

LINE	ID	CO	CO2	H2O LORENTZ	TOTAL LORENTZ	H2O SUPER LORENTZ	TOTAL SUPER LORENTZ
2037.026	1-0 25	3.22E -3	9.79E -3	4.32E -3	1.73E -2	6.91E -3	1.99E -2
2041.667	1-0 24	6.10E -3	1.91E -3	5.55E -1	5.63E -1	5.75E -1	5.83E -1
2046.277	1-0 23	7.92E -3	2.76E -3	2.15E -2	3.22E -2	2.52E -2	3.59E -2
2050.855	1-0 22	1.22E -2	5.15E -3	1.13E -3	1.85E -2	2.18E -3	1.95E -2
2055.401	1-0 21	1.60E -2	1.03E -2	8.25E -4	2.97E -2	1.87E -3	3.02E -2
2059.915	1-0 20	2.66E -2	4.08E -2	2.45E -2	9.19E -2	3.20E -2	9.94E -2
2064.398	1-0 19	3.75E -2	2.42E -1	5.69E -2	3.42E -1	8.13E -2	3.67E -1
2068.843	1-0 18	5.22E -2	7.73E -3	1.94E -3	6.19E -2	4.01E -3	6.39E -2
2073.266	1-0 17	7.12E -2	6.21E -3	6.07E -3	8.35E -2	8.15E -3	8.56E -2
2077.651	1-0 16	9.47E -2	3.72E -1	1.94E -3	4.69E -1	2.88E -3	4.70E -1
2082.003	1-0 15	1.22E -1	2.46E -3	4.59E -2	1.70E -1	4.45E -2	1.59E -1
2086.323	1-0 14	1.57E -1	2.93E -3	1.93E -3	1.62E -1	3.35E -3	1.63E -1
2090.610	1-0 13	1.93E -1	4.76E -4	2.26E -2	2.15E -1	3.03E -2	2.24E -1
2094.864	1-0 12	2.31E -1	3.47E -3	4.33E -3	2.39E -1	4.85E -3	2.39E -1
2099.084	1-0 11	2.70E -1	6.22E -4	9.45E -4	2.72E -1	1.64E -3	2.72E -1
2103.271	1-0 10	3.05E -1	3.65E -4	7.07E -3	3.12E -1	7.16E -3	3.13E -1
2107.425	1-0 9	3.35E -1	2.76E -3	1.63E -2	3.54E -1	1.62E -2	3.54E -1
2111.544	1-0 8	3.54E -1	1.02E -3	2.54E -3	3.58E -1	2.78E -3	3.58E -1
2115.630	1-0 7	3.62E -1	1.57E -3	4.98E -3	3.69E -1	7.18E -3	3.71E -1
2119.682	1-0 6	3.50E -1	6.28E -3	3.95E -4	3.57E -1	6.97E -4	3.57E -1

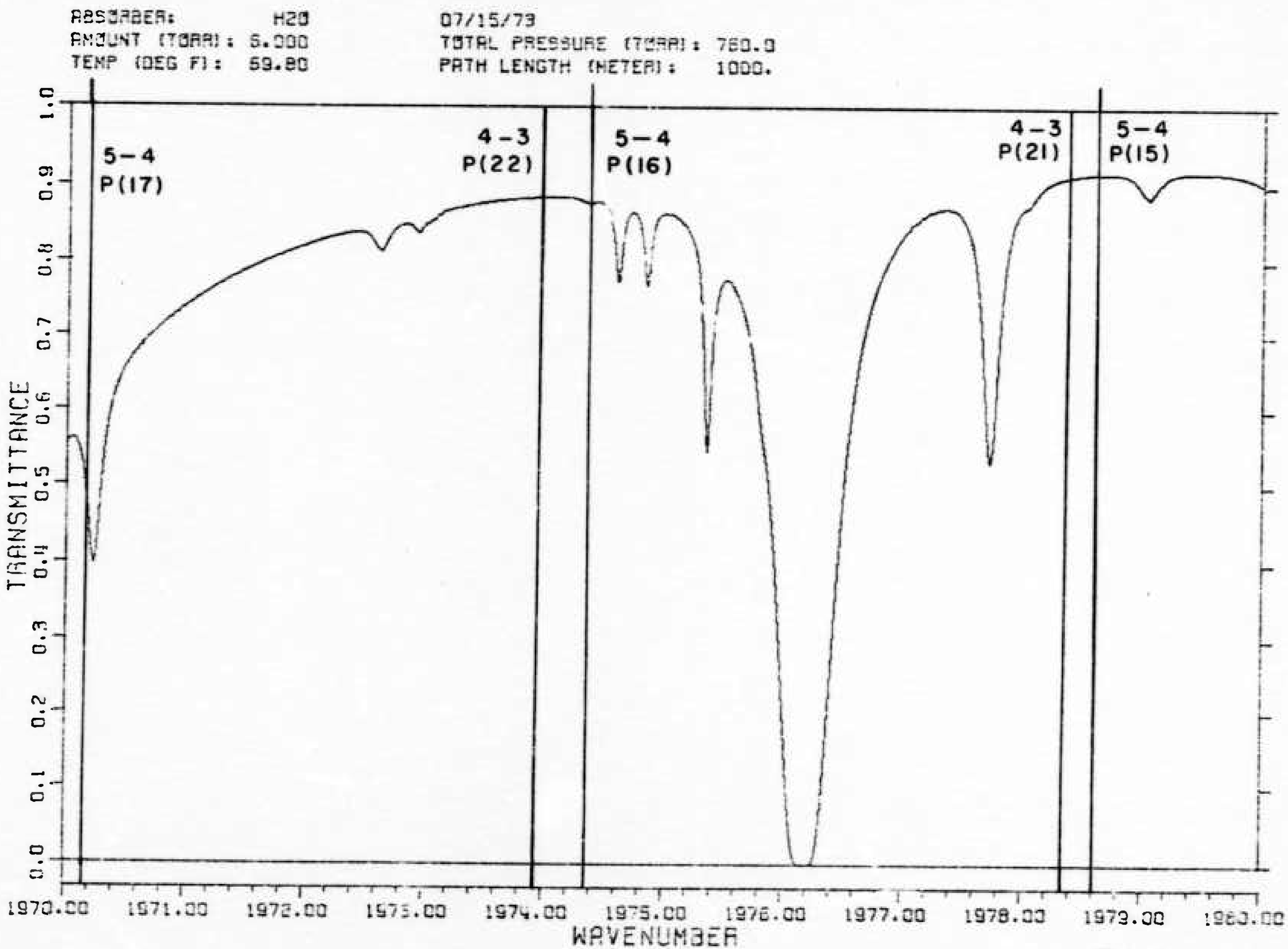

ABSORBER: H2O
AMOUNT (TORR): 6.000
TEMP (DEG F): 59.80
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
5-4 P(17)
4-3 P(22)
5-4 P(16)
4-3 P(21)
5-4 P(15)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1970.00
1971.00
1972.00
1973.00
1974.00
1975.00
1976.00
1977.00
1978.00
1979.00
1980.00
WAVENUMBER

FIG. 1

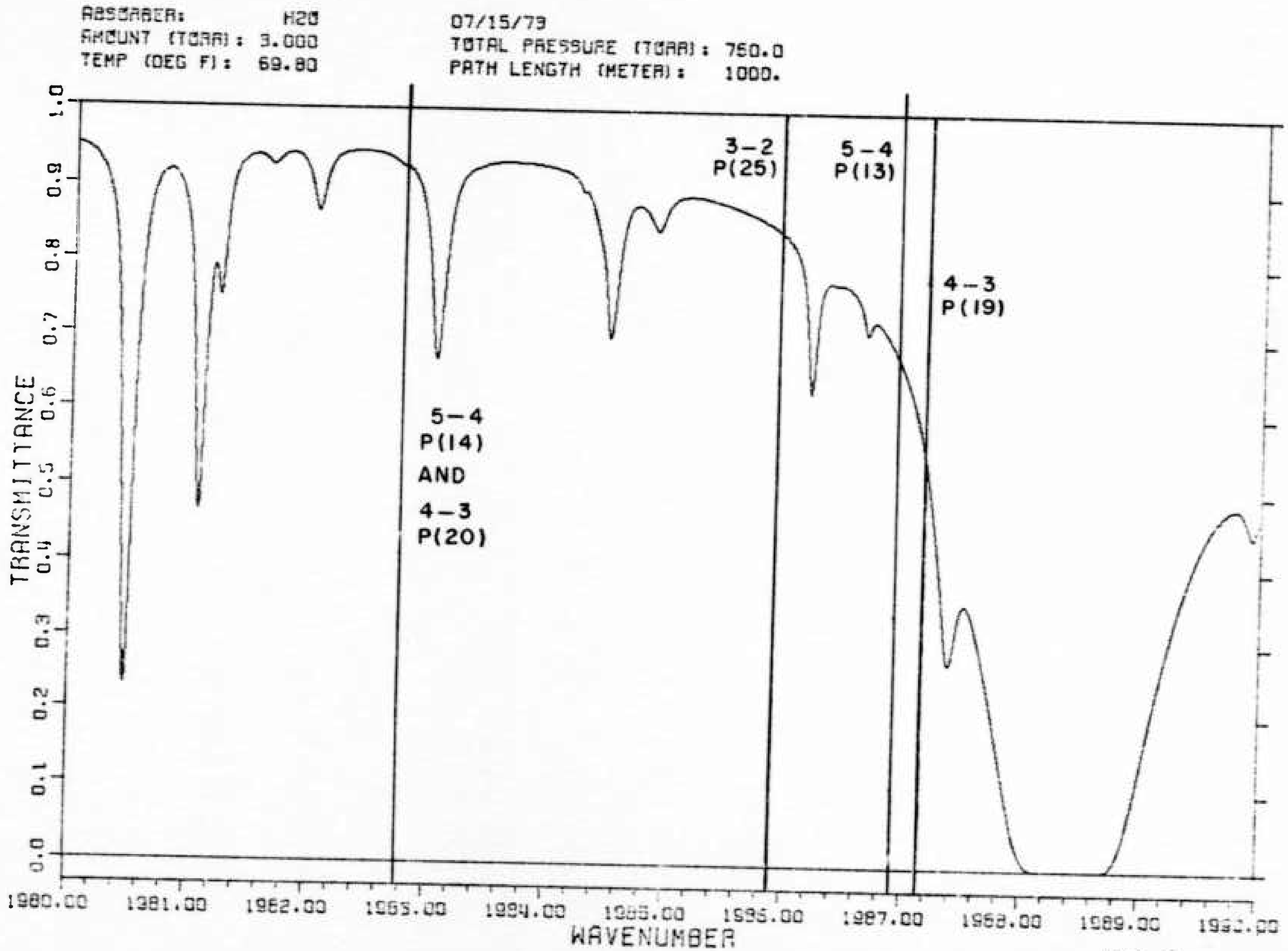

ABSORBER: H2O
AMOUNT (TORR): 3.000
TEMP (DEG F): 69.80
07/15/79
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
5–4
P(14)
AND
4–3
P(20)
3–2
P(25)
5–4
P(13)
4–3
P(19)
1980.00
1981.00
1982.00
1984.00
1987.00
1989.00
WAVENUMBER

FIG. 2

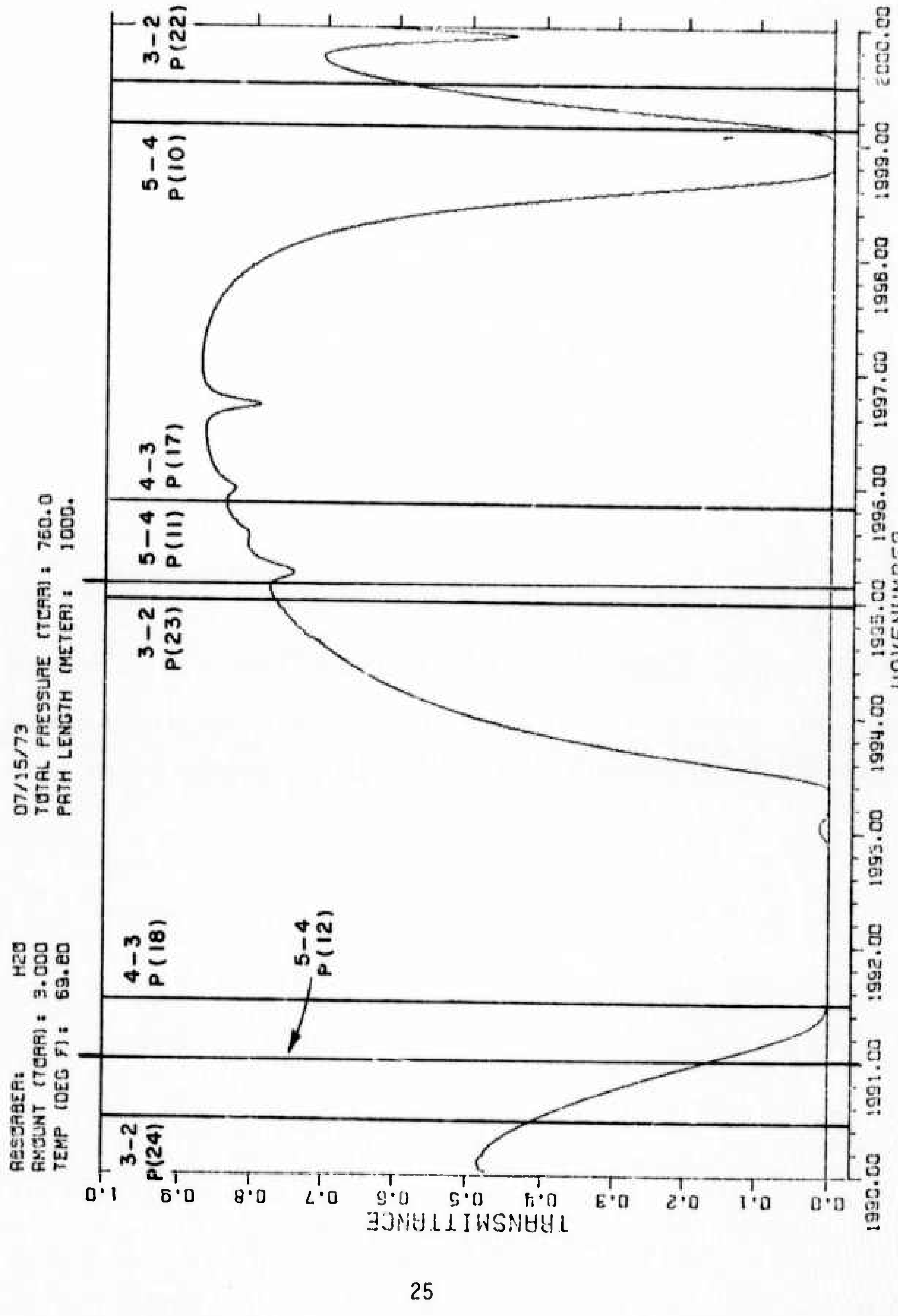

ABSORBER: H2O
AMOUNT (TORR): 3.000
TEMP (DEG F): 69.80
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
3-2 P(24)
4-3 P(18)
5-4 P(12)
3-2 P(23)
5-4 P(11)
4-3 P(17)
5-4 P(10)
3-2 P(22)
TRANSMITTANCE
WAVENUMBER
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1990.00
1991.00
1992.00
1993.00
1994.00
1995.00
1996.00
1997.00
1998.00
1999.00
2000.00

FIG. 3

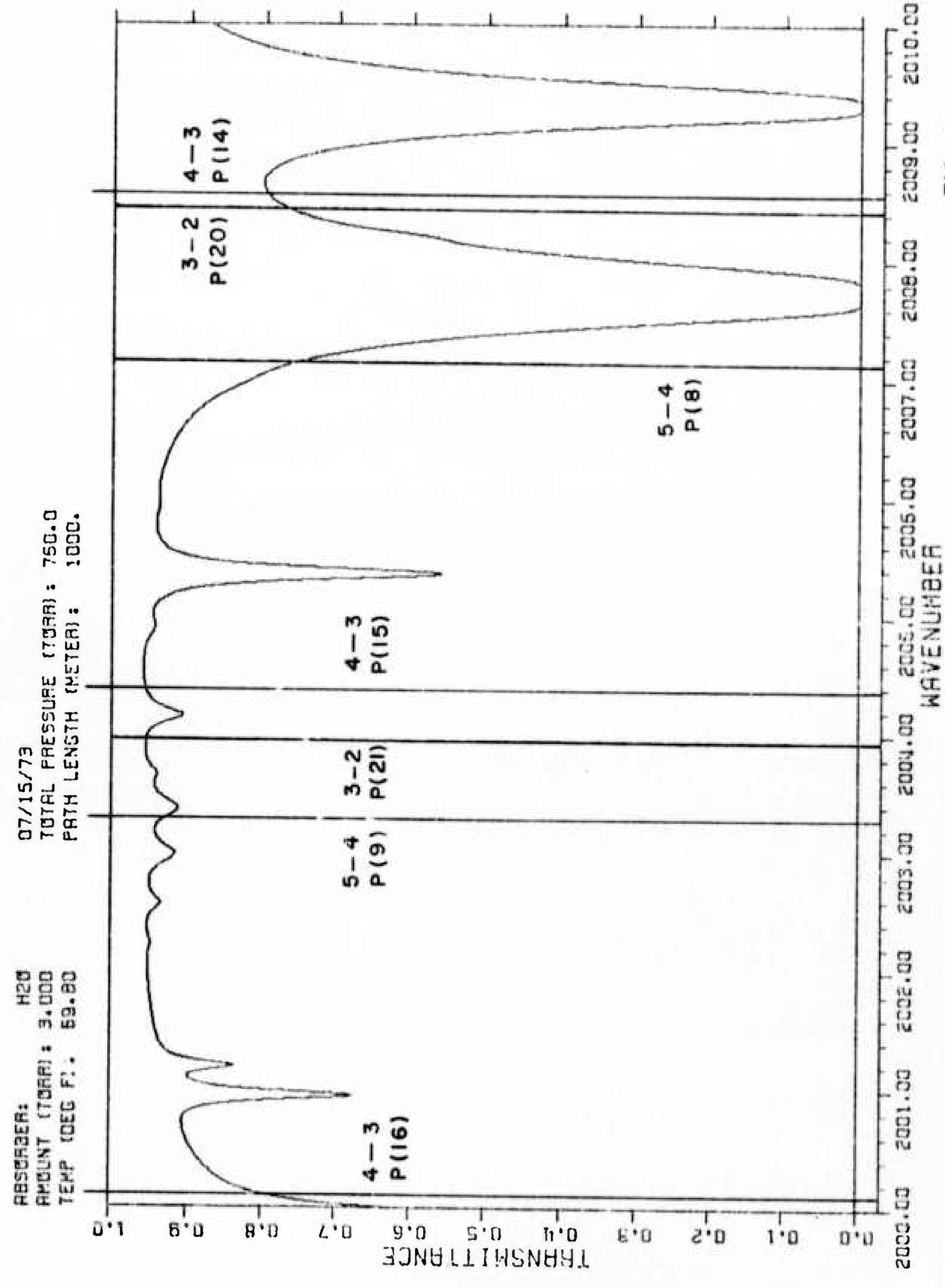
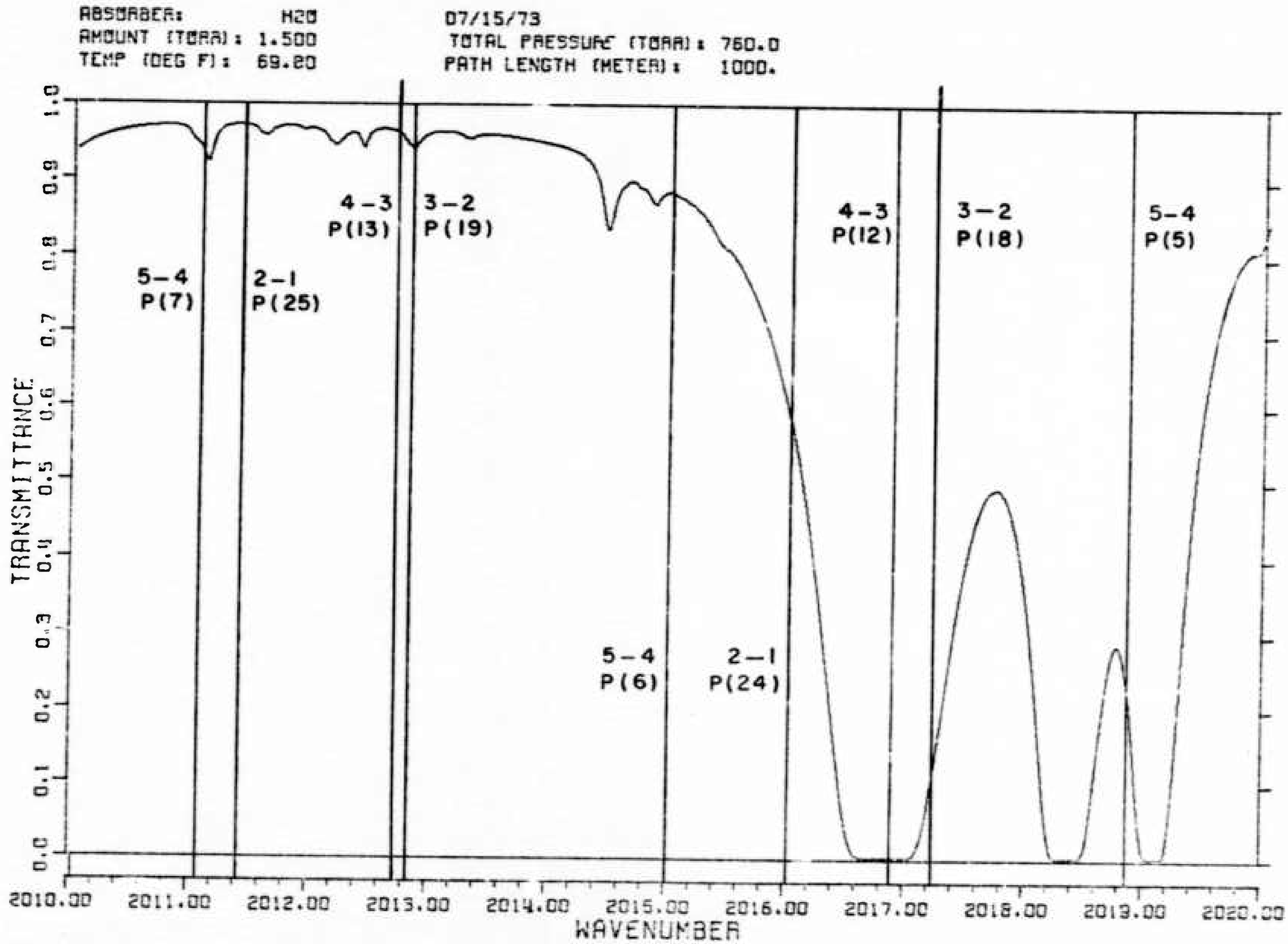

ABSORBER: H2O
AMOUNT (TORR): 3.000
TEMP (DEG F). 69.80
07/15/73
TOTAL PRESSURE (TORR): 750.0
PATH LENGTH (METER): 1000.
4—3
P(16)
5—4
P(9)
3—2
P(21)
4—3
P(15)
5—4
P(8)
3—2
P(20)
4—3
P(14)
TRANSMITTANCE
WAVENUMBER
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2000.00
2001.00
2002.00
2003.00
2004.00
2005.00
2006.00
2007.00
2008.00
2009.00
2010.00

FIG. 4



ABSORBER: H2O
AMOUNT (TORR): 1.500
TEMP (DEG F): 69.20
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
5-4 P(7)
2-1 P(25)
4-3 P(13)
3-2 P(19)
5-4 P(6)
2-1 P(24)
4-3 P(12)
3-2 P(18)
5-4 P(5)
2010.00
2011.00
2012.00
2013.00
2014.00
2015.00
2016.00
2017.00
2018.00
2019.00
2020.00
WAVENUMBER

FIG. 5

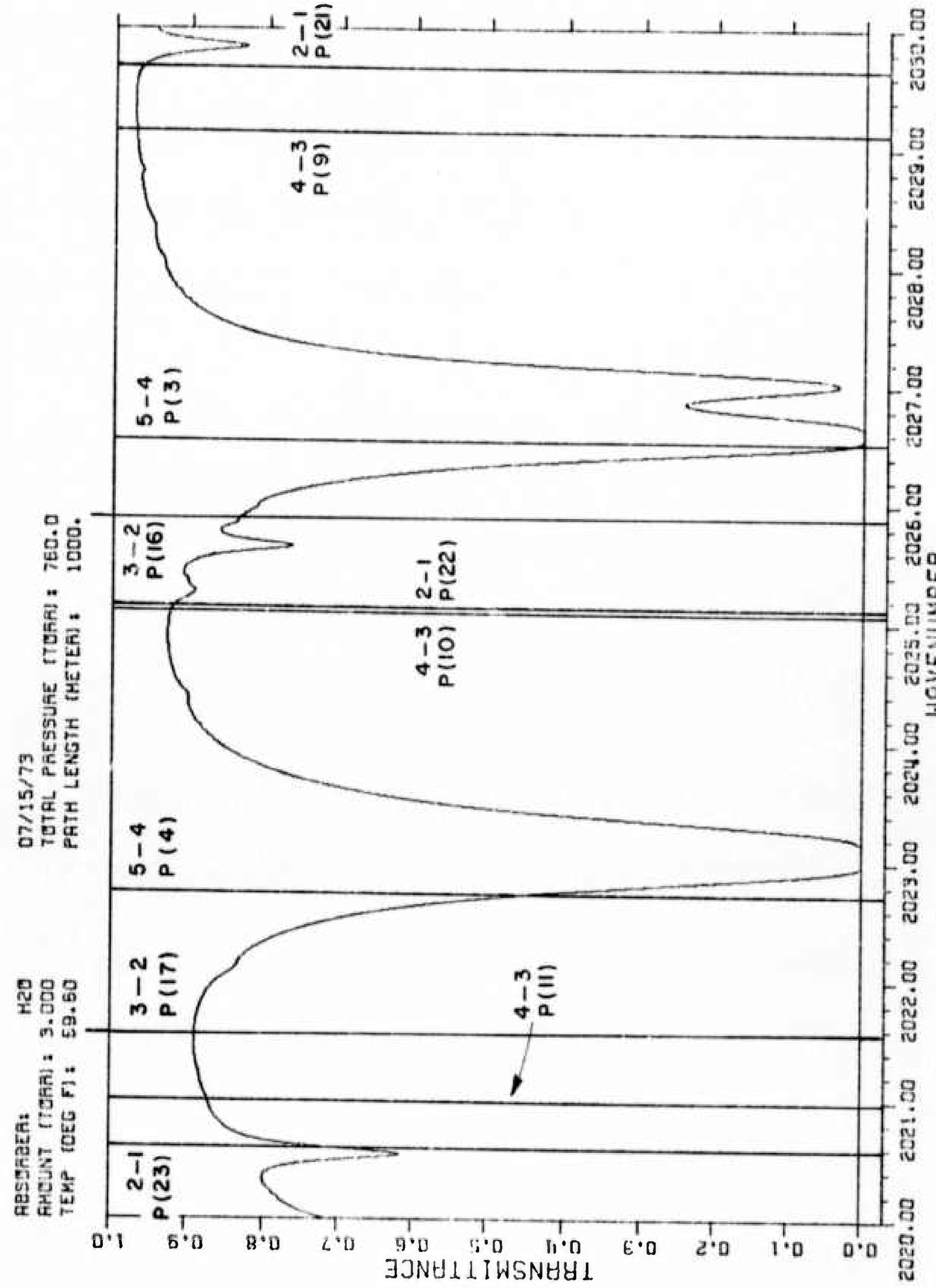

ABSORBER: H2O
AMOUNT (TORR): 3.000
TEMP (DEG F): 59.60
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
2—1 P(23)
3—2 P(17)
4—3 P(11)
5—4 P(4)
4—3 P(10)
2—1 P(22)
3—2 P(16)
5—4 P(3)
4—3 P(9)
2—1 P(21)
TRANSMITTANCE
WAVENUMBER
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2020.00
2021.00
2022.00
2023.00
2024.00
2025.00
2026.00
2027.00
2028.00
2029.00
2030.00

FIG. 6

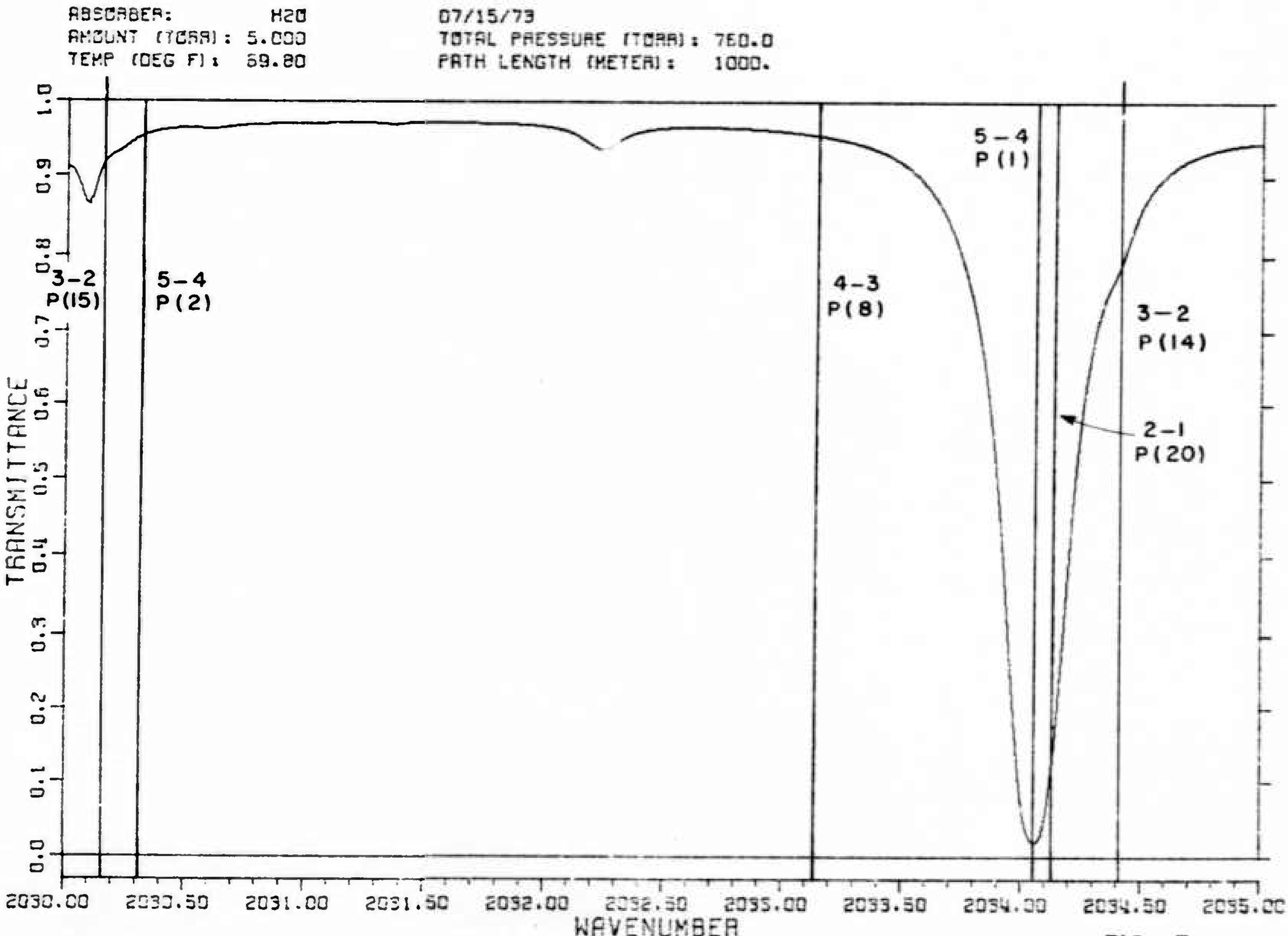
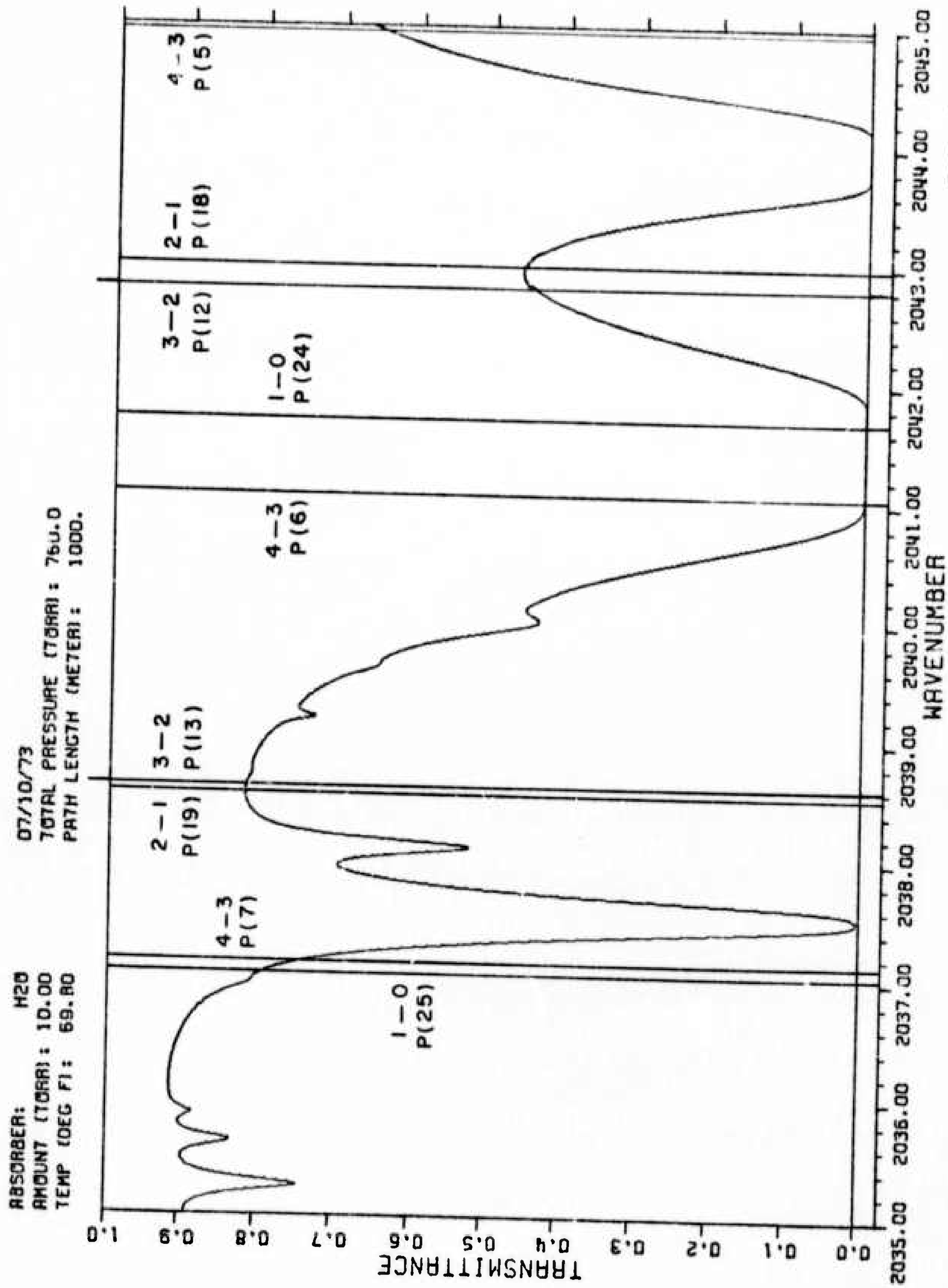

ABSORBER: H2O
AMOUNT (TORR): 5.000
TEMP (DEG F): 59.80
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
3-2
P(15)
5-4
P(2)
4-3
P(8)
5-4
P(1)
3-2
P(14)
2-1
P(20)
2030.00
2030.50
2031.00
2031.50
2032.00
2032.50
2033.00
2033.50
2034.00
2034.50
2035.00
WAVENUMBER

FIG. 7



ABSORBER: H2O
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
WAVENUMBER
1—0 P(25)
4—3 P(7)
2—1 P(19)
3—2 P(13)
4—3 P(6)
1—0 P(24)
3—2 P(12)
2—1 P(18)
4—3 P(5)

FIG. 8

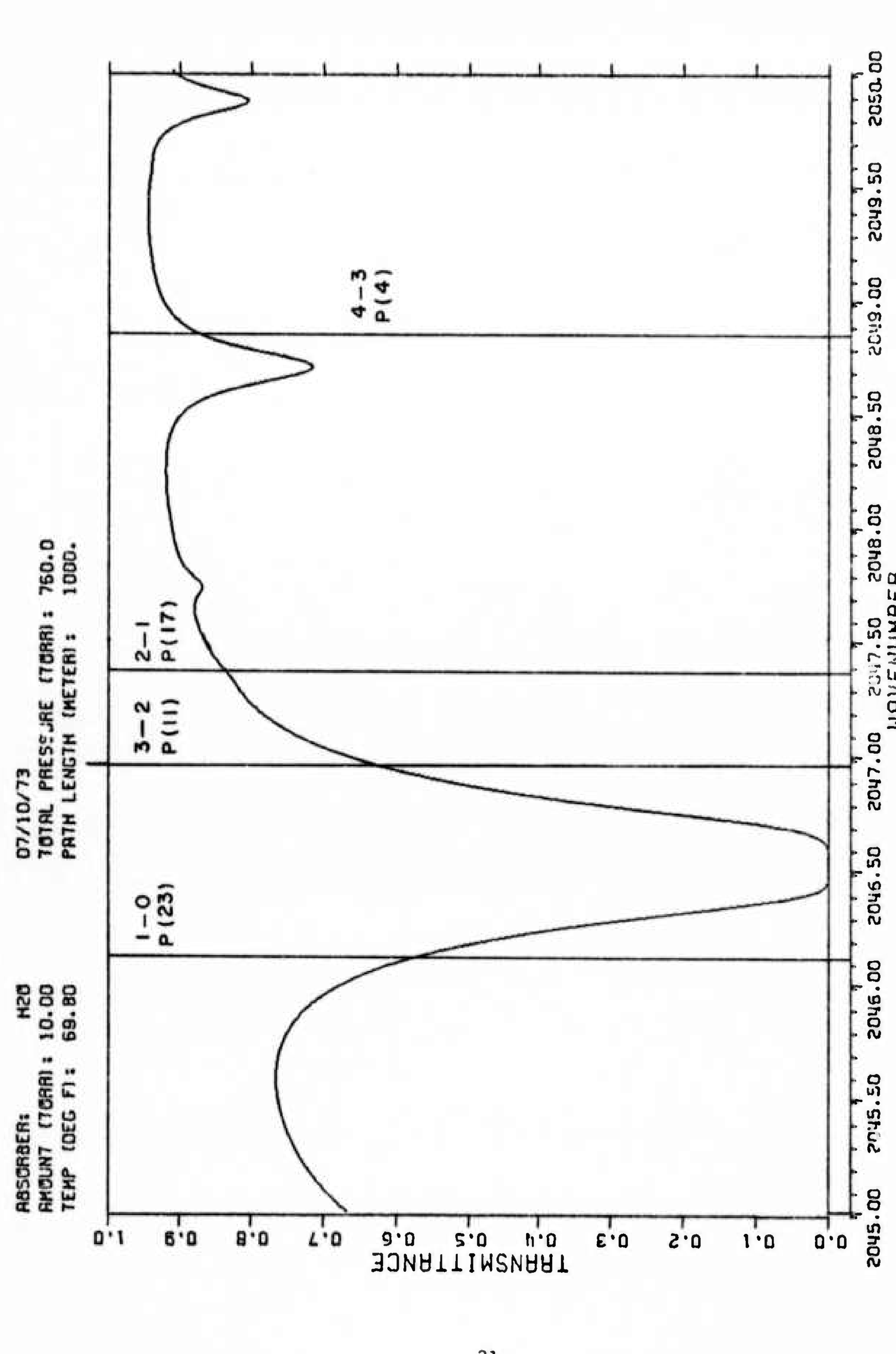

ABSORBER: H2O
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
1–0
P(23)
3–2
P(11)
2–1
P(17)
4–3
P(4)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2045.00
2045.50
2046.00
2046.50
2047.00
2047.50
2048.00
2048.50
2049.00
2049.50
2050.00

FIG. 9

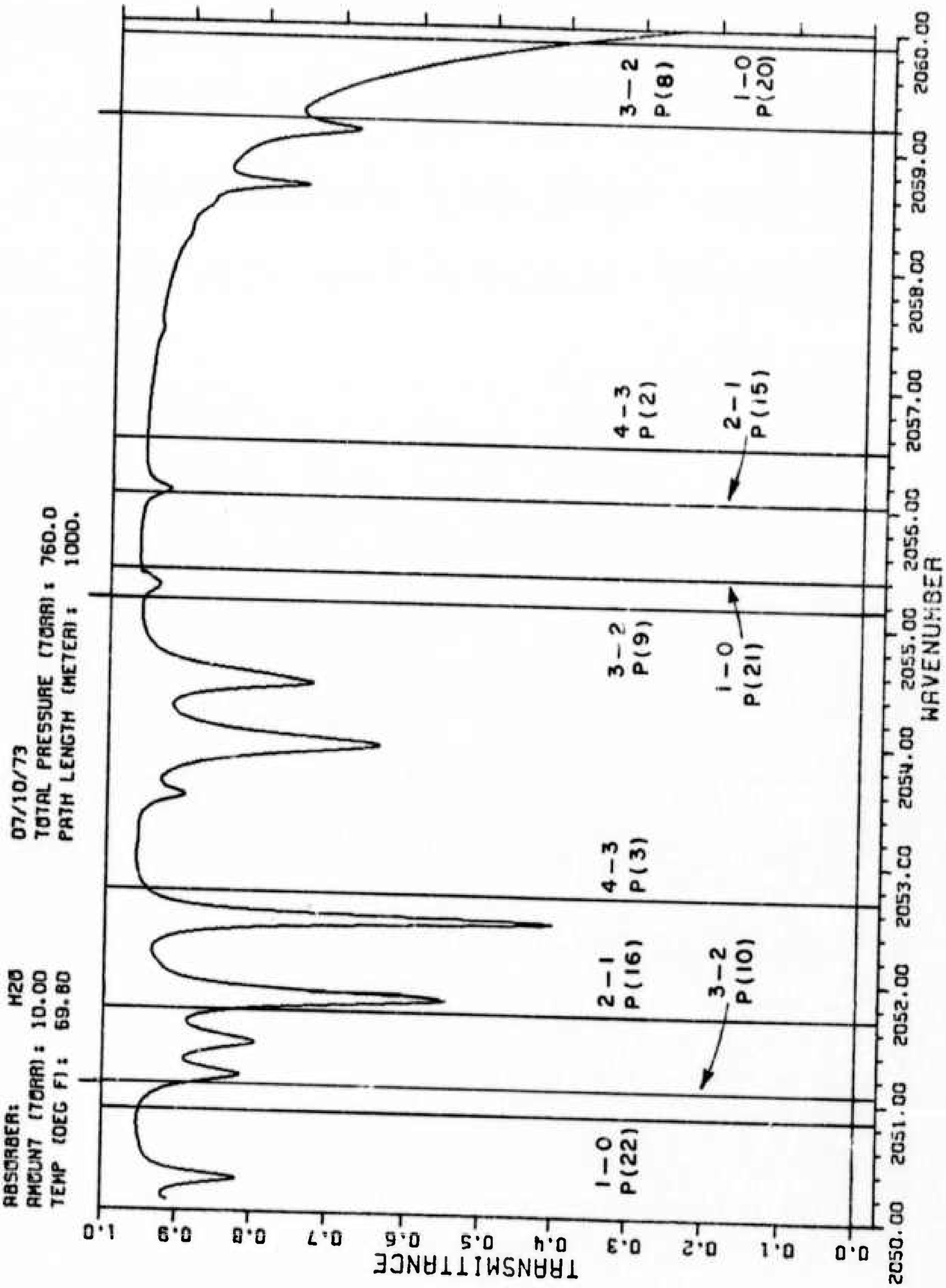

ABSORBER: H2O
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2050.00
2051.00
2052.00
2053.00
2054.00
2055.00
2056.00
2057.00
2058.00
2059.00
2060.00
1—0 P(22)
2—1 P(16)
3—2 P(10)
4—3 P(3)
3—2 P(9)
1—0 P(21)
4—3 P(2)
2—1 P(15)
3—2 P(8)
1—0 P(20)

FIG. 10

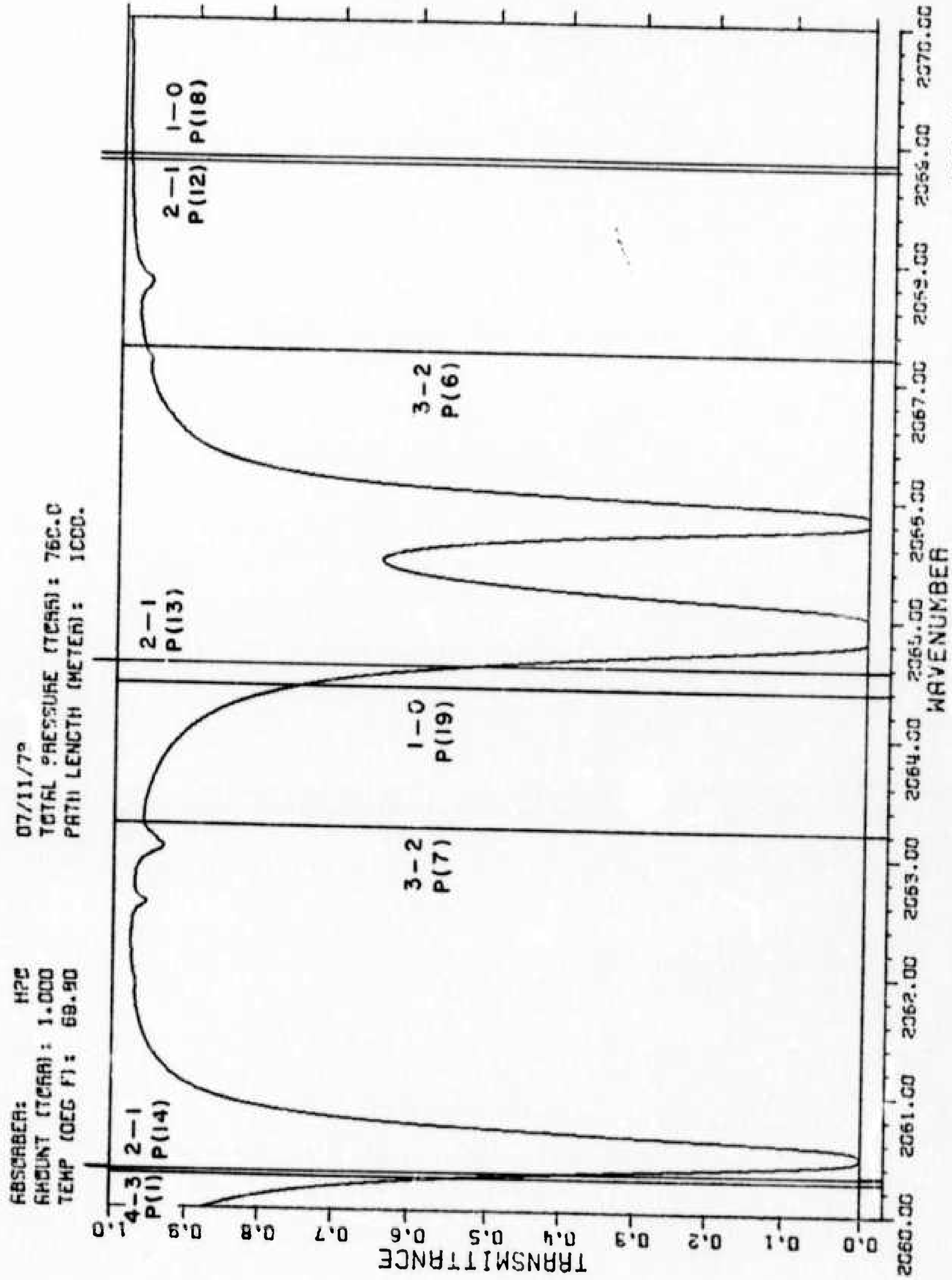

ABSORBER: H2S
AMOUNT (TORR): 1.000
TEMP (DEG F): 69.90
07/11/79
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
WAVENUMBER
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2060.00
2061.00
2062.00
2063.00
2064.00
2065.00
2066.00
2067.00
2068.00
2069.00
2070.00
4—3 P(1)
2—1 P(14)
3—2 P(7)
1—0 P(19)
2—1 P(13)
3—2 P(6)
2—1 P(12)
1—0 P(18)

FIG. 11

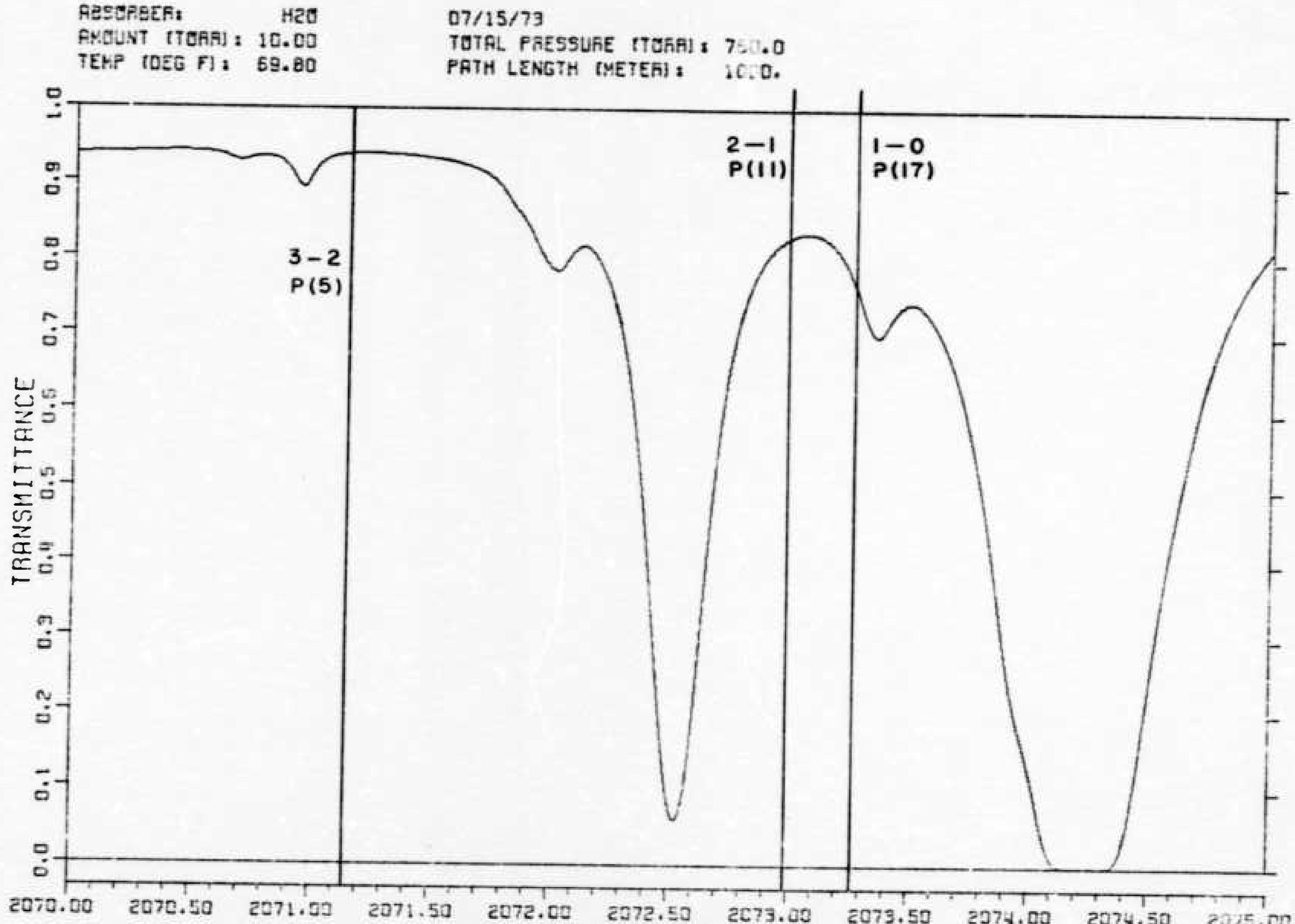

ABSORBER: H2O
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/15/73
TOTAL PRESSURE (TORR):
PATH LENGTH (METER):
3 - 2
P(5)
2—1
P(11)
1—0
P(17)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2070.00
2070.50
2071.00
2071.50
2072.00
2072.50
2073.00
2073.50
2074.00
2074.50
2075.00
WAVENUMBER

FIG.12

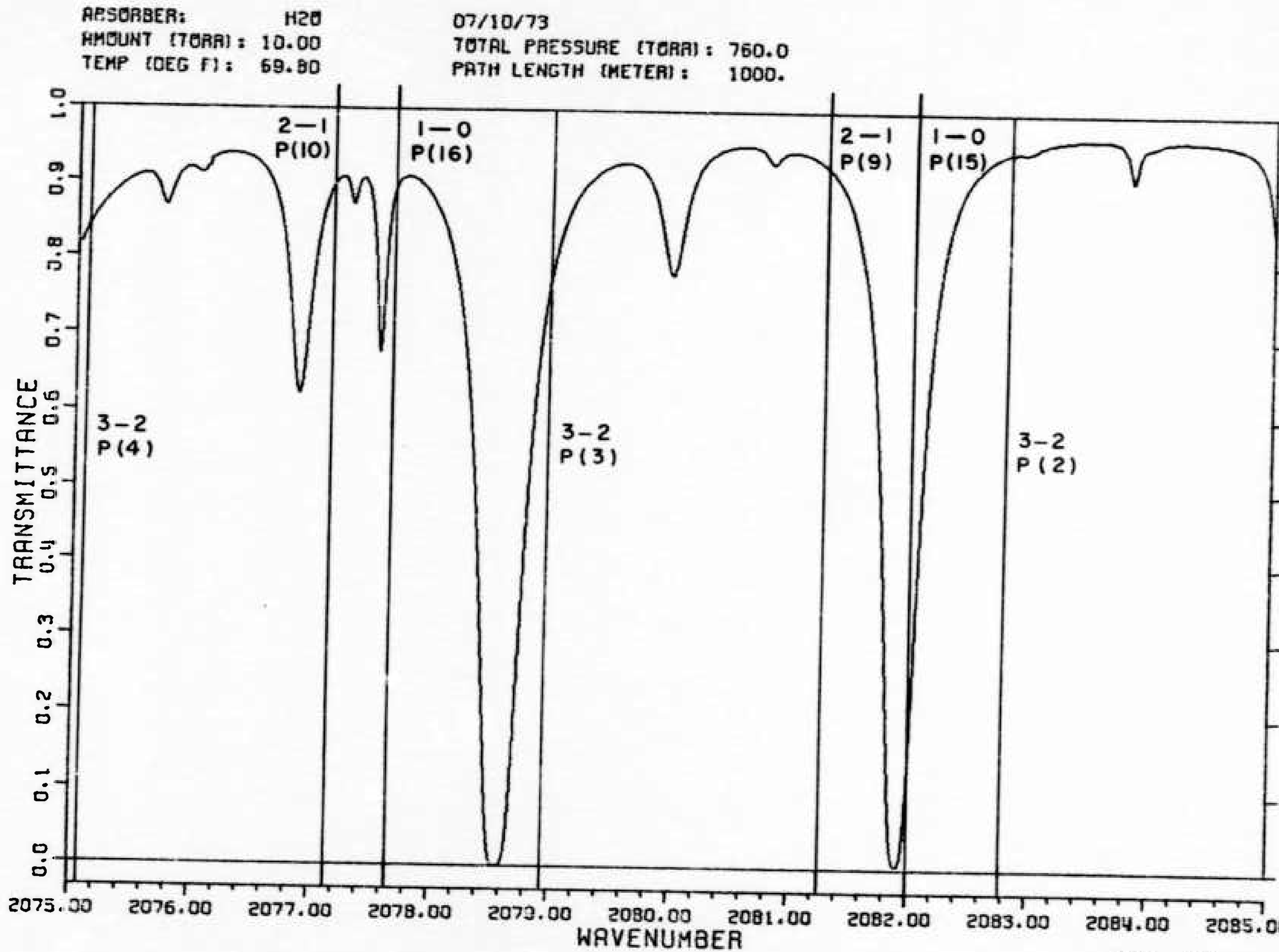

ABSORBER: H2O
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
2—1
P(10)
1—0
P(16)
2—1
P(9)
1—0
P(15)
3-2
P(4)
3-2
P(3)
3-2
P(2)
TRANSMITTANCE
WAVENUMBER
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2075.00
2076.00
2077.00
2078.00
2079.00
2080.00
2081.00
2082.00
2083.00
2084.00
2085.00

FIG. 13

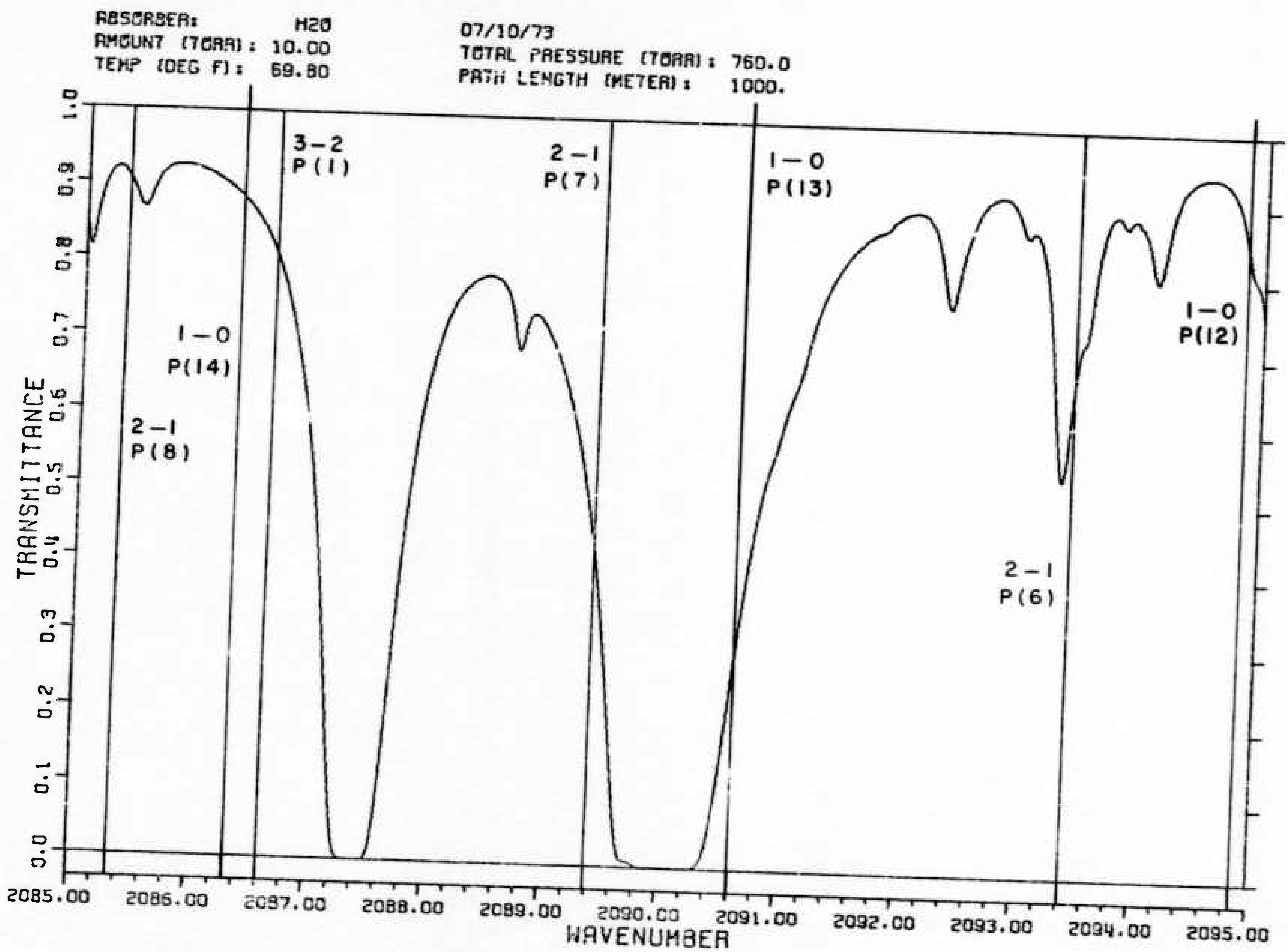

ABSORBER: H2O
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
WAVENUMBER
2085.00
2086.00
2087.00
2088.00
2089.00
2090.00
2091.00
2092.00
2093.00
2094.00
2095.00
2—1 P(8)
1—0 P(14)
3—2 P(1)
2—1 P(7)
1—0 P(13)
2—1 P(6)
1—0 P(12)

FIG. 14

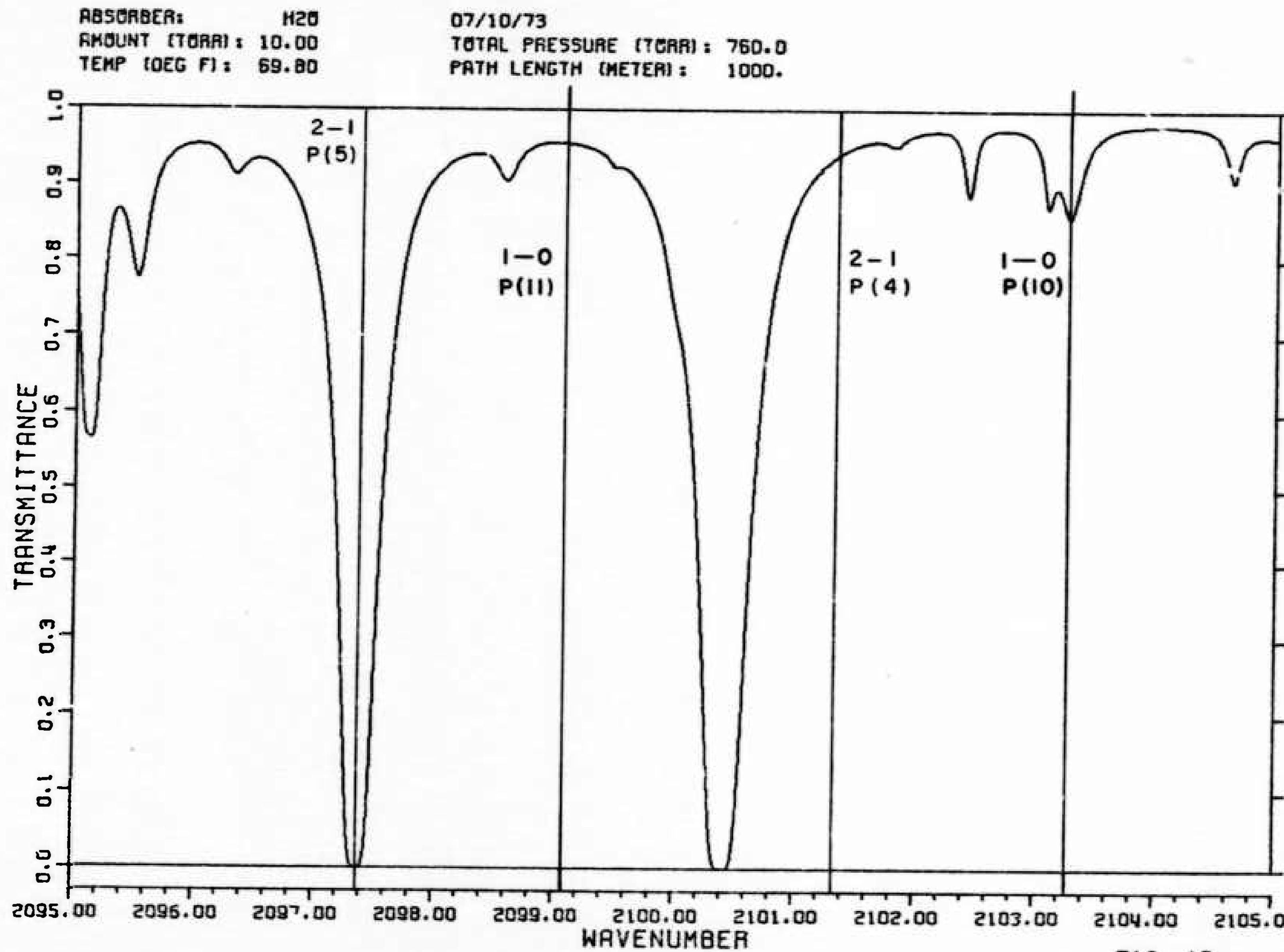

ABSORBER: H2O
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2-1
P(5)
1-0
P(11)
2-1
P(4)
1-0
P(10)
2095.00
2096.00
2097.00
2098.00
2099.00
2100.00
2101.00
2102.00
2103.00
2104.00
2105.00
WAVENUMBER

FIG. 15

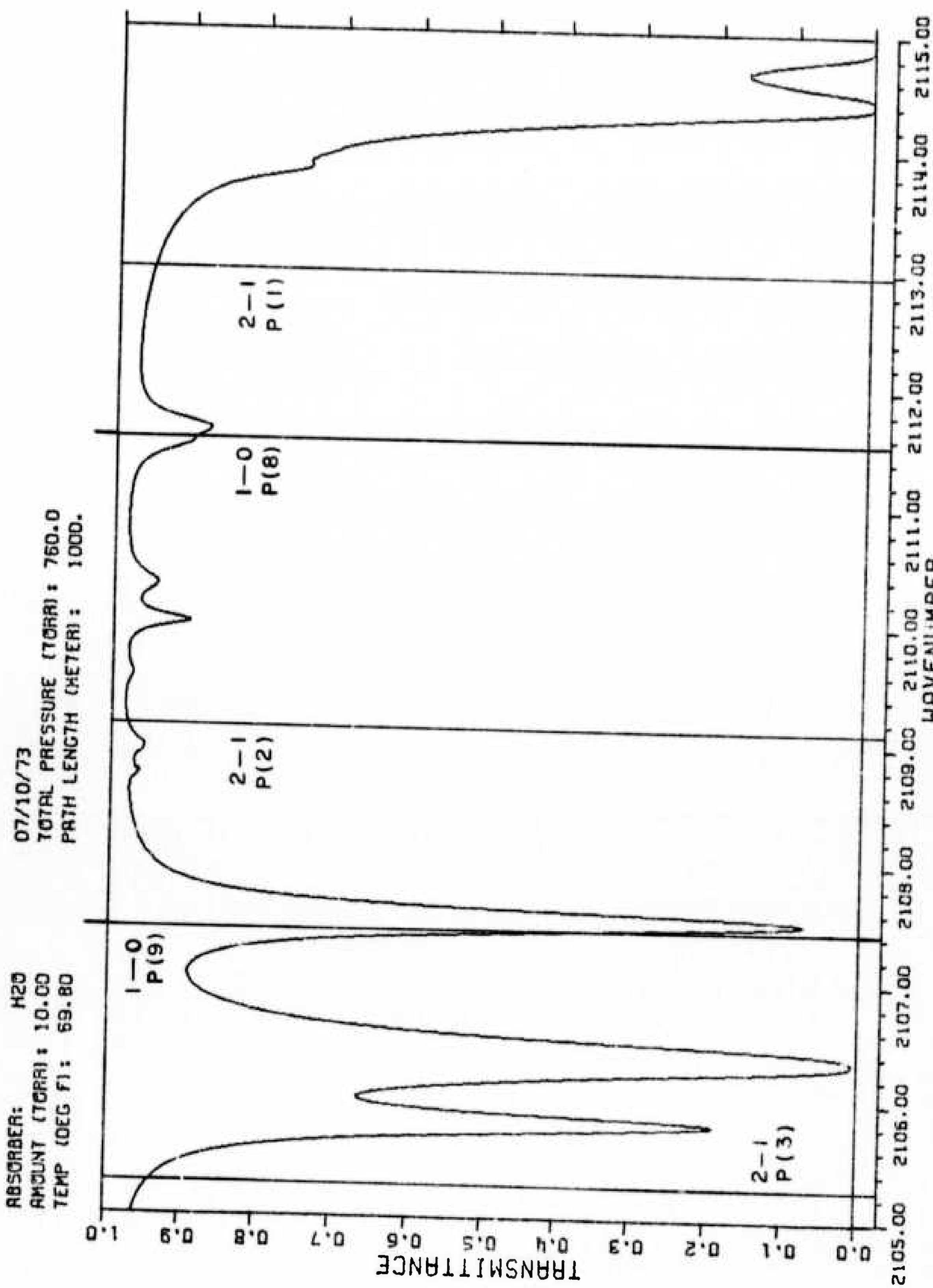

ABSORBER: H2O
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
1—0 P(9)
2—1 P(3)
2—1 P(2)
1—0 P(8)
2—1 P(1)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2105.00
2106.00
2107.00
2108.00
2109.00
2110.00
2111.00
2112.00
2113.00
2114.00
2115.00

FIG. 16

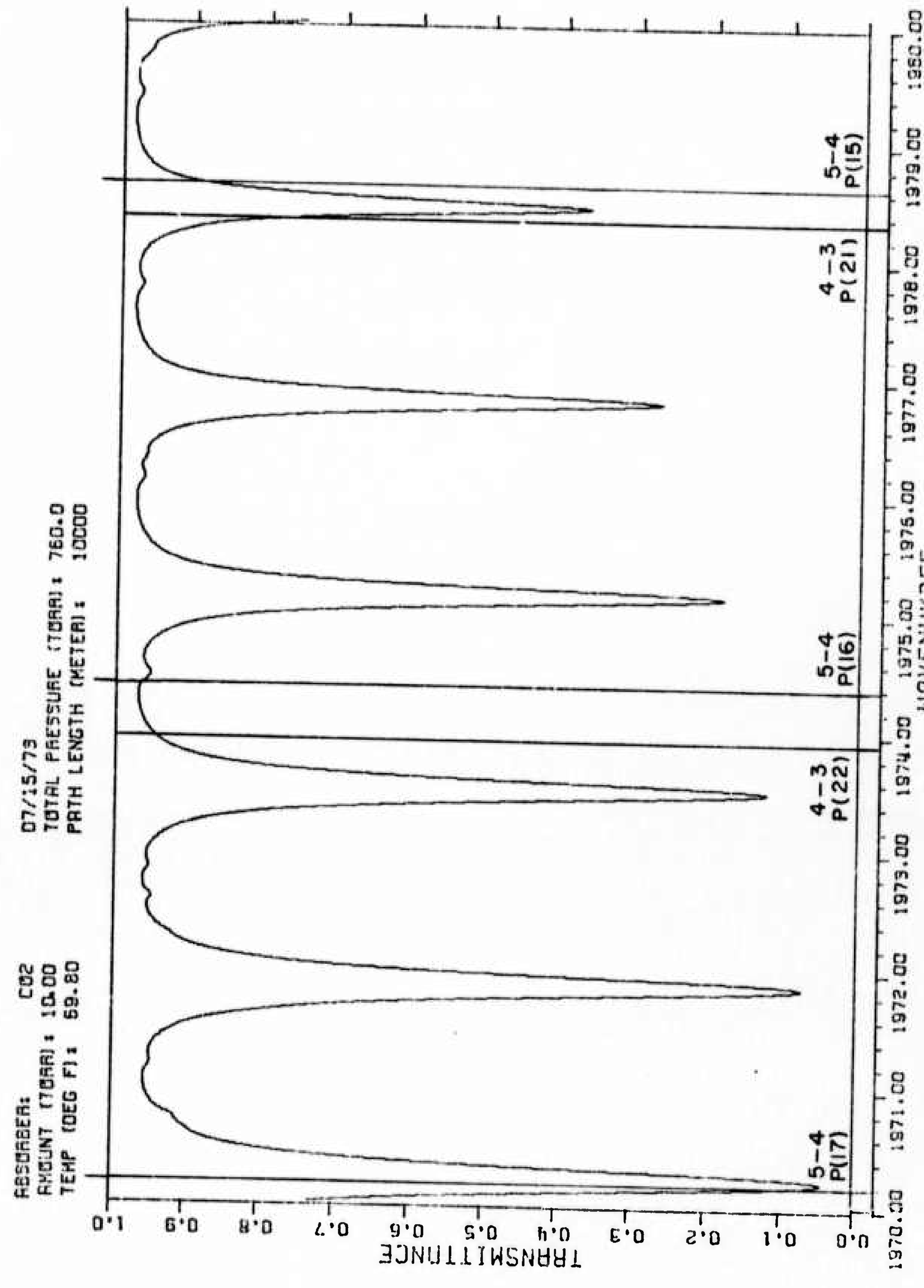

ABSORBER: CO2
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
TRANSMITTANCE
WAVENUMBER
5-4 P(17)
4-3 P(22)
5-4 P(16)
4-3 P(21)
5-4 P(15)
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
1970.00 1971.00 1972.00 1973.00 1974.00 1975.00 1976.00 1977.00 1978.00 1979.00 1980.00

FIG. 17

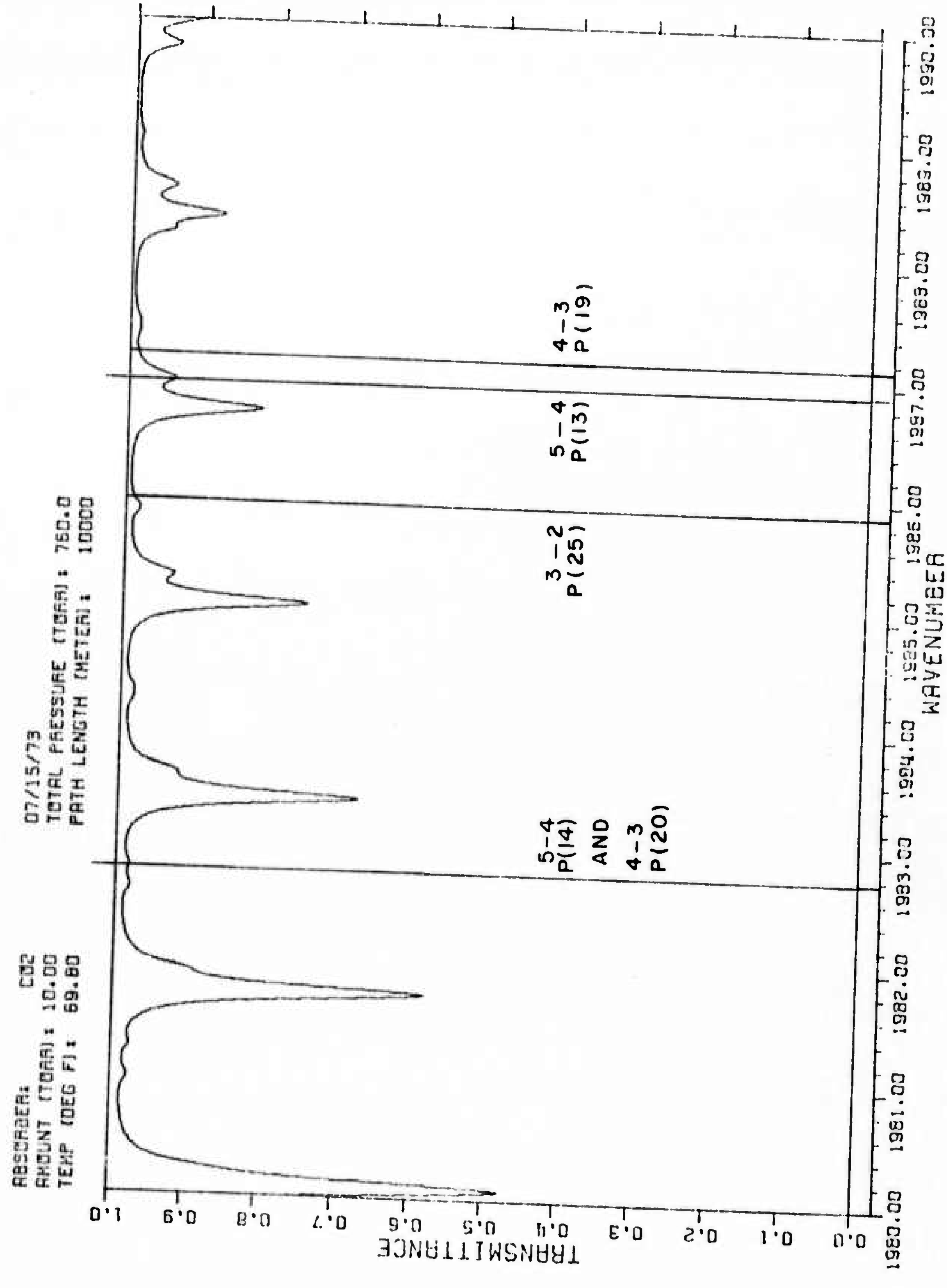
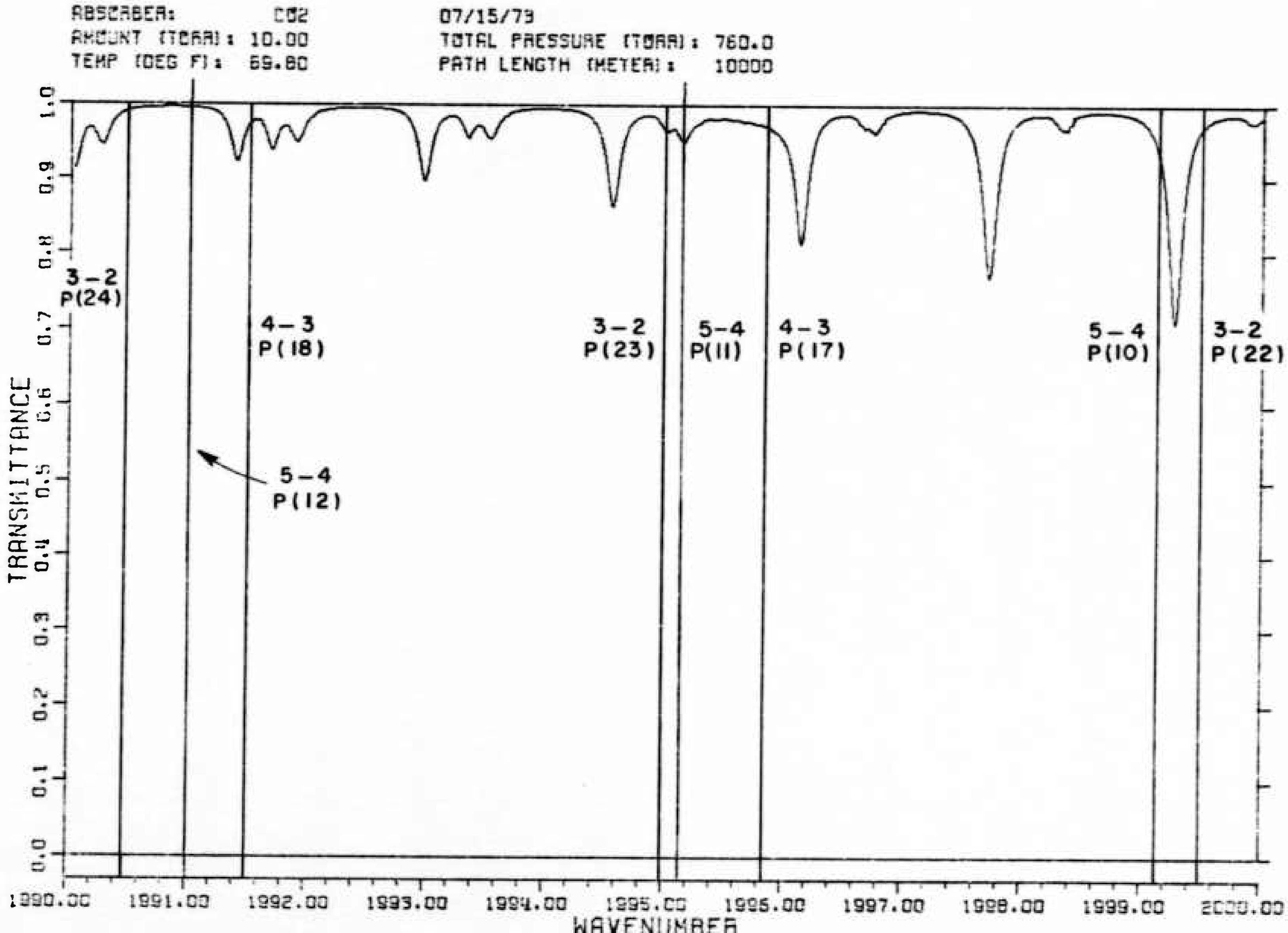

ABSORBER: CO2
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
5-4 P(14) AND 4-3 P(20)
3-2 P(25)
5-4 P(13)
4-3 P(19)
TRANSMITTANCE
WAVENUMBER
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1980.00
1981.00
1982.00
1983.00
1984.00
1985.00
1986.00
1987.00
1988.00
1989.00
1990.00

FIG. 18



ABSORBER: CO2
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
TRANSMITTANCE
WAVENUMBER
3-2 P(24)
4-3 P(18)
5-4 P(12)
3-2 P(23)
5-4 P(11)
4-3 P(17)
5-4 P(10)
3-2 P(22)

FIG. 19

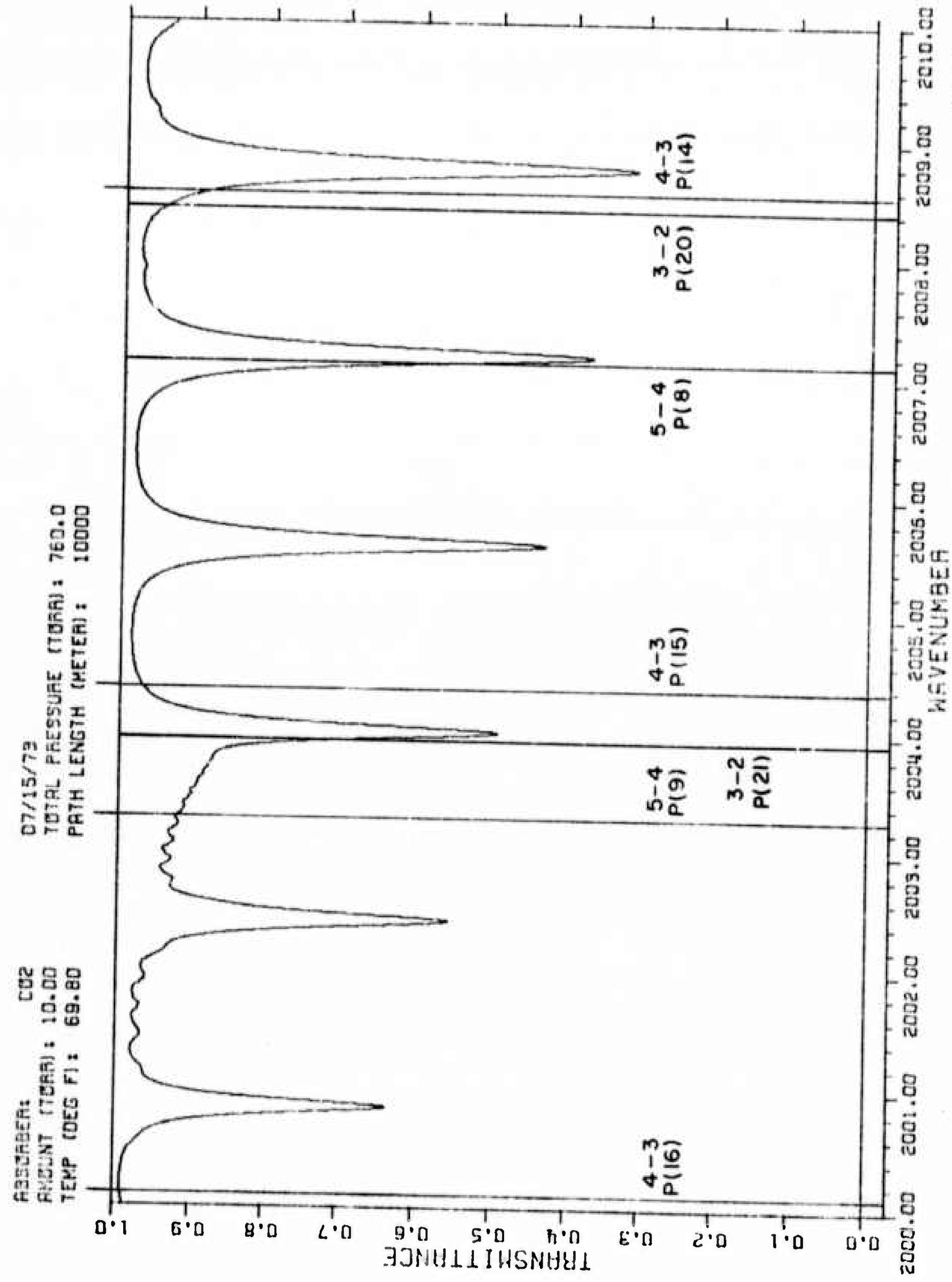

ABSORBER: CO2
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/15/79
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
4-3 P(16)
5-4 P(9)
3-2 P(21)
4-3 P(15)
5-4 P(8)
3-2 P(20)
4-3 P(14)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2000.00
2001.00
2002.00
2003.00
2004.00
2005.00
2006.00
2007.00
2008.00
2009.00
2010.00

FIG. 20

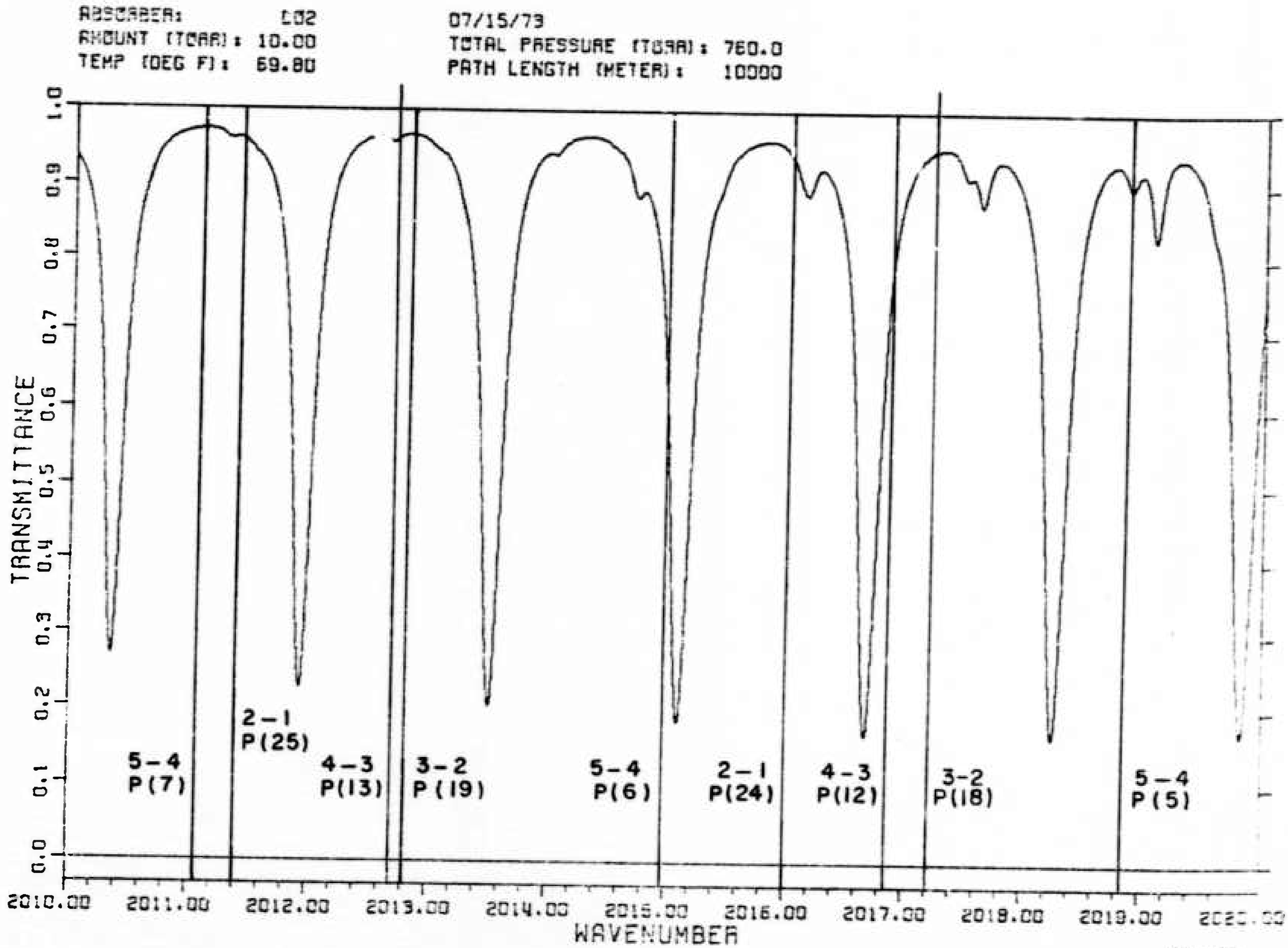

ABSORBER: CO2
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
TRANSMITTANCE
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
5-4 P(7)
2-1 P(25)
4-3 P(13)
3-2 P(19)
5-4 P(6)
2-1 P(24)
4-3 P(12)
3-2 P(18)
5-4 P(5)
2010.00
2011.00
2012.00
2013.00
2014.00
2015.00
2016.00
2017.00
2018.00
2019.00
WAVENUMBER

FIG.2

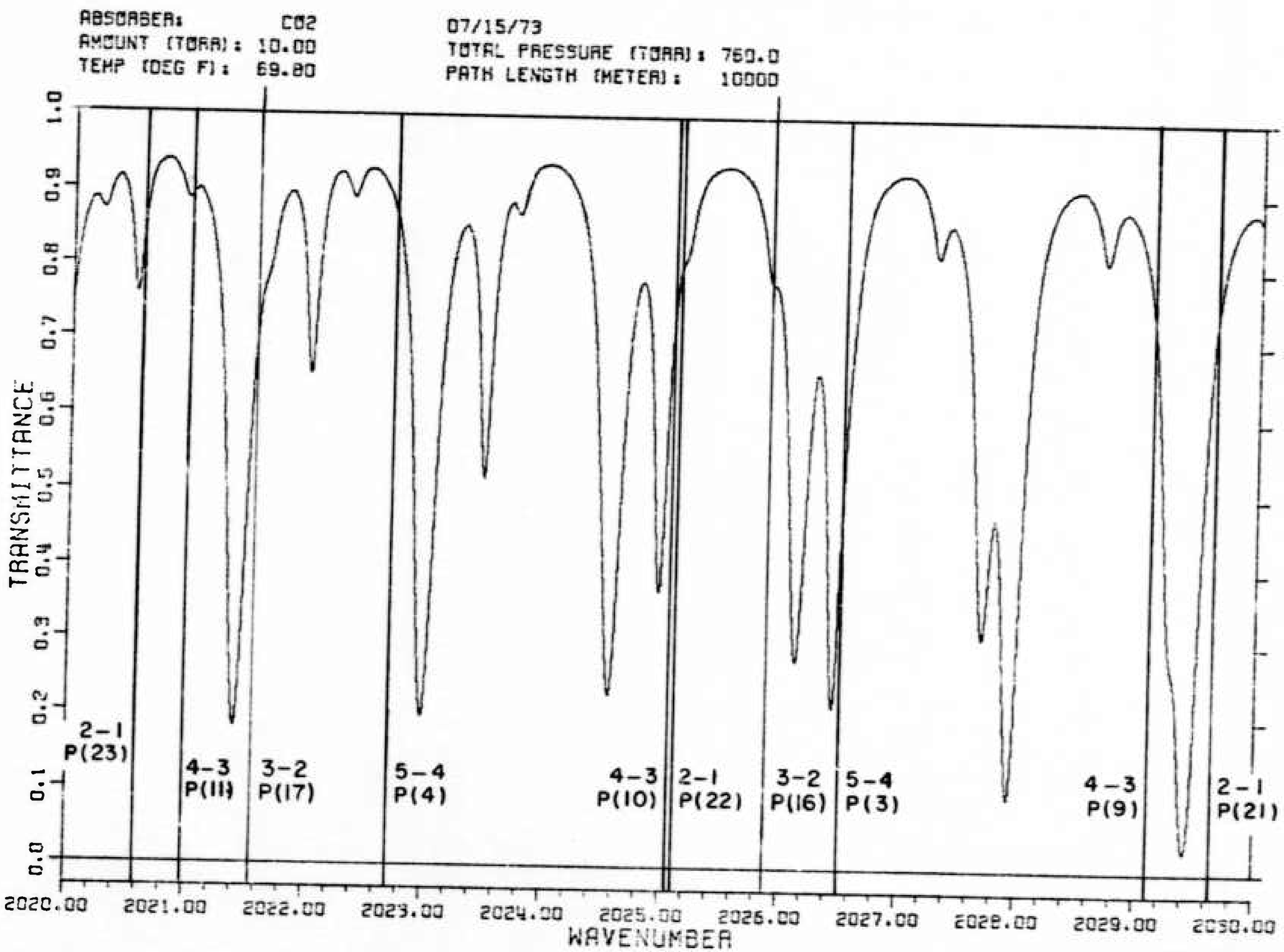

ABSORBER: CO2
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
TRANSMITTANCE
WAVENUMBER
2-1 P(23)
4-3 P(11)
3-2 P(17)
5-4 P(4)
4-3 P(10)
2-1 P(22)
3-2 P(16)
5-4 P(3)
4-3 P(9)
2-1 P(21)

FIG. 22

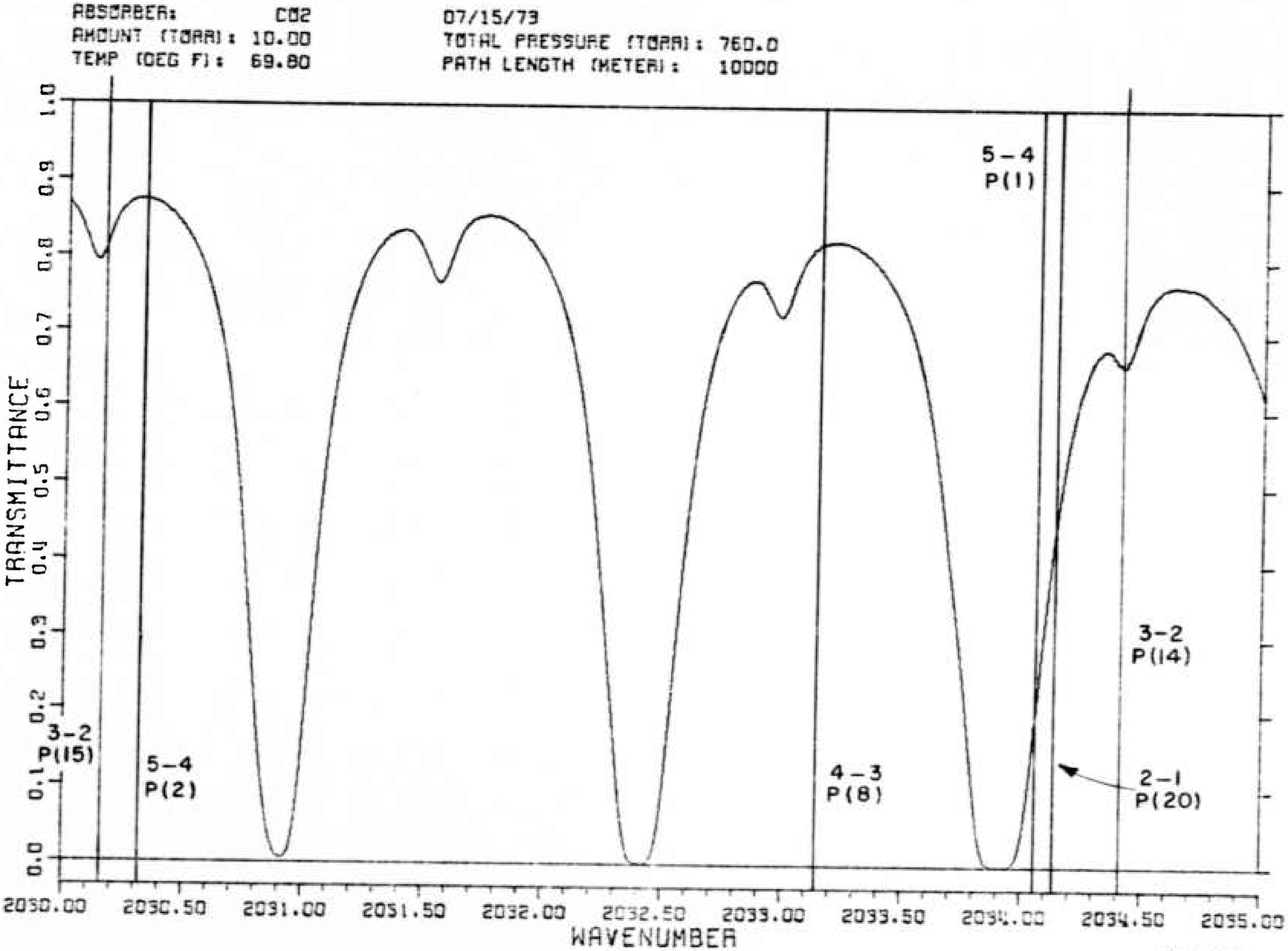

ABSORBER: CO2
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
TRANSMITTANCE
WAVENUMBER
3-2 P(15)
5-4 P(2)
4-3 P(8)
5-4 P(1)
2-1 P(20)
3-2 P(14)

FIG. 23

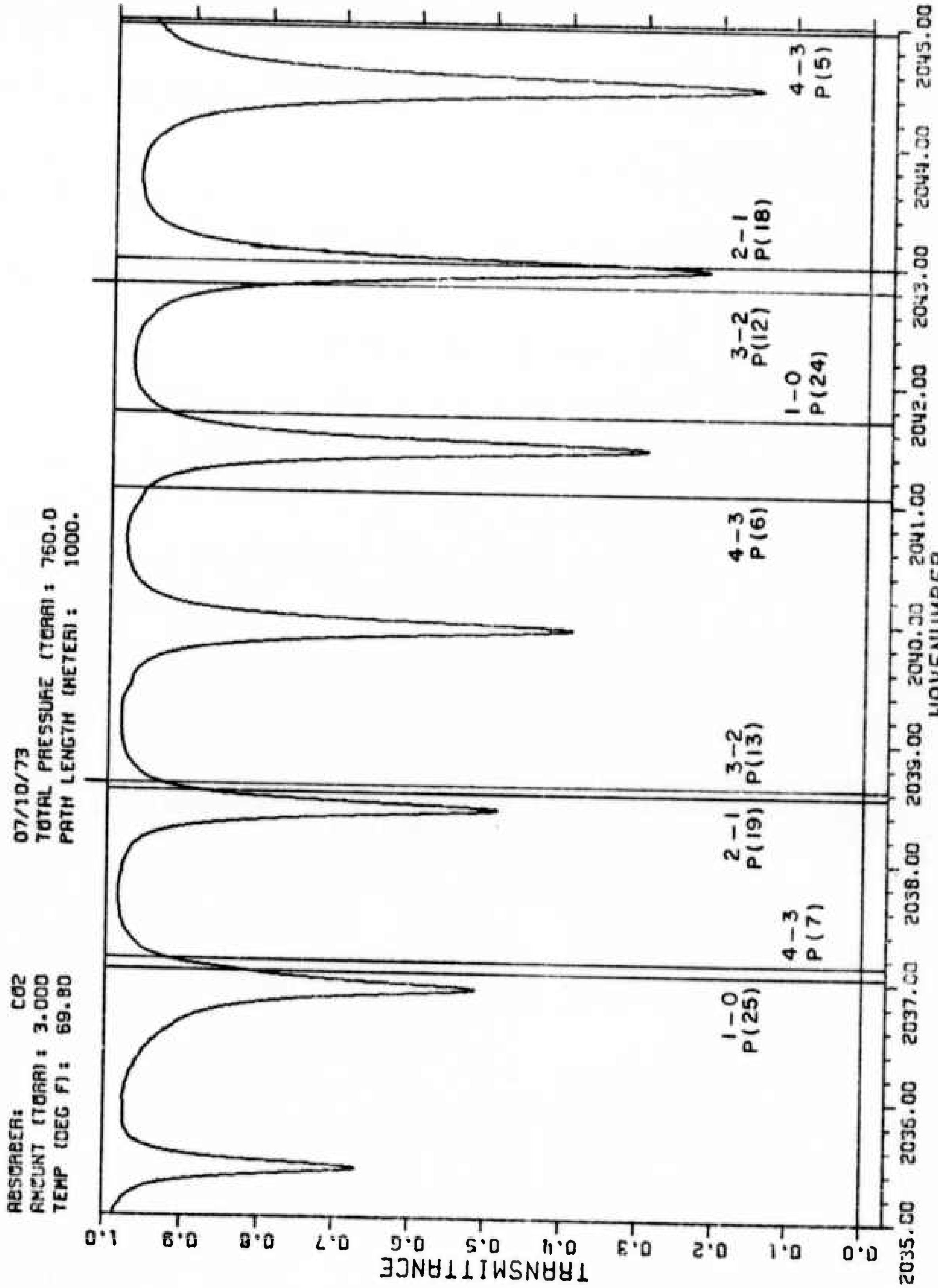

ABSORBER: CO2
AMOUNT (TORR): 3.000
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
1-0 P(25)
4-3 P(7)
2-1 P(19)
3-2 P(13)
4-3 P(6)
1-0 P(24)
3-2 P(12)
2-1 P(18)
4-3 P(5)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2035.00
2036.00
2037.00
2038.00
2039.00
2040.00
2041.00
2042.00
2043.00
2044.00
2045.00

FIG. 24

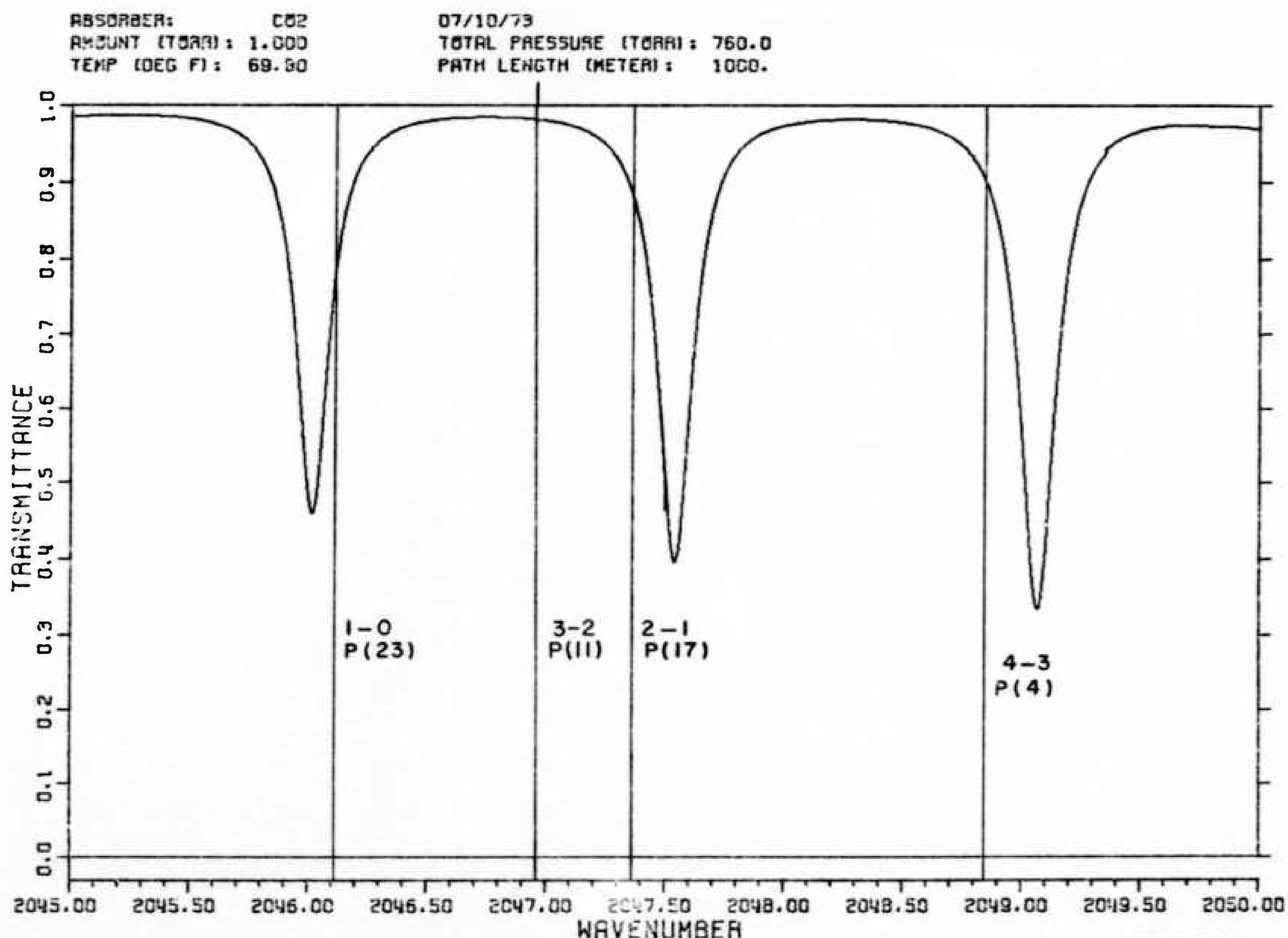

ABSORBER: CO2
AMOUNT (TORR): 1.000
TEMP (DEG F): 69.90
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1-0
P(23)
3-2
P(11)
2-1
P(17)
4-3
P(4)
2045.00
2045.50
2046.00
2046.50
2047.00
2047.50
2048.00
2048.50
2049.00
2049.50
2050.00
WAVENUMBER

FIG. 25

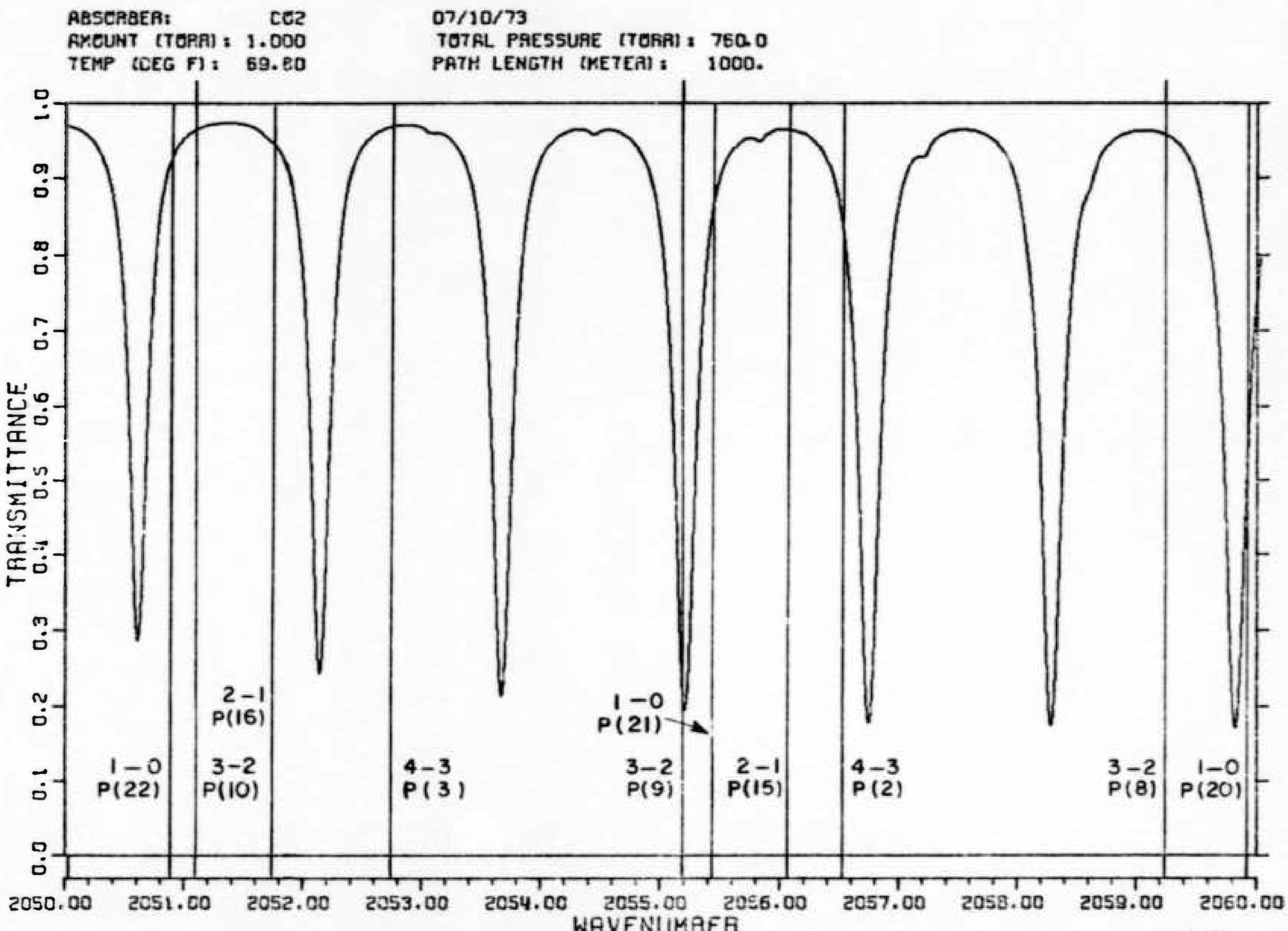

ABSORBER: CO2
AMOUNT (TORR): 1.000
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1-0 P(22)
2-1 P(16)
3-2 P(10)
4-3 P(3)
1-0 P(21)
3-2 P(9)
2-1 P(15)
4-3 P(2)
3-2 P(8)
1-0 P(20)
2050.00
2051.00
2052.00
2053.00
2054.00
2055.00
2056.00
2057.00
2058.00
2059.00
2060.00
WAVENUMBER

FIG. 26

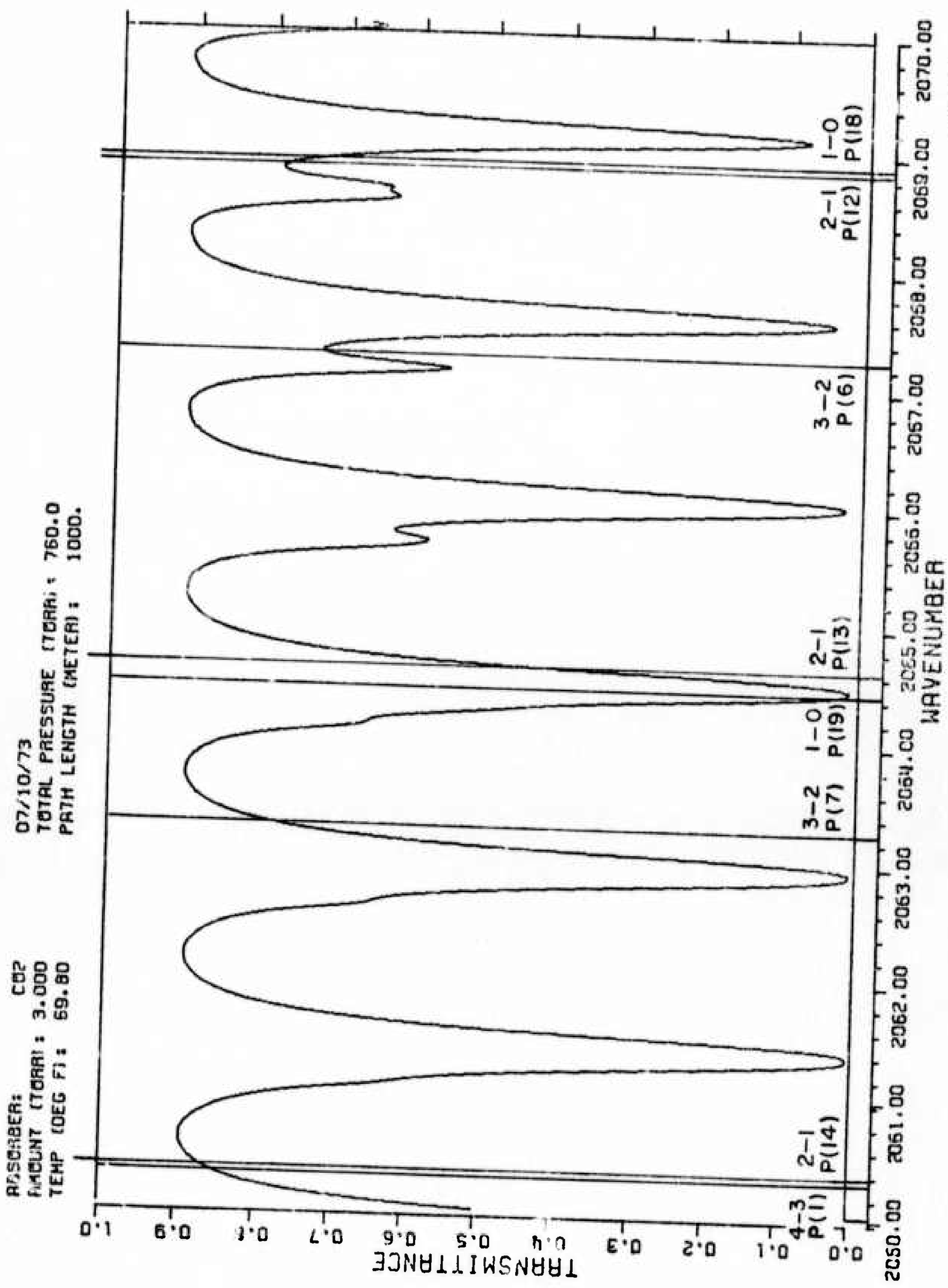

ABSORBER: CO2
AMOUNT (TORR): 3.000
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2050.00
2061.00
2062.00
2063.00
2064.00
2065.00
2066.00
2067.00
2068.00
2069.00
2070.00
4-3 P(1)
2-1 P(14)
3-2 P(7)
1-0 P(19)
2-1 P(13)
3-2 P(6)
2-1 P(12)
1-0 P(18)

FIG. 27

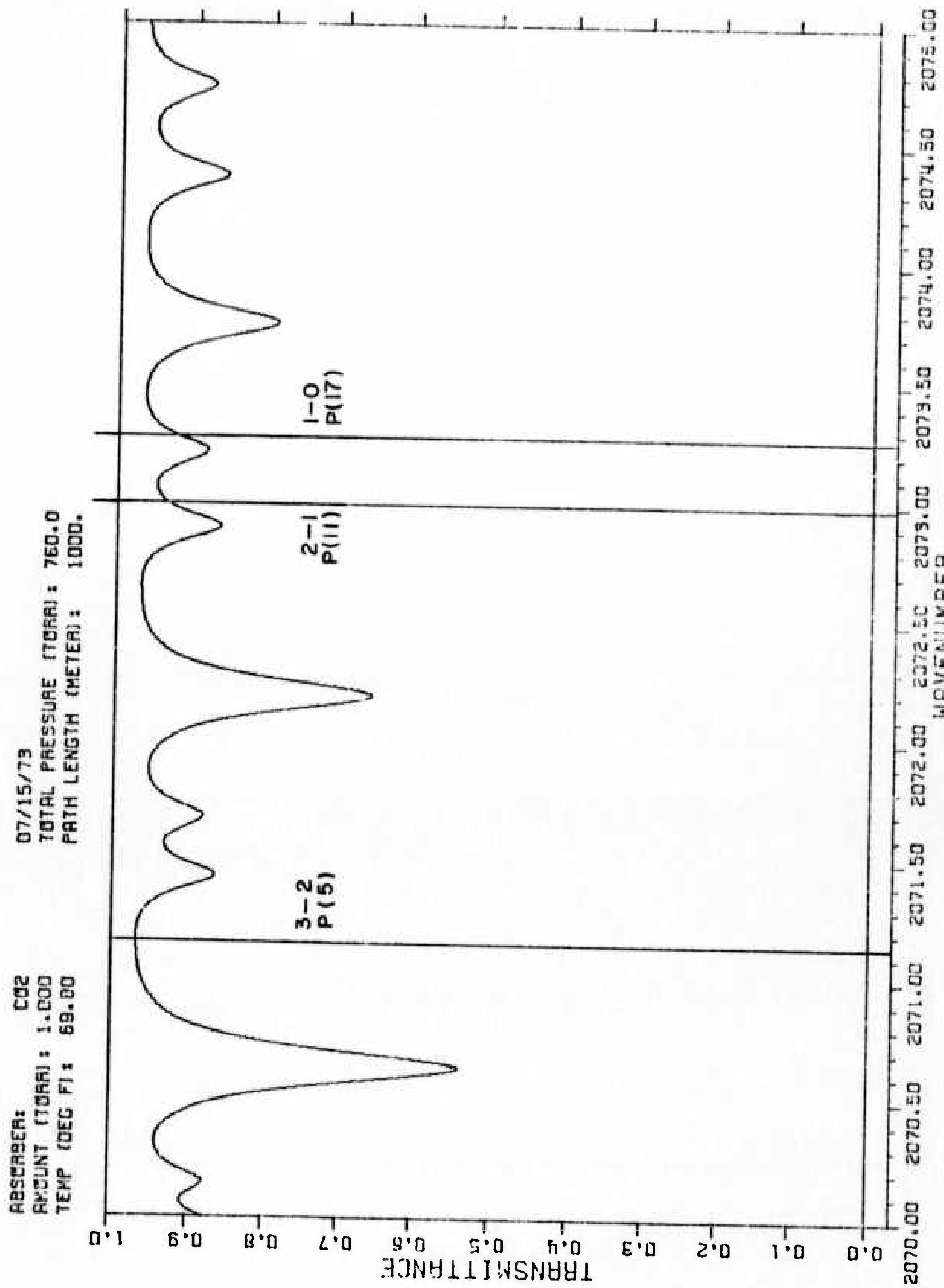

ABSORBER: CO2
AMOUNT (TORR): 1.000
TEMP (DEG F): 69.00
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
3-2
P(5)
2-1
P(11)
1-0
P(17)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2070.00
2070.50
2071.00
2071.50
2072.00
2072.50
2073.00
2073.50
2074.00
2074.50
2075.00
WAVENUMBER

FIG.28

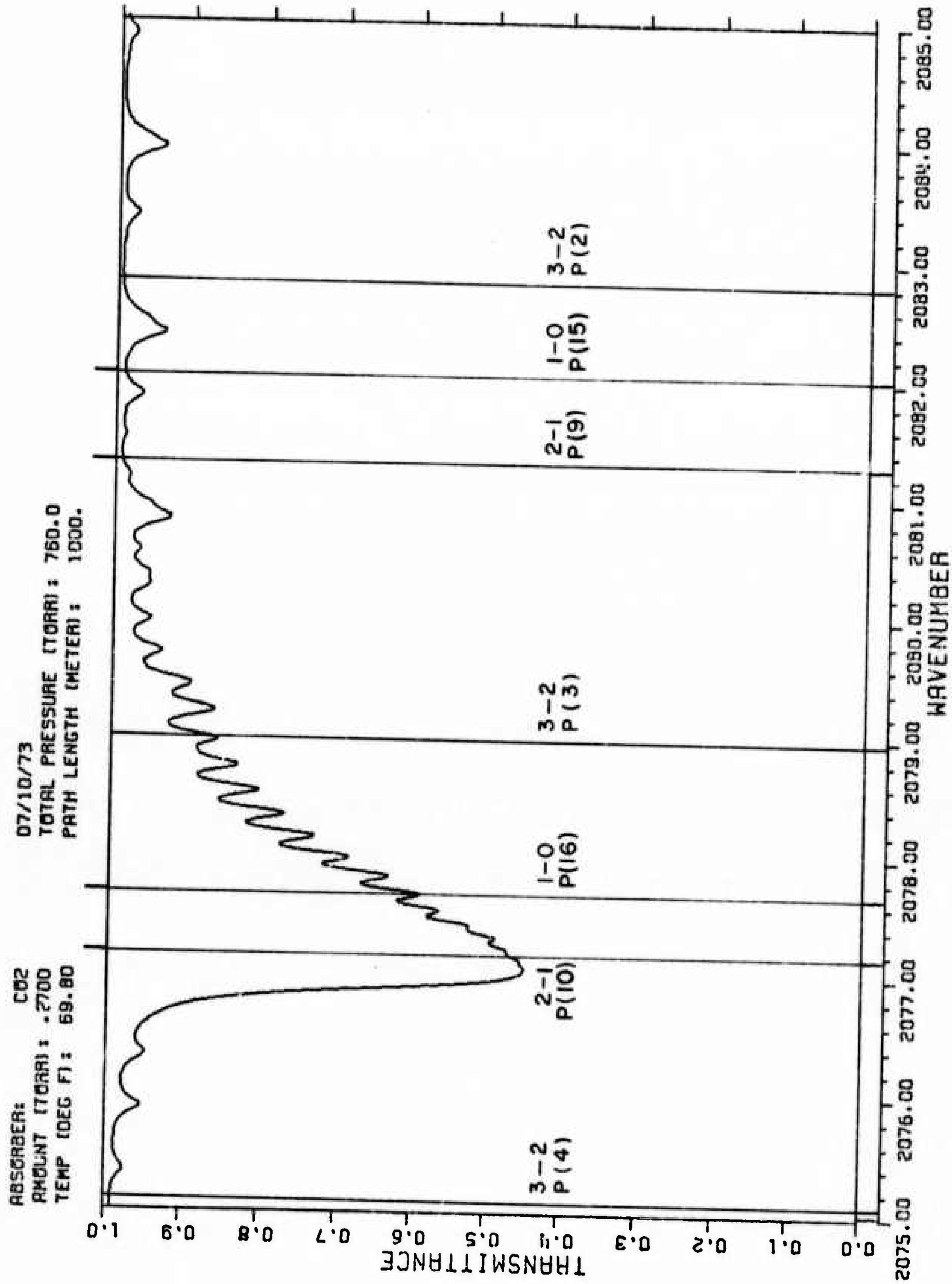

ABSORBER: CO2
AMOUNT (TORR): .2700
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
3-2 P(4)
2-1 P(10)
1-0 P(16)
3-2 P(3)
2-1 P(9)
1-0 P(15)
3-2 P(2)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2075.00
2076.00
2077.00
2078.00
2079.00
2080.00
2081.00
2082.00
2083.00
2084.00
2085.00
WAVENUMBER

FIG.29

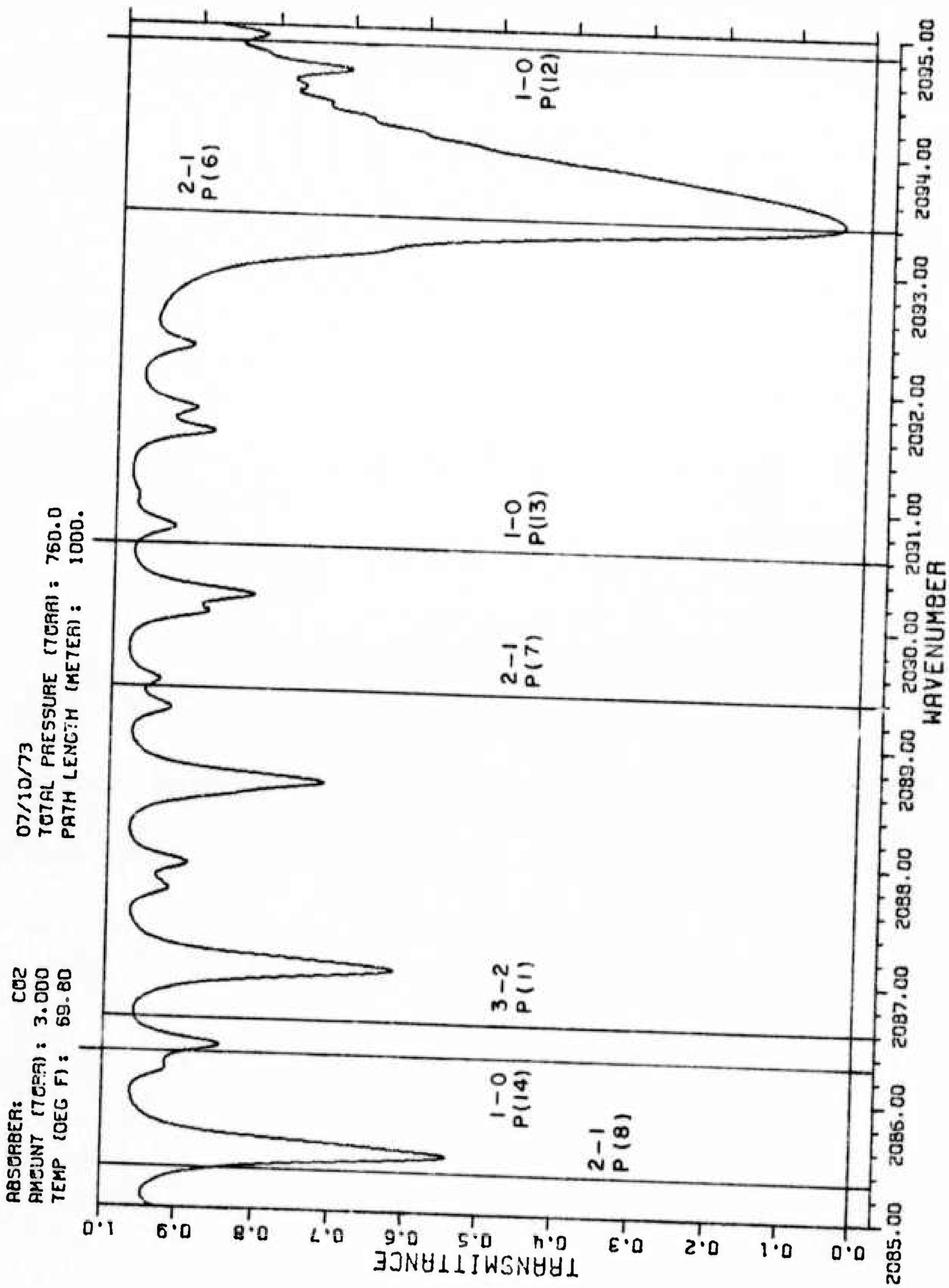

ABSORBER: CO2
AMOUNT (TORR): 3.000
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
2-1 P(8)
1-0 P(14)
3-2 P(1)
2-1 P(7)
1-0 P(13)
2-1 P(6)
1-0 P(12)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2085.00
2086.00
2087.00
2088.00
2089.00
2090.00
2091.00
2092.00
2093.00
2094.00
2095.00

FIG.30

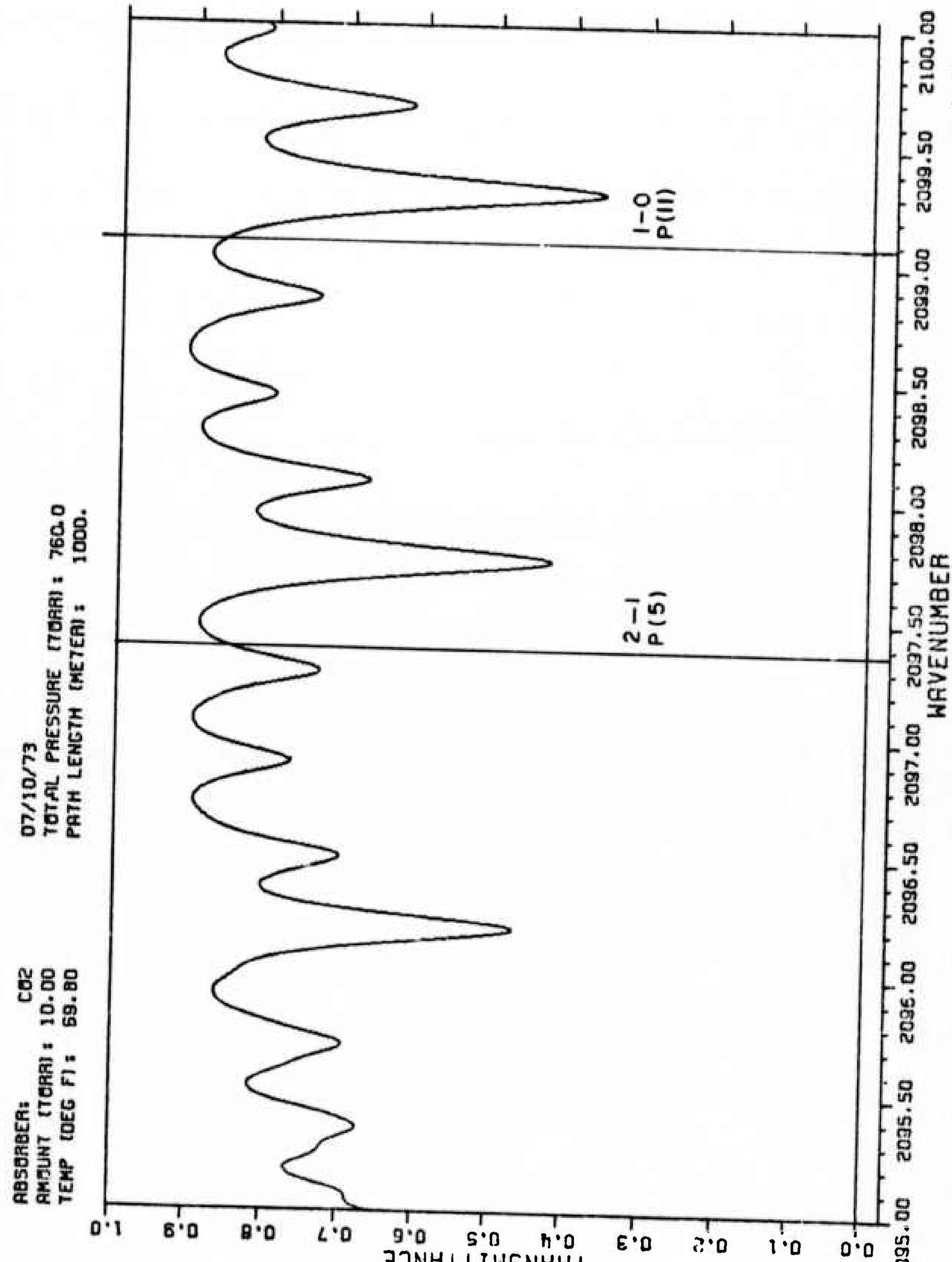

ABSORBER: CO2
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
2—1
P(5)
1—0
P(11)
TRANSMITTANCE
WAVENUMBER
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2095.00
2095.50
2096.00
2096.50
2097.00
2097.50
2098.00
2098.50
2099.00
2099.50
2100.00

FIG. 31

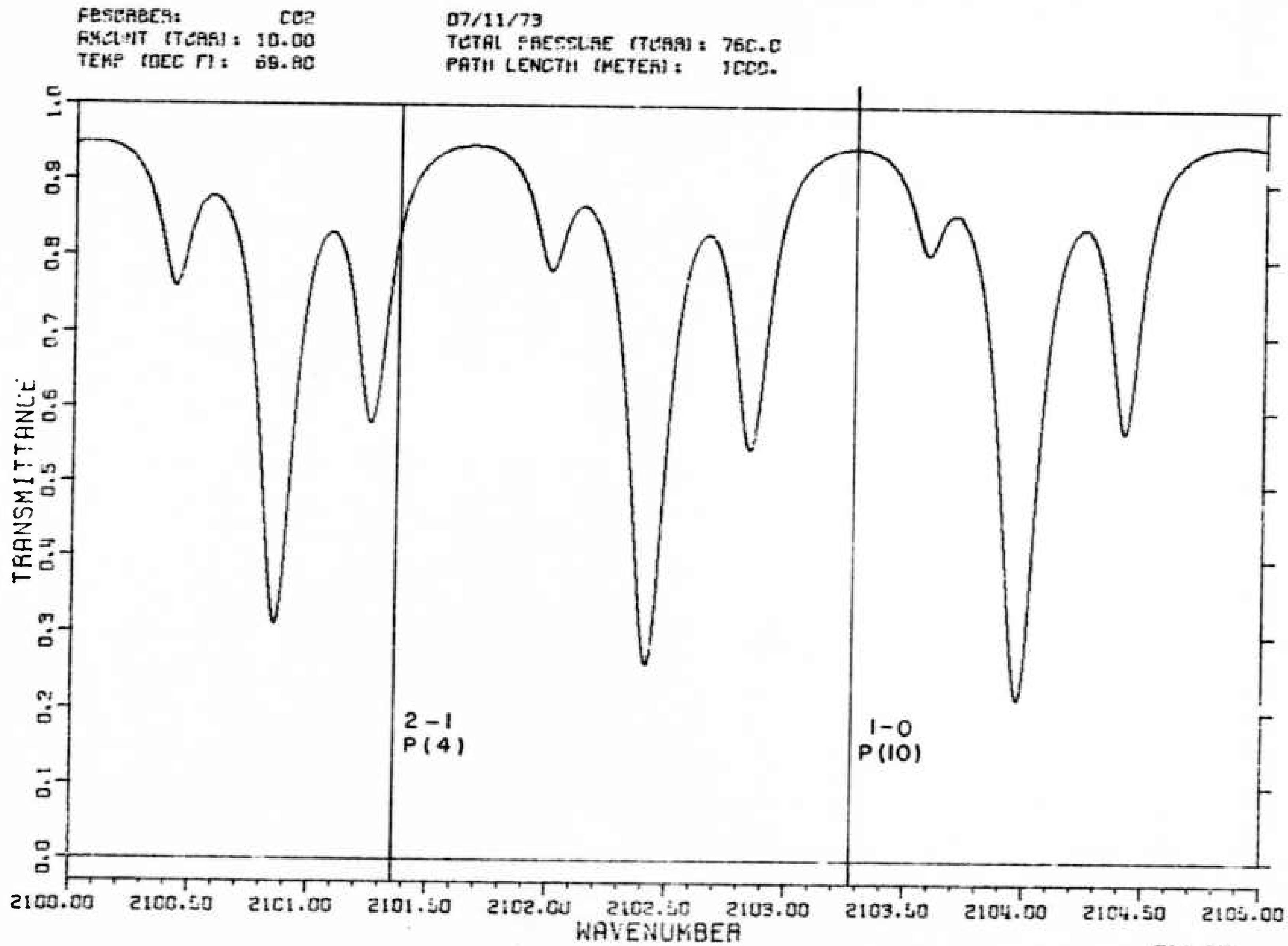

ABSORBER: CO2
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/11/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2 - 1
P (4)
1 - 0
P (10)
2100.00
2100.50
2101.00
2101.50
2102.00
2102.50
2103.00
2103.50
2104.00
2104.50
2105.00
WAVENUMBER

FIG.32

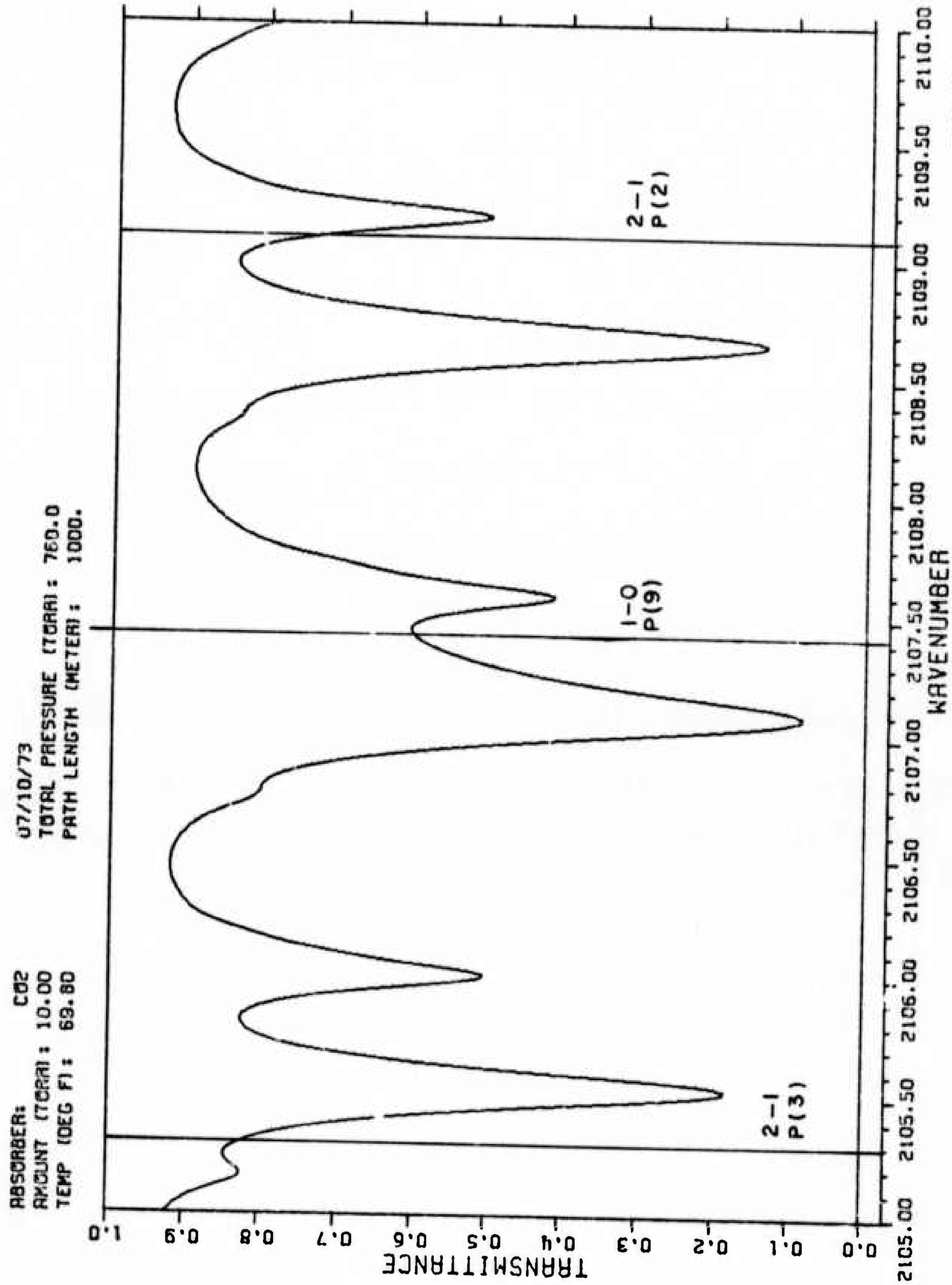

ABSORBER: CO2
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
2–1 P(3)
1–0 P(9)
2–1 P(2)
TRANSMITTANCE
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
WAVENUMBER
2105.00 2105.50 2106.00 2106.50 2107.00 2107.50 2108.00 2108.50 2109.00 2109.50 2110.00

FIG. 33

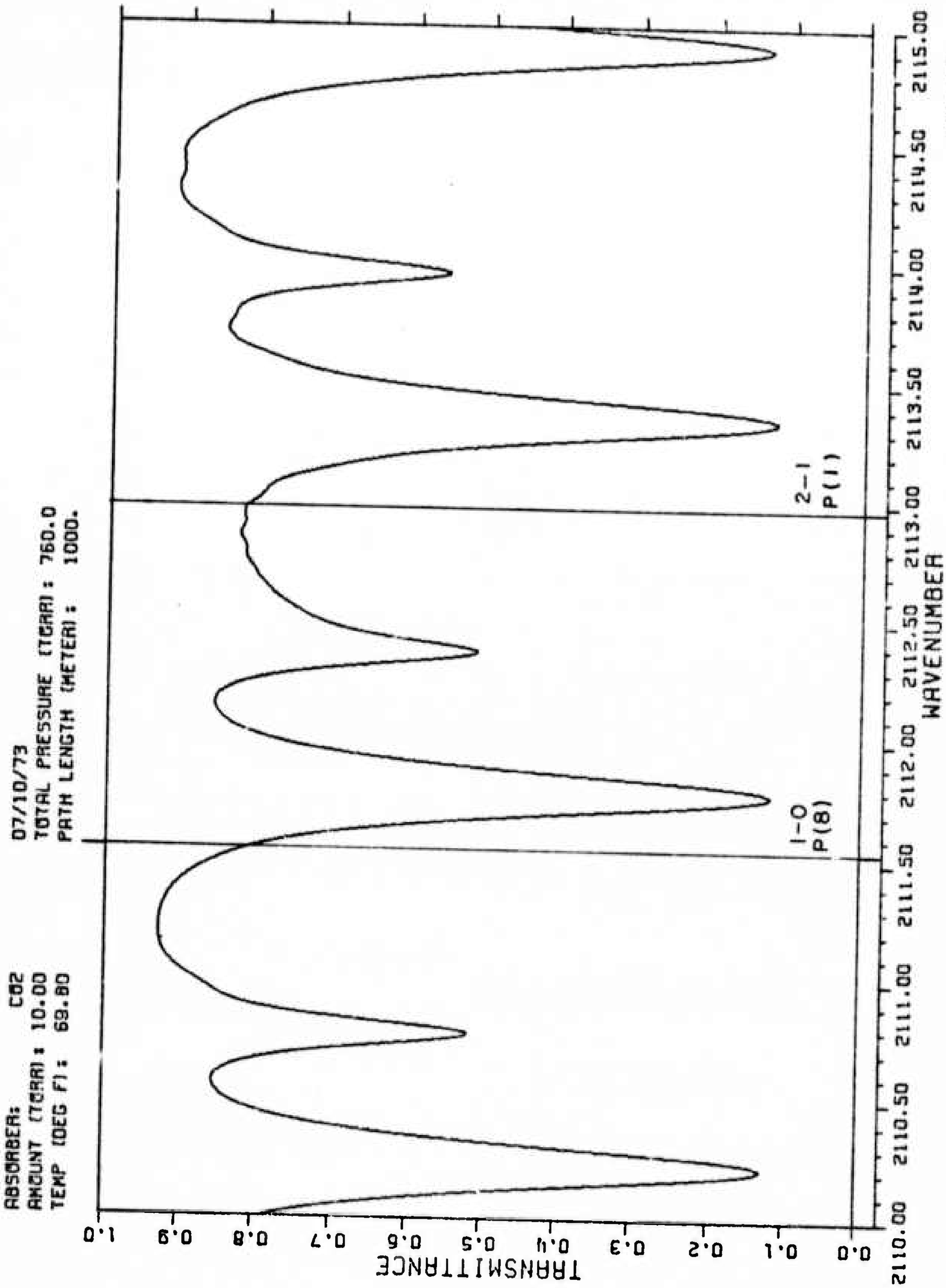

ABSORBER: CO2
AMOUNT (TORR): 10.00
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
1-0 P(8)
2-1 P(1)
TRANSMITTANCE
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
WAVENUMBER
2110.00 2110.50 2111.00 2111.50 2112.00 2112.50 2113.00 2113.50 2114.00 2114.50 2115.00

FIG. 34

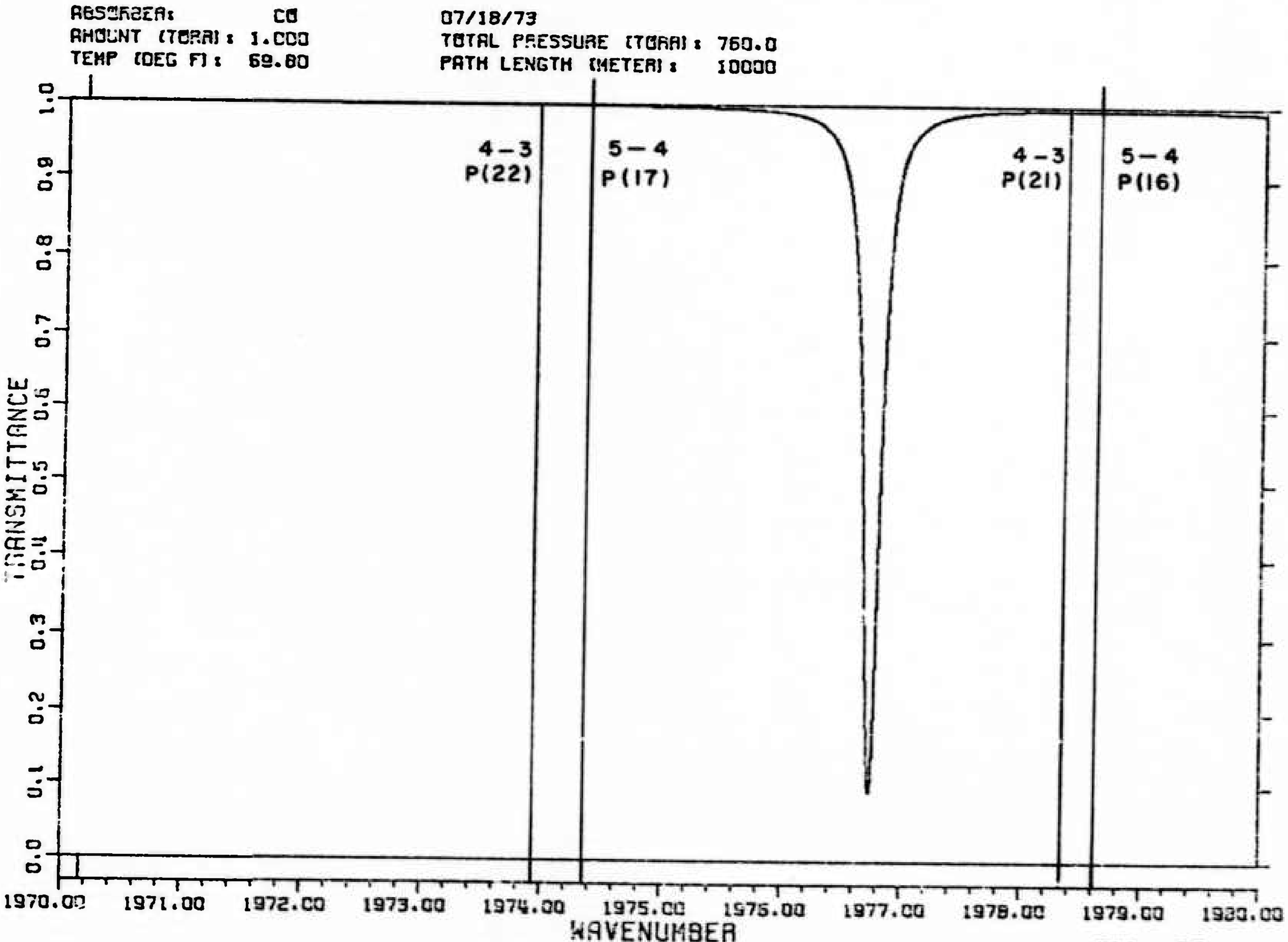

ABSORBER: CO
AMOUNT (TORR): 1.000
TEMP (DEG F): 69.80
07/18/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
4-3 P(22)
5-4 P(17)
4-3 P(21)
5-4 P(16)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1970.00
1971.00
1972.00
1973.00
1974.00
1975.00
1976.00
1977.00
1978.00
1979.00
1980.00
WAVENUMBER

FIG. 35

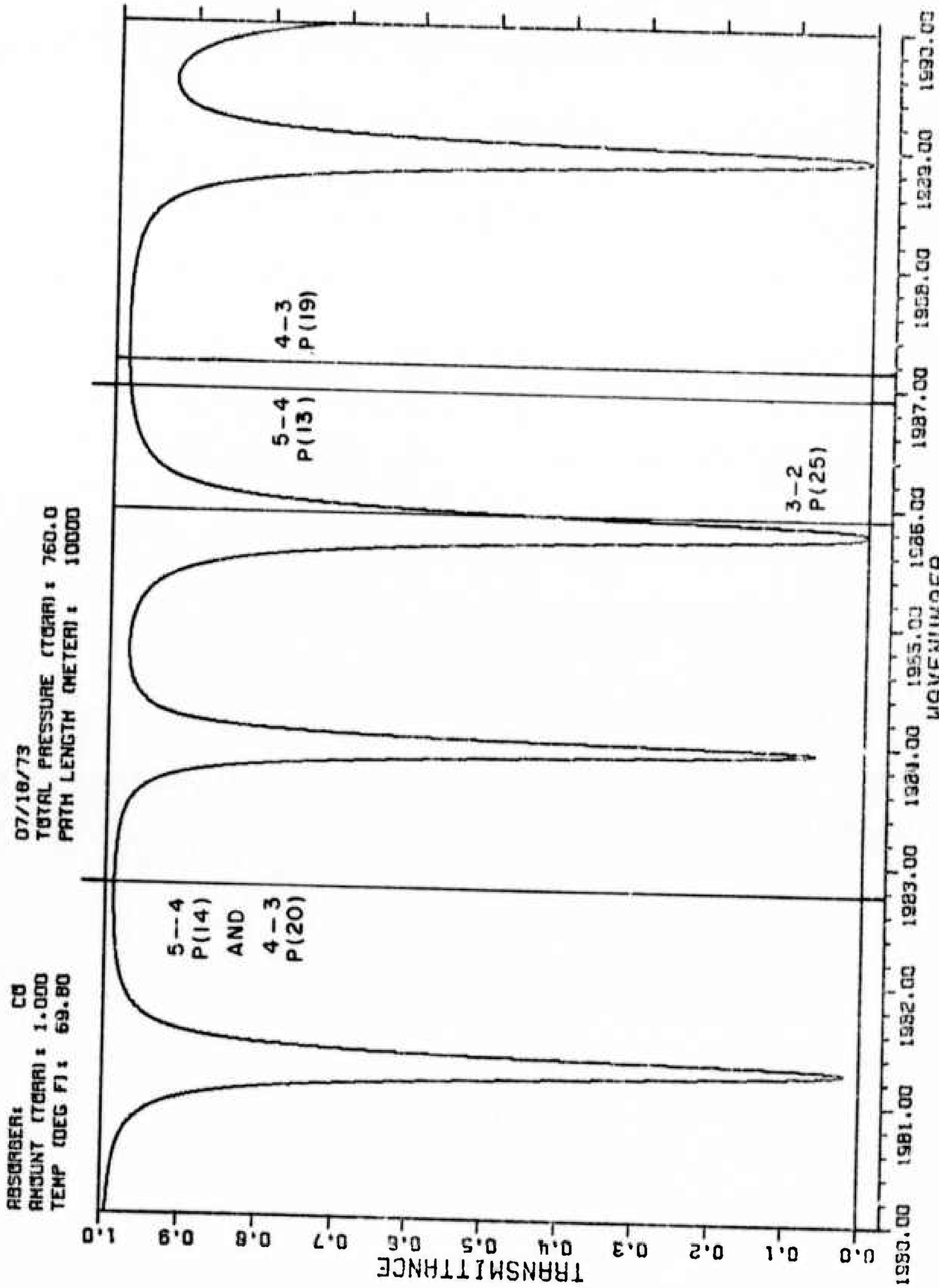

ABSORBER: CO
AMOUNT (TORR): 1.000
TEMP (DEG F): 69.80
07/18/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
5—4 P(14) AND 4—3 P(20)
5—4 P(13)
4—3 P(19)
3—2 P(25)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
1980.00
1981.00
1982.00
1983.00
1984.00
1985.00
1986.00
1987.00
1988.00
1989.00
1990.00

FIG. 36

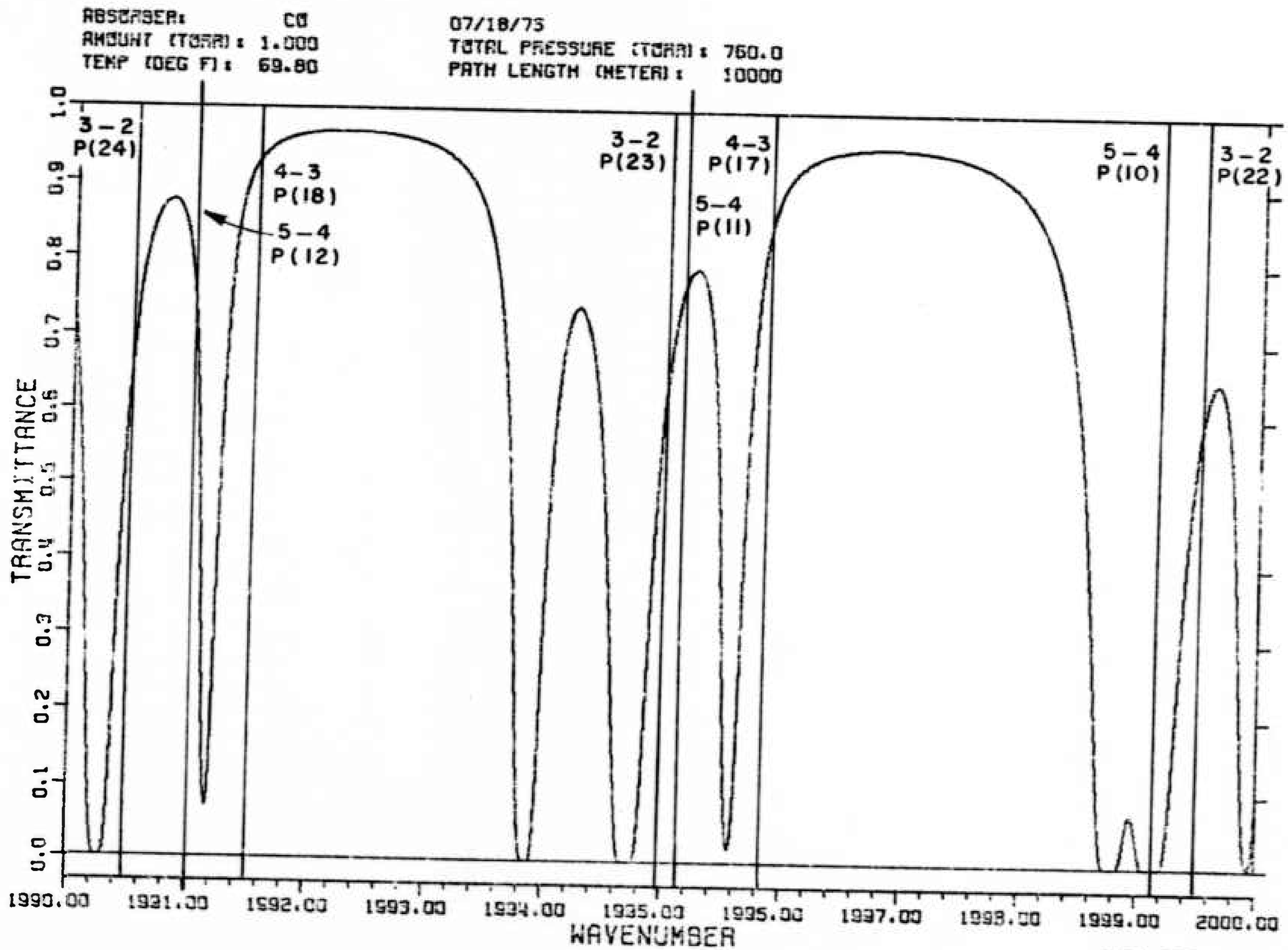

ABSORBER: CO
AMOUNT (TORR): 1.000
TEMP (DEG F): 69.80
07/18/75
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
3-2 P(24)
5-4 P(12)
4-3 P(18)
3-2 P(23)
5-4 P(11)
4-3 P(17)
5-4 P(10)
3-2 P(22)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1990.00
1991.00
1992.00
1993.00
1994.00
1995.00
1996.00
1997.00
1998.00
1999.00
2000.00
WAVENUMBER

FIG. 37

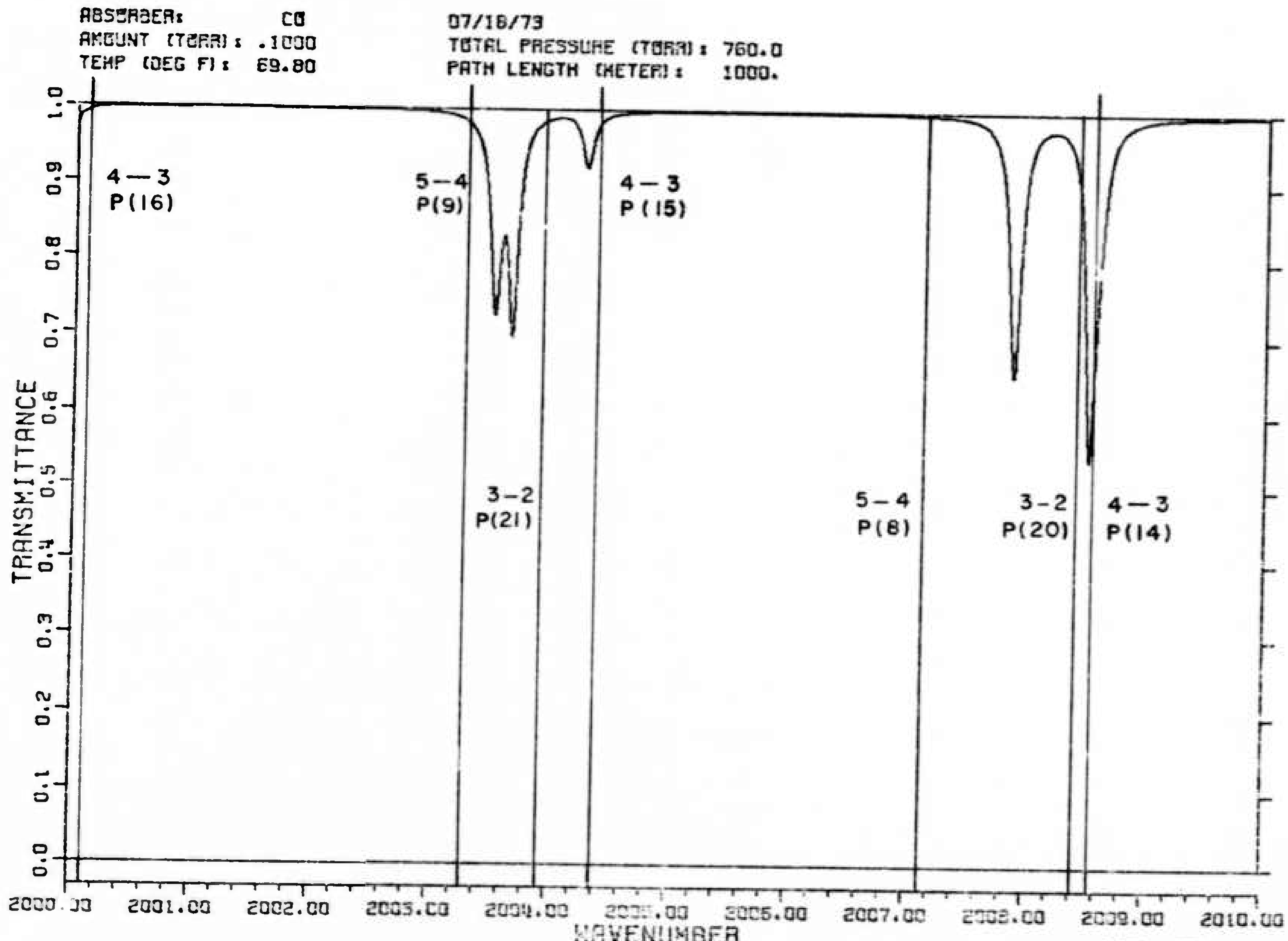

ABSORBER: CO
AMOUNT (TORR): .1000
TEMP (DEG F): 69.80
07/16/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
4 — 3
P(16)
5 — 4
P(9)
3 — 2
P(21)
4 — 3
P (15)
5 — 4
P(8)
3 — 2
P(20)
4 — 3
P(14)
2001.00
2002.00
2004.00
2007.00
2009.00
2010.00
WAVENUMBER

FIG. 38

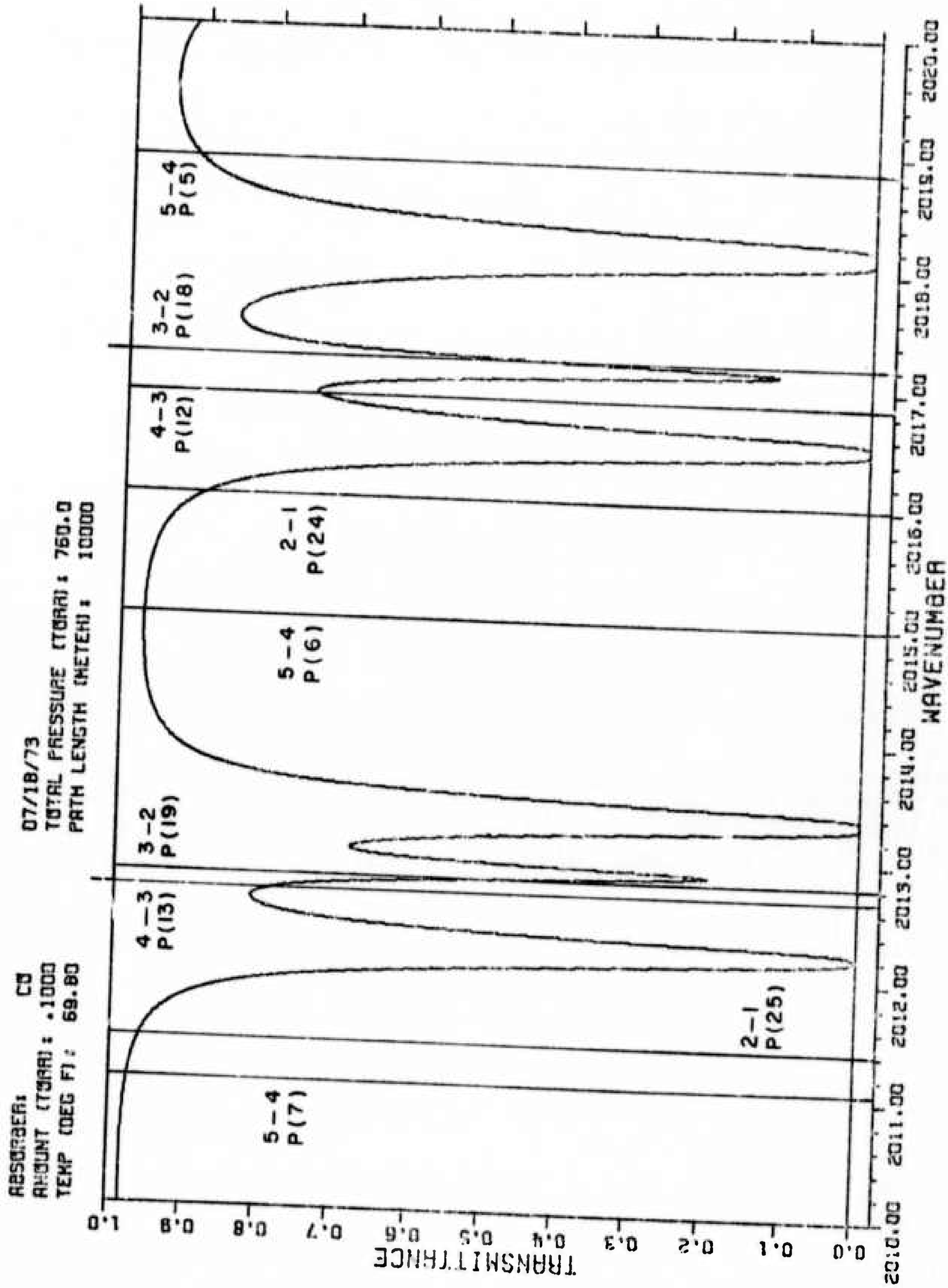
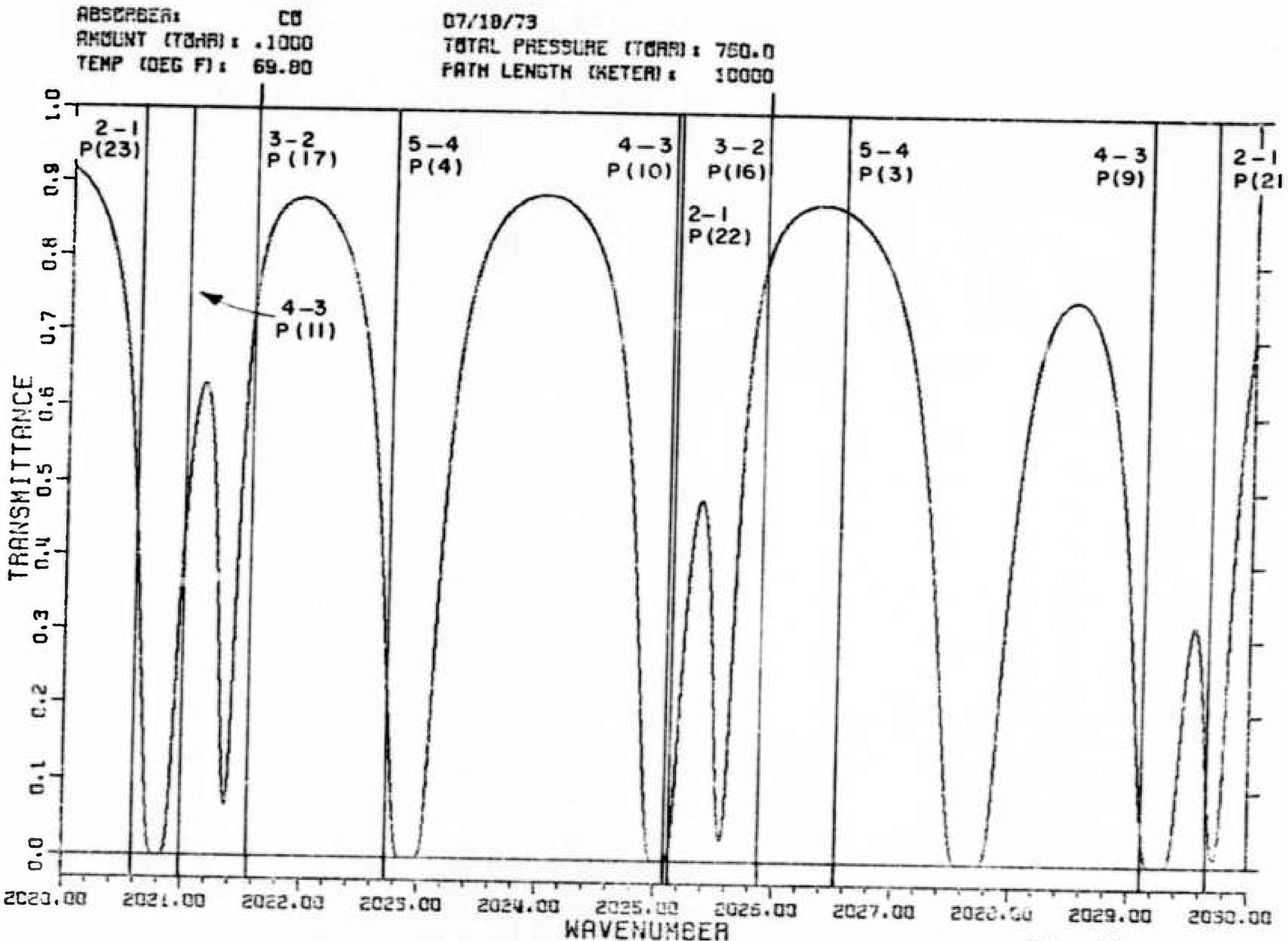

ABSORBER: CO
AMOUNT (TORR): .1000
TEMP (DEG F): 69.80
07/18/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
5-4 P(7)
2-1 P(25)
4-3 P(13)
3-2 P(19)
5-4 P(6)
2-1 P(24)
4-3 P(12)
3-2 P(18)
5-4 P(5)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2010.00
2011.00
2012.00
2013.00
2014.00
2015.00
2016.00
2017.00
2018.00
2019.00
2020.00

FIG. 39



ABSORBER: CO
AMOUNT (TORR): .1000
TEMP (DEG F): 69.80
07/18/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
2-1 P(23)
4-3 P(11)
3-2 P(17)
5-4 P(4)
4-3 P(10)
2-1 P(22)
3-2 P(16)
5-4 P(3)
4-3 P(9)
2-1 P(21)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2020.00
2021.00
2022.00
2023.00
2024.00
2025.00
2026.00
2027.00
2028.00
2029.00
2030.00
WAVENUMBER

FIG. 40

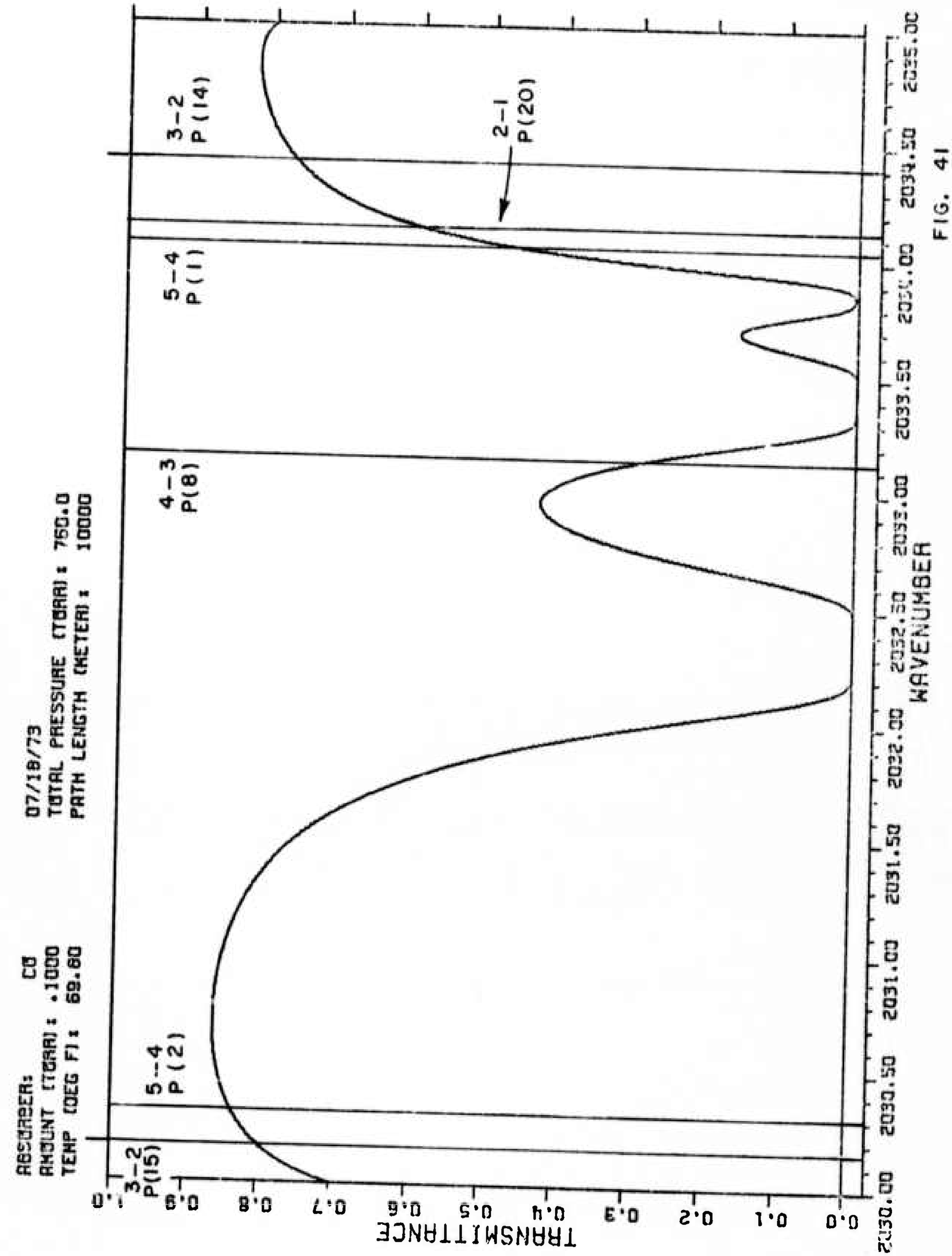

ABSORBER: CO
AMOUNT (TORR): .1000
TEMP (DEG F): 69.80
07/18/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 10000
3-2 P(15)
5-4 P(2)
4-3 P(8)
5-4 P(1)
2-1 P(20)
3-2 P(14)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2030.00
2030.50
2031.00
2031.50
2032.00
2032.50
2033.00
2033.50
2034.00
2034.50
2035.00

FIG. 41

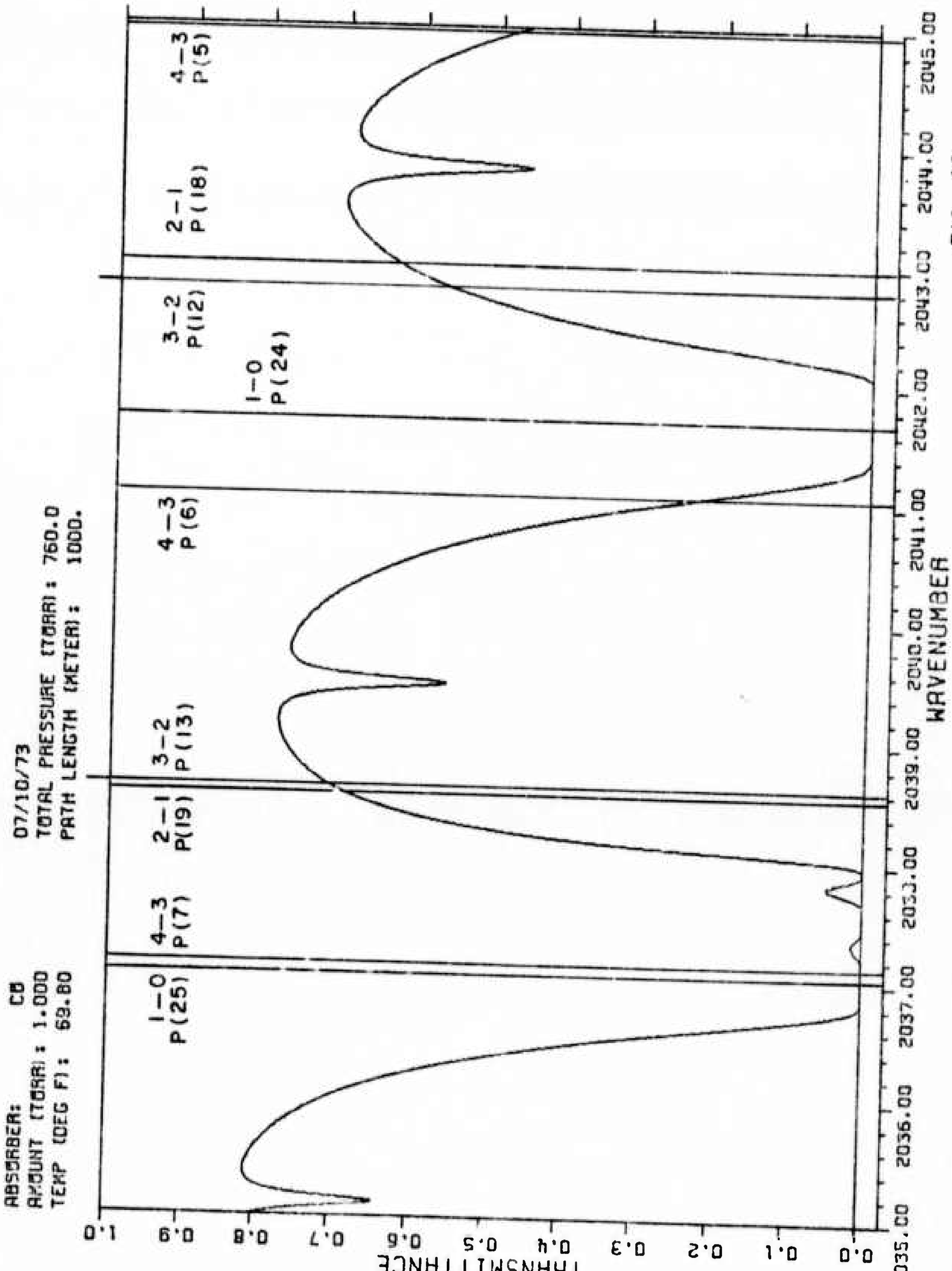

ABSORBER: CO
AMOUNT (TORR): 1.000
TEMP (DEG F): 68.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
1—0 P(25)
4—3 P(7)
2—1 P(19)
3—2 P(13)
4—3 P(6)
1—0 P(24)
3—2 P(12)
2—1 P(18)
4—3 P(5)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2035.00
2036.00
2037.00
2038.00
2039.00
2040.00
2041.00
2042.00
2043.00
2044.00
2045.00

FIG. 42

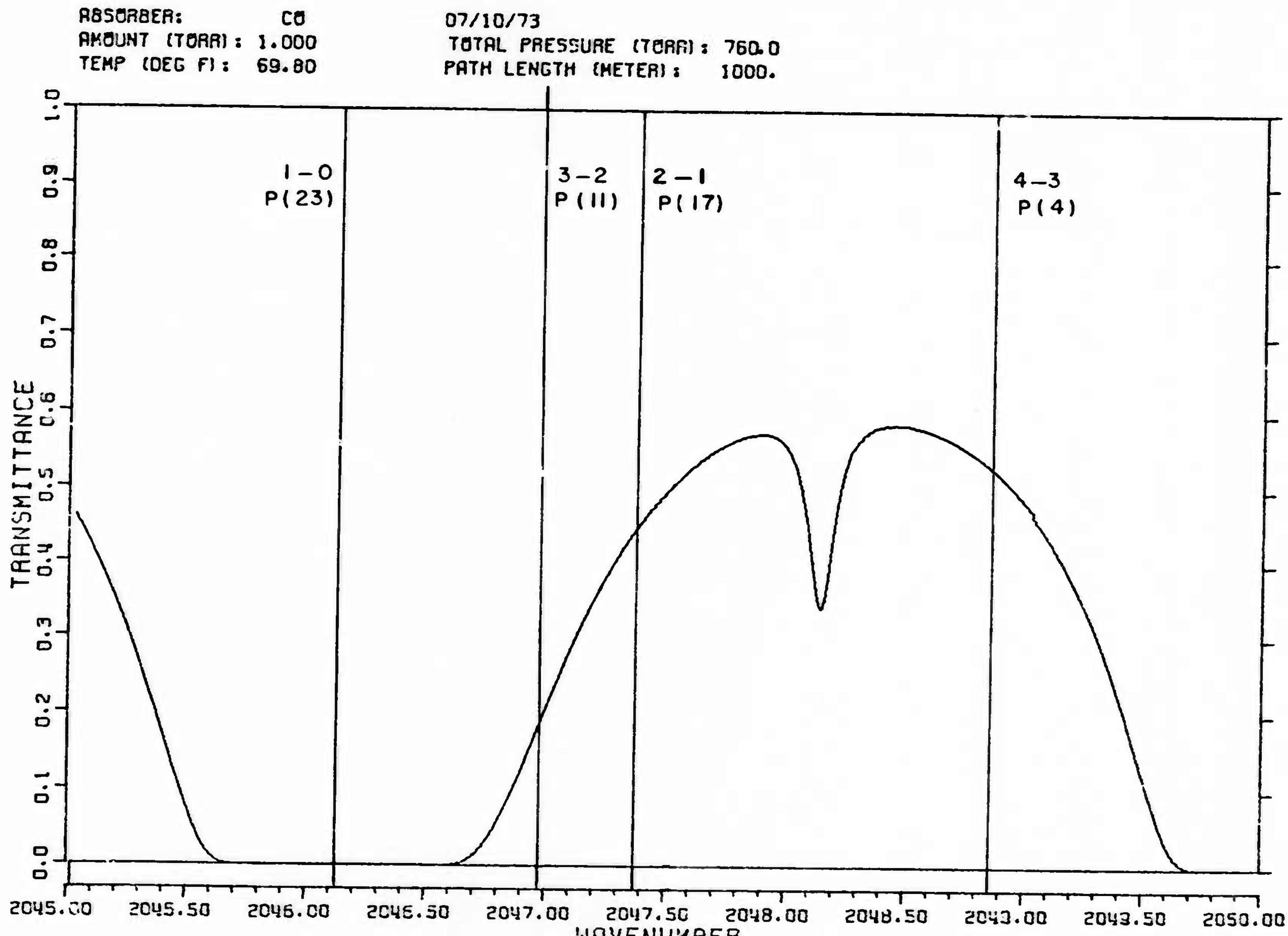

ABSORBER: CO
AMOUNT (TORR): 1.000
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
1-0 P(23)
3-2 P(11)
2-1 P(17)
4-3 P(4)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2045.00
2045.50
2046.00
2046.50
2047.00
2047.50
2048.00
2048.50
2049.00
2049.50
2050.00
WAVENUMBER

FIG. 43

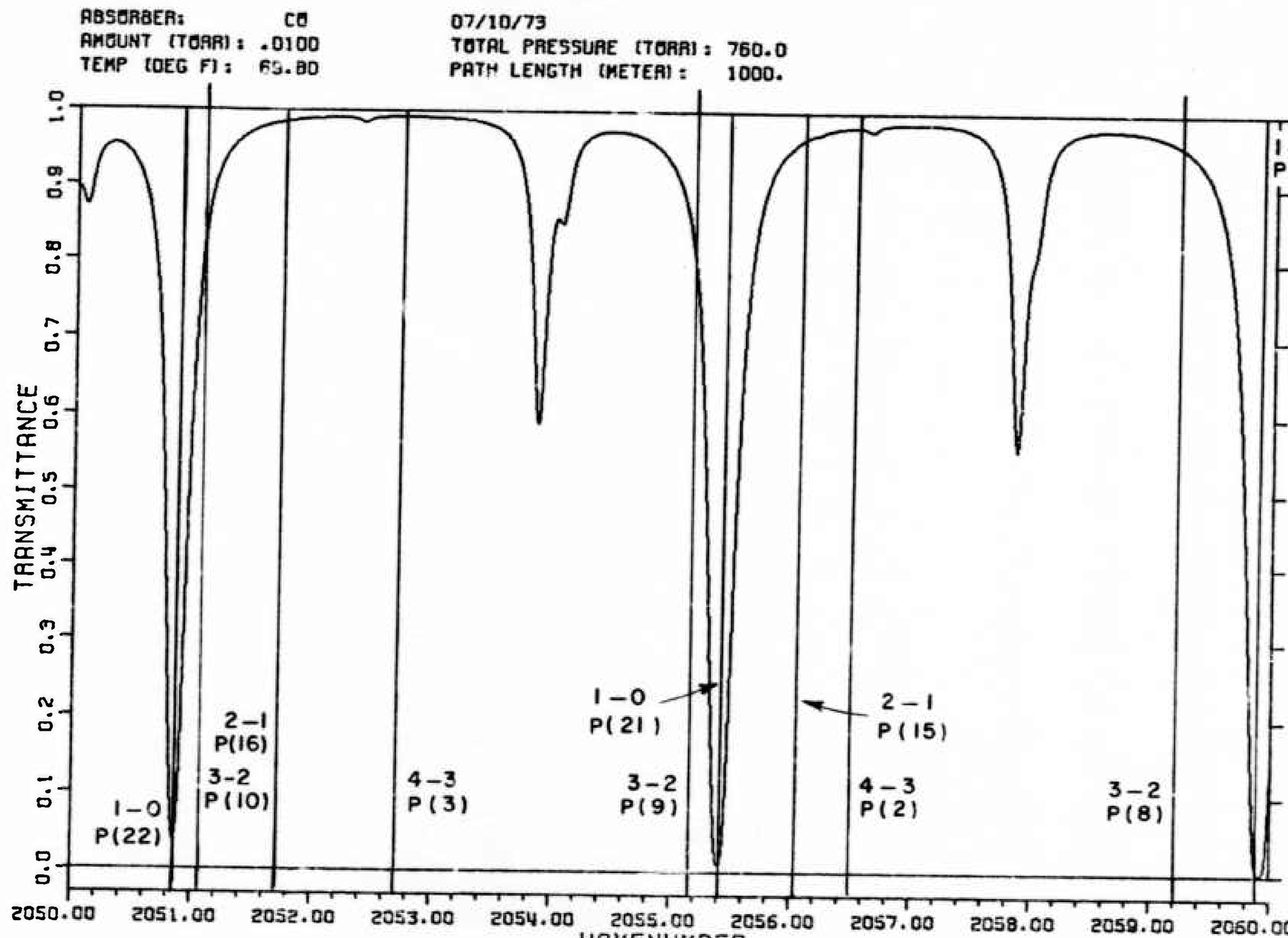

ABSORBER: CO
AMOUNT (TORR): .0100
TEMP (DEG F): 65.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
1—0 P(22)
2—1 P(16)
3—2 P(10)
4—3 P(3)
1—0 P(21)
3—2 P(9)
2—1 P(15)
4—3 P(2)
3—2 P(8)
1—0 P(20)
TRANSMITTANCE
WAVENUMBER
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2050.00
2051.00
2052.00
2053.00
2054.00
2055.00
2056.00
2057.00
2058.00
2059.00
2060.00

FIG. 44

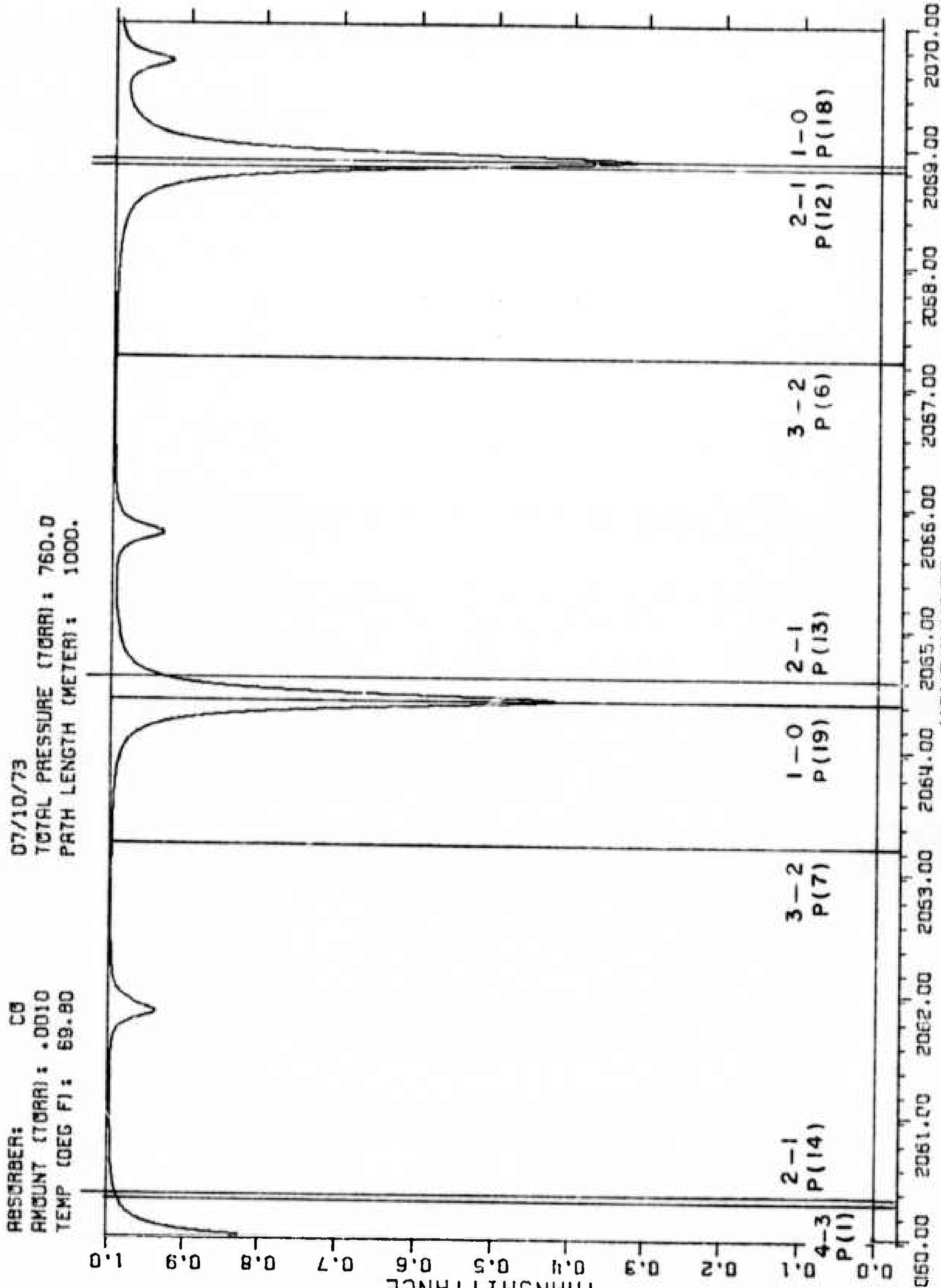

ABSORBER: CO
AMOUNT (TORR): .0010
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
WAVENUMBER
4—3 P(1)
2—1 P(14)
3—2 P(7)
1—0 P(19)
2—1 P(13)
3—2 P(6)
2—1 P(12)
1—0 P(18)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2060.00
2061.00
2062.00
2063.00
2064.00
2065.00
2066.00
2067.00
2068.00
2069.00
2070.00

FIG. 45

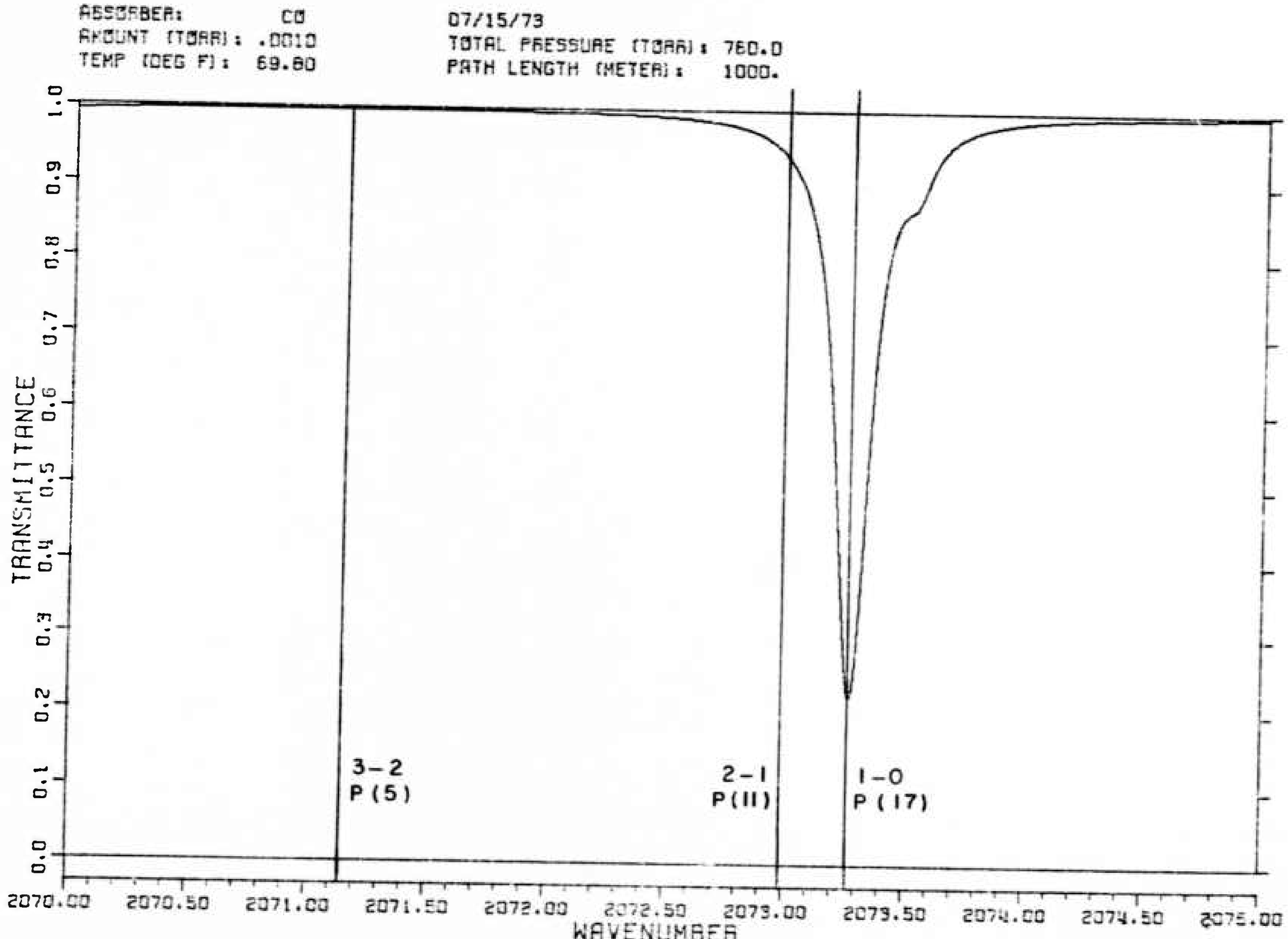

ABSORBER: CO
AMOUNT (TORR): .0010
TEMP (DEG F): 69.80
07/15/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
3-2
P (5)
2-1
P(11)
1-0
P (17)
2070.00
2070.50
2071.00
2071.50
2072.00
2072.50
2073.00
2073.50
2074.00
2074.50
2075.00
WAVENUMBER

FIG. 46

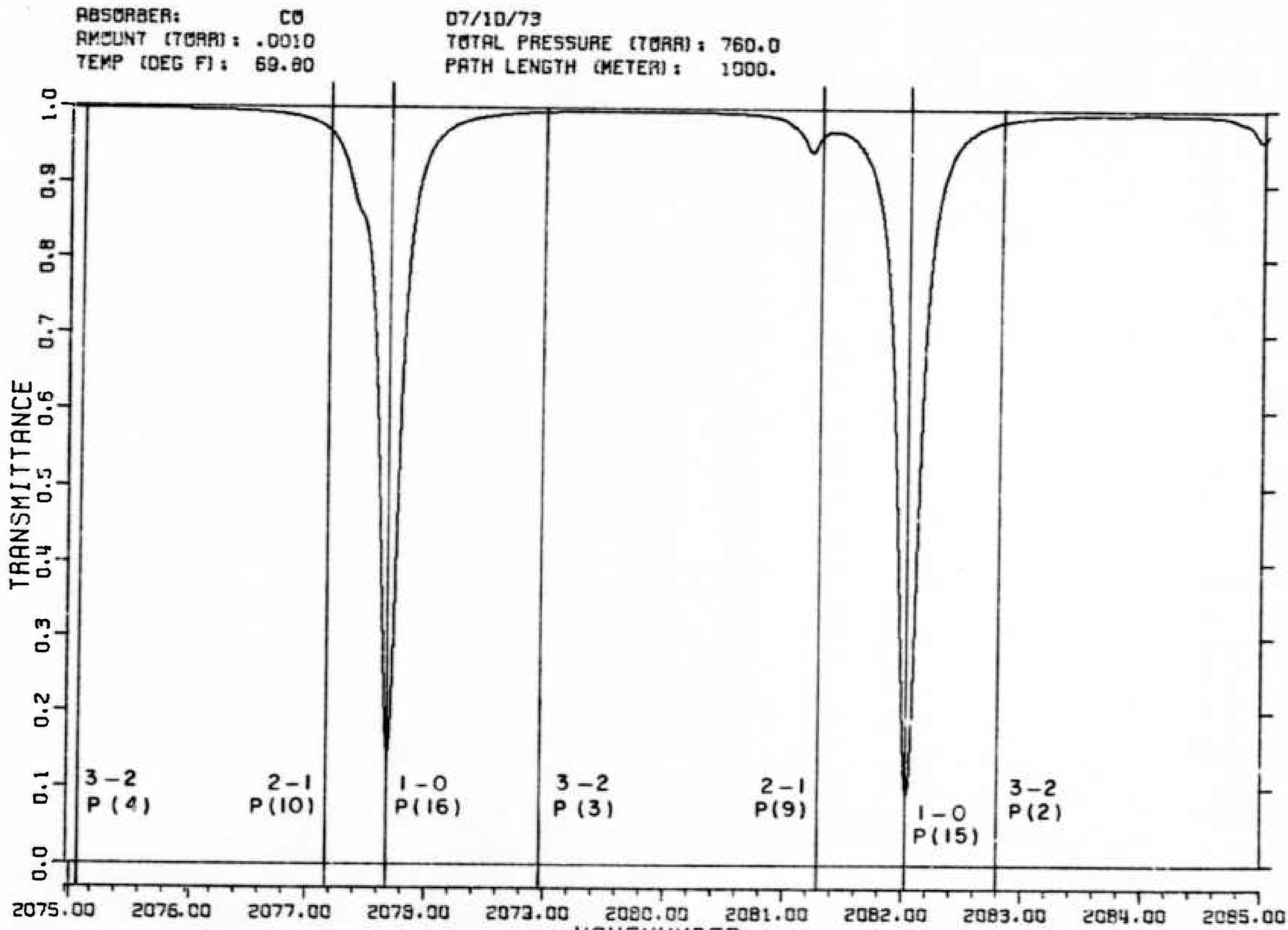

ABSORBER: CO
AMOUNT (TORR): .0010
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
3-2
P (4)
2-1
P(10)
1-0
P(16)
3-2
P (3)
2-1
P(9)
1-0
P(15)
3-2
P(2)
2075.00
2076.00
2077.00
2078.00
2079.00
2080.00
2081.00
2082.00
2083.00
2084.00
2085.00
WAVENUMBER

FIG. 47

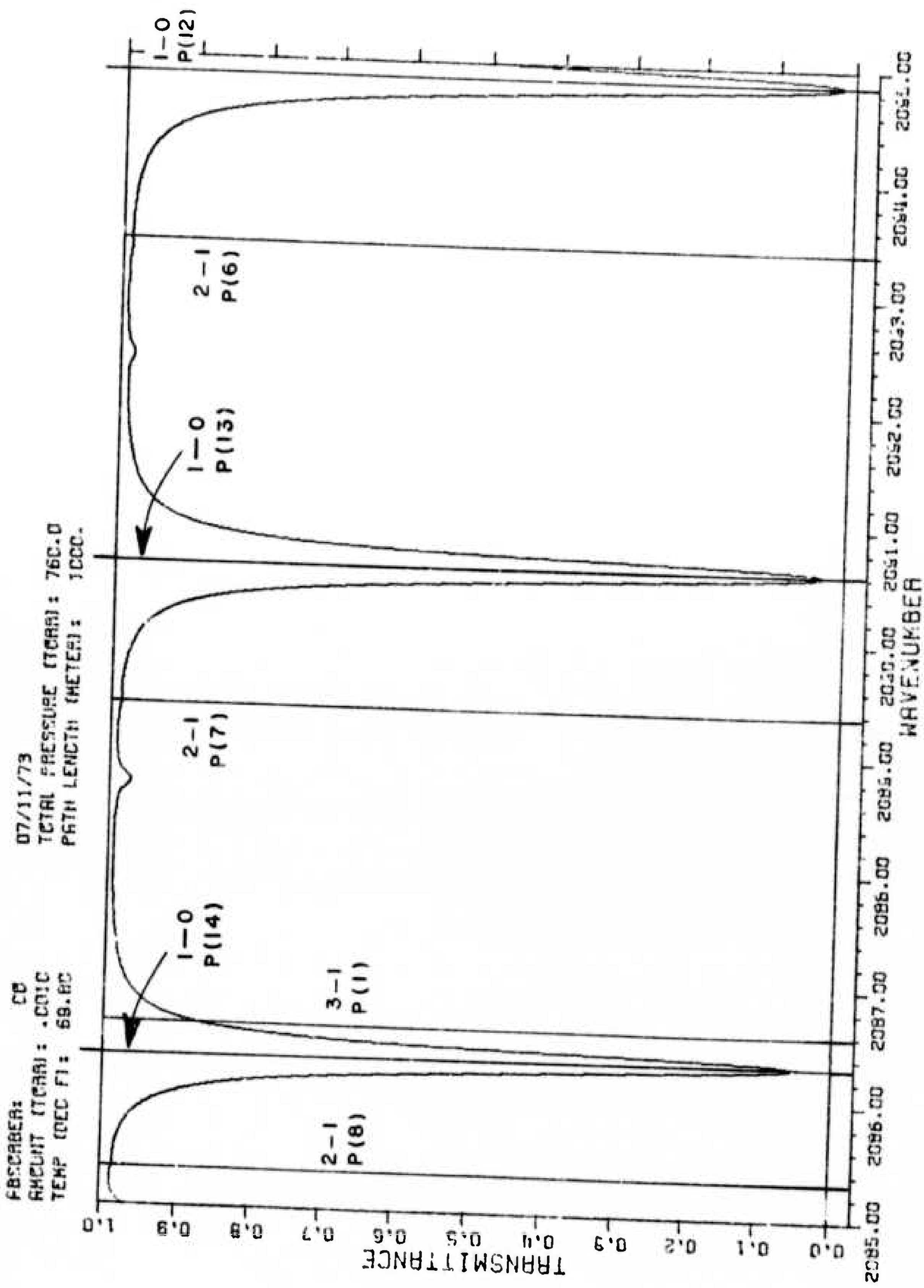

ABSORBER: CO
AMOUNT (TORR): .0010
TEMP (DEG F): 69.80
07/11/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
2—1 P(8)
1—0 P(14)
3—1 P(1)
2—1 P(7)
1—0 P(13)
2—1 P(6)
1—0 P(12)
TRANSMITTANCE
WAVENUMBER
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2085.00
2086.00
2087.00

FIG. 48

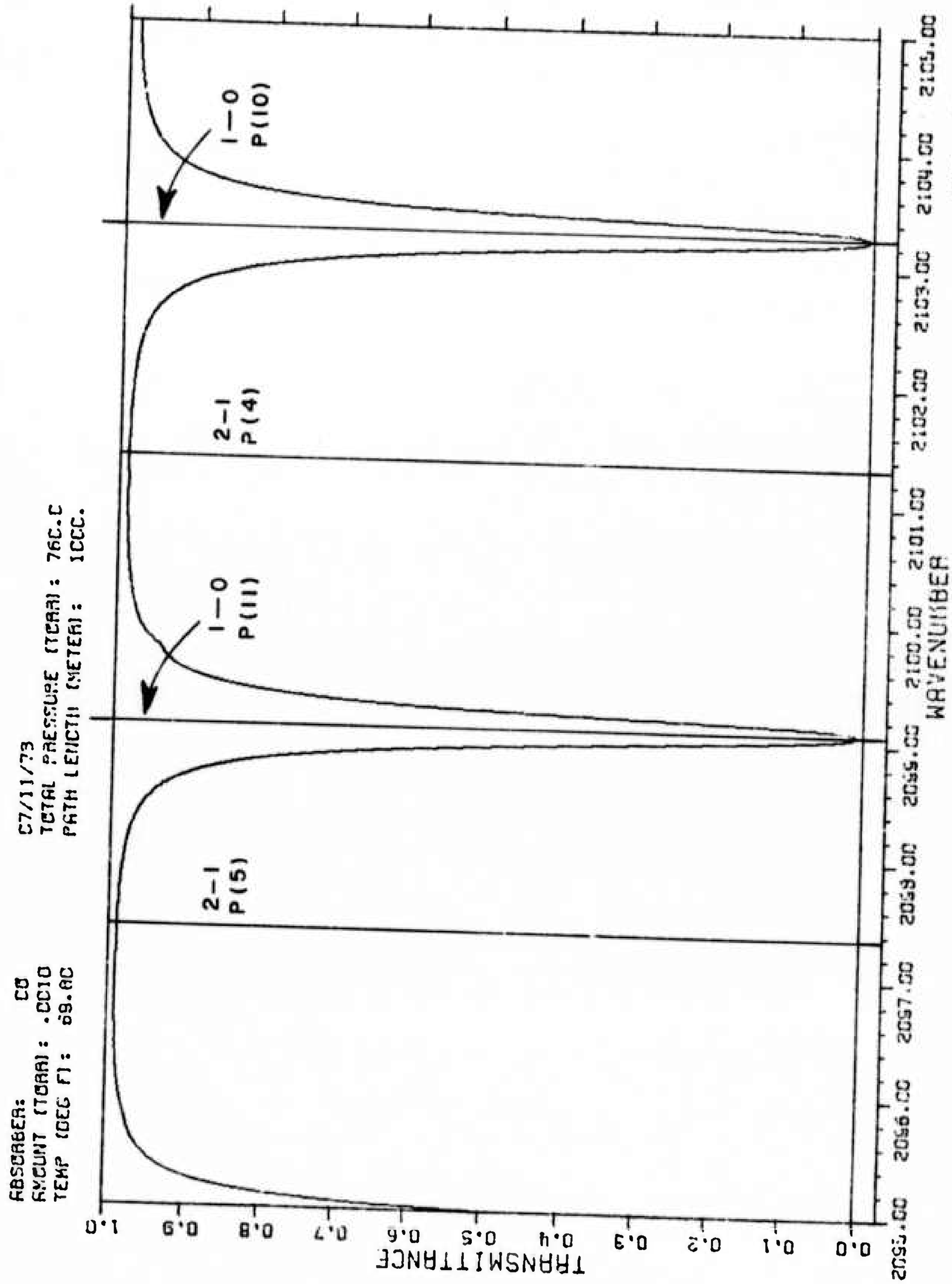

ABSORBER: CO
AMOUNT (TORR): .0010
TEMP (DEG F): 69.80
07/11/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
2—1
P(5)
1—0
P(11)
2—1
P(4)
1—0
P(10)
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2095.00
2096.00
2097.00
2098.00
2099.00
2100.00
2101.00
2102.00
2103.00
2104.00
2105.00

FIG. 49

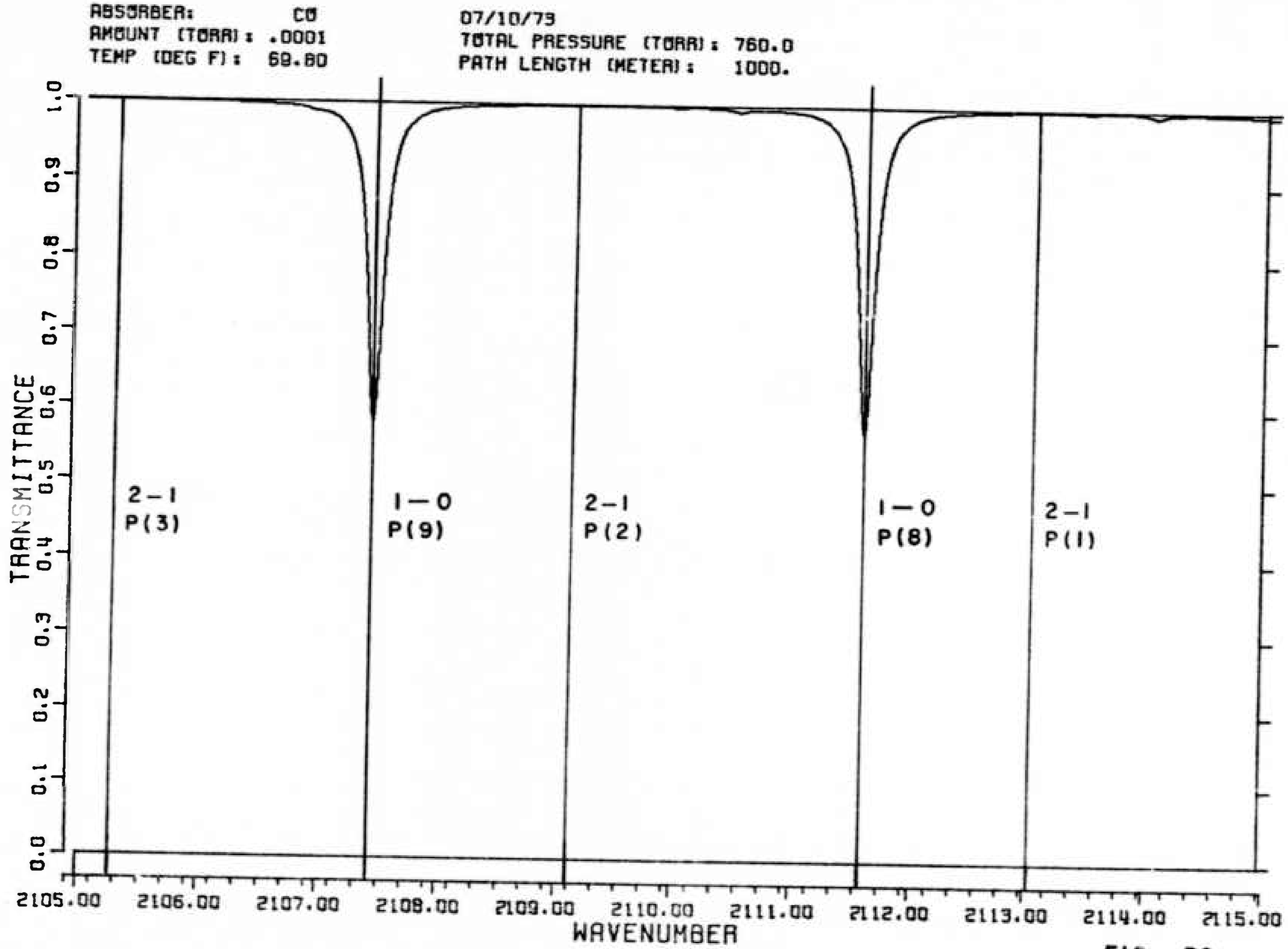

ABSORBER: CO
AMOUNT (TORR): .0001
TEMP (DEG F): 69.80
07/10/73
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2-1 P(3)
1-0 P(9)
2-1 P(2)
1-0 P(8)
2-1 P(1)
2105.00
2106.00
2107.00
2108.00
2109.00
2110.00
2111.00
2112.00
2113.00
2114.00
2115.00
WAVENUMBER

FIG . 50

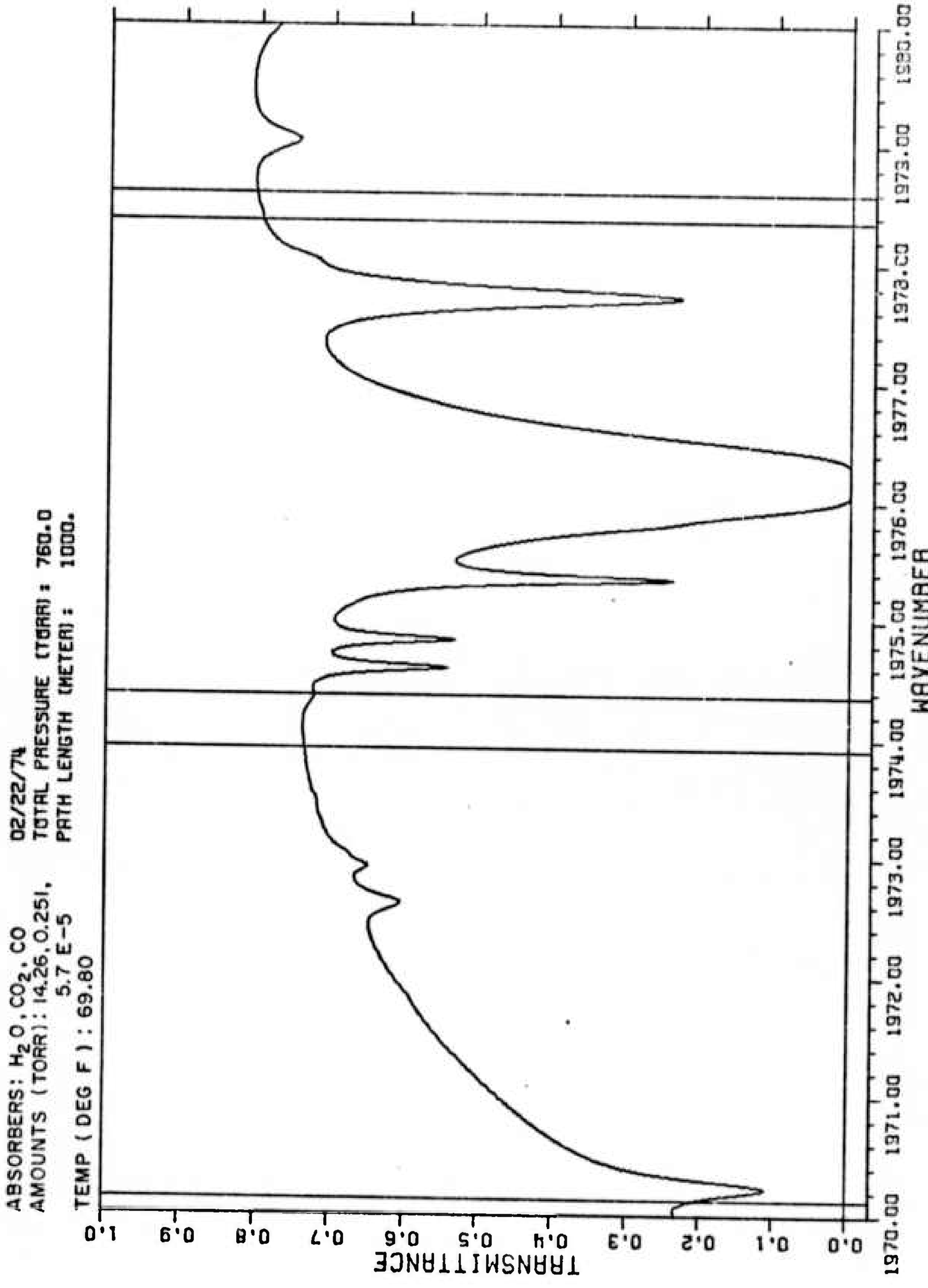

ABSORBERS: H_2O, CO_2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7 E-5
TEMP (DEG F): 69.80
02/22/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
WAVENUMBER

FIG. 51

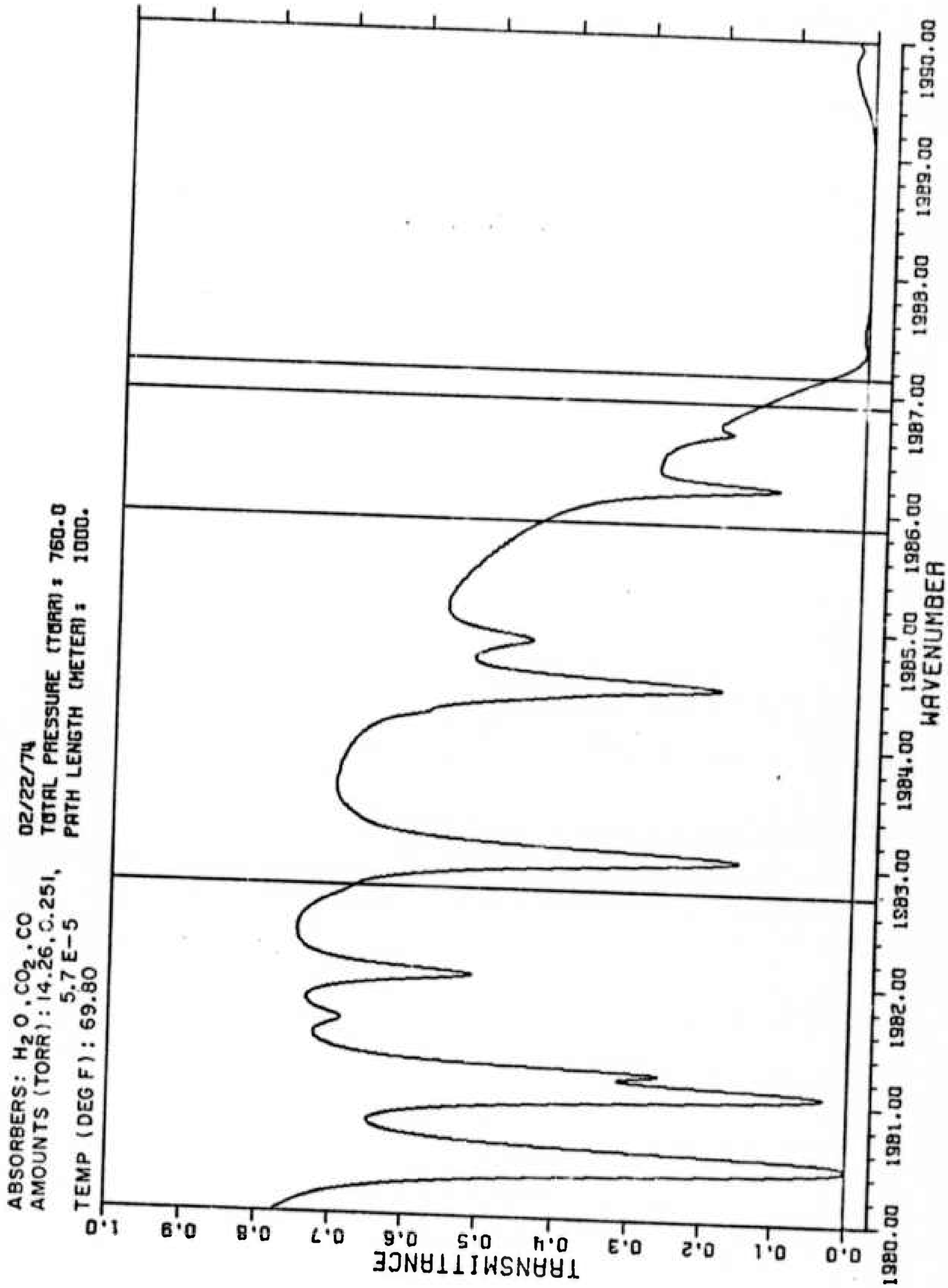

ABSORBERS: H_2O, CO_2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7 E-5
TEMP (DEG F): 69.80
02/22/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
1980.00
1981.00
1982.00
1983.00
1984.00
1985.00
1986.00
1987.00
1988.00
1989.00
1990.00

FIG. 52

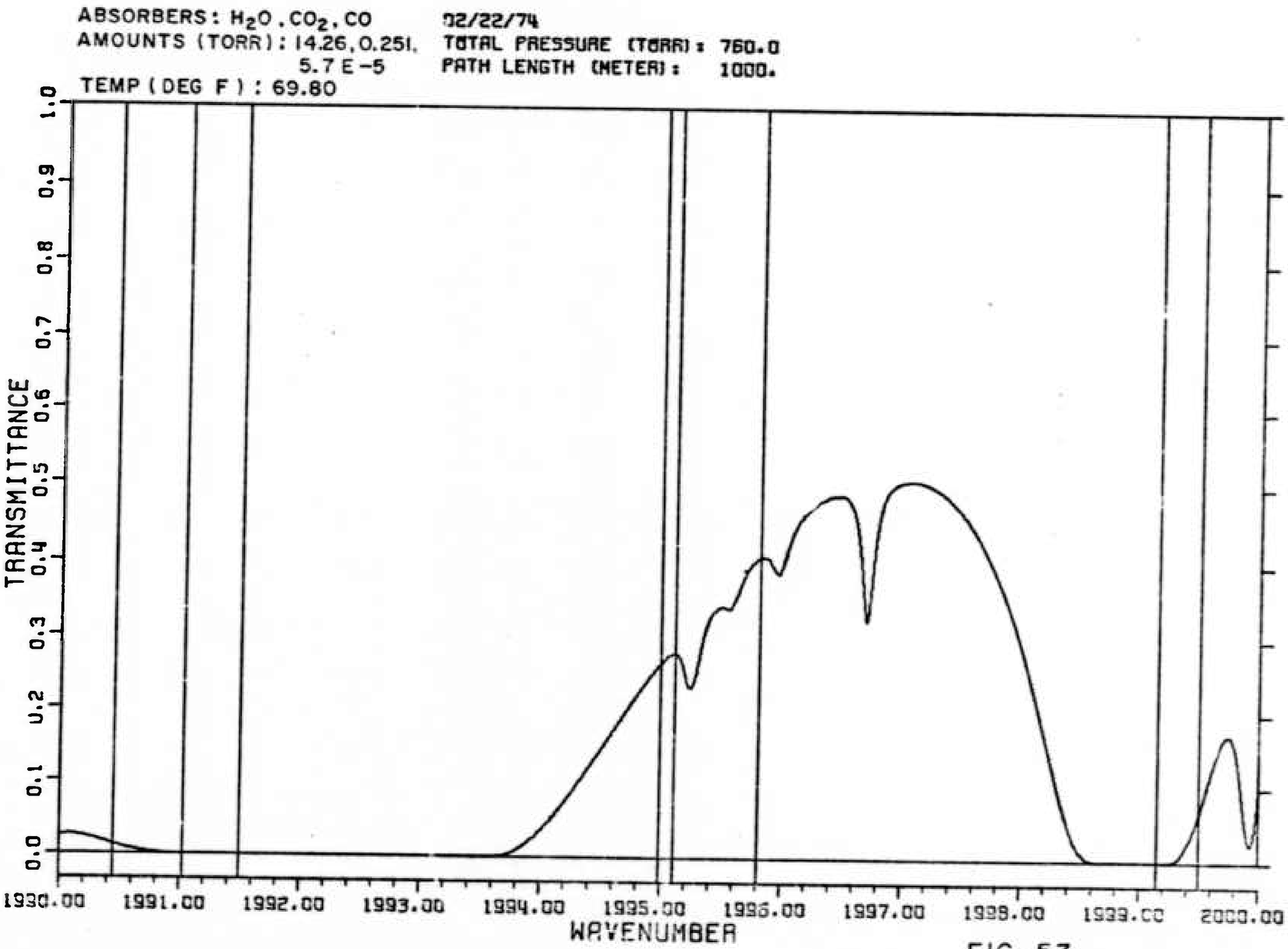
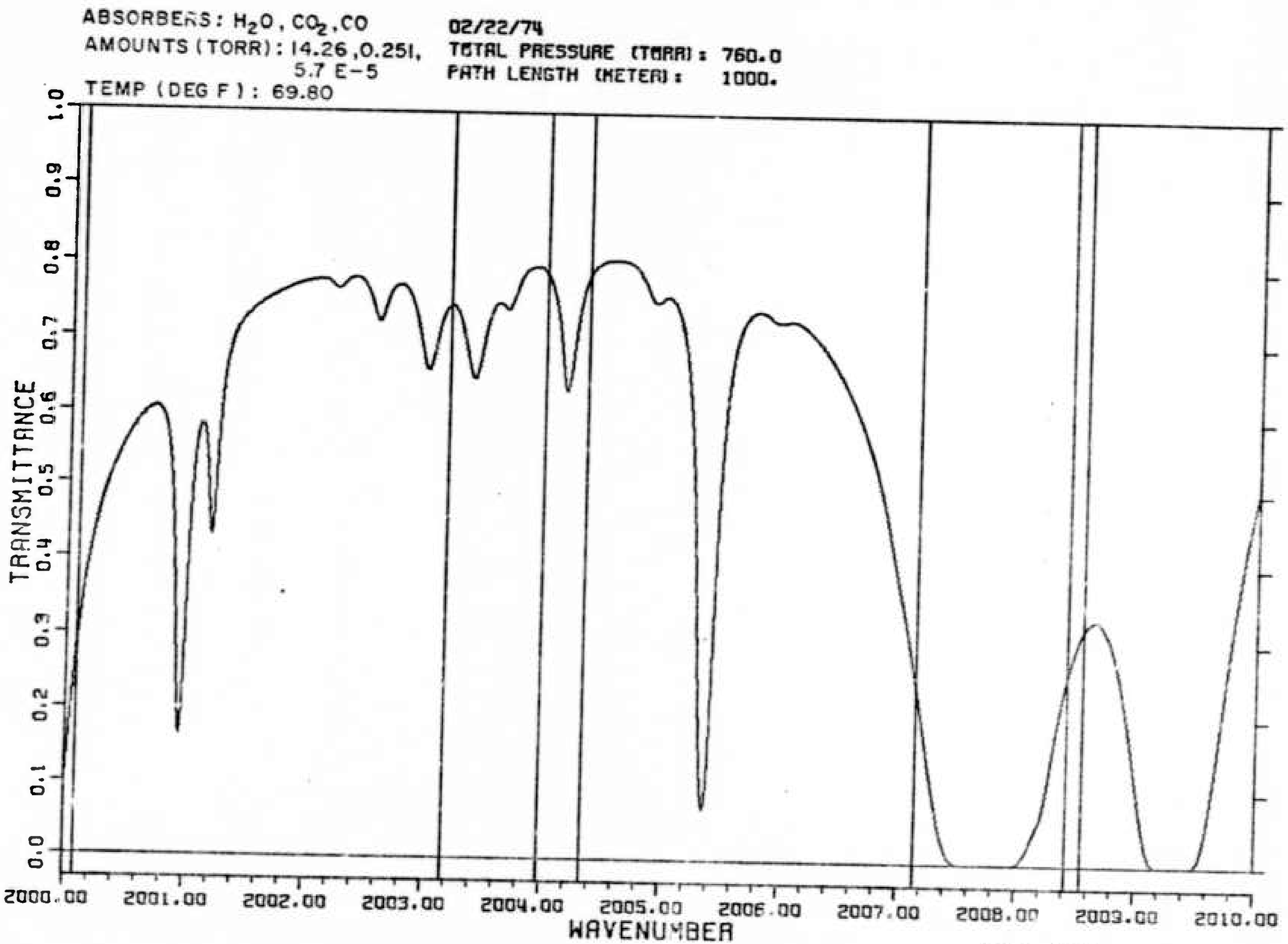

ABSORBERS: H2O . CO2 . CO
AMOUNTS (TORR): 14.26, 0.251, 5.7 E-5
TEMP (DEG F): 69.80
02/22/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1930.00
1991.00
1992.00
1993.00
1994.00
1995.00
1996.00
1997.00
1998.00
1999.00
2000.00
WAVENUMBER

FIG. 53



ABSORBERS: H_2O, CO_2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7 E-5
TEMP (DEG F): 69.80
02/22/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2000.00
2001.00
2002.00
2003.00
2004.00
2005.00
2006.00
2007.00
2008.00
2003.00
2010.00
WAVENUMBER

FIG. 54

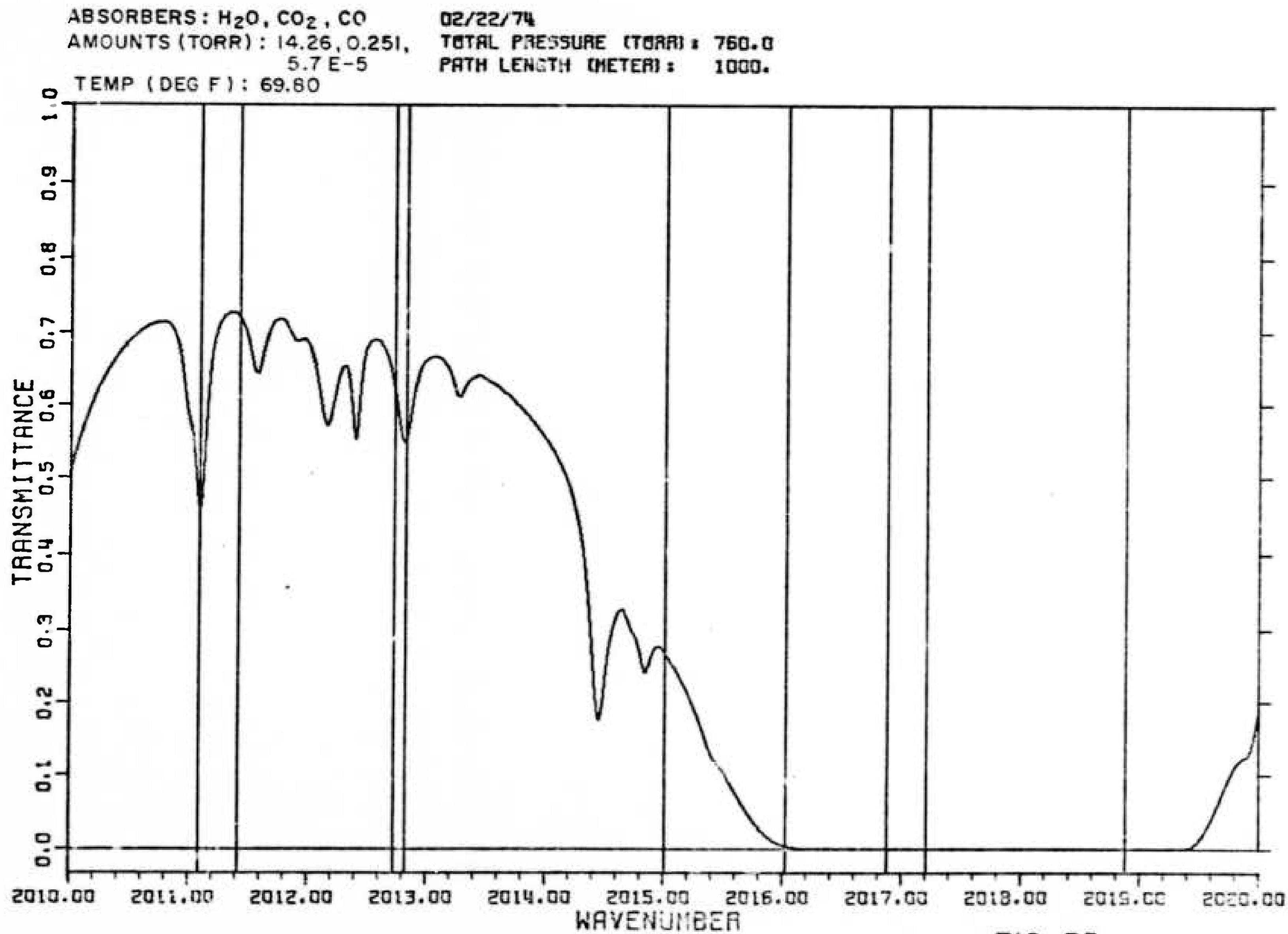

ABSORBERS: H2O, CO2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7 E-5
TEMP (DEG F): 69.60
02/22/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2010.00
2011.00
2012.00
2013.00
2014.00
2015.00
2016.00
2017.00
2018.00
2019.00
2020.00
WAVENUMBER

FIG. 55

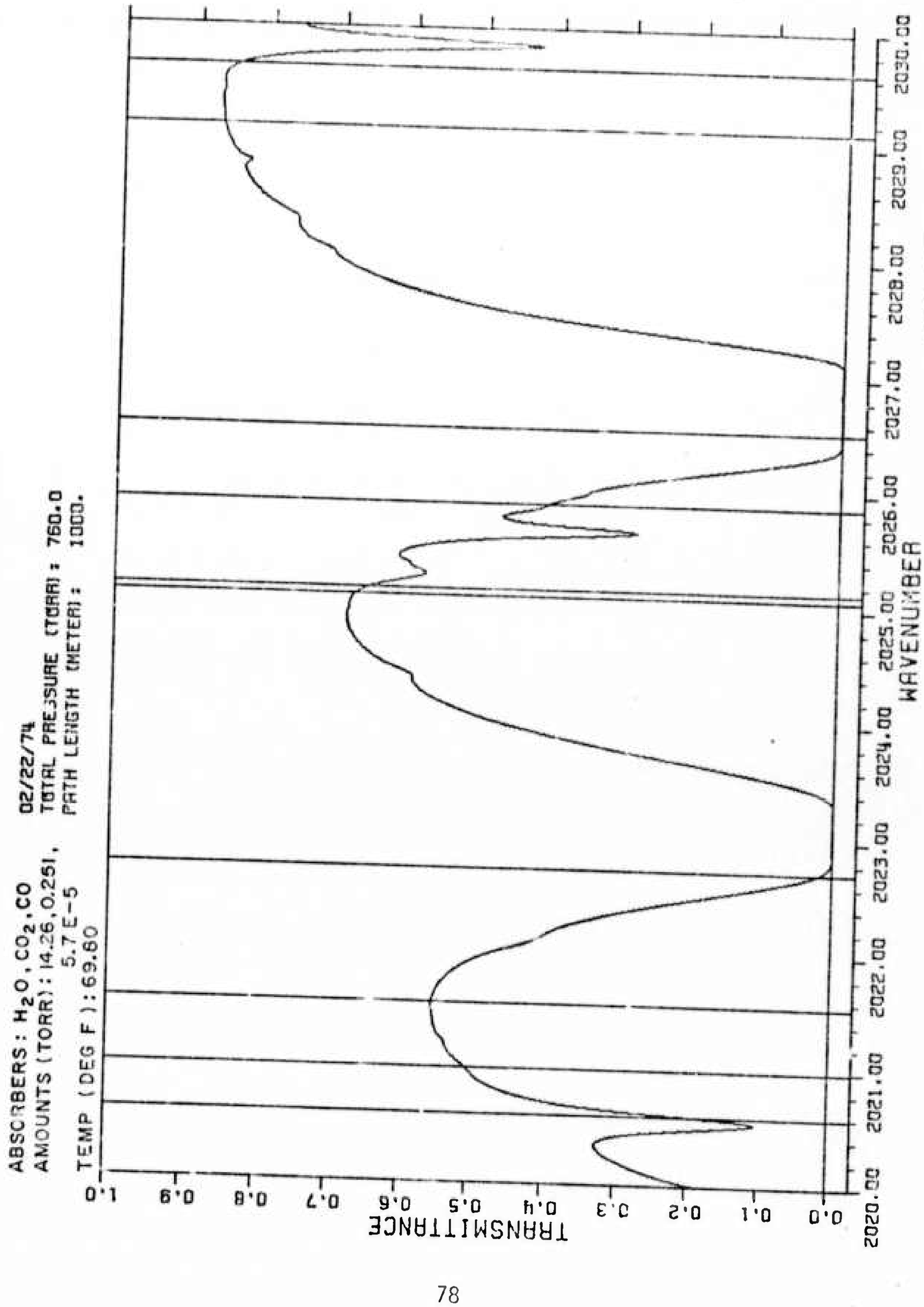

ABSORBERS: H_2O, CO_2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7E-5
TEMP (DEG F): 69.80
02/22/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2020.00
2021.00
2022.00
2023.00
2024.00
2025.00
2026.00
2027.00
2028.00
2029.00
2030.00
WAVENUMBER

FIG. 56

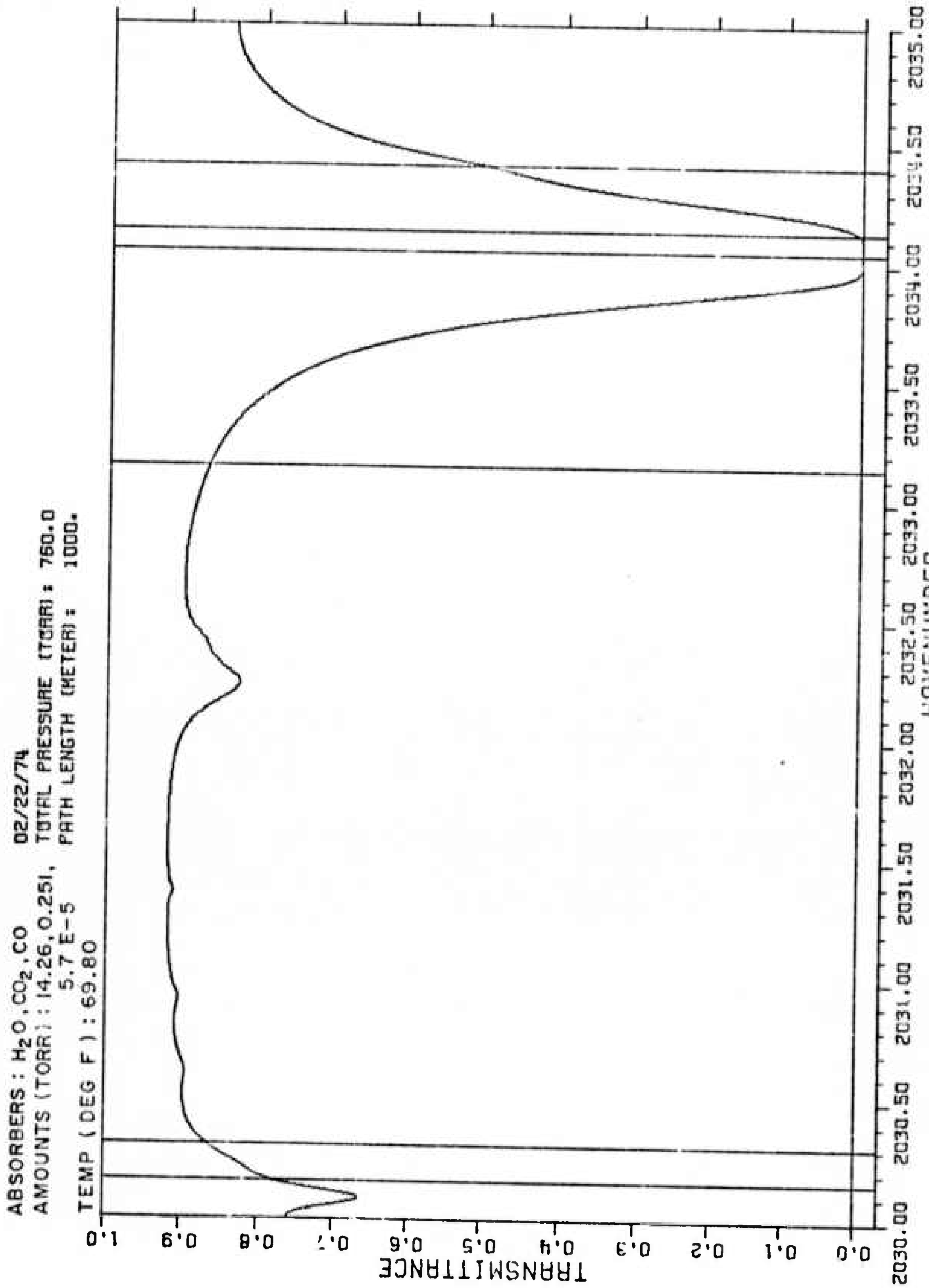

ABSORBERS : H_2O, CO_2, CO
AMOUNTS (TORR) : 14.26, 0.251, 5.7 E-5
TEMP (DEG F) : 69.80
02/22/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2030.00
2030.50
2031.00
2031.50
2032.00
2032.50
2033.00
2033.50
2034.00
2034.50
2035.00

FIG. 57

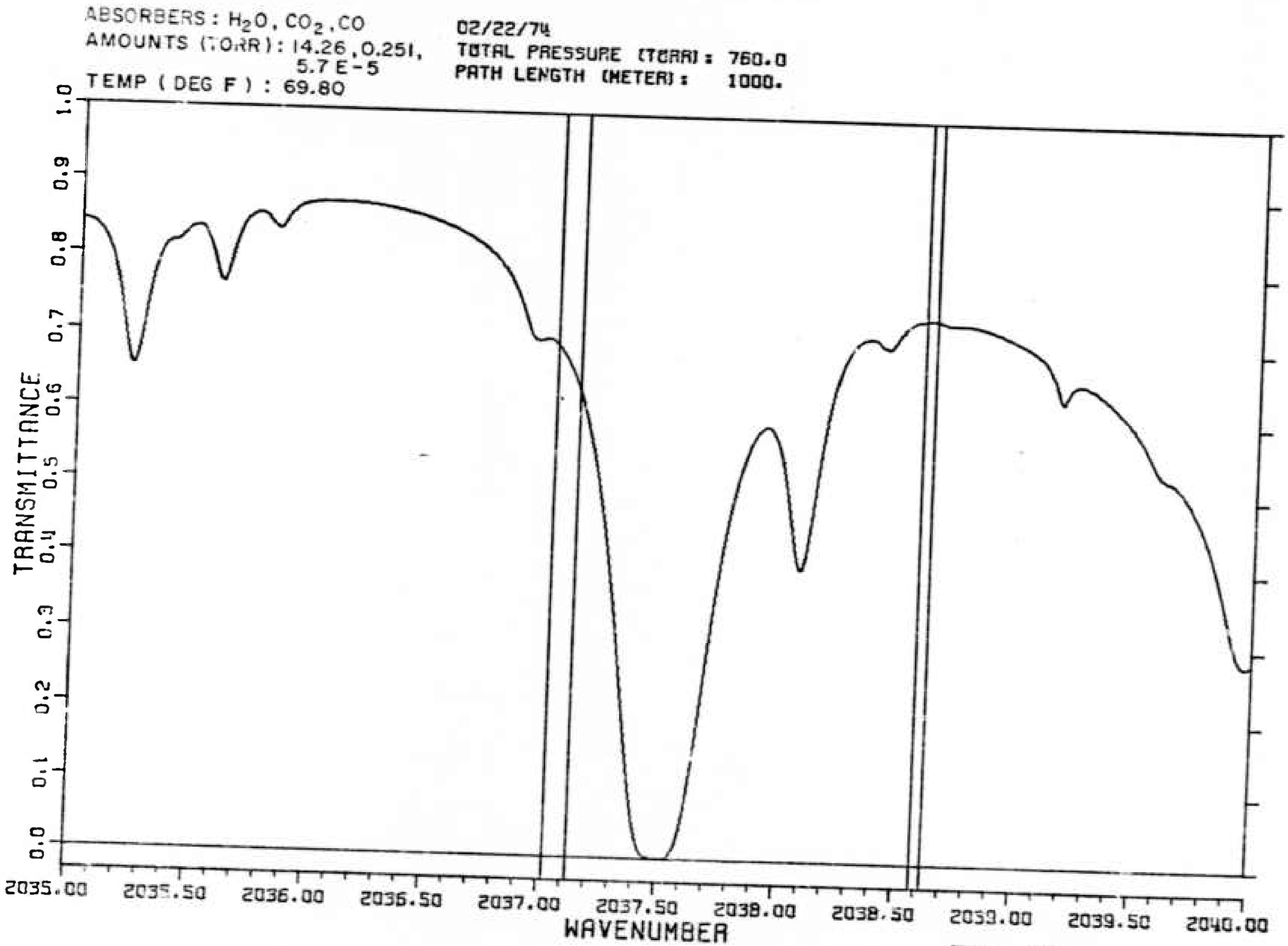

ABSORBERS: H2O, CO2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7 E-5
TEMP (DEG F): 69.80
02/22/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2035.00
2035.50
2036.00
2036.50
2037.00
2037.50
2038.00
2038.50
2039.00
2039.50
2040.00
WAVENUMBER

FIG. 58

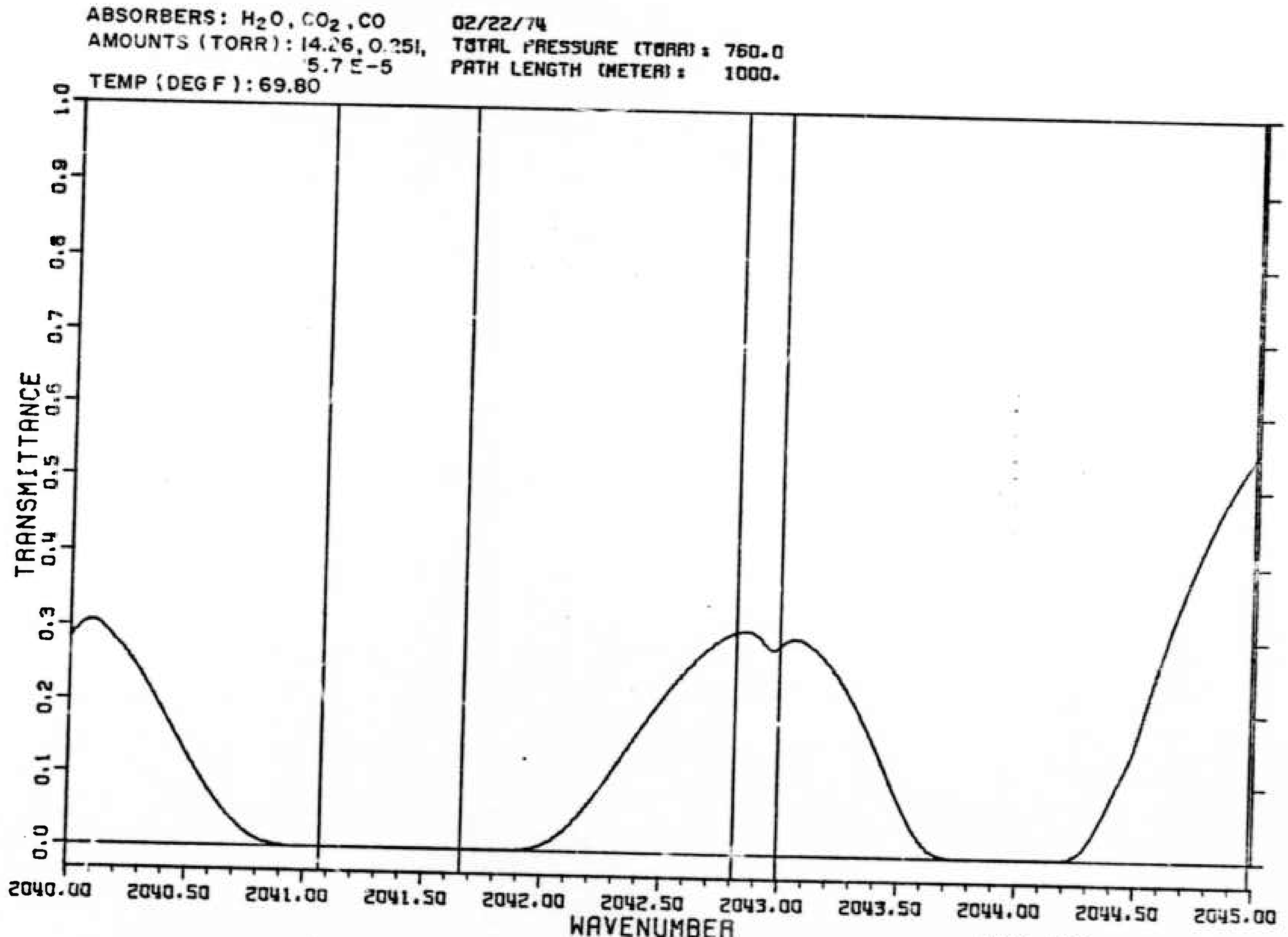
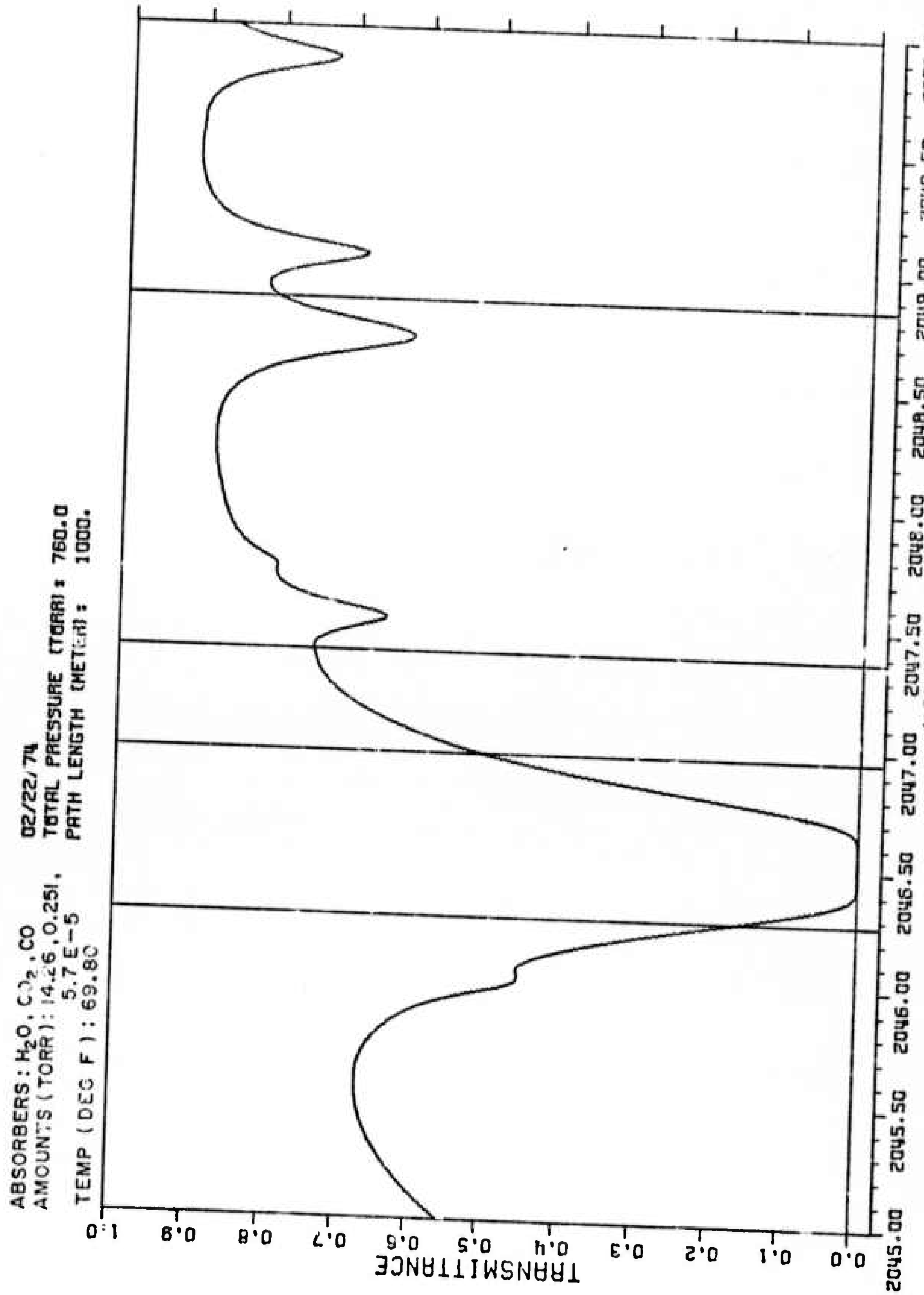

ABSORBERS: H2O, CO2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7 E-5
TEMP (DEG F): 69.80
02/22/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2040.00
2040.50
2041.00
2041.50
2042.00
2042.50
2043.00
2043.50
2044.00
2044.50
2045.00

FIG. 59



ABSORBERS : H_2O, CO_2, CO
AMOUNTS (TORR) : 14.26, 0.251, 5.7 E-5
TEMP (DEG F) : 69.80
02/22/74
TOTAL PRESSURE (TORR) : 760.0
PATH LENGTH (METER) : 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2045.00
2045.50
2046.00
2046.50
2047.00
2047.50
2048.00
2048.50
2049.00
2049.50
2050.00

FIG. 60

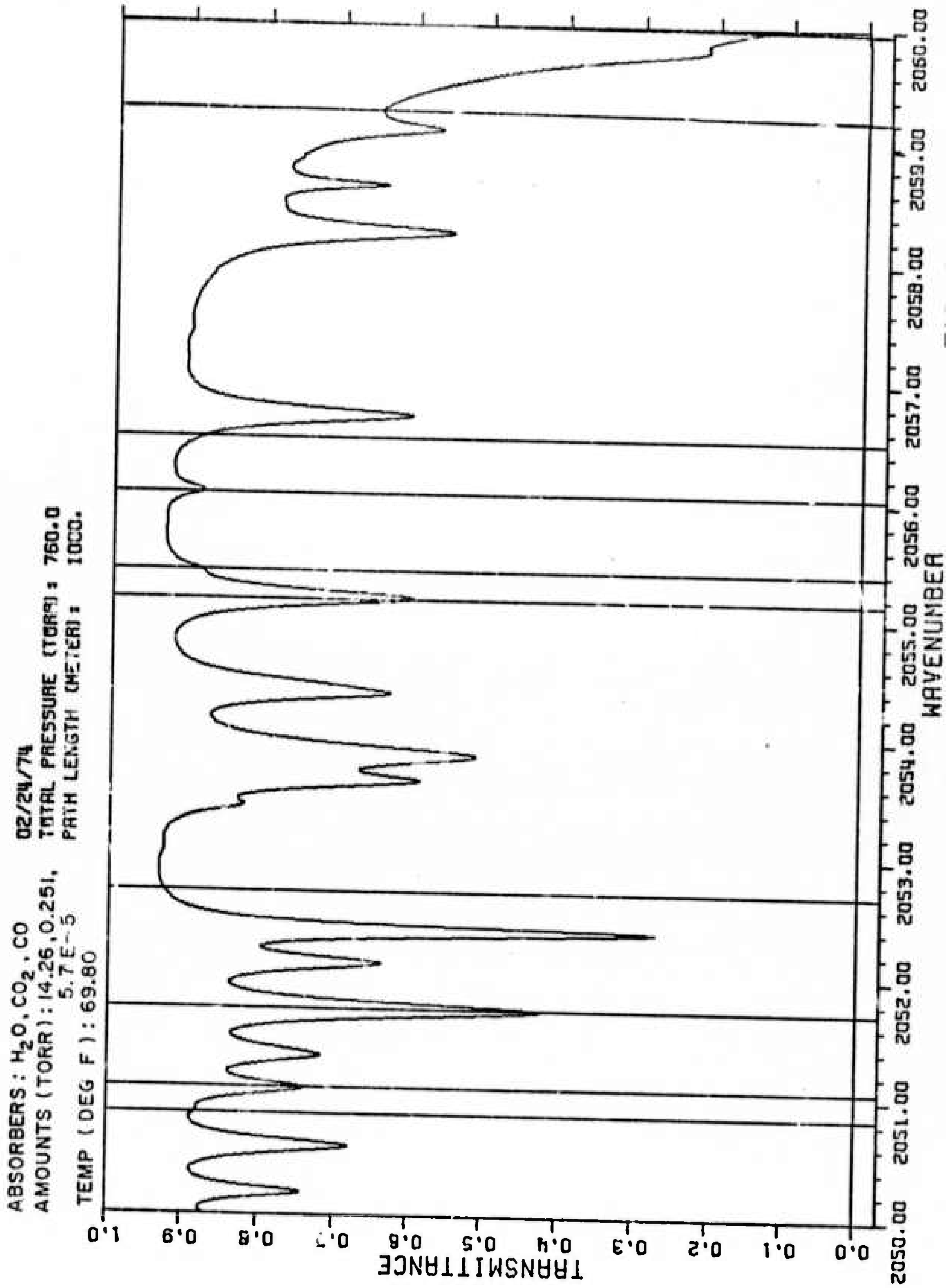

ABSORBERS: H_2O, CO_2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7E-5
TEMP (DEG F): 69.80
02/24/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
WAVENUMBER
2050.00 2051.00 2052.00 2053.00 2054.00 2055.00 2056.00 2057.00 2058.00 2059.00 2060.00

FIG. 61

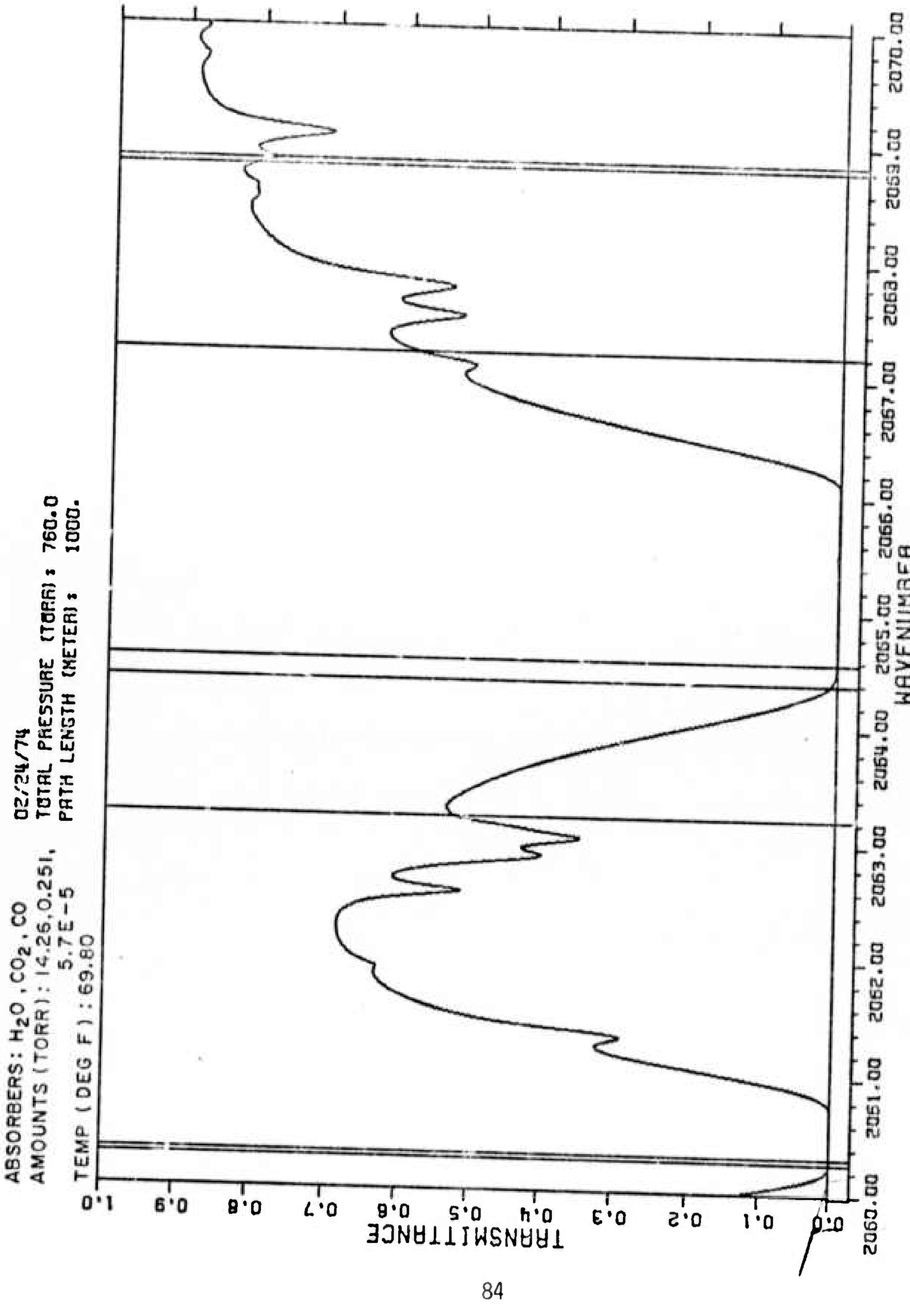

ABSORBERS: H_2O, CO_2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7E-5
TEMP (DEG F): 69.80
02/24/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2060.00
2061.00
2062.00
2063.00
2064.00
2065.00
2066.00
2067.00
2068.00
2069.00
2070.00

FIG. 62

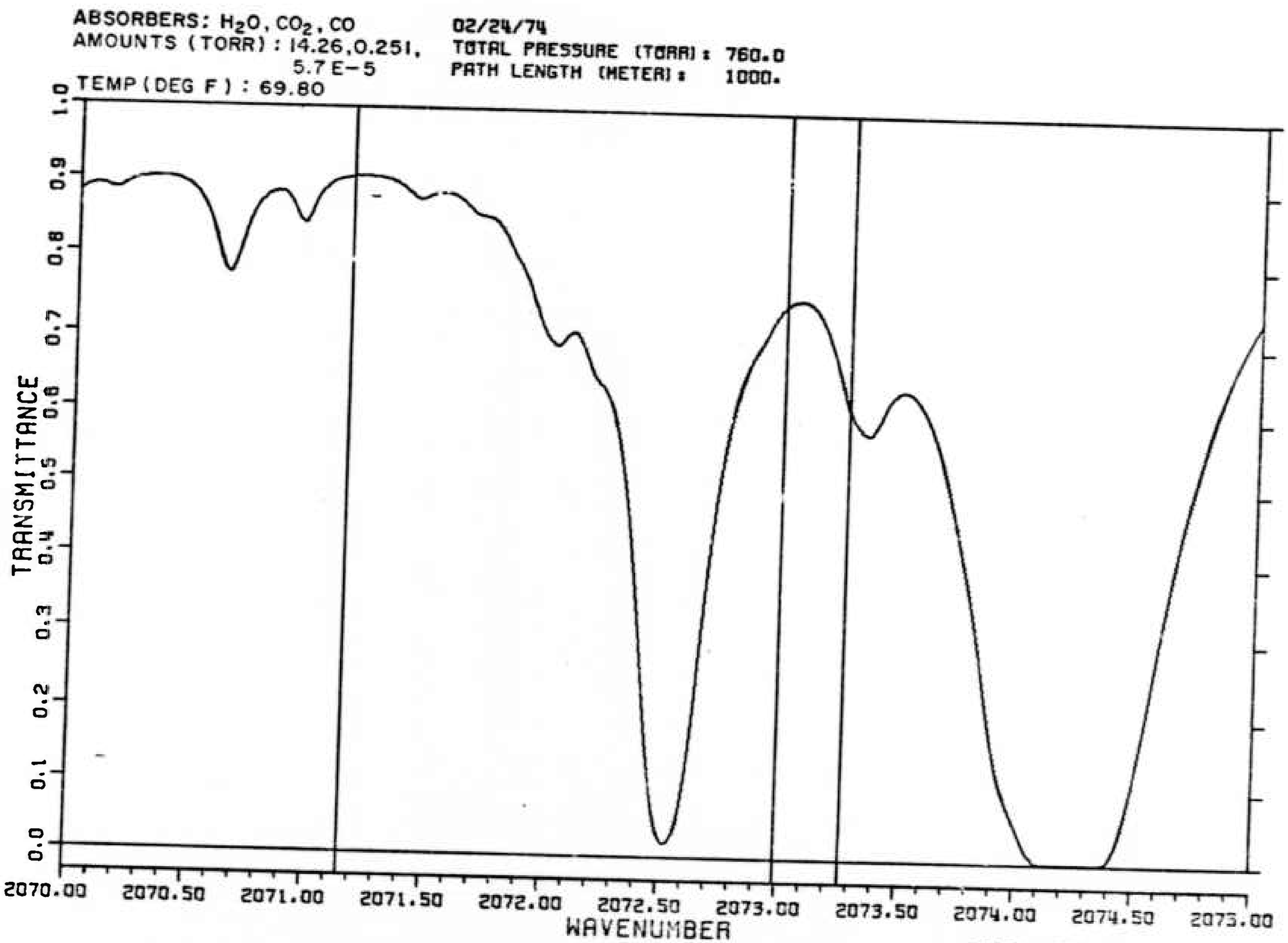

ABSORBERS: H_2O, CO_2, CO
AMOUNTS (TORR) : 14.26,0.251,
5.7 E-5
TEMP (DEG F) : 69.80
02/24/74
TOTAL PRESSURE (TORR) : 760.0
PATH LENGTH (METER) : 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2070.00
2070.50
2071.00
2071.50
2072.00
2072.50
2073.00
2073.50
2074.00
2074.50
2075.00
WAVENUMBER

FIG. 63

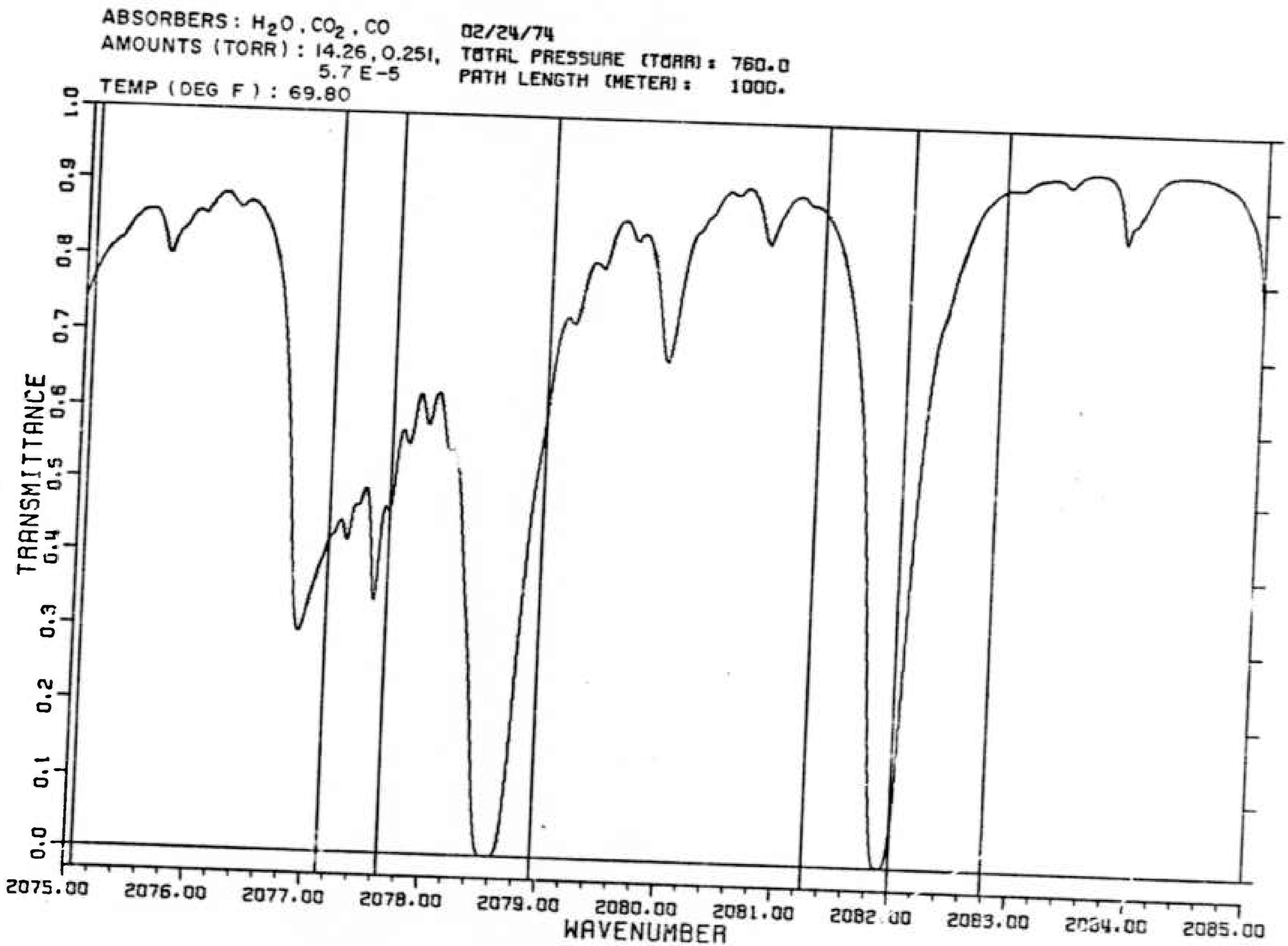
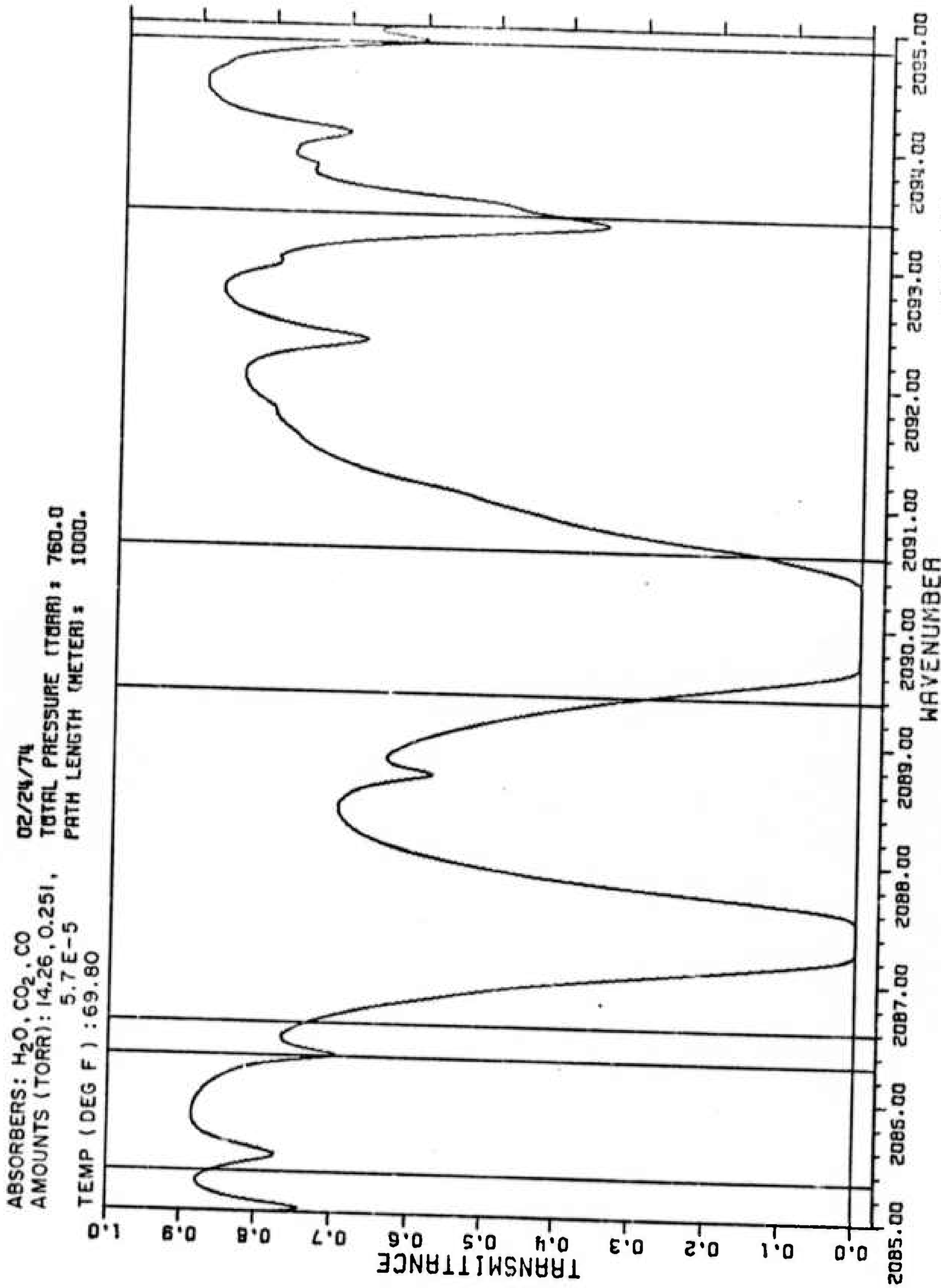

ABSORBERS: H_2O, CO_2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7 E-5
TEMP (DEG F): 69.80
02/24/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2075.00
2076.00
2077.00
2078.00
2079.00
2080.00
2081.00
2082.00
2083.00
2084.00
2085.00
WAVENUMBER

FIG. 64



ABSORBERS: H2O, CO2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7 E-5
TEMP (DEG F): 69.80
02/24/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
WAVENUMBER
2085.00
2086.00
2087.00
2088.00
2089.00
2090.00
2091.00
2092.00
2093.00
2094.00
2095.00

FIG. 65

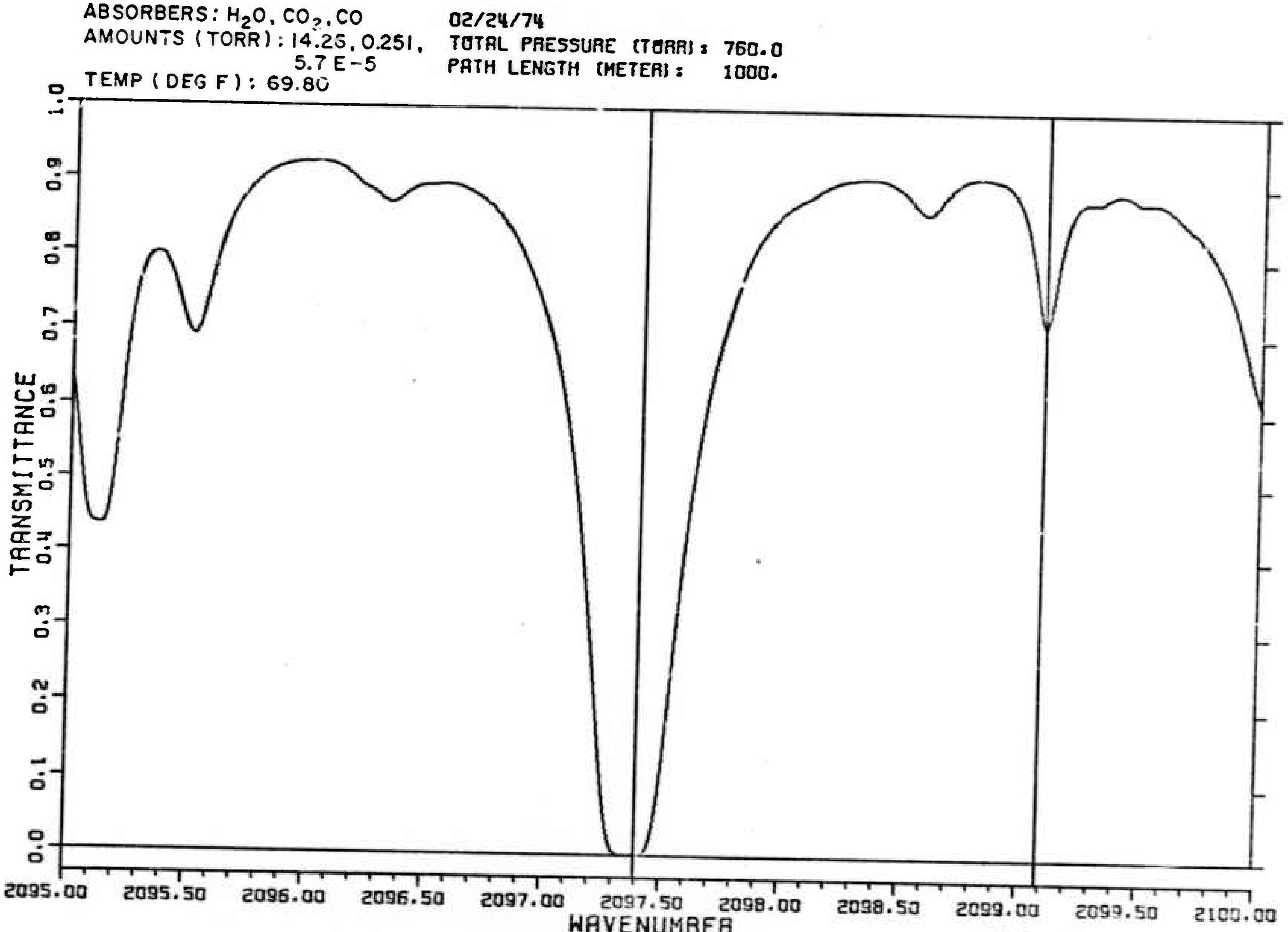

ABSORBERS: H2O, CO2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7 E-5
TEMP (DEG F): 69.80
02/24/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2095.00
2095.50
2096.00
2096.50
2097.00
2097.50
2098.00
2098.50
2099.00
2099.50
2100.00
WAVENUMBER

FIG. 66

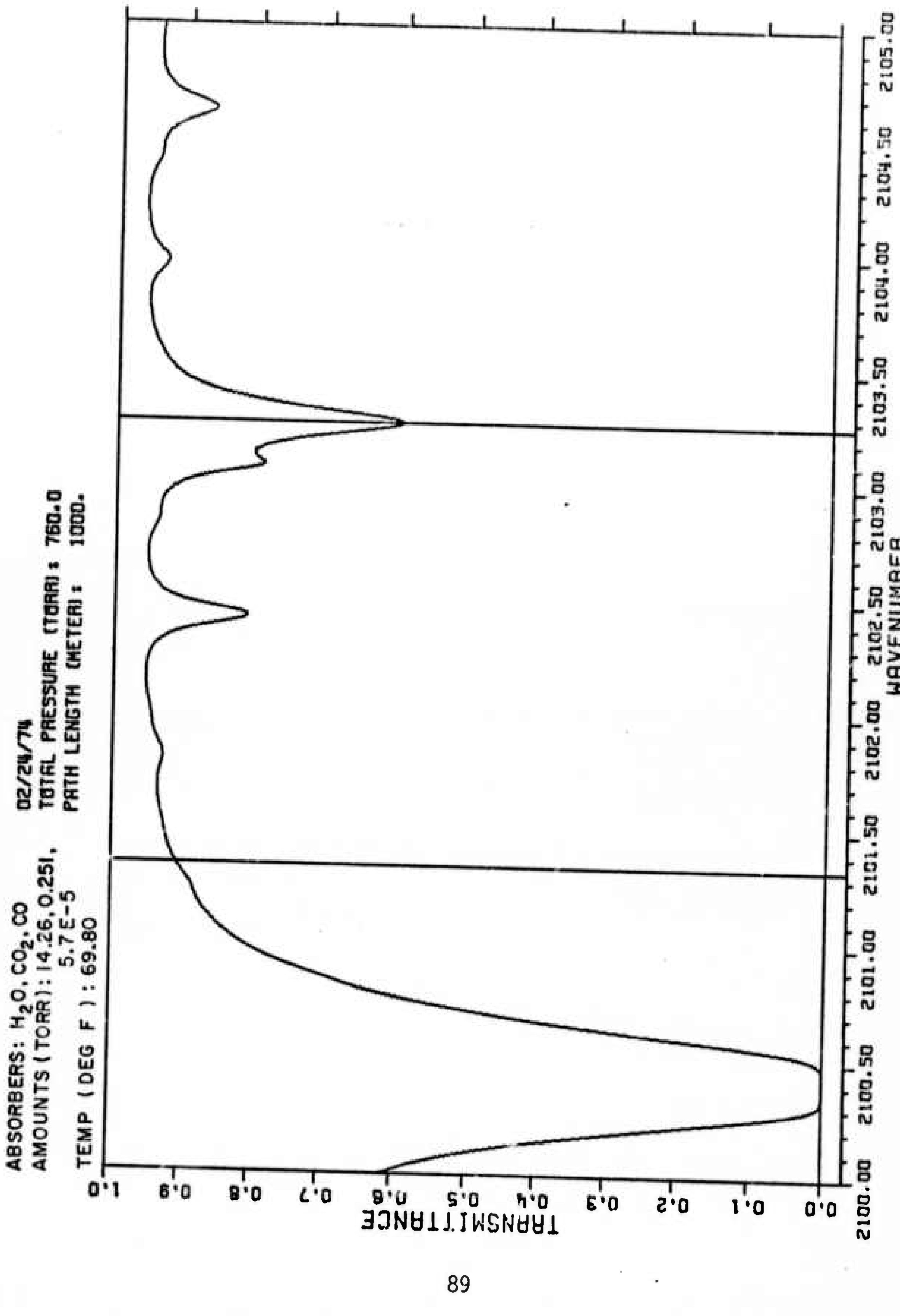

ABSORBERS: H_2O, CO_2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7E-5
TEMP (DEG F): 69.80
02/24/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2100.00
2100.50
2101.00
2101.50
2102.00
2102.50
2103.00
2103.50
2104.00
2104.50
2105.00
WAVENUMBER

FIG. 67

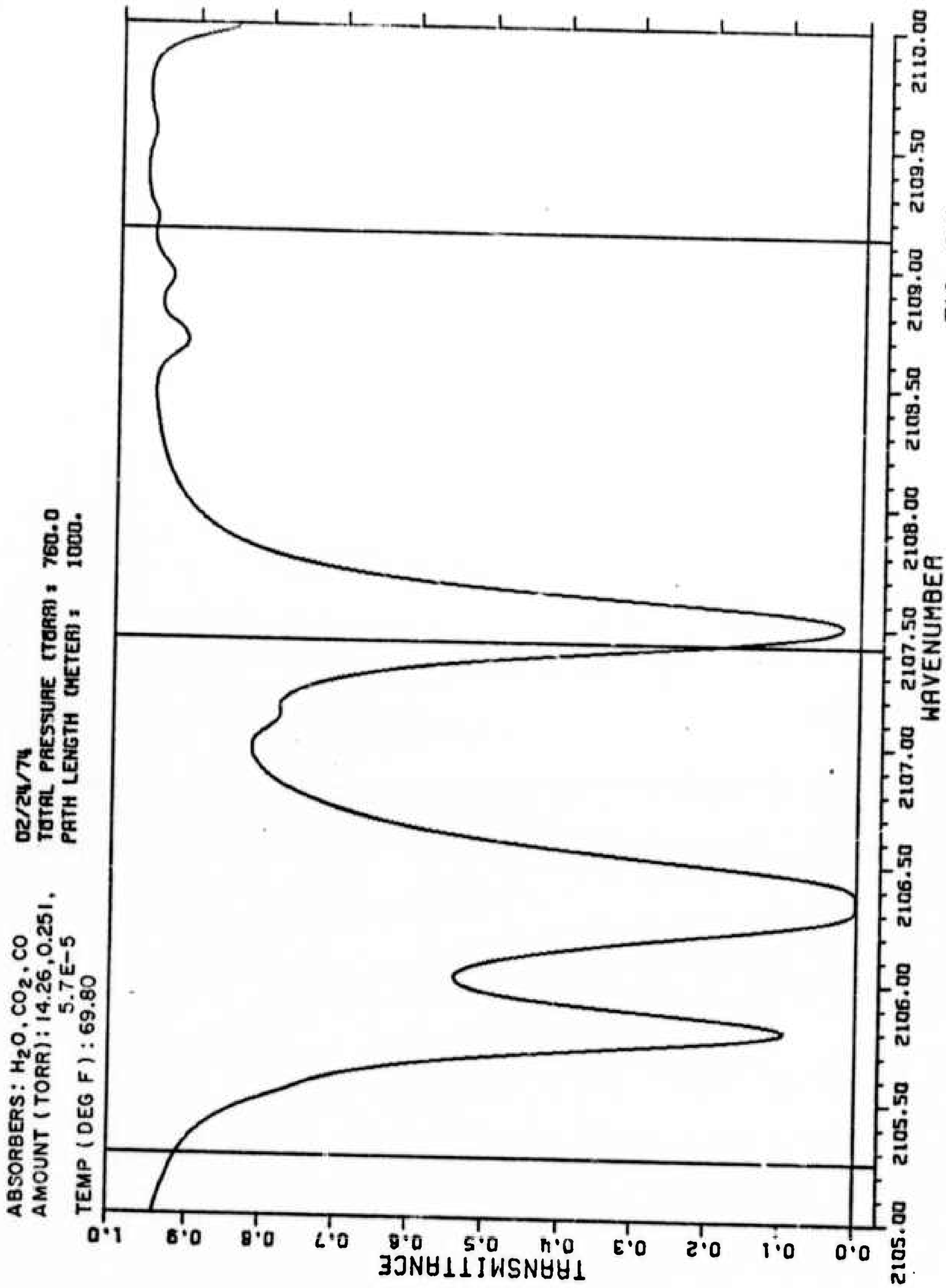
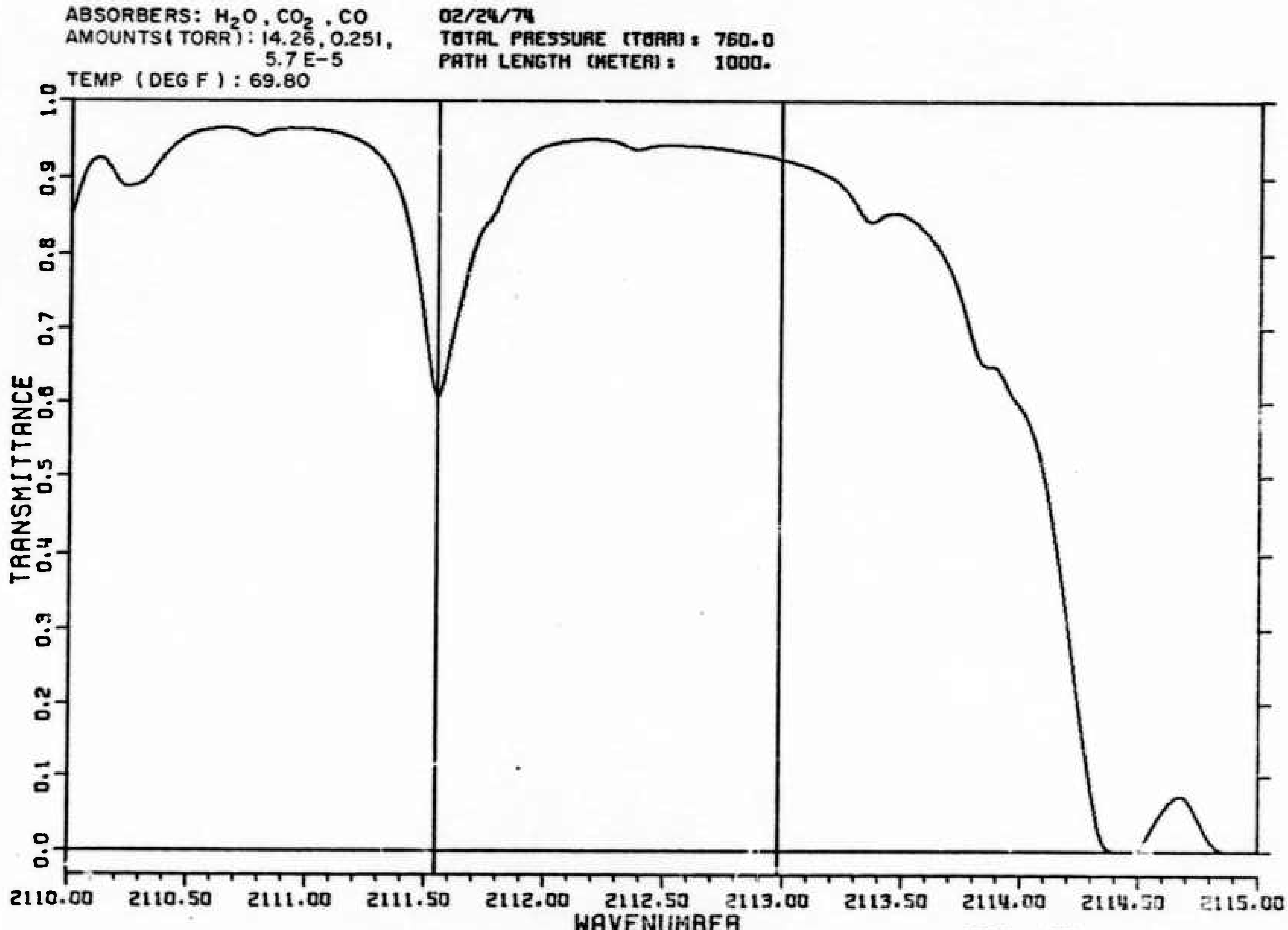

ABSORBERS: H_2O, CO_2, CO
AMOUNT (TORR): 14.26, 0.251, 5.7E-5
TEMP (DEG F): 69.80
02/24/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2105.00
2105.50
2106.00
2106.50
2107.00
2107.50
2108.00
2108.50
2109.00
2109.50
2110.00
WAVENUMBER

FIG. 68



ABSORBERS: H_2O, CO_2, CO
AMOUNTS (TORR): 14.26, 0.251, 5.7 E-5
TEMP (DEG F): 69.80
02/24/74
TOTAL PRESSURE (TORR): 760.0
PATH LENGTH (METER): 1000.
TRANSMITTANCE
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
2110.00
2110.50
2111.00
2111.50
2112.00
2112.50
2113.00
2113.50
2114.00
2114.50
2115.00
WAVENUMBER

FIG. 69

MISSION
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Rome Air Development Center

RADC is the principal AFSC organization charged with planning and executing the USAF exploratory and advanced development programs for electromagnetic intelligence techniques, reliability and compatibility techniques for electronic systems, electromagnetic transmission and reception, ground based surveillance, ground communications, information displays and information processing. This Center provides technical or management assistance in support of studies, analyses, development planning activities, acquisition, test, evaluation, modification, and operation of aerospace systems and related equipment.