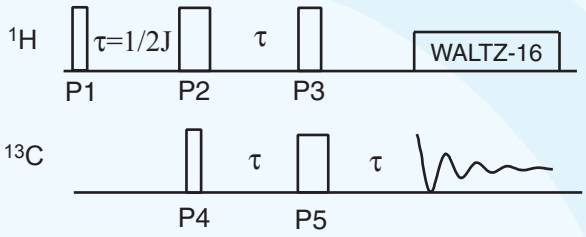
1. Introduction

The Distortionless Enhancement by Polarization Transfer (DEPT) sequence uses polarization transfer from protons to other nuclei via one covalent bond to increase signal strength. The experiment is typically used for CH_n multiplicity determination. The ^{13}C DEPT-135 experiment on cholesterol is described herein. This example demonstrates the basic procedure of double resonance 1D NMR data acquisition and processing on Tecmag spectrometers.

2. Pulse sequence

(a)



(b)

Pulse width and phase cycle:

P1 (H90°): 0
P2 (H180°): phH2 = 0, 2, 1, 3.
P3 (H135°): phH3 = 1, 1, 1, 1, 3, 3, 3, 3.
P4 (C90°): phC1 = $(0)_8$, $(2)_8$, $(1)_8$, $(3)_8$.
P5 (C180°): phC2 = $(0, 2)_4$, $(1, 3)_4$.
Receiver: phRX = $(1)_2$, $(3)_4$, $(1)_2$,$(2)_2$, $(1)_4$, $(2)_2$, $(3)_2$, $(1)_4$, $(3)_2$, $(0)_2$, $(2)_4$, $(0)_2$.
(phH2, phH3, phC1, phC2 phRX are 1D phase tables. All tables are in 4 step mode.)

WALTZ-16 = $RR\bar{R}\bar{R}\ \bar{R}RR\bar{R}\ R\bar{R}\bar{R}R\ \bar{R}\bar{R}RR$,
$R = 90_x180_{-x}270_x$

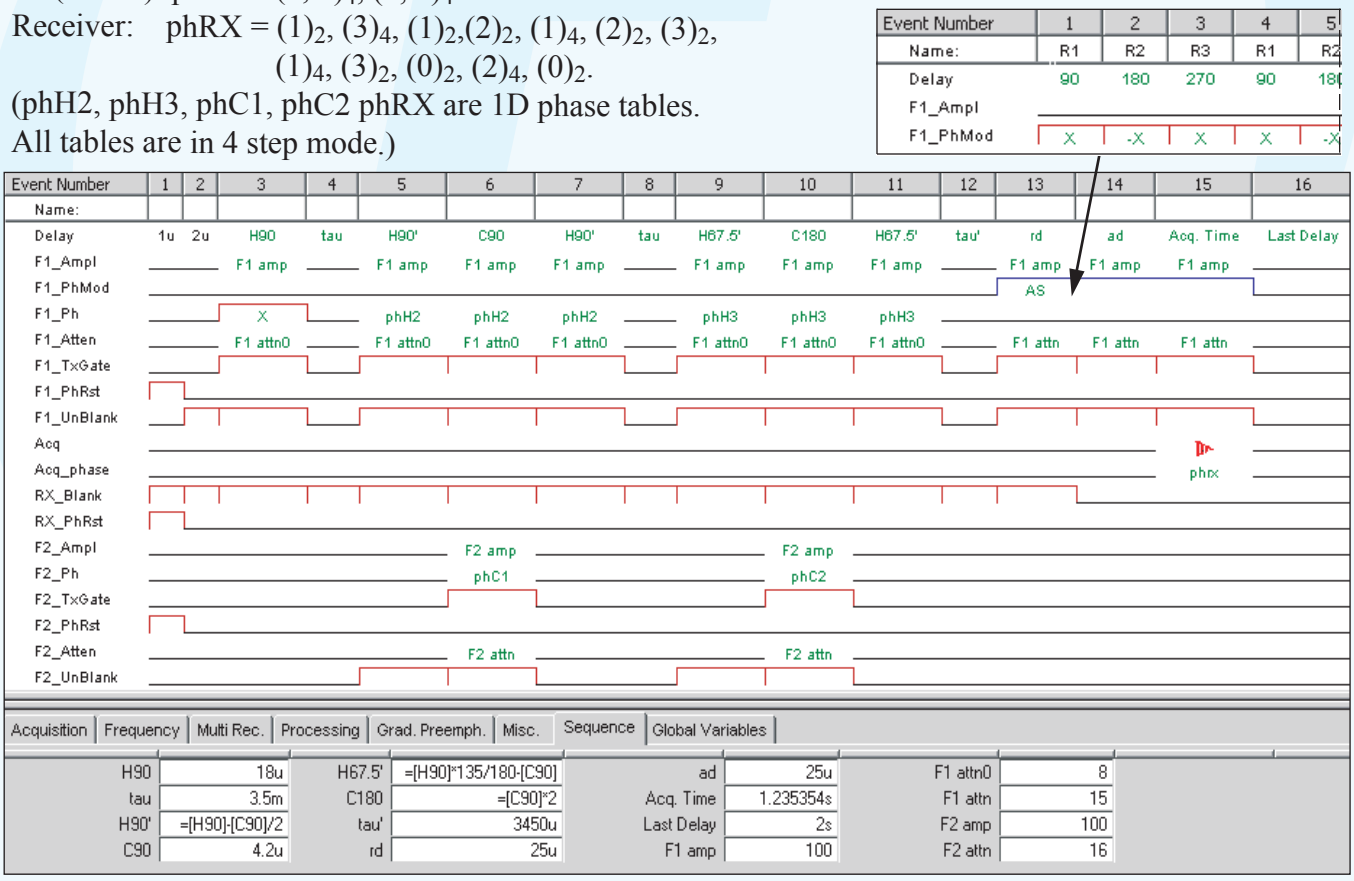
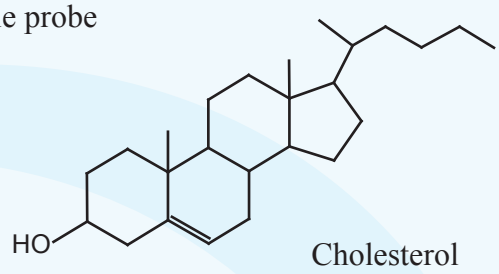


Fig. 1. (a) The ^{13}C DEPT-135 sequence with WALTZ-16 sequence for ^{1}H decoupling. (b) The sequence realized in the NTNMR sequence editor.

3. Experiment

Sample:	Cholesterol in $CDCl_3$ (50mg/ml)
Spectrometer:	7 Tesla Magnet with Tecmag HF3 discovery
Probe:	Naloac D300-5 OWB 5mm $^1H/^{13}C$ Switchable probe
^1H hard pulse:	13.9 kHz (90^o = 18 µs @ 5W)
^1H decoupling field:	5.6 kHz (90^o = 45 µs @ 800 mW)
^{13}C hard pulse:	59.5 kHz (90^o = 4.2 µs @ 250 W)
τ:	3.5 ms (= $1/2J_{C,H}$ = 140 Hz)
SW +/-:	± 6.5kHz
Last Delay:	2s
Scans 1D:	512

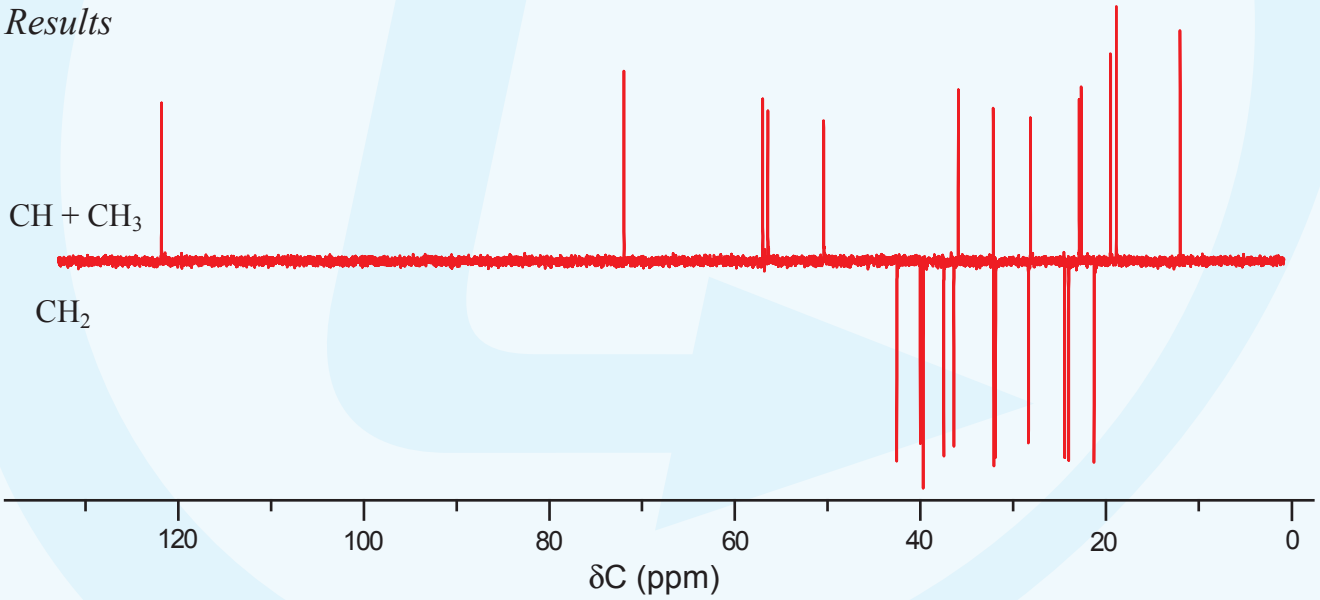


Cholesterol

Notes:

1. Before editing the sequence (Fig. 1b), calibrate the 90^o pulse widths of ^1H and ^{13}C using the nutation experiment (see note, "One Pulse Experiment and Pulse Calibration").
2. Set up the WALTZ sequence according to the note, "^{13}C NMR Spectra with ^1H WALTZ Decoupling".
3. The center of pulses P2 and P4 (also P3 and P5) should be aligned. Since P2 > P4 (and P3 > P5) P2 (and P3) have to split into 3 pulses. The delay of P2's (and P3's) middle pulse equals to P4 (and P5), and the delay of both sides is (P2 - P4)/2 [and (P3 - P5)/2]. The middle pulse of P2 (and P3) falls on the same event as P4 (and P5).

4. Results



CH Fig. 2. The ^{13}C DEPT-135 spectrum of cholesterol obtained using the sequence shown in Fig.1. Since signals are generated from proton polarization, both quaternary carbons and the solvent peak do not appear.

5. References

1. M.R. Bendall, D.M. Doddrell, D.T.Pegg, *J. Am. Chem. Soc.* **1981**, *103, 4603-4605.*
2. D.M. Doddrell, D.T.Pegg, M.R. Bendall, *J. Magn. Res.* **1982**, *48,* 323-327.
3. S. Braun, H.-O. Kalinowski, S. Berger, "150 and More Basic NMR Experiments", Wiley-VCH, 1999, p.180-182.