Certification of the
CIDCO Model CL980 Cordless Telephone
under
FCC ID: **HOLCL980**

as an
Intentional Radiator
under
Title 47 of the CFR, Part 15, Subpart C

MET REPORT EMI9386

October 5, 1998

PREPARED FOR:

CIDCO, Inc.
220 Cochrane Circle
Morgan Hill, CA 95037

PREPARED BY:

MET Laboratories, Inc.
914 West Patapsco Avenue
Baltimore, Maryland 21230-3432

October 5, 1998

Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

Attention: Applications Examiner

Reference: FCC ID: HOLCL980
CIDCO Model CL980 Cordless Telephone

Dear Examiner:

The following equipment authorization application is presented on behalf of CIDCO , Inc. for the certification of their Model Model CL980 Cordless Telephone. Enclosed, please find a complete data and documentation package demonstrating that this device complies with the technical requirements of 47 CFR, Part 15, Subpart C for an Intentional Radiator. The manufacturer seeks authorization under the FCC ID: HOLCL980.

We look forward to an expeditious review of the report presented and a granting of the certification for CIDCO , Inc. If you have any questions or we can be of assistance, in this matter, please call us at (410) 354-3300.

Best regards,

Kenneth Bass
Project Engineer

Enclosures

APPLICATION FOR EQUIPMENT AUTHORIZATION

Certification of the
CIDCO Model CL980 Cordless Telephone
under
FCC ID: **HOLCL980**

as an
Intentional Radiator
under
Title 47 of the CFR, Part 15, Subpart C

MET REPORT EMI9386

October 5, 1998

PREPARED FOR:

CIDCO , Inc.
220 Cochrane Circle
Morgan Hill, CA 95037

PREPARED BY:

MET Laboratories, Inc.
914 West Patapsco Avenue
Baltimore, Maryland 21230-3432

Test Engineer: _____
Kenneth Bass

Reviewed by: _____
Christopher Harvey
Project Manager

MANUFACTURER & PRODUCT INFORMATION

TYPE OF AUTHORIZATION: Certification of an Intentional Radiator

FCC IDENTIFIER: HOLCL980

APPLICABLE FCC RULES: 15.114(a) thru (e);15.107(a); 15.209(a).

CLIENT: CIDCO , Inc.
220 Cochrane Circle
Morgan Hill, CA 95037

EQUIPMENT: Model CL980 Cordless Telephone

TESTING DATE(S): 12, 15, 16, 17, and 20 July 1998

MANUFACTURER'S REPRESENTATIVE: Tam Nguyen

ENGINEERING STATEMENT

I ATTEST: the measurements shown in this report were made in accordance with the procedures indicated, and that the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

I FURTHER ATTEST: on the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 15 of the FCC Rules under normal use and maintenance.

_____
Kenneth Bass
Project Engineer

MODIFICATIONS STATEMENT

I ATTEST: that the product will be manufactured with all modifications for Part 15 compliance as submitted in this report. Modifications made during testing appear below:

1. Screws were added to the exterior case, at the transmit antenna end, to enhance contact between the top and bottom chassis plates.

2. A metal can was added to enclose the output amplifier circuitry.

3. A filter circuit was added to the output amplifier and at the output of the PLL.

INTRODUCTION

An EMI evaluation to determine compliance of the CIDCO Model CL980 Cordless Telephone with the requirements of Part 15, Subpart C for Intentional Radiators was conducted. (All references are to the most current version of Title 47 of the Code of Federal Regulations in effect.) In accordance with §2.1033(b), the following test report is presented in support of the application for grant of certification of the CIDCO Model CL980 Cordless Telephone. CIDCO, Inc. should retain a copy of this document for at least one year after the manufacturing of the CIDCO Model CL980 Cordless Telephone has been **permanently** discontinued, as per §2.938(c).

TEST SITE

All testing was conducted at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, Maryland 21230-3432. Radiated emissions measurements were performed on a three-meter open air test site (OATS). In accordance with §2.948, a complete site description is on file with the FCC Laboratory Division as 31040/SIT/MET.

TEST SUMMARY

The EUT is a direct sequence spread spectrum telephone consisting of a base and a hanset. The phone has 20 channel capability. The worst case channel was used for making measurements for comparison to the FCC rules under 15.247.

MEASUREMENT PROCEDURES

As required by §15.207(a) of CFR 47, *conducted emissions measurements* were made in accordance with

ANSI C63.4-1992 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz". The measurements were performed over the frequency range of 0.45 MHZ to 30 MHZ using a 50 Ω/50 µH LISN as the input transducer to an EMI/Field Intensity Meter. The measurements were made with the detector set for "peak" amplitude within an IF bandwidth of 10 kHz or for "quasi-peak" within a bandwidth of 9 kHz. The tests were conducted in a RF-shielded enclosure.

As required by §15.209(a) of CFR 47, *radiated emissions measurements* were made in accordance with the general procedures of ANSI C63.4-1992 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz". The measurements were performed over the frequency range of 9 kHz to the tenth harmonic of the carrier using the following equipment:

Frequency Range	Input Transducer	Measurement Instrumentation
9 kHz to 30 MHZ	Passive Rod Antenna	Spectrum Analyzer
30 MHZ to 1 GHz	Dipole Antenna Set	Spectrum Analyzer
above 1 GHz	Double Ridged Guide Horn	Spectrum Analyzer

The measurements were made with the detector set for "quasi-peak" within a bandwidth of 9 kHz (for measurements made between 9 kHz and 30 MHZ) or 120 kHz (for measurements made between 30 MHZ and 1 GHz). In general, all radiated emissions measurements were made with the quasi-peak detector unless otherwise noted. For spurious measurements above 1 GHz, a peak detector with a reduced video bandwidth was used in place of an average detector for comparison to the limit. A preliminary RF scan was performed in an RF-shielded enclosure. Final measurements were made on the OATS, as per §15.31(d).

As required by §15.247(a)(2) of CFR 47, *6 dB bandwidth measurements* were performed by using a spectrum analyzer. The analyzer was set to capture the entire modulation envelope and the 6 dB points were recorded. A resolution bandwidth of 100 kHz was used.

As required by §15.247(b) of CFR 47, *output power measurements* could not be performed by connecting a power meter directly to the transmission line at the point of antenna input. Therefore, radiated measurements were performed to verify compliance with the conducted limit.

As required by §15.247© of CFR 47, *out of band emissions measurements* were performed using a spectrum analyzer to sweep beyond the proposed band of operation from 902 to 928 MHz with a resolution bandwidth of 1 MHZ. A marker was placed at the peak harmonic emissions points outside this band, and recorded for comparison to the amplitude of the fundamental minus 20 dB. All other spurious emissions were measured for comparison to the restricted band limits and to the general out-of-band limits of §15.209 of CFR 47, while using a 1.0 MHZ resolution bandwidth and a 10 Hz VBW, for comparison to the average limit.

As required by §15.247(d) of CFR 47, *power density measurements* were performed using a spectrum analyzer. First, the modulation envelope was examined for peak emission levels. The spectrum analyzer was then adjusted to "zoom in" about this frequency. In order to determine the power density within a one second interval, the spectrum analyzer was adjusted for a 100 second sweep time over a span of 300 kHz. The maximum level within a 3 kHz resolution bandwidth was recorded. This was performed for ±1.0 MHZ around the highest peak of the emission in sliding 300 kHz blocks for comparison the +8 dBm limit

As required by §15.247(e) of CFR 47, *processing gain* must be greater than 10 dB. Measurements to demonstrate this were not performed for the EUT, but data for the 900 MHZ phone is included as an Appendix which was provided by the spread spectrum chipset manufacturer. For the results of the processing gain measurements for the EUT please refer to Appendiz A.

INSTRUMENTATION

Conducted emissions measurements were made using two Solar type 8028-50-TS-24-BNC LISNs and an EATON NM-17/27A EMI/Field Intensity Meter.

Radiated emissions measurements from 9 kHz to 30 MHZ were made using an EMCO passive rod, Model 3301. Measurements between 30 to 1000 MHZ were made using IFR Model A-7550 Spectrum Analyzer and from 1 to 22 GHz using a Hewlett Packard 8563A Spectrum Analyzer and EMCO Model 3116 & 3115 double ridge guided horn antennas.

6 dB bandwidth measurements were performed using a Hewlett Packard 8563A spectrum analyzer.

Output power measurements were performed using a Hewlett Packard 8563A spectrum analyzer, and an EMCO Model 3115 double ridge guided horn antenna.

Out of band emissions measurements were performed using a Hewlett Packard 8563A spectrum analyzer, a Hewlett Packard 83017 microwave pre-amplifier, and high-pass/band-pass filters, PMI model F1931A, Microlabs model 09408 UG021 B/U, and a PMI Model 292121P6.
A microwave source, EIP model 928 was also used for signal substitution when applicable.

Power density measurements were performed using a Hewlett Packard 8563A spectrum analyzer, and an EMCO Model 3115 double ridge guided horn antenna.

TEST CONFIGURATION

The CIDCO Cordless Telephone was configured in accordance with the manufacturer's instructions and operated in a manner representative of the typical usage of the equipment. During all testing, system components were manipulated within the confines of typical usage to maximize each emission.

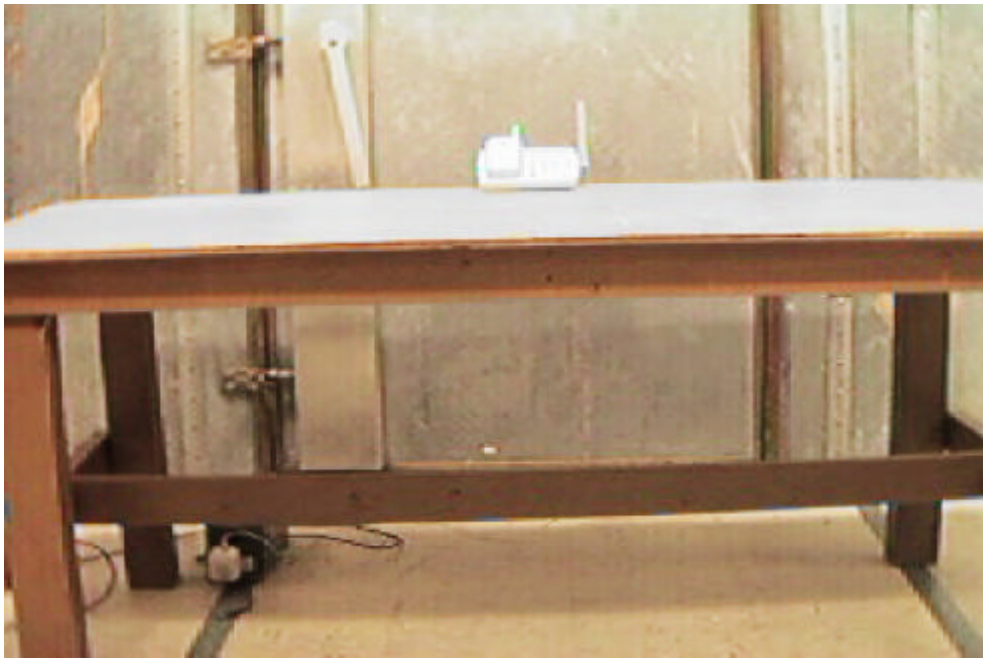
The EUT can tune to various channels within the authorized band. Therefore, representative measurements were taken on the worst case channels in the possible tuning range.

DEVICE, PERIPHERALS, AND CABLES USED

Equipment:	Base Station (900MHz Cordless Telephone)	
Model #:	CL980	
Serial #:	not provided	
FCC ID:	HOLCL980	
Equipment:	Handset (900MHz cordless Telephone	
Model #:	Spreadnet IPC-6806	
Serial #:	not provided	
FCC ID:	HOLCL980	
Equipment:	CO simulator	
Model #:	MET Labs	1.5m unshielded RJ-11 cable
Serial #:	n/a	
FCC ID #:	n/a	

Photograph(s) of Conducted Emissions Test Configuration

CIDCO Model CL980 Cordless Telephone



Photograph(s) of Radiated Emissions Test Configuration

CIDCO Model CL980 Cordless Telephone

SUBJECT: Peak Output Power
15.247(b)
FCC Part 15, Subpart C
Intentional Radiator

MET REPORT: EMI9386
MFG: CIDCO
TESTED BY: Ken Bass
TEST DATE(S): 15 JUL 1998

EUT: CIDCO
MODEL: CL 980

TECHNICAL SPECIFICATION: 15.247(b)

CARRIER POWER: Peak Output power was calculated through the following means:

The raw reading from the analyzer was added to the cable loss and antenna factor (for the specific frequency of measurement). The final E-field strength limit is derived from the conversion of the power limit specified in FCC Part. 15.247(b) to V/m considering a 50Ω system.

Please see Plots/files: pohan.jpg and pobase.jpg

Frequency (GHz)	Raw+ACF Reading (mW)	Distance (m)	Cbl/HPF/Con Loss (dB)	Preamp (dB)	Corrected level (dBµV/m)	Total (V/m)
914.65	31.62	3.0	0.10*	n/a	122.00	1.26
918.28	2.61	3.0	0.10*	n/a	111.00	0.355

* - Cable losses only. No High-pass filter (i.e. insertion loss) factors, etc., associated with measurement.

The Model CL980 system results for the Handset are provided as the highest level of the system. (Across the entire channel range)

Frequency Range	Frequency (MHz)	Measured Signal (V/m)	E limit (V/m)	E margin (dB)
High	914.65	1.26	3.64	-9.21

SUBJECT: 6 dB Bandwidth
15.247(a)(2)
FCC Part 15, Subpart C
Intentional Radiator

MET REPORT: EMI9386
MFG: CIDCO
TESTED BY: Ken Bass
TEST DATE(S): 15 JUL 1998

EUT: CIDCO
MODEL: CL980

TECHNICAL SPECIFICATION: 15.247(a)(2)

Please see Plots/files: bwh.jpg and bwb.jpg

The 6 dB bandwidth was determined from plots provided in the files above:

EUT	Frequency (MHz)	6 dB Bandwidth (MHZ)
Base (worst case)	914.53	1.175
Handset (worst case)	918.28	1.183

SUBJECT: Processing Gain
15.247(e)
FCC Part 15, Subpart C
Intentional Radiator

MET REPORT: EMI9386
MFG: CIDCO
TESTED BY: Ken Bass

EUT: CIDCO
MODEL: CL980

TECHNICAL SPECIFICATION: 15.247(e)

Processing Gain Measurements, per CFR 47, Part 15.247(e) were performed by the spread spectrum chipset manufacturer, Rockwell Semiconductor. Testing results as performed by Roackwell, have been included for reference and comparrison to the applicable limit.

Refer to the following tables, notes, and data, from the processing gain measurements in files:

procga1.jpg ; procga2.jpg ; procga3.jpg ; procga4.jpg ; procga5.jpg.

SUBJECT: Spurious Emissions
15.247(c)(paragraph 1)
FCC Part 15, Subpart C
Intentional Radiator

MET REPORT: EMI9386
MFG: CIDCO
TESTED BY: Ken Bass
TEST DATE(S): 16 JULY 98

EUT: CIDCO
MODEL: CL980

TECHNICAL SPECIFICATION: 15.247(c)(paragraph 1)

Test data is presented in the following file @100 kHz RBW: **bw100k1.jpg**

The marker was placed on the highest emission inside the band and the marker recorded.

w/RBW = 100 kHz, the highest emission was found to be = -15.0dBm

therefore;

-15.0dBm + 24dB (ACF) = +9.0dBm = 116 dBuV - 20dB (from spec)

spur limit is therefore;

Spur limit = 96dBuV

Plots for spurious emissions above 1 GHz appear in files:

hspur1.jpg ; hspur2.jpg ; bspur1.jpg ; bspur2.jpg ; bspur3.jpg ; bspur4.jpg

Freq (GHz)	Ant orien H/V	Raw Reading (dBµV)	Ant Factor (dB/m)	Cbl/HPF/ Conn Loss (dB)	d (m)	Pre-Amp Gain[1] (dB)	Corr. Level (dBµV/m)	Limits (dBµV/m)	Comments
2.711	H	28.83	31.20	1.0	1.0	37.00	50.49	96	spur
2.711	V	19.33	31.20	1.0	1.0	37.00	42.19	96	spur
2.779	H	24.00	31.50	1.0	1.0	37.00	46.96	96	spur
2.779	V	26.50	31.50	1.0	1.0	37.00	49.46	96	spur
2.754	H	19.83	31.50	1.0	1.0	37.00	41.79	96	spur
2.754	V	25.33	31.50	1.0	1.0	37.00	48.29	96	spur

[1] **Note - Preamplifier gain level compensated in spectrum analyser reference level offset.**

SUBJECT: Spurs Outside of Authorized Bandwidth
15.247(c)(paragraph 2)
FCC Part 15, Subpart C
Intentional Radiator

MET REPORT: EMI9386
MFG: CIDCO
TESTED BY: Ken Bass
TEST DATE(S): 7 JUL 1998

EUT: CIDCO
MODEL: CL980

TECHNICAL SPECIFICATION: 15.247(c)(paragraph 2)

The marker was placed on the highest emission outside the band and the marker recorded.

Plots for spurious emissions above 1 GHz appear in files:

obspur1.jpg ; obspur2.jpg ; obspur3.jpg ; obspur4.jpg ; obspur5.jpg ; obspur6.jpg

Freq (GHz)	Ant orien H/V	Raw Reading (dBµV)	Ant Factor (dB/m)	Cbl/HPF/ Conn Loss (dB)	d (m)	Pre-Amp Gain (dB)	Corr. Level (dBµV/m)	Limits (dBµV/m)	Comments
1.807	V	31.33	26.80	1.0	1.0	31.33	12.59	53.97	spur
2.711	V	32.83	31.20	1.0	1.0	37.00	17.49	53.97	spur
2.754*	H	11.70	31.50	1.0	1.0	37.00	34.66	53.97	spur
2.754*	V	17.33	31.50	1.0	1.0	37.00	40.29	53.97	spur
4.589	H	-	-	-	1.5	37.00	-	53.97	signal below noise floor
4.589	V	2.33	32.30	1.5	1.5	37.00	26.59	53.97	spur

* - Corrected for pre-amp gain using reference level offset.

Note - All levels taken above, were with VBW set to 10 Hz to simulate an average measurement. These levels are pulsed in nature, but HAVE NOT been adjusted for the peak-average correction factor.

SUBJECT: Transmitted Power Spectural Density
15.247(d)
FCC Part 15, Subpart C
Intentional Radiator

MET REPORT: EMI9386
MFG: CIDCO
TESTED BY: Ken Bass
TEST DATE(S): JUL 1998

EUT: CIDCO
MODEL: CL980
TECHNICAL SPECIFICATION: 15.247(d)

Power density limit is stated as +8 dBm.

Test data is presented in the following files:

Handset : hanpd1.jpg ; hanpd2.jpg ; hanpd3.jpg ; hanpd4.jpg ; hanpd5.jpg ; hanpd6.jpg ; hanpd7.jpg ; hanpd7.jpg

Base : baspd1.jpg ; baspd2.jpg ; baspd3.jpg ; baspd4.jpg ; baspd5.jpg ; baspd6.jpg

The largest value found within a 3 kHz bandwidth for either the Handset or Base units of the EUT were found to be:

For the handset : -33.83 dBm + 24.00 dB = -9.83dBm or 97.17 dBµV/m.
For the base : -30.50 dBm + 24.00 dB = -6.5 dBm or 100.50 dBµV/m.

(Note: were 24.00 dB is AF for the Log Periodic antenna used.)

< Solving the above for power output using the equation: $P = \frac{(E \cdot d)^2}{30G}$

SUBJECT: Conducted Emissions
Neutral Side
FCC Part 15, Subpart C
Intentional Radiator

MET REPORT: EMI9386
MFG: CIDCO
TESTED BY: Ken Bass
TEST DATE(S): 17 JUL 98

EUT: CIDCO Wireless LAN Station Unit
MODEL: CL980

TECHNICAL SPECIFICATION:

Equipment meets the specifications of Part 15.107(a)

Plots for the following line conducted emissions appear in file: bcen.jpg

SUMMARY — 3 Worst-Case Emissions

Frequency (MHZ)	Quasi-Peak Level (dBµV)	Limit (dBµV)
0..970	30.68	47.95
17.52	15.77	47.95
0.820	37.45	47.95

SUBJECT: Conducted Emissions
Phase Side
FCC Part 15, Subpart C
Intentional Radiator
EUT: CIDCO
MODEL: CL980

MET REPORT: EMI9386
MFG: CIDCO
TESTED BY: Ken Bass
TEST DATE(S): 17 JUL 98

TECHNICAL SPECIFICATION: 15.107(a)

LIMITS: 0.45 - 1.705 MHZ : 250 µV (47.9 dBµV)

Equipment meets the specifications of Part 15.107(a)

Plots for the following line conducted emissions appear in file: bcep.jpg

SUMMARY — 3 Worst-Case Emissions

Frequency (MHZ)	Level (dBµV)	Limit (dBµV)
0.970	30.54	47.95
17.29	15.98	47.95
0.820	29.98	47.95

SUBJECT: Radiated Emissions below 1 GHz FCC Part 15 Intentional Radiator

MET REPORT: EMI9386
MFG: CIDCO
TESTED BY: Ken Bass
TEST DATE(S): 16 JUL 1998

EUT: CIDCO
MODEL: CL 980
TECHNICAL SPECIFICATION: 15.209(a)
Base emissions:

FREQUENCY (MHz)	EUT AZIMUTH (Degrees)	ANTENNA		UNCORRD READING (dBµV)	CBL LOSS (dB)	ANTENNA FACTOR (dB/m)	FIELD STRENGTH	
		POL (H/V)	HGT (m)				Corr Level (dBµV/m)	Limit (dBµV/m)
307.21	180	H	1.0	22.5	3.50	14.90	40.9	46.0
307.21	180	V	1.5	19.0	3.5	13.9	36.4	46.0
316.82	120	H	1.0	19.9	3.50	16.00	39.4	46.0
316.82	200	V	1.5	20.8	3.5	15.8	40.1	46.0
326.41	180	H	1.0	23.7	3.80	16.10	43.1	46.0
326.41	210	V	2.0	19.8	3.8	15.6	39.2	46.0
345.61	90	H	1.0	20.4	3.80	17.70	41.9	46.0
345.61	180	V	1.0	17.9	3.8	17.5	39.2	46.0
355.21	120	H	1.0	21.4	3.80	17.70	42.9	46.0
355.21	180	V	1.5	13.5	3.8	17.5	38.5	46.0
364.81	180	H	1.0	20.8		17.30	41.9	46.0
364.81	190	V	1.5	13.5		17.60	34.9	46.0

SUBJECT: Radiated Emissions below 1 GHz FCC Part 15 Intentional Radiator
MET REPORT: EMI9386
MFG: CIDCO
TESTED BY: Ken Bass
TEST DATE(S): 17 JUL 98
EUT: CIDCO
MODEL: CL980
TECHNICAL SPECIFICATION: 15.209(a)
Handset emissions:

FREQUENCY (MHz)	EUT AZIMUTH (Degrees)	ANTENNA		UNCORRD READING (dBµV)	CBL LOSS (dB)	ANTENNA FACTOR (dB/m)	FIELD STRENGTH	
		POL (H/V)	HGT (m)				Corr Level (dBµV/m)	Limit (dBµV/m)
432.00	270	H	1.5	16.4	4.50	18.30	39.2	46.0
4332.00	0	V	1.0	16.1	4.5	18.4	39.00	46.0
566.40	90	H	1.0	20.1	5.00	19.50	44.5	46.0
566.40	0	V	1.0	19.40	5.0	19.2	43.6	46.0
595.00	90	H	1.0	17.5	5.00	19.20	41.8	46.0
595.00	0	V	1.0	14.02	5.0	19.2	38.22	46.0
288.00	45	H	1.0	12.0	3.00	14.80	29.8	46.0
288.00	45	V	1.0	15.06	3.0	13.8	31.86	46.0
307.20	0	H	1.0	13.0	3.00	16.00	31.0	46.0
307.20	0	V	1.0	14.77	3.0	15.8	33.57	46.0
365.00	270	H	1.0	12.6	3.50	17.30	33.4	46.0
365.00	270	V	1.0	15.3	3.50	17.40	36.2	46.0