

# **Alford Industries Limited**

Application  
For  
Certification  
**(FCC ID: LPV-STF990)**

Transmitter

WO# 9913333  
DY/kl  
January 13, 2000

- The test results reported in this report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report shall not be reproduced except in full without prior authorization from Intertek Testing Services Hong Kong Limited

FCC ID : LPV-STF990

**Intertek Testing Services Hong Kong Ltd.**  
2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.  
Telephone (852) 2173 8888 Fax (852) 2785 5487

---

---

# INTERTEK TESTING SERVICES

---

---

## LIST OF EXHIBITS

### *INTRODUCTION*

<i>EXHIBIT 1:</i>	General Description
<i>EXHIBIT 2:</i>	System Test Configuration
<i>EXHIBIT 3:</i>	Emission Results
<i>EXHIBIT 4:</i>	Equipment Photographs
<i>EXHIBIT 5:</i>	Product Labelling
<i>EXHIBIT 6:</i>	Technical Specifications
<i>EXHIBIT 7:</i>	Instruction Manual
<i>EXHIBIT 8:</i>	Miscellaneous Information

---

---

**INTERTEK TESTING SERVICES**

---

---

**MEASUREMENT/TECHNICAL REPORT**

**Alford Industries Limited - MODEL: Cyber Lab STF990  
FCC ID: LPV-STF990**

**January 13, 2000**

This report concerns (check one:)	Original Grant <input checked="" type="checkbox"/>	Class II Change <input type="checkbox"/>
Equipment Type: <u>Low Power Transmitter</u> (example: computer, printer, modem, etc.)		
<hr/>		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If yes, defer until: _____ date	
Company Name agrees to notify the Commission by: _____ date		
of the intended date of announcement of the product so that the grant can be issued on that date.		
Transition Rules Request per 15.37?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-1-96 Edition] provision.		
<hr/>		
Report prepared by:	Daniel Yau Intertek Testing Services 2/F., Garment Center, 576, Castle Peak Road, HONG KONG Phone: 852-2173-8542 Fax: 852-2371-0914	

---

---

# INTERTEK TESTING SERVICES

---

---

## Table of Contents

1.0 <b><u>General Description</u></b> .....	2
1.1 Product Description.....	2
1.2 Related Submittal(s) Grants .....	2
1.3 Test Methodology .....	3
1.4 Test Facility.....	3
2.0 <b><u>System Test Configuration</u></b> .....	5
2.1 Justification .....	5
2.2 EUT Exercising Software.....	5
2.3 Special Accessories .....	5
2.4 Equipment Modification .....	6
2.5 Support Equipment List and Description.....	6
3.0 <b><u>Emission Results</u></b> .....	8
3.1 Field Strength Calculation .....	9
3.1 Field Strength Calculation (cont).....	10
3.2 Radiated Emission Configuration Photograph.....	11
3.3 Radiated Emission Data .....	12
3.4 Line Conducted Configuration Photograph (cont) .....	14
3.5 Line Conducted Emission Data.....	16
4.0 <b><u>Equipment Photographs</u></b> .....	18
5.0 <b><u>Product Labelling</u></b> .....	20
6.0 <b><u>Technical Specifications</u></b> .....	22
7.0 <b><u>Instruction Manual</u></b> .....	24
8.0 <b><u>Miscellaneous Information</u></b> .....	26
8.1 Measured Bandwidth .....	27
8.2 Discussion of Pulse Desensitization .....	28
8.3 Calculation of Average Factor.....	29
8.4 Emissions Test Procedures .....	31
8.4 Emissions Test Procedures (cont'd).....	31

---

## INTERTEK TESTING SERVICES

---

List of attached file

Exhibit type	File Description	filename
Cover Letter	Letter of Agency	letter.pdf
Test Report	Test Report	report.doc
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	radiated1.jpg, radiated2.jpg
Test Setup Photo	Conducted Emission	conduct1.jpg, conduct2.jpg, conduct3.jpg
Test Report	Conducted Emission Test Result	conduct.pdf
Test Report	Bandwidth Plot	bw.pdf
External Photo	External Photo	ophoto1.jpg, ophoto2.jpg, ophoto3.jpg.
Internal Photo	Internal Photo	iphoto1.jpg, iphoto2.jpg,
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 1**

**GENERAL DESCRIPTION**

# INTERTEK TESTING SERVICES

---

## 1.0 General Description

### 1.1 Product Description

The equipment under test (EUT) is a transmitter operating at 49.860 MHz. The EUT is powered by a AC120V to DC6V adaptor. Turn on the EUT, then feed the audio source, such as cassette player, to the connector at the back of the EUT. The audio signal will be frequency modulated to RF signal, and then transmit to the receiver.

The brief circuit description of the transmitter portion is saved with filename :descri.pdf.

### 1.2 Related Submittal(s) Grants

This is a single application for certification of a transmitter. **The FCC ID of receiver for this transmitter is LPV-SRF990, and has been filed at the same time as this application.**

## INTERTEK TESTING SERVICES

---

### 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated emission and Conducted Emission measurements were performed in Open Area Test Sites and shield room respectively. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. For each scan, the procedure for maximizing emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

### 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the emission data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 2**

**SYSTEM TEST CONFIGURATION**

## **INTERTEK TESTING SERVICES**

---

### **2.0 System Test Configuration**

#### **2.1 Justification**

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (1992.)

The EUT was powered by AC120V to DC6V adaptor.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was placed in the center of the turntable.

For simplicity of testing, the unit was wired to transmit continuously.

#### **2.2 EUT Exercising Software**

There was no special software to exercise the device. Once the button is depressed, the unit transmits the typical signal.

#### **2.3 Special Accessories**

There are no special accessories necessary for compliance of this product.

---

## INTERTEK TESTING SERVICES

---

### 2.4 Equipment Modification

Any modifications installed previous to testing by Alford Industries Limited will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

### 2.5 Support Equipment List and Description

All the items listed under section 2.0 of this report are

*Confirmed by:*

*Daniel Yau  
Technical Manager  
Intertek Testing Services  
Agent for Alford Industries Limited*



\_\_\_\_\_  
Signature

\_\_\_\_\_  
January 13, 2000

\_\_\_\_\_  
Date

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 3**

**EMISSION RESULTS**

## INTERTEK TESTING SERVICES

---

### 3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

---

## INTERTEK TESTING SERVICES

---

### 3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

where FS = Field Strength in dB $\mu$ V/m

RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

## INTERTEK TESTING SERVICES

---

### 3.1 Field Strength Calculation (cont'd)

#### Example

Assume a receiver reading of 62.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0 \text{ dB}$$

$$AV = -10 \text{ dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m}$$

$$\text{Level in mV/m} = \text{Common Antilogarithm} [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

## INTERTEK TESTING SERVICES

---

### 3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission

249.330 MHz

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated1.jpg and radiated2.jpg.

## INTERTEK TESTING SERVICES

---

### 3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 1.8 dB margin

#### ***TEST PERSONNEL:***



---

*Signature*

Prudence S. M. Poon, Compliance Engineer  
*Typed/Printed Name*

January 13, 2000  
*Date*

---

---

## INTERTEK TESTING SERVICES

---

---

Company: Alford Industries Limited  
Model: Cyber Lab STF990

Date of Test: January 4, 2000

Table 1

### Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB $\mu$ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	49.867	128.8	11	16	64.8	80.0	-15.2
V	51.200	55.7	11	16	31.7	40.0	-8.3
H	99.734	57.7	11	16	30.2	43.5	-13.3
H	149.601	56.4	13	16	28.9	43.5	-14.6
H	199.468	68.3	16	16	40.8	43.5	-2.7
H	*249.33	74.2	20	16	44.2	46.0	-1.8
H	299.197	68.8	22	16	38.8	46.0	-7.2
H	349.064	64.8	24	16	34.8	46.0	-11.2
H	398.931	68.2	25	16	38.2	46.0	-7.8
H	448.798	62.6	26	16	32.6	46.0	-13.4
H	498.665	62.0	26	16	32.0	46.0	-14.0

- Notes:
1. Peak Detector Data unless otherwise stated.
  2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna and average detector are used for the emission over 1000MHz.
- \*Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Prudence S. M. Poon

## INTERTEK TESTING SERVICES

---

### 3.4 Line Conducted Configuration Photograph

#### Worst Case Line-Conducted Configuration

For electronic filing, the worst case line-conducted configuration photographs are saved with filename: conduct1.jpg, conduct2.jpg and conduct3.jpg.

## **INTERTEK TESTING SERVICES**

---

Company: Alford Industries Limited  
Model: Cyber Lab STF990

Date of Test: January 4, 2000

### **Conducted Emissions Section 15.107 Requirements**

For electronic filing, the conducted emission test result is saved with filename: conduct.pdf

## INTERTEK TESTING SERVICES

---

### 3.5 Line Conducted Emission Configuration Data

The data on the following pages list the significant emission frequencies, the limit, and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by below 20 dB margin

\* All readings are peak unless stated otherwise.

#### ***TEST PERSONNEL:***



---

*Signature*

Prudence S. M. Poon, Compliance Engineer  
*Typed/Printed Name*

January 13, 2000  
*Date*

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 4**

**EQUIPMENT PHOTOGRAPHS**

## INTERTEK TESTING SERVICES

---

### 4.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: ophoto1.jpg to ophoto3.jpg and iphoto1.jpg to iphoto2.jpg

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 5**

**PRODUCT LABELLING**

## INTERTEK TESTING SERVICES

---

### 5.0 **Product Labelling**

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 6**

**TECHNICAL SPECIFICATIONS**

## INTERTEK TESTING SERVICES

---

### 6.0 Technical Specifications

For electronic filing, the block diagram and schematics are saved with filename: block.pdf and circuit.pdf respectively.

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 7**

**INSTRUCTION MANUAL**

## INTERTEK TESTING SERVICES

---

### 7.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf

This manual will be provided to the end-user with each unit sold/leased in the United States.

**INTERTEK TESTING SERVICES**

---

**EXHIBIT 8**

**MISCELLANEOUS INFORMATION**

## INTERTEK TESTING SERVICES

---

### 8.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandwidth, the test procedure and calculation of factors such as pulse desensitization and averaging factor.

## INTERTEK TESTING SERVICES

---

### 8.1 Measured Bandwidth

The plot on saved in bw.pdf shows the fundamental emission when modulated. From the plot, it shows the emission is at the least 28.42 dB below the carrier level at the band edge. The unit meets the FCC bandwidth requirements.

Figure 8.1 Bandwidth

## INTERTEK TESTING SERVICES

---

### 8.2 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF*.

Pulse desensitivity was not applicable for this device. Since the transmitted frequency is a continue signal.

## INTERTEK TESTING SERVICES

---

### 8.3 Calculation of Average Factor

The average factor is not applicable for this device as the transmitted signal is a continue signal.

---

## INTERTEK TESTING SERVICES

---

### 8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 1992.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 450 kHz to 30 MHz.

---

## INTERTEK TESTING SERVICES

---

### 8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.4 - 1992.

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.2). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.