



# 300VMF+

## Commercial Video Modulator

(For use in NTSC systems)

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# INSTRUCTION MANUAL

## 2 Caution Statements

### IMPORTANT SAFEGUARDS



This symbol is intended to alert the user to the presence of non-insulated “dangerous voltage” within the product’s enclosure, that may be of sufficient magnitude to constitute a risk of electric shock to persons.



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



#### CAUTION

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE



#### CAUTION

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK) NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.

#### WARNING:

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.

#### CAUTION:

Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

#### ATTENTION:

POUR PREVENIR LES CHOCS ELECTRIQUES, NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR, UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

## IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.



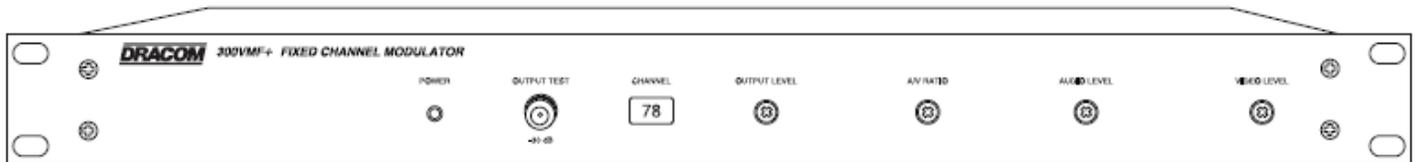
13. Unplug the apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

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## DESCRIPTION

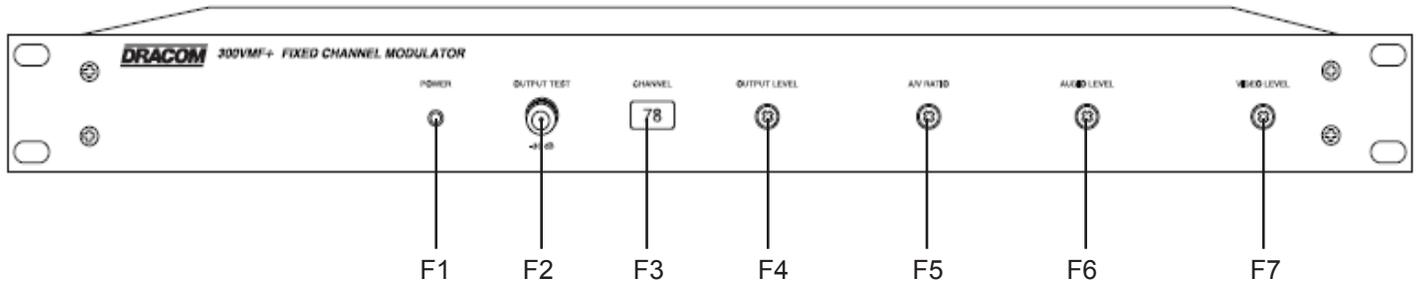


The DRACOM 300VMF+ Video Modulator is a vestigial sideband heterodyne audio/video modulator that provides a modulated visual and aural RF carrier output on any single EIA standard channel from channel 2 through channel 78 plus channels 95 to 99. This range covers 54 through 552 MHz. Consult factory for custom channels. All aeronautical channels are offset positive with a tolerance of  $\pm 5$  kHz as required by FCC rules. The 300VMF+ is designed to accept video and audio baseband signals from a satellite receiver, TV camera, video tape recorder, TV demodulator or similar equipment. The heterodyne conversion system, in conjunction with the use of a SAW filter, insures optimum vestigial selectivity for adjacent channel headends. The modulator accepts standard (sync negative) polarity video at a 0.7 -1.5 Vpp level. All level controls are located on the front panel for ease of operation.

## SPECIFICATIONS

RF	VIDEO
Frequency Range: 54 - 552 MHz.	Input level for 87.5% Modulation: 1 Vp-p $\pm 3$ dB, manual gain adjust with front panel control.
Channels Available: <b>Factory-ordered for a single channel:</b> EIA CATV channels 2 to 78 and 95 to 99.	Input Impedance: 75 Ohms, return loss of 18 dB minimum.
FCC Frequency Offsets: All aeronautical channels offset positive with a tolerance of $\pm 5$ kHz.	Frequency Response: Flat $\pm 2$ dB from 30 Hz to 4.2 MHz.
Output Level: +55 dBmV, (typically adjustable from +43 to +55 dBmV).	Video S/N: 60 dB, luminance weighted.
Output Impedance: 75 OHMS, return loss of 14 dB, nominal.	L/C Delay: Within 50 nSec of 0 nSec L/C delay (complies with FCC rules, 76.605).
Output Test: -30 dB, $\pm 3$ dB (referenced to RF OUTPUT level).	Differential Gain: Less than $\pm 5\%$ (10 to 90% APL).
A/V Ratio: Audio Carrier -20 to -12 dB referenced to video carrier, adjustable.	Differential Phase: Less than $\pm 5$ degrees (10 to 90% APL).
Frequency Stability, Visual: Within $\pm 10$ kHz of assigned channel frequency; $\pm 5$ kHz on FCC offset channels.	<b>AUDIO</b>
Aural Inter-carrier Frequency: 4.5 MHz, $\pm 5$ kHz.	Input Level for 25 kHz Peak Deviation: 175 mV rms minimum. Manual gain adjustment with front panel control.
Spurious Outputs: -60 dBc minimum, measured at -15 dB A/V ratio and with modulator output level of +55 dBmV.	Input Impedance: 10K Ohms, unbalanced.
In-Channel C/N: Better than 60 dB.	Pre-emphasis: 75 mSec. (flat by moving internal jumper)
Broadband Noise: -95 dBc @ $\pm 30$ MHz or greater spacings. (Specified levels are referenced to the video carrier and measured in a 4 MHz bandwidth).	Frequency Response: 40 Hz to 15 kHz, $\pm 1.5$ dB, referenced to 75 mSec pre-emphasis curve.
	4.5 MHz Inter-carrier Stability: Within $\pm 5$ kHz, 00 C to +500 C.
	Total Harmonic Distortion: 1.5% maximum.
	Hum and Noise: -60 dB minimum, referenced to 25 kHz peak deviation.
	<b>GENERAL</b>
	Modulator Power Requirement: 115 VAC $\pm 10\%$ , 60Hz, 10 Watts.
	Auxiliary AC Outlet: Nominal 120 VAC, 600 Watts, maximum.
	Total AC Power Input: Nominal 120 VAC 60 Hz, 610 Watts, maximum.
	Operating Temperature Range: 0 C to +50 C, ambient.
	Size: 19" W x 1.75" H x 4.0" D.
	Weight: 3.6 lbs.
	Connectors: Video input, Audio input, RF output, and Monitor output are all type F.

## 4 Front Panel Description



### F1 - POWER Indicator

Lights when the unit is connected to a source of AC power.

### F2 - OUTPUT TEST Connector

Provides a reduced level sample of the RF output signal. The level at this connector is approximately 30 dB lower in level than the RF OUTPUT signal. It is used to monitor the active signal without affecting the level or quality of the RF output signal.

### F3 - CHANNEL Designation

The label indicates the fixed channel output for your particular model. The 300VMF+ is capable of fixed channel output (factory tuned) within the following ranges: Channel 2 through 78 and 95 through 99.

### F4 - RF OUTPUT LEVEL

This screwdriver adjustment permits decreasing the RF output level a minimum of 12 dB below its specified output level as the control is rotated counterclockwise. The maximum output level of +55 dBmV is set with the adjustment approximately fully clockwise.

NOTE: If an output level of less than +43 dBmV is required, add an attenuator of the appropriate value at the modulator output.

Example: For an output level of +35 dBmV, add a 12 dB attenuator pad to the modulator output and set the output level to +47 dBmV.

### F5 - A/V RATIO Control

This screwdriver adjustment varies the level of the aural carrier over a range from 12 to 20 dB below the visual carrier. The aural carrier should normally be adjusted to approximately 15 dB below the visual carrier (normal operation). Clockwise rotation increases the aural carrier level and thus decreases the A/V ratio.

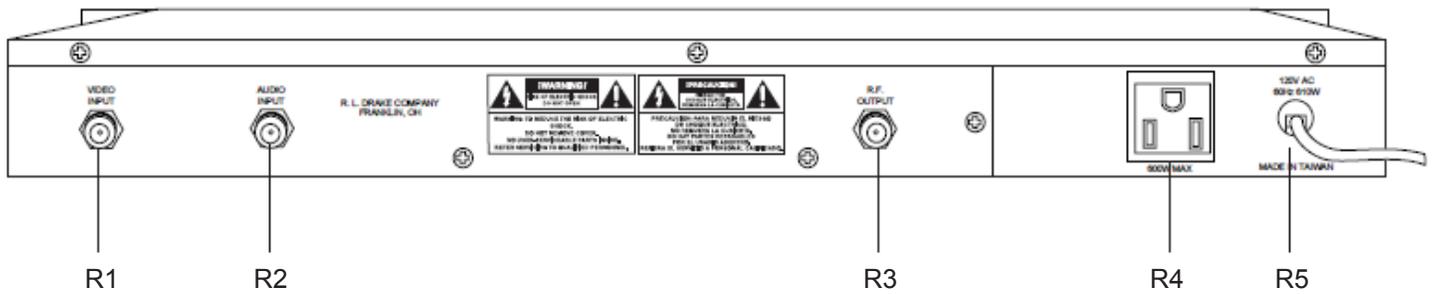
### F6 - AUDIO LEVEL Control

The setting of this screwdriver adjustment determines the peak aural carrier deviation. Clockwise rotation increases the carrier deviation. After installing the unit, and with an audio source connected, adjust the AUDIO LEVEL control for 25 kHz deviation. If an audio modulation meter is not available, use a TV set and adjust for equal volume as compared to a known off-air broadcast. Monitor for a few minutes to assure that maximum volume of the audio source program does not cause an over-modulation condition.

### F7 - VIDEO LEVEL Control

The setting of this screwdriver adjustment determines the video modulation level. Clockwise rotation increases the modulation depth. After installing the unit, and with a nominal 1 Volt P-P video source connected, adjust the VIDEO LEVEL control for the correct percentage of modulation (87.5%). If test equipment is not available for such measurements, then adjust for proper picture contrast when viewed on a TV set (compare with known off-air broadcast picture quality).

# Rear Panel Description and Internal Jumper 5



## R1 - VIDEO INPUT Connector

This is the baseband video input to the IF circuits. This input accepts baseband through 4.2 MHz video at levels from 0.7 V<sub>p-p</sub> to 1.5 V<sub>p-p</sub>

## R2 - AUDIO INPUT Connector

This is an unbalanced audio input to the IF circuits. This input accepts 40 Hz through 15 kHz audio at a nominal level of 250 mV RMS (approximately -10 dBu). If a separate BTSC stereo encoder, such as the Drake MMTS20, is to be used with this modulator, this jack can input 40 Hz through over 50 kHz with flat response if internal jumper J8 is set to flat - see below)

## R3 - RF OUTPUT

This is the modulator output.

## R4 - AC OUTLET Receptacle

This is a power receptacle for other equipment and is rated at 600 W maximum; 120 V, 5 Amp. This receptacle is unfused and unswitched.

## R5 - LINE CORD

This is a three-wire power cable. When the cable is connected to a properly wired AC power line outlet, this cable grounds the instrument cabinet. Connect to a 115 VAC  $\pm 10\%$ , 60 Hz source. Do not defeat the safety purpose of the attached line cord plug.

## INTERNAL JUMPER SETTING - AUDIO RESPONSE

Internal jumper J8 may be used to disable the 75 uSec pre-emphasis (normal setting). Flat response may be chosen if an external BTSC stereo signal is to be input to the modulator through the audio input jack. To access this jumper, disconnect the unit from AC power. Remove the three screws holding the top cover of the chassis in place. Remove top cover. J8 is a three pin header with J8 printed on the PCB. After setting this jumper, reinstall the cover before returning power to the unit.

NORMAL RESPONSE of 75 uSec = Jumper in the 1-2 position (shorting pins 1 and 2 of the J8 header). Use this setting for normal mono audio input. This is the factory default setting.

FLAT RESPONSE = Jumper in the 2-3 position (shorting pins 2 and 3 of header J8). Change to this setting when an external BTSC stereo encoder is used with the 300VMF+.

# 6 Installation

## CONNECTIONS AND CONTROLS

All connections to and from the 300VMF+ are made through the rear panel. Figure 4 shows a typical two channel installation using a typical satellite receiver as a signal source. Additional channels can be added by using additional 300VMF+ modulators and either multi-port combiners or combinations of two-port combiners.

## INSTALLATION NOTES

Level adjustment provides optimum performance in multichannel installations. The modulator outputs should be checked periodically with a spectrum analyzer to maintain a  $\pm 1$  dB variation of adjacent channel carriers. Aural/Visual (A/V) ratios should be held to -15 dB or less.

The 'RF Output Level' and 'A/V Ratio' controls are used respectively to make these adjustments. If an output level of less than +43 dBmV is required, add an attenuator of the appropriate value to the modulator output.

**Example:** For an output level of +35 dBmV, add a 12 dB attenuator pad to the modulator output and set the output level.

## RACK MOUNTING

Adequate ventilation is very important in multichannel installations. Units should be spaced apart by at least one panel height wherever possible, and some air movement is advisable in enclosed rack cabinets. Excessive heat will shorten component life and modulator performance will be degraded without proper cooling.

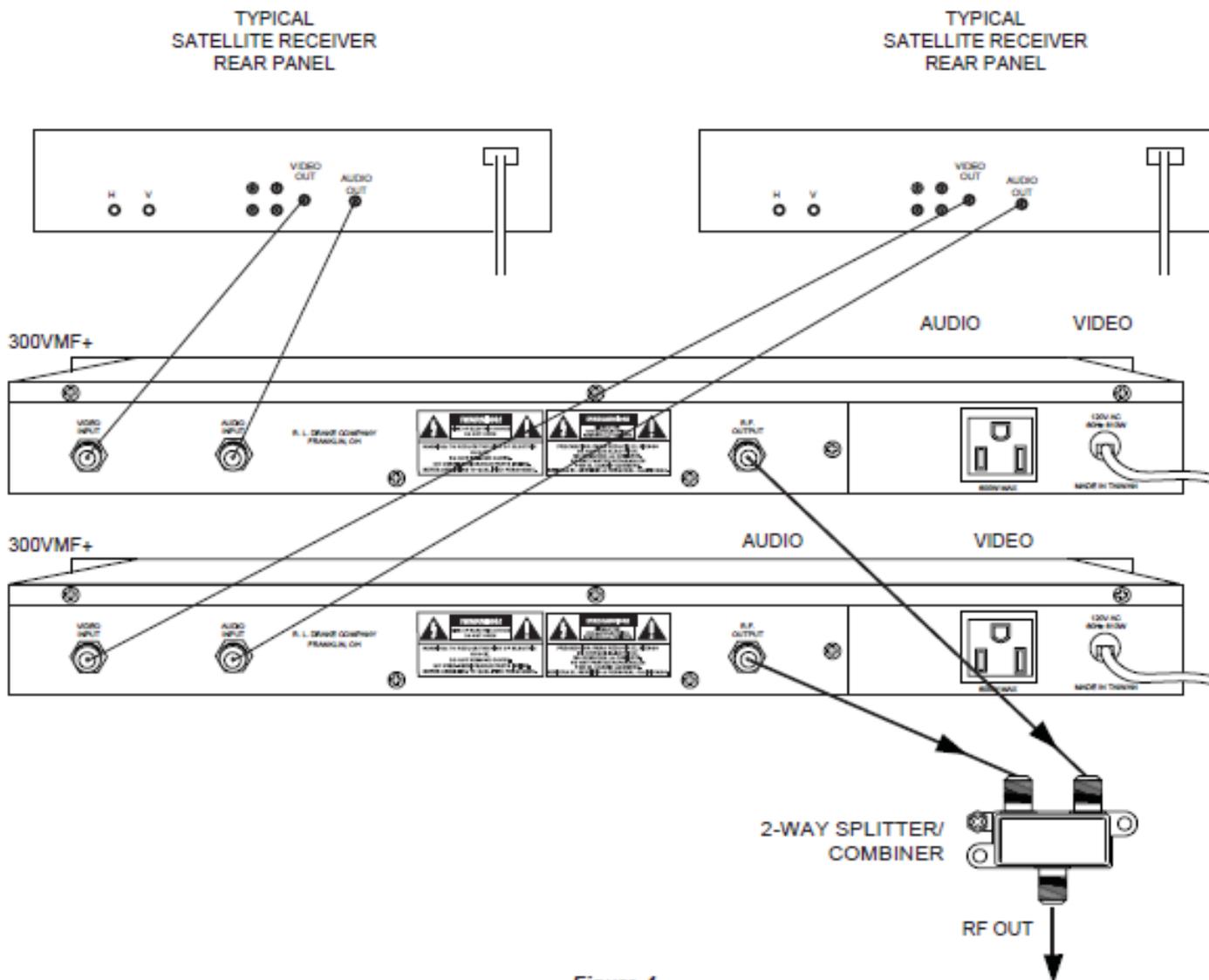


Figure 4  
TYPICAL MULTIPLE MODULATOR INSTALLATION

# Frequency Allocation Charts 7

Table 1 CHANNEL ASSIGNMENTS

EIA Channel	Visual Carrier MHz	Offset kHz	EIA Channel	Visual Carrier MHz	Offset kHz
02	55.25	NONE	44	343.25	±12.5
03	61.25	NONE	45	349.25	±12.5
04	67.25	NONE	46	355.25	±12.5
05	77.25	NONE	47	361.25	±12.5
06	83.25	NONE	48	367.25	±12.5
07	175.25	NONE	49	373.25	±12.5
08	181.25	NONE	50	379.25	±12.5
09	187.25	NONE	51	385.25	±12.5
10	193.25	NONE	52	391.25	±12.5
11	199.25	NONE	53	397.25	±12.5
12	205.25	NONE	54	403.25	NONE
13	211.25	NONE	55	409.25	NONE
14	121.25	±12.5	56	415.25	NONE
15	127.25	±12.5	57	421.25	NONE
16	133.25	±12.5	58	427.25	NONE
17	139.25	NONE	59	433.25	NONE
18	145.25	NONE	60	439.25	NONE
19	151.25	NONE	61	445.25	NONE
20	157.25	NONE	62	451.25	NONE
21	163.25	NONE	63	457.25	NONE
22	169.25	NONE	64	463.25	NONE
23	217.25	NONE	65	469.25	NONE
24	223.25	±12.5	66	475.25	NONE
25	229.25	±12.5	67	481.25	NONE
26	235.25	±12.5	68	487.25	NONE
27	241.25	±12.5	69	493.25	NONE
28	247.25	±12.5	70	499.25	NONE
29	253.25	±12.5	71	505.25	NONE
30	259.25	±12.5	72	511.25	NONE
31	265.25	±12.5	73	517.25	NONE
32	271.25	±12.5	74	523.25	NONE
33	277.25	±12.5	75	529.25	NONE
34	283.25	±12.5	76	535.25	NONE
35	289.25	±12.5	77	541.25	NONE
36	295.25	±12.5	78	547.25	NONE
37	301.25	±12.5	95	91.25	NONE
38	307.25	±12.5	96	97.25	NONE
39	313.25	±12.5	97	103.25	NONE
40	319.25	±12.5	98	109.25	±25
41	325.25	±12.5	99	115.25	±25
42	331.25	±25			
43	337.25	±12.5			

## 8 Service / If You Need To Call For Help

### SERVICE INFORMATION

You may contact the R.L. DRAKE HOLDINGS, LLC Service Department for additional information or assistance by calling:

+1 (937) 746-6990

Monday through Friday  
8:00 A.M. to 4:00 P.M. EST, except on holidays.

You may also contact the R.L. DRAKE HOLDINGS, LLC Service Department by E-mail at the following address:

servicehelp@rldrake.com

or by Telefax:

+1 (937) 806-1510.

Should you want to return your unit for service, package the unit carefully using the original carton or other suitable container.

Write your return address clearly on the shipping carton and on an enclosed cover letter describing the service required, symptoms or problems. Also include your daytime telephone number and a copy of your proof of purchase.

The unit will be serviced under the terms of the R.L. DRAKE HOLDINGS, LLC Limited Warranty and returned to you.

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### IF YOU NEED TO CALL FOR HELP

Call our Customer Service/Technical Support line a +1 (937) 746-6990 between 8:00 A.M. and 4:00 P.M. Eastern Time, weekdays. Please have the unit's serial number available. We will also need to know the specifics of any other equipment connected to the unit.

When calling, please have the unit up and running, near the phone if possible. Our technician(s) will likely ask certain questions to aid in diagnosis of the problem. Also, have a voltmeter handy, if possible.

R.L. DRAKE also provides technical assistance by e-mail:

servicehelp@rldrake.com

or by Telefax:

+1 (937) 806-1510.

Many of the products that are sent to us for repair are in perfect working order when we receive them. For these units, there is a standard checkout fee that you will be charged. Please perform whatever steps are applicable from the installation sections of the Owner's Manual before calling or writing—this could save unnecessary phone charges. Please do not return the unit without contacting R.L. DRAKE first: it is preferred to help troubleshoot the problem over the phone (or by mail) first, saving you both time and money.

Inside the carton, enclose a note with your name, address, daytime phone number, and a description of the unit's problem.

The unit must be sent to the following address:

Service Department  
R.L. DRAKE HOLDINGS, LLC  
9900 Springboro Pike  
Miamisburg, OH 45342 U.S.A.

Be sure to include your street address which will be needed for UPS return.

UPS Surface (Brown Label) takes 7-10 days to reach us depending on your location.  
Blue takes 2-3 days.

Red is an overnight service.

Send the unit in a way that it can be traced if we can't verify receipt of shipment. We suggest UPS or insured postal shipment.

If the unit is still under the original owner's warranty, R.L. DRAKE will pay the cost of the return shipment to you. Our return shipping policy is that we will return it UPS Brown if received Brown or by US Mail, it will be returned Blue if received Blue or Red—or it will be returned however you prefer if you furnish the return cost for the method you select.

If the unit is out of warranty, use one of the following methods for return shipment:

- 1) You designate billing to American ExPress, VISA, MasterCard or Discover card;
- 2) You prepay the service charges with a personal check,  
or
- 3) You specify some other method of return and payment.

When calling, the technician can estimate the repair charges for you over the phone. This is another good reason to call before sending a unit in for repair. Typically, equipment is repaired in five to ten working days after it arrives at DRAKE if we have all the facts. If we must call you, it may take longer. R.L. DRAKE HOLDINGS, LLC is not responsible for damage caused by lightning, non-professional alterations, "acts of God", shipping damage, poor storage/handling, etc. DRAKE will make note of any shipping damage upon receipt. You will need to send proof of purchase to receive warranty service. Typically, a copy of the invoice from a DRAKE dealer will suffice. The warranty is for the original owner only and is not transferable.

## ***One Year Limited Warranty***

R.L. DRAKE HOLDINGS LLC warrants to the original purchaser this product shall be free from defects in material or workmanship for one (1) year from the date of original purchase.

During the warranty period R.L. DRAKE HOLDINGS LLC or an authorized Drake service facility will provide, free of charge, both parts and labor necessary to correct defects in material and workmanship. At its option, R.L. DRAKE HOLDINGS LLC may replace a defective unit.

To obtain such a warranty service, the original purchaser must:

1. Retain invoice or original proof of purchase to establish the start of the warranty period.
2. Notify R.L. DRAKE HOLDINGS LLC or the nearest authorized service facility, as soon as possible after discovery of a possible defect, of:
  - a) the model and serial number,
  - b) the identity of the seller and the approximate date of purchase; and
  - c) A detailed description of the problem, including details on the electrical connection to associated equipment and the list of such equipment.
3. Deliver the product to R.L. DRAKE HOLDINGS LLC or the nearest authorized service facility, or ship the same in its original container or equivalent, fully insured and shipping charges prepaid.

Correct maintenance, repair, and use are important to obtain proper performance from this product. Therefore carefully read the Instruction Manual. This warranty does not apply to any defect that R.L. DRAKE HOLDINGS LLC determines is due to:

1. Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specifications of the original parts.
2. Misuse, abuse, neglect or improper installation.
3. Accidental or intentional damage.

All implied warranties, if any, including warranties of merchantability and fitness for a particular purpose, terminate one (1) years from the date of the original purchase.

The foregoing constitutes R.L. DRAKE HOLDINGS LLC'S entire obligation with respect to this product, and the original purchaser shall have no other remedy and no claim for incidental or consequential damages, losses or expenses. Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusions or limitation of incidental or consequential damages, so the above limitation and exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state. This warranty shall be construed under the laws of Ohio.

For Service, contact:

R.L. DRAKE HOLDINGS LLC  
9900 Springboro Pike  
Miamisburg, Ohio 45342. USA  
Customer Service and Parts Telephone: +1 (937) 746-6990  
Telefax: +1 (937) 806-1510  
Web Site: <http://www.rldrake.com>



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Telefax: +1 (937) 806-1510  
[www.rldrake.com](http://www.rldrake.com)*