





HCP2550A
Commercial Heterodyne Channel Processor
(For use in NTSC systems)

Instruction Manual

WARNING: TO PREVENT FIRE OR ELECTRICAL SHOCK DO NOT EXPOSE TO RAIN OR MOISTURE

	CAUTION RISK OF ELECTRIC SHOCK DO NOT OPEN	
<p>CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER NO USER-SERVICEABLE PARTS INSIDE REFER SERVICING TO QUALIFIED PERSONNEL</p>		



A product and cart combination should be moved with care. Quick stops, excessive force and uneven surfaces may cause the product and cart combination to overturn.



The lightning flash with arrow head symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE.
DO NOT OPEN THE CABINET, REFER SERVICING TO QUALIFIED PERSONNEL ONLY.

CAUTION: TO PREVENT ELECTRIC SHOCK, DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

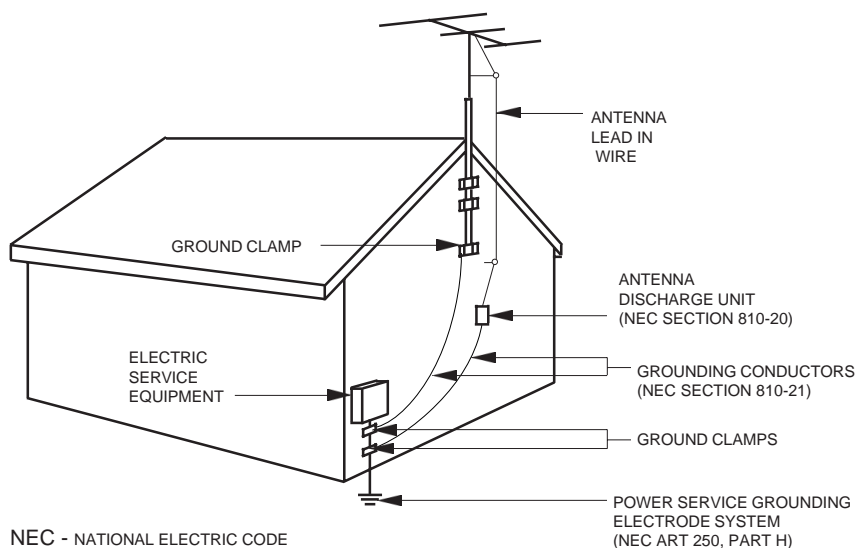
ATTENTION: POUR PREVENIR LES CHOCS ELECTRIQUES, NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR, UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

- 1. Read Instructions**—All the safety and operating instructions should be read before the product is operated.
- 2. Retain Instructions**—The safety and operating instructions should be retained for future reference.
- 3. Heed Warnings**—All warnings on the product and in the operating instructions should be adhered to.
- 4. Follow Instructions**—All operating and use instructions should be followed.
- 5. Cleaning**—Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleansers. Use a damp cloth for cleaning.
- 6. Attachments**—Do not use attachments that are not recommended by the product manufacturer as they may cause hazards.
- 7. Water and Moisture**—Do not use this product near water—for example, near a bathtub, wash bowl, kitchen sink or laundry tub; in a wet basement; or near a swimming pool; and the like.
- 8. Accessories**—Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.
- 9.** A product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart combination to overturn.
- 10. Ventilation**—Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or similar surface. This product should not be placed in a built-in installation such as bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.
- 11. Power Sources**—This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supplied to your home, consult your product dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.
- 12. Grounding or Polarization**—This product may be equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug. Alternate Warnings—If this product is equipped with a three-wire grounding-type plug, a plug having a third (grounding) pin, the plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.
 - 12a. Mise à la terre ou Polarisation**—Cet appareil est équipé avec un cordon d'alimentation à trois fils. Il est à brancher sur une prise ayant un connecteur à la terre. Assurez-vous que la connection à la terre ne manque pas.
- 13. Power-Cord Protection**—Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.

- 14. Outdoor Antenna Grounding**—If an outside antenna or cable system is connected to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Article 810 of the National Electrical Code, ANSI/NFPA 70, provides information with regard to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. See Figure A.
- 15. Lightning**—For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.
- 16. Power Lines**—An outside antenna system should not be located in the vicinity of overhead power lines, other electric light or power circuits, where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them may be fatal.
- 17. Overloading**—Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in a risk of fire or electric shock.
- 18. Object and Liquid Entry**—Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.
- 19. Servicing**—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.
- 20. Damage Requiring Service**—Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
 - a. When the power-supply cord or plug is damaged,
 - b. If liquid has been spilled, or objects have fallen into the product,
 - c. If the product has been exposed to rain or water,
 - d. If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation,
 - e. If the product has been dropped or damaged in any way, and
 - f. When the product exhibits a distinct change in performance—this indicates a need for service.
- 21. Replacement Parts**—When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutes may result in fire, electric shock or other hazards.
- 22. Safety Check**—Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
- 23. Wall or Ceiling Mounting**—The product should be mounted to a wall or ceiling only as recommended by the manufacturer.
- 24. Heat**—The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.

NOTE TO CATV SYSTEM INSTALLERS:
THIS REMINDER IS PROVIDED TO CALL THE CATV SYSTEM INSTALLER'S ATTENTION TO ARTICLE 820 - 40 OF THE NEC THAT PROVIDES GUIDELINES FOR PROPER GROUNDING AND, IN PARTICULAR, SPECIFIES THAT THE CABLE GROUND SHALL BE CONNECTED TO THE GROUNDING SYSTEM OF THE BUILDING, AS CLOSE TO THE POINT OF CABLE ENTRY AS PRACTICAL.

Figure A
Example of antenna grounding as per National Electrical Code, ANSI/NFPA 70



NEC - NATIONAL ELECTRIC CODE

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SPECIFICATIONS

INPUT SECTION

Frequency Range:	54 - 806 MHz: Off-Air TV channels 2 - 69, Standard CATV channels 2 - 125, IRC and HRC channels 1 - 125.
Input Impedance:	75 Ohms, greater than 10 dB return loss.
RF Input Level:	-20 dBmV to +25 dBmV (preamp on). -10 dBmV to +35 dBmV (preamp off).
Adjacent Channel Rejection:	Greater than 60 dB.
Noise Figure:	Less than 10 dB (preamp on).
Tuner Image Rejection:	Greater than 75 dB.
In-channel C/N:	60 dB for input levels of +15 dBmV or greater (preamp on). 60 dB for input levels of +25 dBmV or greater (preamp off).
AFC Range:	± 75 kHz minimum.
Pilot Threshold:	Typical adjustment range: -20 dBmV to +5 dBmV (preamp on). -10 dBmV to +15 dBmV (preamp off).

COMPOSITE IF LOOP

Output Level (V carrier):	+28 dBmV ±2 dB.
Spurious Outputs:	-60 dBc minimum.
Input Level (V carrier):	+28 dBmV nominal, +30 dBmV maximum.
IF Input/Output Impedance:	75 Ohms, greater than 15 dB return loss.
Isolation:	Greater than 60 dB.

OUTPUT SECTION

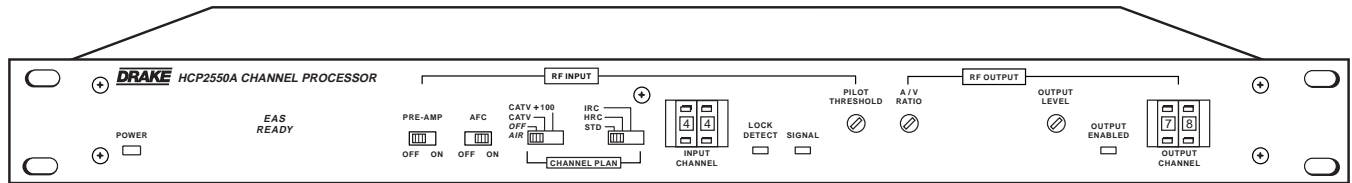
Frequency Range:	82 channels, 54 to 550 MHz; Channels 2 - 78 and 95 - 99.
Output Level:	+60 dBmV (typically adjustable from +50 to +60 dBmV).
Output Impedance:	75 Ohms, greater than 12 dB return loss.
Video Frequency Response:	20 Hz to 4.2 MHz, ±1.5 dB maximum.
L-C Delay:	±50 nSec.
Frequency Stability:	±5 PPM of output frequency (AFC on), ±5 PPM of frequency difference between input and output signals (AFC off).
FCC Offset:	Automatic (plus, minus, or none is selectable).
A/V Ratio Adjustment:	+5 dB to -12 dB typical, relative to input A/V ratio.
Spurious Outputs:	-60 dBc.
Broadband Noise:	-80 dBc (measured in a 4 MHz bandwidth at greater than ±12 MHz offset from carrier at an output level of +60 dBmV).

EAS INPUT

Input Level:	+28 dBmV nominal.
Input Impedance:	75 Ohms, greater than 15 dB return loss with this port enabled.
Auto Switching Level:	Greater than +20 dBmV, nominal.
Isolation Between Composite and EAS Inputs:	Greater than 60 dB.

GENERAL

AC Power Input:	115 VAC (±10%), 60 Hz, 30 Watts.
Operating Temperature:	0° C to +50° C, ambient.
Dimensions:	19" (481 mm) W x 1.75" (44 mm) H x 14.3" (363 mm) D.
Weight:	10 lbs. (4.6 Kg).



The R.L. Drake HCP2550A is a high quality, frequency agile channel processor capable of converting any VHF, UHF, or CATV input signal to any standard output channel between 54 and 550 MHz. Input and output frequency are easily set with front panel pushwheel switches. Selectable preamp and AFC provide stable reception of weak or out-of-tolerance signals. A/V ratio and output level controls are also provided along with IF loop-thru connections to offer exceptional flexibility.

The synthesized input tuning permits reception of Off-Air TV channels 2 through 69, standard CATV channels 2 through 125, and IRC, HRC channels 1 through 125. A selectable preamp ensures reliable reception of weak input signals. Selectable AFC ensures that out-of-tolerance cable channels, VCR modulators, or UHF translator signals will not affect the IF or RF output frequencies of the HCP2550A. A front panel indicator lights for signals that are within the AFC lock range. A selectable and adjustable threshold level control for the input signal level is also provided. An internally generated carrier is substituted for input signals below the set threshold level. A front panel signal indicator lights for input signal strengths greater than a threshold value.

The use of SAW filtering permits reliable adjacent channel operation of multiple Channel Processor and modulator units. IF loop-thru capability in the HCP2550A supplies a padded IF output prior to channel conversion.

This feature provides the capability to replace the standard internally generated IF output with an alternate source of composite IF, or allows the insertion of IF scrambling equipment.

The synthesized RF output can be set for any CATV channel 2 through 78 and 95 through 99. FCC required channel frequency offsets are automatically provided. Offsets of \pm and zero can be selected with a rear panel switch. RF output level is front panel adjustable to +60 dBmV maximum.

The output modulator section of the HCP2550A accepts Emergency Alert System (EAS) signals as required by the FCC Part 11 for many CATV systems. Either automatic or manual activation of the Emergency Alert System input is controlled by the rear panel (EAS) switch.

Coaxial connectors are provided for the RF Input, the IF Loop-out and Loop-in, and the RF Output. All of the above mentioned features, combined with a carefully designed low intermodulation output stage, provide reliable operation in a densely crowded SMATV or cable environment.

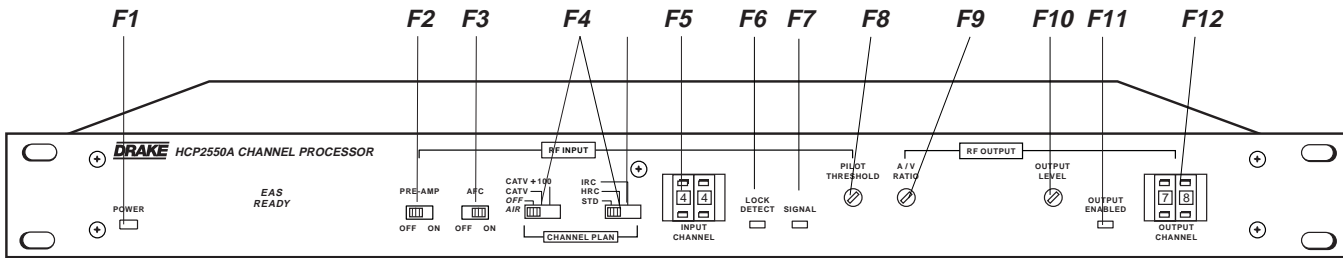


Figure 1

F1 – POWER Indicator

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

F2 – Preamp Switch

Switch to the 'ON' position to provide approximately 10 dB of low noise amplification to the input signal.

F3 – AFC Switch

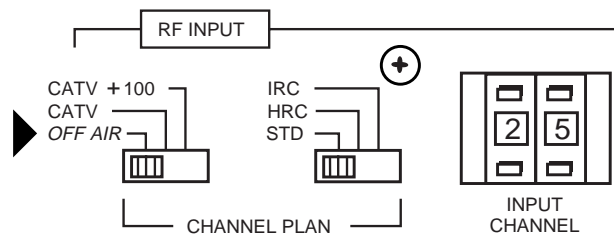
Switch to the 'ON' position to provide automatic frequency control tuning of the input signal. The input signal must be within ± 75 kHz of an assigned off-air or CATV channel for AFC capture. This feature, when activated, causes the composite IF output signal to have its visual carrier locked at 45.75 MHz. This AFC action ensures that the RF output signal of the HCP2550A will automatically remain at the assigned frequency of operation for a given channel with any required FCC offset. **It is recommended that the AFC be switched on for all input and output channel combinations, except when the output channel is set for the same channel as the input.** The 'LOCK DETECT' LED (see Item F6) will light to indicate that both input signal synthesizers are locked and the AFC function is active.

F4 – CHANNEL PLAN Switches

Sets the type of channel, Off-Air or various CATV channel plans.

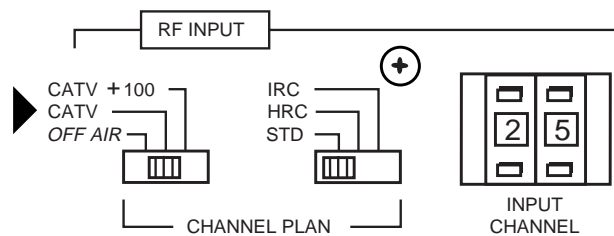
- Setting the left-hand switch for "OFF AIR" electronically locks out the right-hand switch.

OFF-AIR CHANNEL 25:



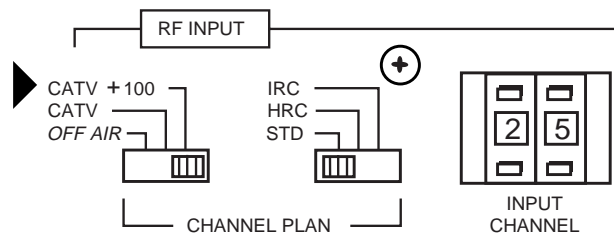
- Setting the left-hand switch for "CATV" ("CATV + 100") also requires setting the right-hand switch for "IRC", "HRC", or "STD" (standard) as desired for the given input signal operating channel.

STANDARD CATV CHANNEL 25:



- Setting the left-hand switch for "CATV +100" sets a leading "1" to the INPUT CHANNEL thumbwheel switch for CATV channels from 100 through 125.

STANDARD CATV CHANNEL 125:



F5 – INPUT CHANNEL Number Switch

Sets the input channel number for off-air TV channels 02 through 69, for standard CATV channels 02 through 125, or IRC, HRC* channels 01 through 125. See also Item F4 which sets the type of channel (off-air or various types of CATV channel plans) and sets the leading “1” for CATV channels 100 through 125.

*HRC – Harmonically Related Carrier

*IRC – Incrementally Related Carrier

F6 – LOCK DETECT Indicator

Lights to indicate that both input signal synthesizers are locked. Additionally, if the ‘AFC’ switch is on, this LED lights to indicate that the AFC is locked. If this indicator is off, check for ‘Channel Plan’ switch settings that are consistent with the type of input signal that is supplied to the HCP2550A.

F7 – SIGNAL Indicator

Lights to indicate that an input signal is being received as set by the input channel switches and has a signal strength greater than the PILOT THRESHOLD setting.

F8 – PILOT THRESHOLD Control

When enabled by the rear panel ‘PILOT’ switch, the setting of this control determines the input signal level threshold at which an internal visual carrier is generated to replace the (missing) input signal carrier. This feature provides full black screen video and muted audio at a connected TV receiver in the absence of, or below threshold level, input signal. This threshold level is reduced approximately 10 dB if the input preamp is switched on (see Item F2).

F9 – A/V RATIO Control

This screwdriver adjustment varies the level of the output aural carrier over a range from +5 to –12 dB relative to the input A/V ratio. The aural carrier should be adjusted to approximately 15 dB below the visual carrier (normal operation). Clockwise rotation increases the output aural carrier level and thus decreases the output A/V ratio.

F10 – OUTPUT LEVEL Control

This screwdriver adjustment varies the RF OUTPUT level. Clockwise rotation increases the level.

F11 – OUTPUT ENABLED Indicator

Lights to indicate that a valid channel is selected. The RF output is switched off for any invalid output channel settings.

F12 – OUTPUT CHANNEL Number Switch

Sets the output channel number for standard CATV channels 02 through 78 and 95 through 99. Note that these switches set the output frequency for a visual carrier frequency of ‘xx.25’ or ‘xxx.25’ MHz along with any required FCC offset for shared aviation/navigation frequencies. See Table 2 – “OUTPUT CHANNEL” included in this manual for the list of corresponding operating frequency, and offset, if any, for each channel number. It is important to note, however, that the output frequency is accurate only if the input signal is on a proper frequency (includes any offset, plus or minus, if required) or the AFC function is active and locked. **It is recommended that the AFC (see Item F3) be switched on for all combinations of input and output channels, except when the output channel is set for the same channel as the input.**

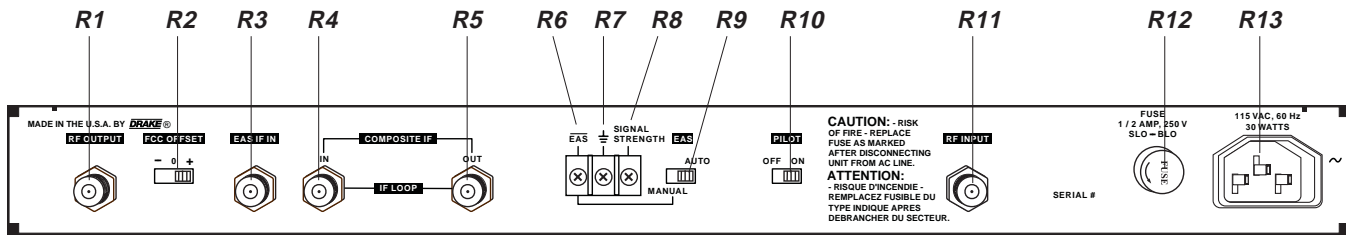


Figure 2

R1 – RF OUTPUT Connector

This is the converted channel output.

R2 - FCC OFFSET Switch

The HCP2550A synthesizer has been programmed to comply with FCC requirements for offsets on cable channel frequencies assigned to aviation and navigation communications with the 'FCC OFFSET' switch set to the "+" position. With the switch in the "+" position, the HCP2550A will automatically offset the visual carrier either +12.5 kHz or +25 kHz above the channel frequency on required channels as listed in Table 2 – OUTPUT CHANNEL included in this manual. **Be certain of the permissible operating frequency** if this switch is to be set to the "0" position since **NO** offset will be applied to any channel. Similarly, setting the switch to the "-" position forces the offset to a programmed -12.5 kHz or -25 kHz as required. **The normal setting for this switch is in the "+" position.**

R3 – EAS IF IN Connector

This is an alternate composite IF intended for the Emergency Alert System (EAS) signals as defined by Part 11 of the FCC requirements. This input is manually activated by setting the 'EAS' switch (R9) to the 'Manual' position and grounding the \bar{EAS} screw terminal (R6), or is automatically activated by setting the 'EAS' switch to the 'AUTO' position. When the unit is strapped for automatic switching to the EAS input, switching will occur for levels of the 45.75 MHz RF signal exceeding +20 dBmV at the 'EAS IF IN' connector. The nominal operating EAS composite IF input level is +28 dBmV. Note that the composite signal must have the visual carrier at 45.75 MHz and the aural carrier at 41.25 MHz.

R4 – COMPOSITE IF IN Connector

This is the composite IF input to the output channel circuits. The composite IF has both the aural and visual IF combined. This connection is normally cabled directly to the "COMPOSITE IF OUT" connector (see Item R5). This external loop allows the use of accessories such as scramblers or alternate video sources. Note that accessory equipment must also have the visual carrier at 45.75 MHz and the aural carrier at 41.25 MHz. Both input carriers must be at their nominally specified levels.

R5 – COMPOSITE IF OUT Connector

This is the composite IF output from the IF circuits. The composite IF provides a vestigial sideband filtered visual carrier at 45.75 MHz (plus or minus any input signal offset) combined with a level controlled aural carrier at 41.25 MHz (plus or minus any input signal offset). This connection is normally cabled directly to the "COMPOSITE IF IN" connector (see Item R4).

R6 – \bar{EAS} Terminal

With the "EAS" switch (see Item R9) set to the 'MANUAL' position, connect this screw terminal to ground for manual activation of the EAS input.

R7 – GROUND Terminal

This screw terminal connects to circuit ground.

R8 – SIGNAL STRENGTH Terminal

This screw terminal provides monitoring the received signal strength by supplying a 0 to +12 VDC output that is proportional to the relative signal strength. Increasing signal strength levels produce an increasingly positive voltage at this terminal.

R9 – EAS Switch

Set this switch to the 'AUTO' position for automatic EAS activation for signal levels greater than +20 dBmV at the "EAS IF IN" connector. With this switch set to the 'MANUAL' position, ground the " \bar{EAS} " terminal (see Item R6) for manual activation of the EAS input.

R10 – PILOT Threshold Switch

Set this switch to the 'ON' position to enable the front panel "PILOT THRESHOLD" Control (see Item F8 – "Front Panel Controls and Indicators" section of this manual).

R11 – RF INPUT Connector

This is the input to the channel processor circuits for all signals with video carrier frequencies in the range of 54 through 806 MHz.

R12 – FUSE Holder

Always replace this fuse with one of the same type and rating: ½ Amp, 250 V, SLO-BLO, 5 x 20 mm type.

R13 – LINE CORD Receptacle

Accepts a 3-wire detachable power cord. Connect to a 115 VAC ($\pm 10\%$), 60 Hz source.

CONNECTIONS AND CONTROLS – All connections to and from the HCP2550A are made through the rear panel. Figure 3 shows a typical two channel processing installation involving the converting of an off-air signal and a CATV signal. Additional channels can be processed by using additional channel processor units and either multi-port combiners or combinations of two-port combiners.

INSTALLATION NOTES – Level adjustment provides optimum performance in multichannel installations. The channel processor outputs should be checked periodically with a spectrum analyzer to maintain a ± 1 dB variation of adjacent channel carriers. Aural/Visual (A/V) ratios should be held to -15 dB or less. The 'Output Level' and 'A/V Ratio' controls are used respectively to make these adjustments. If an output level of less than $+50$ dBmV is required, add an attenuator of the appropriate value to the modulator output.

Example: For an output level of $+45$ 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 unit performance will be degraded without proper cooling.

FCC PAR.76.612 – Certain cable channel frequencies assigned to aviation and navigation communications require frequency offsets. The OUTPUT CHANNEL switches set the output frequency for a visual carrier frequency of 'xx.25' or 'xxx.25' MHz only. The exact output frequency, however, is relative to the input frequency and is offset plus, minus, or no offset on required channels according to the setting of the rear panel "FCC OFFSET" switch. Refer to the 'Output Channel' list included in this manual to determine the required offset for a particular output channel.

OUTPUT CHANNEL IS DIFFERENT FROM INPUT CHANNEL:

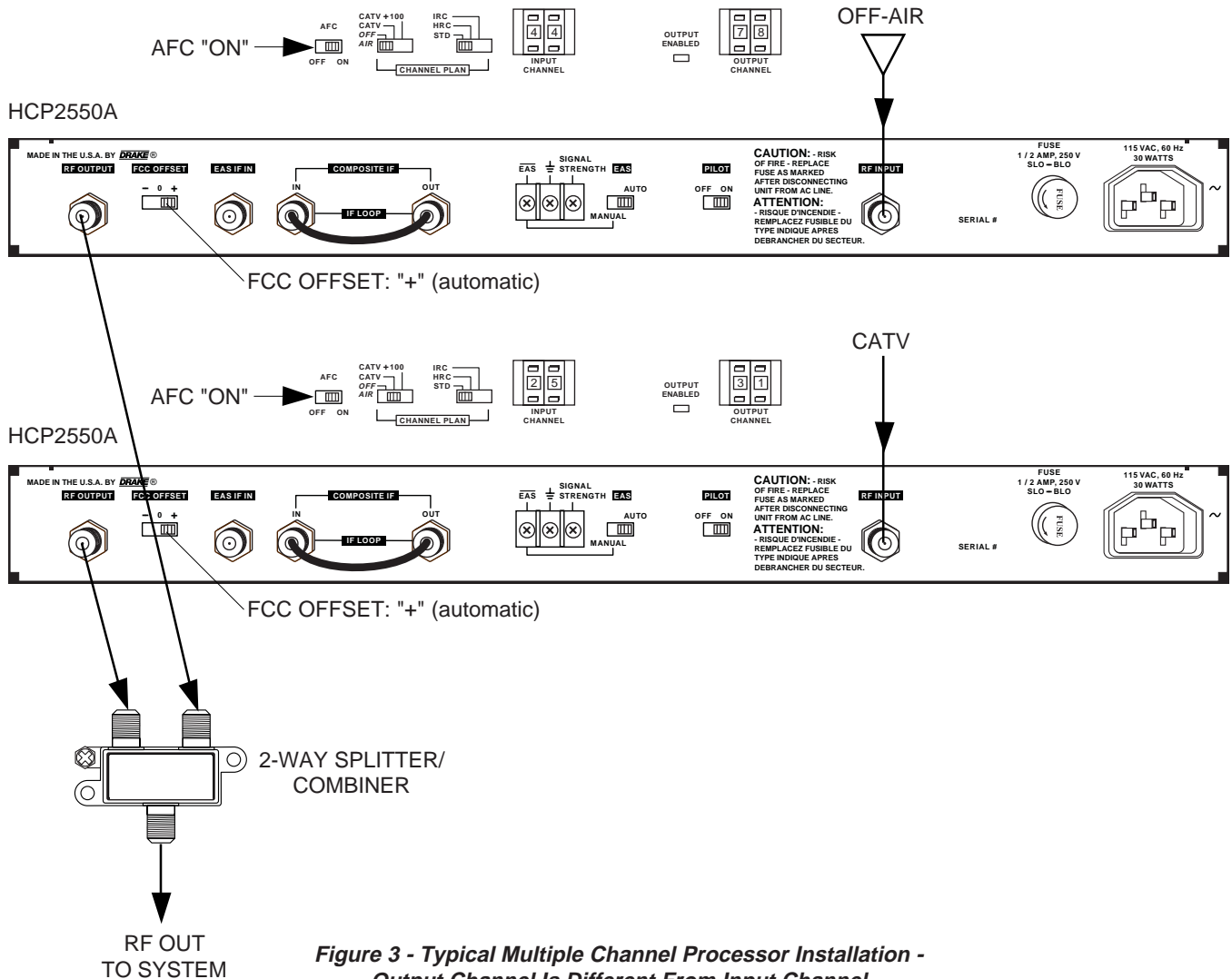


Figure 3 - Typical Multiple Channel Processor Installation - Output Channel Is Different From Input Channel

6 Installation, continued

CHANNEL - TO - CHANNEL PROCESSING (Output channel is SAME as Input Channel):

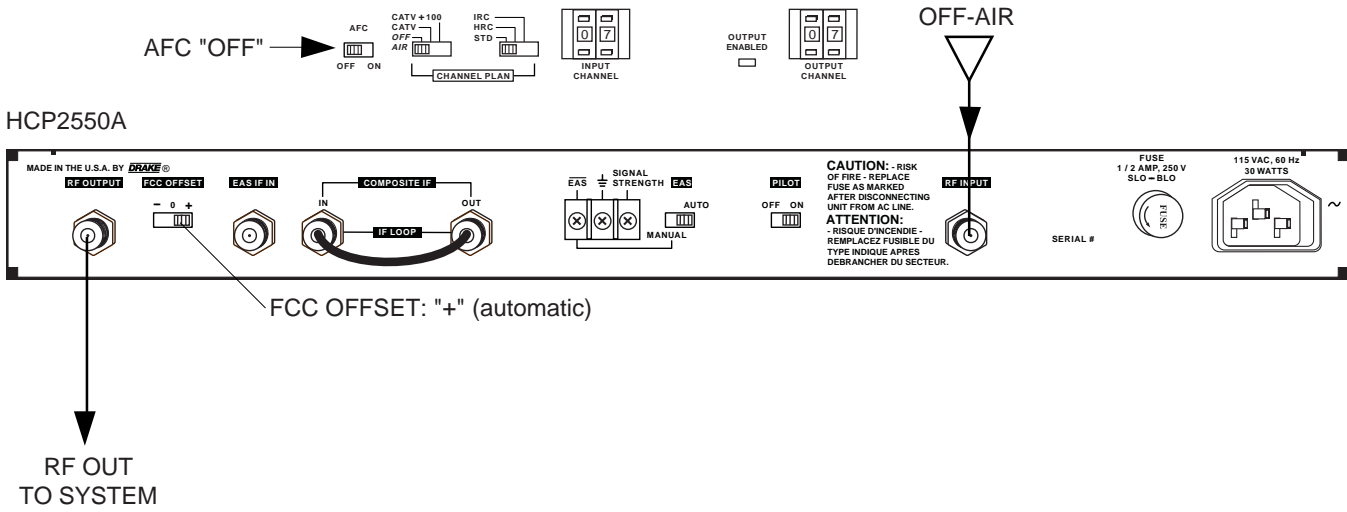
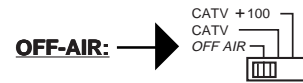
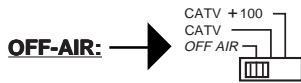


Figure 4 - Channel - To - Channel Processing

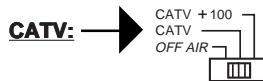
TABLE 1: LIST OF OFF-AIR TYPE INPUT CHANNELS



VHF BROADCAST CHANNELS	
Channel Number	Visual Carrier Frequency (MHz)
2	55.25
3	61.25
4	67.25
5	77.25
6	83.25
7	175.25
8	181.25
9	187.25
10	193.25
11	199.25
12	205.25
13	211.25

UHF BROADCAST CHANNELS	
Channel Number	Visual Carrier Frequency (MHz)
14	471.25
15	477.25
16	483.24
17	489.25
18	495.25
19	501.25
20	507.25
21	513.25
22	519.25
23	525.25
24	531.25
25	537.25
26	543.25
27	549.25
28	555.25
29	561.25
30	567.25
31	573.25
32	579.25
33	585.25
34	591.25
35	597.25
36	603.25
37	609.25
38	615.25
39	621.25
40	627.25
41	633.25
42	639.25
43	645.25
44	651.25
45	657.25
46	663.25
47	669.25
48	675.25
49	681.25
50	687.25
51	693.25
52	699.25
53	705.25
54	711.25
55	717.25
56	723.25
57	729.25
58	735.25
59	741.25
60	747.25
61	753.25
62	759.25
63	765.25
64	771.25
65	777.25
66	783.25
67	789.25
68	795.25
69	801.25

TABLE 1: LIST OF CATV TYPE INPUT CHANNELS



CABLE TV CHANNELS							
Channel Designation			Visual Carrier Frequency (MHz)				
BAND	Standard Alphanumeric Identification	EIA/NCTA Numeric Equivalent Input Channel	STD / IRC	Harmonically Related Carriers HRC			
LOW	2	2	55.25	54.00			
	3	3	61.25	60.00			
	4	4	67.25	66.00			
	A-8	1	STD:	IRC:	HRC:		
			5	5	77.25	79.25	78.00
			6	6	83.25	85.25	84.00
MID	A-5	95	91.25	90.00			
	A-4	96	97.25	96.00			
	A-3	97	103.25	102.00			
	A-2**	98	109.25	108.00			
	A-1**	99	115.25	114.00			
	A*	14	121.25	120.00			
	B*	15	127.25	126.00			
	C*	16	133.25	132.00			
	D	17	139.25	138.00			
	E	18	145.25	144.00			
	F	19	151.25	150.00			
	G	20	157.25	156.00			
	H	21	163.25	162.00			
	I	22	169.25	168.00			
HIGH	7	7	175.25	174.00			
	8	8	181.25	180.00			
	9	9	187.25	186.00			
	10	10	193.25	192.00			
	11	11	199.25	198.00			
	12	12	205.25	204.00			
SUPER	13	13	211.25	210.00			
	J	23	217.25	216.00			
	K*	24	223.25	222.00			
	L*	25	229.25	228.00			
	M*	26	235.25	234.00			
	N*	27	241.25	240.00			
	O*	28	247.25	246.00			
	P*	29	253.25	252.00			
	Q*	30	259.25	258.00			
	R*	31	265.25	264.00			
HYPER	S*	32	271.25	270.00			
	T*	33	277.25	276.00			
	U*	34	283.25	282.00			
	V*	35	289.25	288.00			
	W*	36	295.25	294.00			
	AA*	37	301.25	300.00			
	BB*	38	307.25	306.00			
	CC*	39	313.25	312.00			
	DD*	40	319.25	318.00			
	EE*	41	325.25	324.00			
HYPER	FF**	42	331.25	330.00			
	GG*	43	337.25	336.00			
	HH*	44	343.25	342.00			
	II*	45	349.25	348.00			
	JJ*	46	355.25	354.00			
	KK*	47	361.25	360.00			
	LL*	48	367.25	366.00			
	MM*	49	373.25	372.00			
	NN*	50	379.25	378.00			
	OO*	51	385.25	384.00			
	PP*	52	391.25	390.00			
	QQ*	53	397.25	396.00			
	RR	54	403.25	402.00			
	SS	55	409.25	408.00			
	TT	56	415.25	414.00			
	UU	57	421.25	420.00			
	VV	58	427.25	426.00			

BAND	Channel Designation		Visual Carrier Frequency (MHz)		
	Standard Alphanumeric Identification	EIA/NCTA Numeric Equivalent Input Channel	STD / IRC	Harmonically Related Carriers HRC	
HYPER	WW	59	433.25	432.00	
	XX	60	439.25	438.00	
	YY	61	445.25	444.00	
	ZZ	62	451.25	450.00	
	AAA	63	457.25	456.00	
	BBB	64	463.25	462.00	
	CCC	65	469.25	468.00	
	DDD	66	475.25	474.00	
	EEE	67	481.25	480.00	
	FFF	68	487.25	486.00	
	GGG	69	493.25	492.00	
	HHH	70	499.25	498.00	
	III	71	505.25	504.00	
	JJJ	72	511.25	510.00	
	KKK	73	517.25	516.00	
	LLL	74	523.25	522.00	
	MMM	75	529.25	528.00	
	NNN	76	535.25	534.00	
	OOO	77	541.25	540.00	
	PPP	78	547.25	546.00	
	QQQ	79	553.25	552.00	
	RRR	80	559.25	558.00	
	SSS	81	565.25	564.00	
	TTT	82	571.25	570.00	
	UUU	83	577.25	576.00	
	VVV	84	583.25	582.00	
	WWW	85	589.25	588.00	
	XXX	86	595.25	594.00	
		87	601.25	600.00	
		88	607.25	606.00	
		89	613.25	612.00	
		90	619.25	618.00	
		91	625.25	624.00	
		92	631.25	630.00	
		93	637.25	636.00	
		94	643.25	642.00	
			100	649.25	648.00
			101	655.25	654.00
			102	661.25	660.00
			103	667.25	666.00
			104	673.25	672.00
			105	679.25	678.00
			106	685.25	684.00
		107	691.25	690.00	
		108	697.25	696.00	
		109	703.25	702.00	
		110	709.25	708.00	
		111	715.25	714.00	
		112	721.25	720.00	
		113	727.25	726.00	
		114	733.25	732.00	
		115	739.25	738.00	
		116	745.25	744.00	
		117	751.25	750.00	
		118	757.25	756.00	
		119	763.25	762.00	
		120	769.25	768.00	
		121	775.25	774.00	
		122	781.25	780.00	
		123	787.25	786.00	
		124	793.25	792.00	
		125	799.25	798.00	

*Aeronautical offset of ±12.5 kHz.

**Aeronautical offset of ±25 kHz.

TABLE 2: LIST OF OUTPUT CHANNELS (CATV)

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

SERVICE INFORMATION

You may contact the R.L. DRAKE Service Department for additional information or assistance by calling +1 (937) 746-6990, Monday through Friday, between 8:00 A.M. and 4:00 P.M. Eastern Time, except on holidays.

You may also contact the R.L. DRAKE Service Department by E-mail at the following address:
service@rldrake.com
or by Telefax:
+1 (937) 743-4576.

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 COMPANY Limited Warranty and returned to you.

IF YOU NEED TO CALL FOR HELP

Call our Customer Service/Technical Support line at +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: service@rldrake.com
or by Telefax: +1 (937) 743-4576.

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 COMPANY
230 Industrial Drive
Franklin, Ohio 45005 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 R.L. DRAKE if we have all the facts. If we must call you, it may take longer. R.L. DRAKE is not responsible for damage caused by lightning, nonprofessional alterations, "acts of God", shipping damage, poor storage/handling, etc. R.L. DRAKE will make note of any shipping damage upon receipt.

Should your warranty card not be on file at R.L. DRAKE, you will need to send proof of purchase to receive warranty service. Typically, a copy of the invoice from an R.L. DRAKE dealer will suffice. The warranty is for the original owner only and is not transferable.

Three Year Limited Warranty

R.L. DRAKE COMPANY warrants to the original purchaser this product shall be free from defects in material or workmanship for three (3) years from the date of original purchase.

During the warranty period the R.L. DRAKE COMPANY 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 COMPANY 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 the R.L. DRAKE COMPANY 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 the R.L. DRAKE COMPANY 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 COMPANY 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 three (3) years from the date of the original purchase.

The foregoing constitutes R.L. DRAKE COMPANY'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 COMPANY
 230 Industrial Drive
 Franklin, Ohio 45005 U.S.A.
Customer Service and Parts Telephone:
 +1 (937) 746-6990
Telefax:
 +1 (937) 743-4576
World Wide Web Site:
<http://www.rldrake.com>



R.L. DRAKE COMPANY
230 INDUSTRIAL DRIVE
FRANKLIN, OHIO 45005 U.S.A.

CUSTOMER SERVICE AND PARTS TELEPHONE:

+1 (937) 746-6990

TELEFAX:

+1 (937) 743-4576

WORLD WIDE WEB SITE:

<http://www.rldrake.com>