

## ARIES MODULE AR-339 MULTI-MODE VOLTAGE CONTROLLED FILTER

## ASSEMBLY INSTRUCTIONS

(Please refer to the System 300 General Assembly Instructions as a general guide to parts identification and mounting.)

We highly recommend that you:

- (a) Find a place where you can work through completion, without disturbing set-up.
- (b) Use adequate lighting.
- (c) Make sure your hands are free of grease or oil which would interfere with proper soldering.
- (d) Check off each of the following steps, as you proceed.

( ) PREPARATION:

Lay the circuit board down on a sheet of white paper. PLACE METAL FOIL SIDE DOWN! Turn board so that connector strip is to the left.

Lay the assembly drawing down near the board.

Unpack the parts carefully and place in a large box or tray so they won't get lost.

HAVE THE FOLLOWING TOOLS NEARBY:

- \* Pencil tip soldering iron, hot and tinned (solder coated)
- \* Solder; USE ONLY thin ROSIN-CORE (Electronic grade) SOLDER. Any other type will destroy the connections, and voids the warranty!
- \* Small, diagonal wire cutters
- \* Small wire strippers
- \* Small long-nose pliers
- \* Flat blade screw driver
- \* 1/2" or #16 nut driver
- \* 5/16" or #10 nut driver
- \* 1/4" or #8 nut driver

A pair of regular pliers can substitute for the nut drivers but will not be as easy to use and may scratch the front panel.

( ) 1. First install both jumpers (J1 & J2)

( ) 2. Resistors: (see general assembly instructions)

Carefully install all resistors on the circuit board. Double check your installation against the P.C. board component layout drawing to be sure that the correct value is in the correct location. To prepare the resistor for insertion hold the body of the resistor between the thumb and index finger of your left hand. With the thumb and index finger of your right hand bend both leads of the resistor at once to form right angles with the body. The resistor will now insert easily into the P.C. board. Once the resistor is inserted, bend the leads on the foil side outward to hold the resistor in place. Solder the resistors to the board and cut the leads about 1/16 of an inch away from the board. For ease in reading the resistor values after they are installed on the P.C. board, install the resistors with the gold band facing either the bottom or the right-hand side of the board.

- |    |           |    |                 |                                      |   |
|----|-----------|----|-----------------|--------------------------------------|---|
| A) | Mount all | 12 | 100K resistors; | R4,13,14,15,16,18,20,21,22,24,33,34, | solder & cut leads                            |
| B) | "         | "  | 8               | 10K                                  | " R1,12,26,30,39,47,48,50, solder & cut leads |
| C) | "         | "  | 5               | 1K                                   | " R5, 25, 38, 40, 41, solder & cut leads      |
| D) | "         | "  | 4               | 22 ohm                               | " R28,29,45,46, solder & cut leads            |
| E) | "         | "  | 3               | 47K                                  | " R17,27,43, solder & cut leads               |
| F) | "         | "  | 3               | 33K                                  | " R11,23,42, solder & cut leads               |

AR-339 ASSEMBLY INSTRUCTIONS (Cont.)

G) Mount both 22K resistors R3, & 36, solder & cut leads  
 H) " " 150K " R19, & 32, solder & cut leads  
 I) " " 150ohm " R8, & 9, solder & cut leads  
 J) " " 12K " R37 & 44, solder & cut leads  
 K) Mount the 560 ohm resistor; R2, solder & cut leads  
 L) " " 4.7K " R6; solder & cut leads  
 M) " " 68K " R10; solder & cut leads  
 N) " " 330K " R7; solder & cut leads  
 O) " " 1 meg " R25; solder & cut leads  
 P) " " 1.8K " R31; solder & cut leads  
 Q) " " 27K " R41; solder & cut leads  
 R) " " 470K " R51; solder & cut leads

## ( ) 3. DIODES: (see general assembly instructions)

The black band on the component should correspond to the black band on the diode as drawn on the P.C. board layout drawing.

Mount all 5 diodes; CR1,2,3,4,5- solder and cut leads

## ( ) 4. INTEGRATED CIRCUITS: (see general assembly instructions)

Pay particular attention to the orientation of the I.C.'s. The pin indication on the component should correspond with the indication on the P.C. board component layout drawing.

1) Mount the three CA3080; U4,2,5

2) Mount the two TL082CP; U1 & 3

3) Mount the LM301A; U6

## ( ) 5. TRANSISTORS: (see general assembly instructions)

The leads, emitter, collector and base are designated on the P.C. board

1) Mount the 2N3393 NPN transistors-Q1 & 3

2) Mount the 2N3638 PNP transistors-Q2 & 4

## ( ) 6. CAPCITORS: (see general assembly instructions)

Observe the polarity of the three tantalum capacitors. The positive lead is the lead closest to the (+) sign on the component.

1) Mount all 3 1mf tantalum capacitors; C1, 10 11; solder & cut leads

2) Mount both 330pf mica capacitors; C5, 6; solder & cut leads

3) Mount all 3 100pf disc capacitors; C2,7,9; solder & cut leads

4) Mount the 47pf disc capacitor C3; solder & cut leads

5) Mount the 1000pf disc capacitor; C4; solder & cut leads

6) Mount the 150pf disc capacitor; C8; solder & cut leads

## ( ) 7. TRIMPOTS: (see general assembly instructions)

Mount all seven 50K trimpots; T1,2,3,4,5,6, & 7.

THIS COMPLETES THE ASSEMBLY OF THE P.C. BOARD

For the time being, lay it aside and go on to the next section.

AR-339 ASSEMBLY INSTRUCTIONS (cont.)

## FRONT PANEL ASSEMBLY PROCEDURE:

(refer to front panel wiring diagram)

Aries Music face panels are made of anodized aluminum. They will not be scratched in normal operation, but they can be scratched with pliers or a nut driver. When using tools on the front panel, be careful not to scratch it.

- ( ) 1. Mount AUDIO 1 pot and the FREQ pot. Do not yet fully tighten the nuts; they will be later removed for final assembly. If the pots have a small flange which prohibits them from being mounted flush against the face panel, bend the flange outward so the pots can be mounted flush.
- ( ) 2. Mount the remaining 3 single pots, AUDIO 2,3 & 4. Install the additional larger nut onto the bushing and tighten firmly. Now install the pots as usual.
- ( ) 3. Mount the two dual pots. Again install the additional larger nut before mounting.
- ( ) 4. Mount the switch so that the three terminals are in a horizontal line with each other. It makes no difference which terminal is on the right. Screw one nut onto the bushing and against the body of the switch. This is used as a spacer so that when the switch is mounted the threads will protrude from the front of the face panel as far as the jack threads protrude. Place the lock washer between this nut and the back of the face panel. Mount the switch, holding it in place with the second nut.
- ( ) 5. Mount the thirteen jacks orienting them as shown on the wiring diagram. Mount the washer on the front side of the face panel and tighten the nuts.

## PANEL WIRING: (see general assembly instructions before going any further)

The order in which these connections are made has proven to be the easiest and the most convenient method of wiring this module. The color-coded wires will facilitate trouble shooting the module.

USING BLACK WIRE, CONNECT AND SOLDER THE FOLLOWING WIRES. CUT THESE WIRES TO LENGTH AND STRIP THEM. LEAVE AS LITTLE SLACK AS CONVENIENTLY POSSIBLE EXCEPT WHERE INDICATED AT STEP 4 AND 6. When soldering, be careful not to fill up the terminals on the pots and jacks with solder. It will be necessary to connect additional wires to some of the terminals later. All these wires should be just a bit longer than absolutely necessary. They should not be excessively long that they form loops between terminals.

- 1. The CCW of P8 to the CCW of P9
- 2. The CCW of P6 to the CCW of P7
- 3. The CCW of P8 to the CCW of P6
- 4. The CCW of P6 to the CCW of P5. These wires should be 2" long.
- 5. The CCW of P5 to the CCW of P1
- 6. The CCW of P1 to the CCW of P2. This wire should be 2" long.
- 7. The CCW of P2 to the CCW of P3
- 8. The CCW of P3 to the CCW of P4
- 9. Using un-shielded wire, connect the grounds of all 13 jacks together. Do not yet solder the connection to the ground of jack AUD 1.
- 10. Connect the CCW of P4 to the jack ground of AUD 1.
- 11. Connect and solder the shunt of jack Q to the ground of jack Q.
- 12. Connect and solder the shunt of jack FM3 to the ground of jack FM3

AR-339 ASSEMBLY INSTRUCTIONS (cont.)

USING RED WIRE:

1. Connect the CW of P9 to the CW of P5.

USING COLOR-CODED WIRE;

1. Connect BROWN wire from CW of P8 to tip of jack Q1
2. Connect BLUE wire from CW of P6 to tip of jack FM1
3. Connect GREY wire from CW of P7 to tip of jack FM2
4. Connect BROWN wire from CW of P1 to tip of jack AUDIO 1
5. Connect ORANGE wire from CW of P2 to tip of jack AUDIO 2
6. Connect YELLOW wire from CW of P3 to tip of jack AUDIO 3
7. Connect GREEN wire from CW of P4 to tip of jack AUDIO 4

FOR THE FOLLOWING CONNECTIONS, USE 12" LENGTHS OF COLORED WIRE:

1. Connect BROWN wire to the CT of P8
2. Connect GREEN wire to CT of P9
3. Connect BLUE wire to the CT of P6
4. Connect GREY wire to the CT of P7
5. Connect GREY wire to the CT of P5
6. Connect RED wire to the CW of P5
7. Connect BROWN wire to the CT of P1
8. Connect ORANGE wire to the CT of P2
9. Connect YELLOW wire to the CT of P3
10. Connect GREEN wire to the CT of P4
11. Connect ORANGE wire to the terminal 2 of the SWITCH
12. Connect YELLOW wire to the terminal 3 of the SWITCH
13. Connect YELLOW wire to the TIP of jack N/P
14. Connect GREEN wire to the TIP of jack H
15. Connect BLUE wire to the TIP of jack B
16. Connect GREY wire to the TIP of jack L
17. Connect ORANGE wire to the TIP of jack Q2
18. Connect WHITE wire to the TIP of jack FM3
19. Connect BLACK wire to the GROUND of jack AUD 1

REFER TO MODULE ASSEMBLY DRAWING

- ( ) 1. Unpack the frame, bag of hardware, and front panel.
- ( ) 2. Snap the two plastic card guides into the holes in the frame. Be sure that the pairs of tabs point toward the rear, as shown.
- ( ) 3. Slide the printed circuit board into the frame, holding top and bottom of frame together against the board, so that the board fits snugly in the guides, between the tabs.
- ( ) 4. Using the 4-40 x 3/8" screws and nuts, mount the two angle brackets to the frame as shown. The brackets should be on the component side of the board.
- ( ) 5. Now screw the board to the brackets. Insert the 4-40 x 3/8" screw from foil side of board. DOUBLE CHECK THAT SCREW HEAD DOES NOT TOUCH ANY METAL FOIL!!!
- ( ) 6. Refer again to MODULE ASSEMBLY DRAWING. Mount top of panel to frame, using the two UPPER pots (P1 and P5): Put on lock washers and insert pot shaft through rear of upper holes in front of frame. Bring panel against frame, so these pots also go through matching holes in panel. Tighten nuts on front of panel, with pots oriented in same direction as lower pots.
- ( ) 7. Attach bottom of panel to frame, using remaining 4-40 x 3/8" screws & nuts,

AR-339 ASSEMBLY INSTRUCTIONS (cont.)

CONNECT THE WIRES FROM THE FACE PANEL TO THE BOARD IN THIS ORDER. RUN THE WIRES AROUND THE PERIPHERY OF THE BOARD WHENEVER POSSIBLE. WIRING THE MODULE NEATLY WILL FACILITATE TRIMMING AND TROUBLE-SHOOTING. LEAVE ABOUT 1" SLACK FOR EACH WIRE; CUT THE WIRE, STRIP IT AND SOLDER IT TO THE BOARD.

1. connect RED wire from P5 to board A
2. connect GREEN wire from P9 to board Q INITIAL
3. connect BROWN wire from P8 to board Q MOD 1
4. connect ORANGE wire from jack Q to board Q MOD 2
5. connect BLACK wire from jack 1 AUD to board GROUND
6. connect YELLOW wire from jack N/P to board N/P
7. connect GREY wire from jack L to board L
8. connect BLUE wire from jack B to board B
9. connect GREEN wire from jack H to board H
10. connect ORANGE wire from SWITCH to board S2
11. connect YELLOW wire from SWITCH to board S3
12. connect BROWN wire from P1 to board AUDIO 1
13. connect ORANGE wire from P2 to board AUDIO 2
14. connect YELLOW wire from P3 to board AUDIO 3
15. connect GREEN wire from P4 to board AUDIO 4
16. connect GREY wire from P5 to board FREQ
17. connect BLUE wire from P6 to board FM 1
18. connect GREY wire from P7 to board FM 2
19. connect WHITE wire from jack FM 3 to board FM 3

Turn all pot shafts fully counter-clockwise (to the left) and install the knobs in this order:

1. Audio 4
2. Audio 3
3. Audio 2
4. Audio 1
5. Q-1
6. Initial Q
7. FM 1
8. FM 2
9. FREQ

THIS COMPLETES ASSEMBLY INSTRUCTION OF MODULE AR-339

## AR-339 MULTI-MODE FILTER MODULE

### TRIM PROCEDURE

This procedure should be approached with care and patience in order to obtain maximum performance.

In order to trim your AR-339 you will need:

+ 15 volt dual regulated power supply

DC coupled oscilloscope

DC Voltmeter

Wide range audio oscillator with + 5 volt triangle wave output. (Any of the Aries Music VCOs will do fine.)

1. Refer to the AR-339 PC board component layout drawing. Turn T7 (H.F.Q. trim) fully counter-clockwise. Turn all six other trims T1,2,3,4,5,6 to the center of their rotation.
2. Before turning on the power supply connect the +15 volt output of the supply to pin "A" on the PC board edge connector of the AR-339. Connect power supply GROUND  $\perp$  to pin "M". Connect the -15 volt output to terminal "Z". CAUTION! Improper connections can destroy components!!!
3. Set the voltmeter or oscilloscope on an appropriate range for measuring up to 15 volts D.C. Connect the negative lead to the ground on one of the AR-339 output jacks. Connect the positive lead to the junction of R37 and pin 1 of the #1748 exponential generator module on the PC board. This junction is labelled [1] on the PC board component layout drawing.
4. Set the front panel controls as follows: freq. knob fully clockwise. The eight remaining knobs fully counter-clockwise.
5. TURN ON POWER SUPPLY. IMMEDIATELY feel ALL I.C.'s and TRANSISTORS repeatedly, to check for overheating. Slight warming is normal on the I.C.'s, but TURN POWER OFF IMMEDIATELY in the event of any device becoming HOT to the touch! In this case, check your wiring, and check for any shorts, such as metal specks on the board.
6. If all seems well, adjust T1 (frequency trim) for a reading or -1 Volt on the meter. Now, shift the positive meter lead to the junction of R44 and pin 2 of the 1748 exp. generator. This is marked [2] on the PC board component layout diagram. The voltage here should be between 0 and -8 volts.
7. Connect the positive lead of the meter to the junction of R6 and the collector of Q4. This is marked [3] on the PC board component layout drawing. Adjust T2 ("Q" trim) for a voltage of -11 volts.
8. Reset the following front panel controls: Freq. knob to one o'clock "initial Q" knob to one o'clock. Connect the positive lead to the Band Pass Out at the end of R38 on the PC board. This is labelled "B" on the PC board component layout drawing. The voltage here may be initially any where from +15V to -15V. Adjust T4 ("B" offset trim) for a reading of 0V, + 0.1V.
9. Without changing the front panel controller, connect the positive lead to the Low Pass Out at the end of R40 on the PCB. This is labelled "L" on the PCB component layout diagram. Adjust T3 (LH offset HiQ trim) for 0V, + 0.1V at the Low Pass Out.



AR-339 TRIM PROCEDURE (Cont.)

10. Set the front panel "initial Q" knob fully counter clockwise. Leave the Freq. knob at 1 o'clock. Keep the positive lead connected to the Low Pass Out. Adjust T5 (LH offset LoQ trim) for 0V, +0.1V at the Low Pass Out.
11. Set the front panel "initial Q" control knob to ten o'clock. Set the front panel "freq." control knob fully counter clockwise. Connect a triangle wave oscillator to the Audio 1 input on the front panel. Connect the oscilloscope positive lead to the junction of R13 and the bottom wire from the center tap of P1. This is labelled Audio 1 on the PC board component layout drawing. Set the Audio 1 front panel control for a 1V peak to peak triangle wave at R13. Set the triangle wave oscillator to a frequency of 16 Hz. Now move the positive lead of the oscilloscope to the Band Pass Out labelled "B". Carefully adjust T1 (freq.trim) for the maximum peak to peak signal at the Band Pass Out.
12. Turn the Freq. control knob fully clockwise. Set the triangle wave oscillator to 16K Hz. Adjust T6 (1V/oct. trim) for the maximum peak to peak signal at the Band Pass Out.
13. Disconnect the triangle wave oscillator. Set the front panel controls as follows: Freq = fully clockwise; initial Q = fully clockwise; the seven remaining knobs fully counter clockwise. Connect +10V DC to the FM1 input. Turn the FM1 input control knob to 12 o'clock. With the oscilloscope, monitor the Band Pass Out. Slowly turn T7 (H.F.Q. trim) clockwise. At some point the Band Pass Out will show high frequency oscillations. Back off the trim pot until the oscillations stop. Remove all connections from the AR-339 and install it in your case.

YOUR AR-339 IS NOW FULLY TRIMMED AND READY TO USE.

## ARIES MUSIC SYNTHESIZER MODULE AR-339

## Multi-Mode VCF

## PARTS LIST

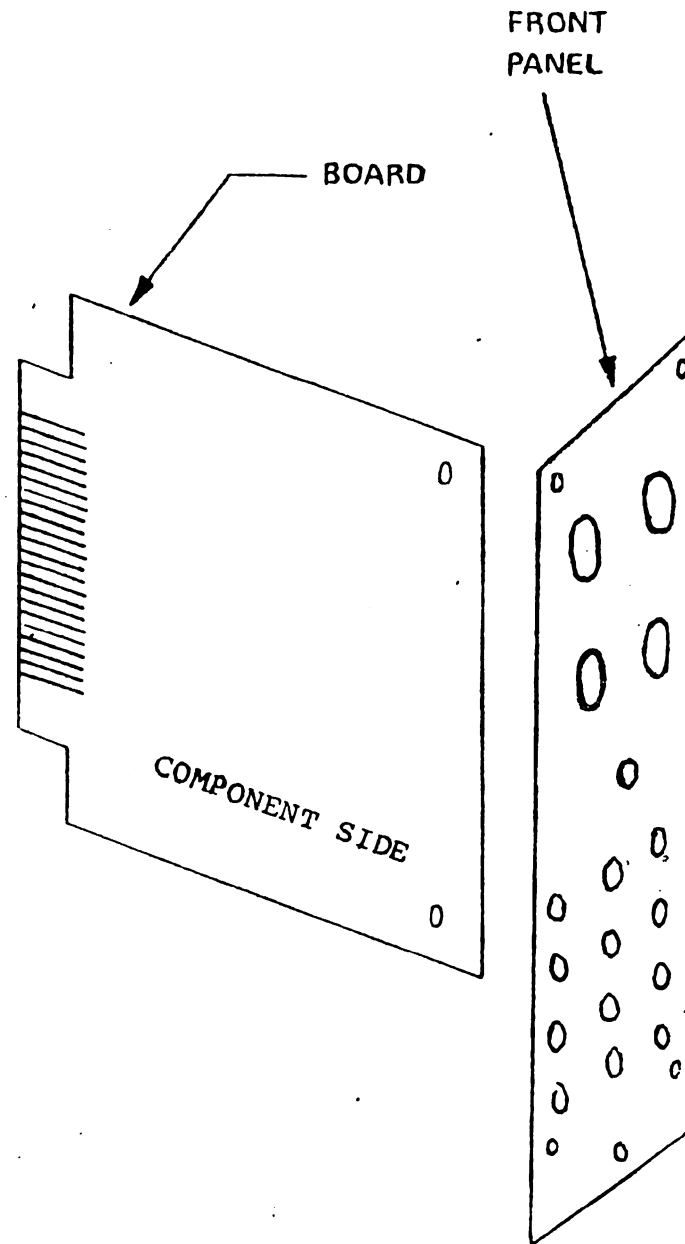
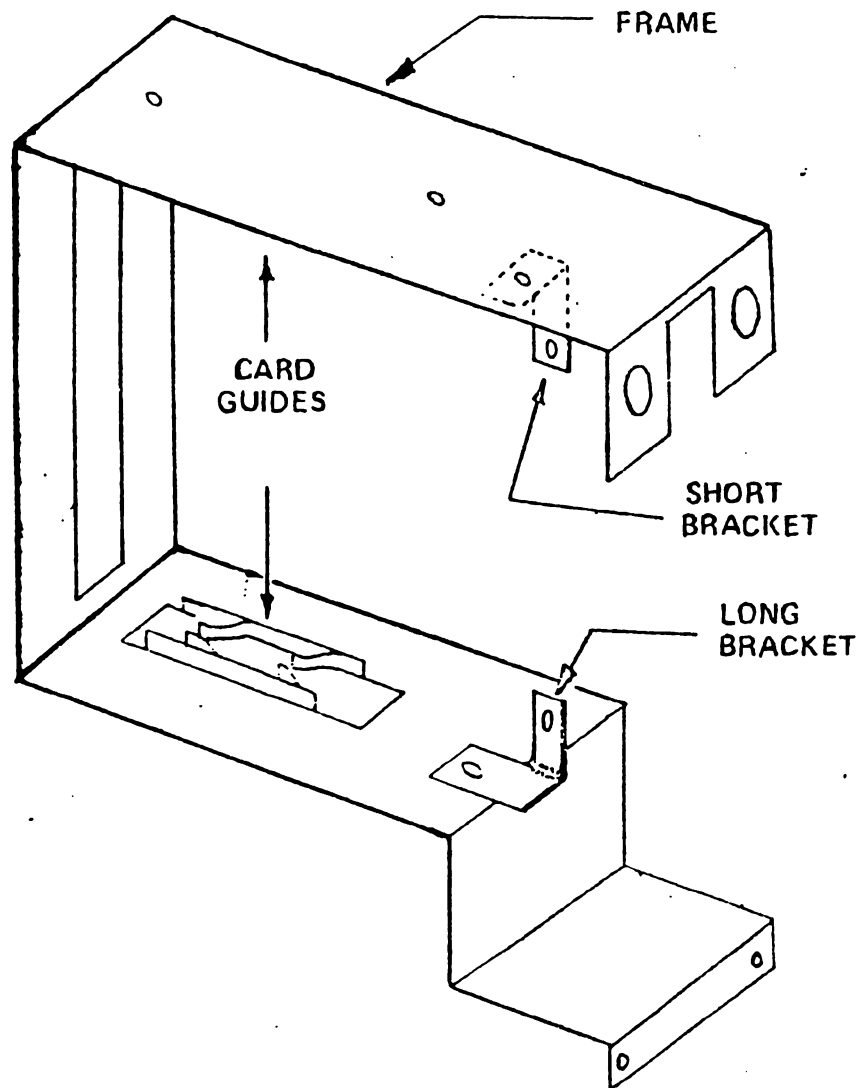
QUANTITY	DESCRIPTION	VALUE & RATING
4	Carbon film resistor; $\frac{1}{4}w$	22 ohm
2	" " " "	150 ohm
1	" " " "	560 ohm
5	" " " "	1K
1	" " " "	1.8K
1	" " " "	4.7K
7	" " " "	10K
2	" " " "	12K
2	" " " "	22K
1	" " " "	27K
3 -1	" " " "	33K
3	" " " "	47K
1	" " " "	68K
2	" " " "	100K
2	" " " "	<del>130K</del> 150K
1	" " " "	330K
1	" " " "	470K
1 54	" " " "	1 meg
7	Linear Trim Pots	50K
4	Log pots (single)	100K
1	Linear pots (single)	100K
1	Log pots (dual)	100K
1	Linear Pots (dual)	100K
CAPACITORS:		
3	Tantalum	1 mf ✓
2	mica or film	330 pf -
3	Disc	100 pf ✓
1	"	47 pf ✓
1	"	150 pf ✓
1	"	1000 pf ✓
I.C.		
1	Operational Amplifier	LM301-A
3	Operational Transconductance Amplifier (selected category 1)	CA3080
2	Dual FET input op amp	TL-082CP LM358N
TRANSISTOR:		
2	NPN Transistor	2N-3393
2	PNP "	2N-3638
DIODE:		
5	Diodes	1N-4148
1	SPDT Toggle Switch; on-none-one	
2	P.C. Card Guides	
1	AR-339 P.C. Board	
1	Front Panel	
5	Knobs, single	
2 sets	Knobs, dual concentric	
1	Module Frame	



## AR-339 PARTS LIST, CONT.

QUANTITY	DESCRIPTION	VALUE & RATING
2	Brackets	
6	Screws; 4-40 x 3/16"	
6	Nuts; 4-40	
13	Mini Jacks	
5	Nuts; 1/16" thick; 3/8" internal diameter	
1*	#1748 Exponential Generator Sub-module	
2	Cable tie	
4	12" black wires	
5	12" brown wires	
3	12" red wires	
5	12" orange wires	
5	12" yellow wires	
5	12" green wires	
4	12" blue wires	
5	12" grey wires	
2	12" white wires	
1	20" 24 gauge AWG bus wire	

\* In many cases, this sub-module will be installed on the board at the factory



# AR-339 MULTIMODE FILTER FRONT PANEL WIRING DIAGRAM

ARIES MUSIC INC.

