PARTS LIST * AR-315 * BALANCED MODULATOR

NUMBER	QUANTITY	DESCRIPTION	VALUE AND RATINGS
C1,2	2	Capacitor,Disc	0.1 mfd, 25v
C3	1	" "	33 pf
C4,5		" "	330 pf
R1,16,17,18	4	Potentiometer,1/4" shaft	100k linear
R2,3,4,5,14,15	6	Resistor,Carbon	10k 10%
R6,19,22	3	" "	3.3k 10%
R9	1	" "	12k 10%
R8,10,11,21	4	Trimpot	10k linear
R12,13	2	Resistor,Carbon	2.2k 10%
R7	1	" "	6.8k 10%
R23	1	Resistor,Carbon	22k 10%
R24,25	2	" "	1k 10%
R20	1	" "	15k 10%
U1	1	I C Multiplier	MC1595 (Motorola)
U2	1	Operational Amplifier	LM301A
	1	Printed Circuit Board	
	1	Front Panel	
	4	Knobs,1/4" Shaft	
	1	Frame	
	2	Bracket	
	6	Screw, 4-40 x 3/8	
	6	Nuts	
	12	Jack, mini-phone	

ARIES System 300 Music Synthesizer
Module AR 315
Balanced Modulator and Attenuators Assembly Instructions

The previous pages were written as a general guide, to familiarize the builder with the components. Here, now, are the specific assembly instructions for building your
It is recommended that you do the following before you proceed:

Find a place where you can work through completion, without disturbing your set-up.
Use adequate lighting.
Wash your hands before starting. This removes contaminating oils and perspiration and makes assembly more comfortable.
As you proceed, check off each step with a pencil.

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

Lay the assembly drawing down near the boaed.

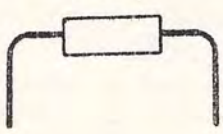
Unpack the parts carefully and place in a large box or tray so they won't get lost.

Have the following tools nearby:
Pencil tip soldering iron, hot and tinned (solder coated)
Solder--Use only thin rosin core solder!
Small diagonal wire cutters
Small wire strippers
Small long-nose pliers
Regular pliers
Flat blade screw driver

( ) 2. Jumpers
Find jumper J1 on the drawing. Measure J1 on the PCboard. Cut a piece of insulated wire one inch longer than J1 measures on the PC board. Strip 1/2 inch of insulation from each end being careful not to damage the wire itself. Bend the bare ends to a right angle and insert into the holes on the boaed, according to the drawing. While holding the ends down against the board to hold the wire in place. Solder and cut off the excess. (Refer to the introduction on parts installation.)

( ) 3. Resistors:
Carefully install all 25 resistors on the circuit board.
R8, 10, 11, and 21 are trimpots. R1,16,17,18 are potentiometers.
To avoid breaking the resistors leads, bend the leads at least 1/16 of an inch away from the body of the resistor.
For example:

Correct



Incorrect

( ) 4. Capacitors
Install all four capacitors on the board. (C1 through C4)

( ) 5. Integrated Circuit Amplifiers
Install the 1595 Modulator and the LM301 op amp and the board.

ALL BOARD COMPONENTS ARE NOW MOUNTED.

MODULE ASSEMBLY-- Please refer to Module Assembly Drawing

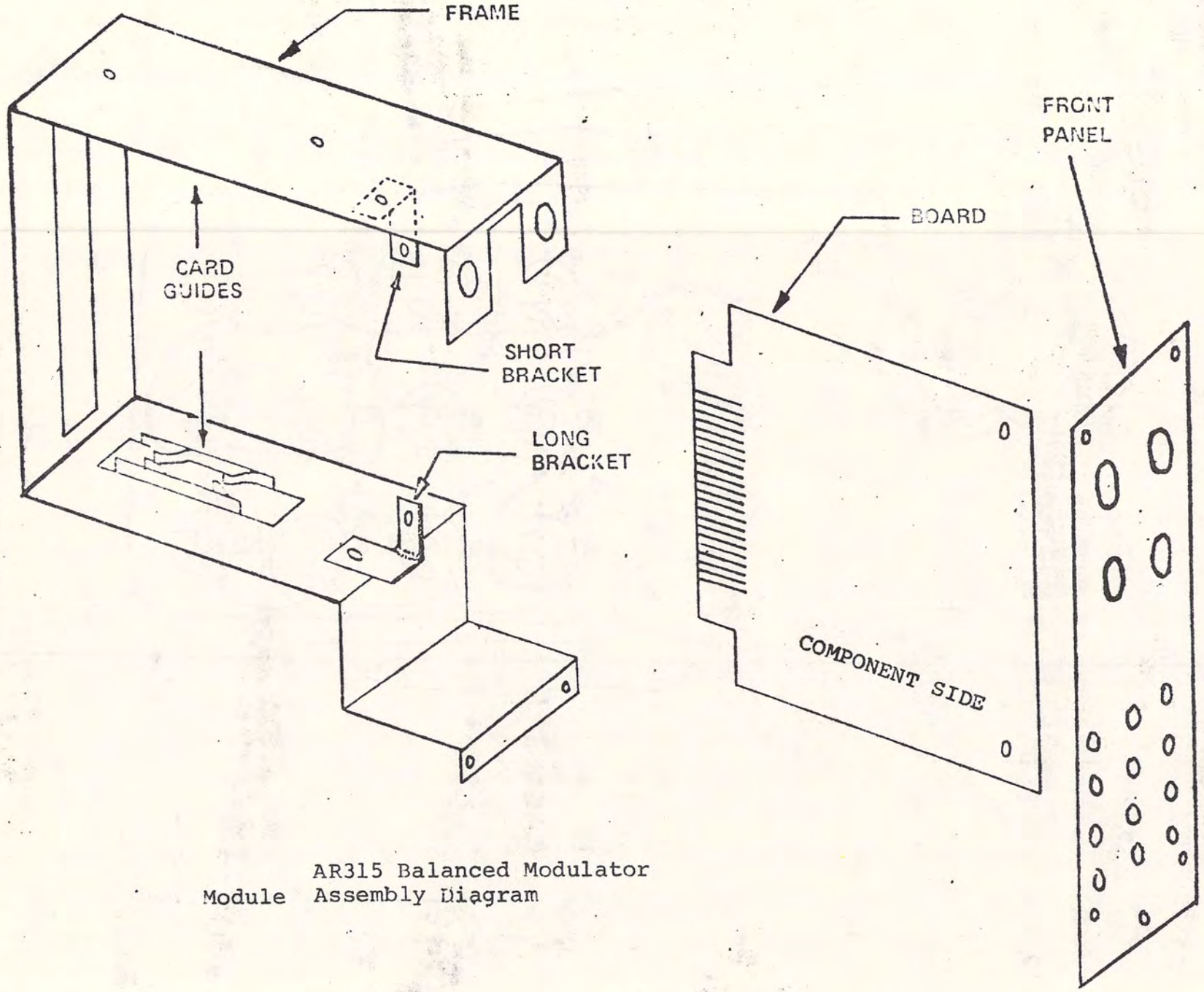
( ) 1. Unpack the frame, bag of hardware, and front panel.
( ) 2. Snap the two plastic card guides into the holes in the frame. Be sure that the pairs of tabs in the guides which hold the board point toward the rear of the frame. (The bottom one is shown installed in the drawing.)
( ) 3. Slide the circuit board into the frame, holding the top and bottom of the frame together against the board so that the board fits snugly in the card guides. Be sure that the pairs of plastic tabs pinch the edge of the circuit board properly.
( ) 4. Using 4-40X3/8" screws and nuts, mount the two angle brackets to the frame as shown in the drawing. The brackets should be entirely on the component side of the board.
( ) 5. Now screw the board to the brackets. Insert the 4-40 X 3/8" screw from the foil side of the board. DOUBLE CHECK THAT THE HEAD OF THE SCREW DOES NOT TOUCH ANY FOIL!!!
( ) 6. Unpack the front panel carefully. Avoid scratching its surface. AT THIS POINT you may if you wish skip steps 7-8 and proceed through the first few steps in the panel wiring (those in which wiring is done between components on the panel, but not to the board) before finishing the module assembly.
( ) 7. Mount the top of the panel to the top of the module frame using the top two potentiometers as follows: If there are tabs sticking up parallel to the shaft on the pots, bend 90 degrees inward out of the way. Put the locking washer on the pots. Insert the pot shafts through the matching 3/8" holes in the frame and the top of the panel. Put on the nuts and tighten them very snugly, but avoid scratching the panel.
( ) 8. Attach the bottom of the panel to the frame using the remaining 4-40 screws and nuts.
( ) 9. Install the other pots onto the panel.
( ) 10. Install all 12 mini-phone jacks as shown in the panel drawing.
( ) 11. Turn all pot shafts fully counterclockwise and mount the knobs pointing to the leftmost number. Tighten knob screws.

THIS COMPLETES MODULE ASSEMBLY

PANEL WIRING--Refer to panel wiring diagram and board assembly drawing.

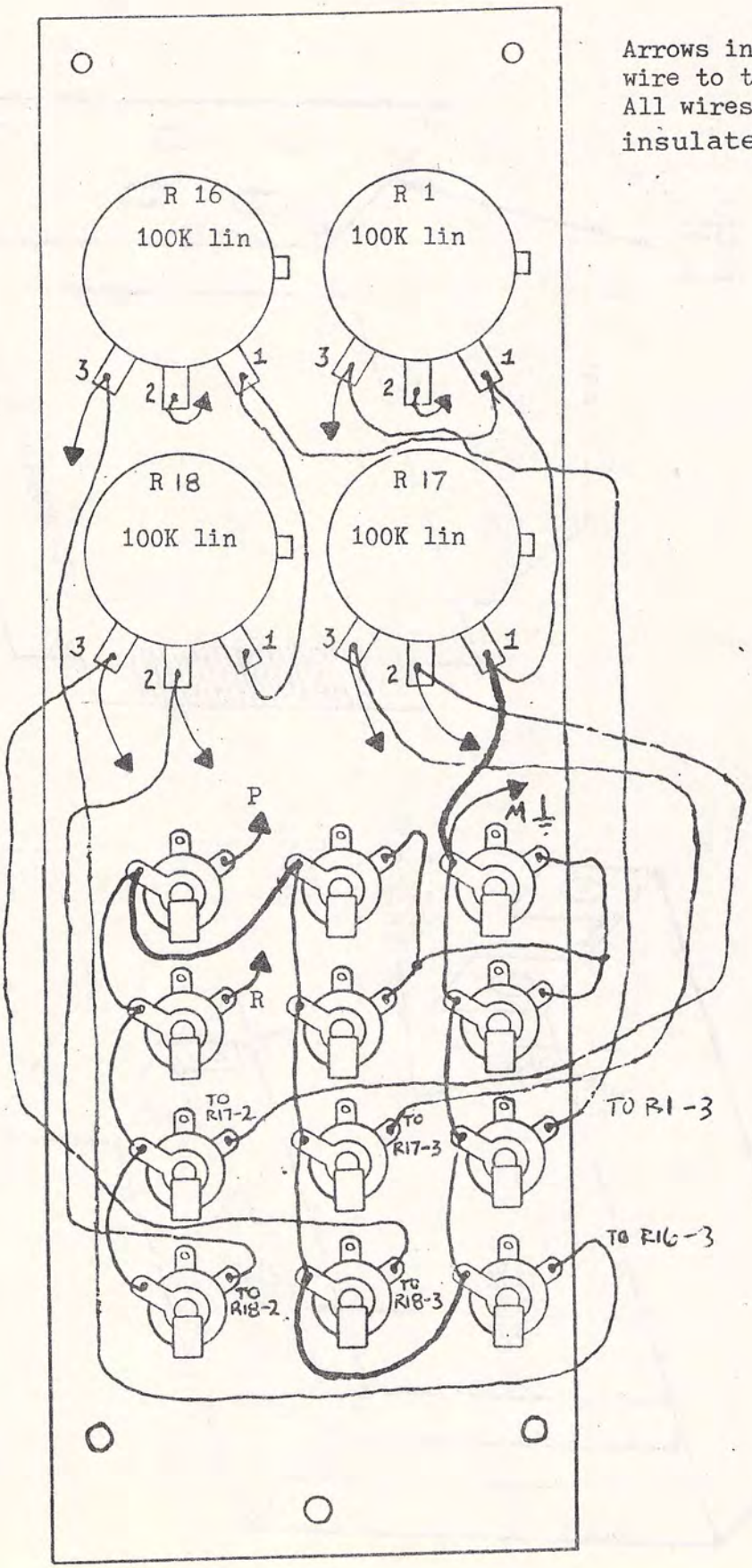
( ) 1. Run a wire connecting the grounds of all 12 mini-jacks, as shown, and from there to the point on the board labelled M on the assembly drawing.
( ) 2. Run a wire connecting pins 1,2,and 3 of each pot on the panel to the appropriate point on the board as labelled on the assembly drawing. Wire one pot at a time to avoid confusion.
( ) 3. Wire all jacks with arrows and a letter designation to the appropriate point on the board as labelled on the assembly drawing.

THIS COMPLETES ASSEMBLY OF YOUR BALANCED MODULATOR AND ATTENUATORS.



AR315 Balanced Modulator Module Assembly Diagram

AR 315 BALANCED MODULATOR AND ATTENUATORS PANEL WIRING DIAGRAM--rear view



Arrows indicate a wire to the PC board. All wires must be insulated.

BALANCED MODULATOR AND ATTENUATORS TRIM PROCEDURE

The following procedure is recommended if the test instruments are available.

1. Oscilloscope with direct doupled (DC) vertical input.
2. 10 volt DC voltage source. (The output from an envelope generator with sustain at maximum may be used for this.)
3. An oscillator with two waveforms.

Trim as follows: Turn all trim pots to center position before proceeding.

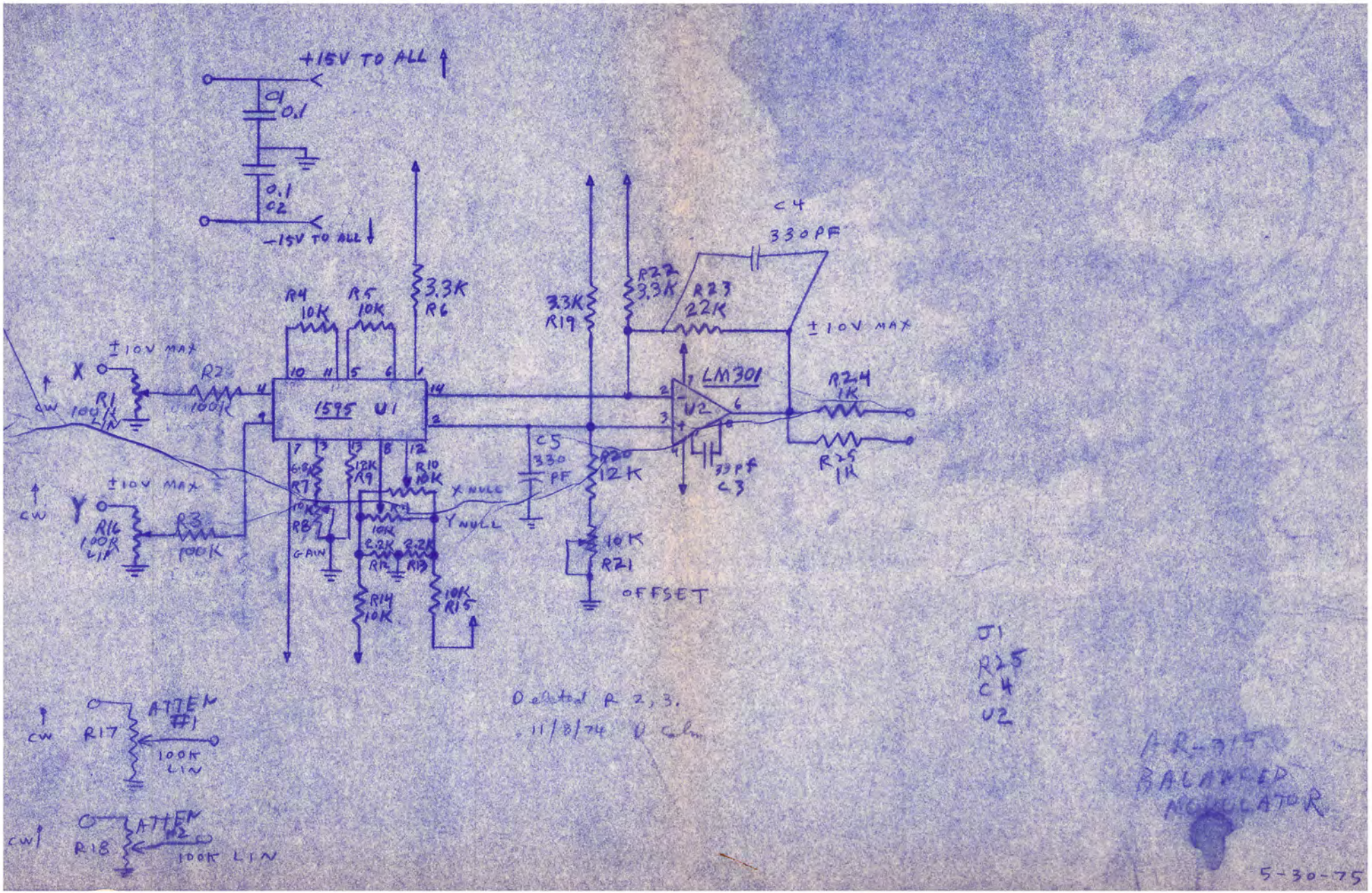
1. Turn the Y input attenuator to 0 and apply a 10 volt sawtooth to the X input. X input at 10.
2. Adjust R 10 for minimum signal on the output. (Oscilloscope gain may be increased for more precise trimming.)
3. Turn X input attenuator to 0 and apply a 10 volt sawtooth to the Y input. Y input at 10.
4. Adjust R 11 for minimum signal at the output.
5. Turn both input attenuators to 0. Adjust R 21 for 0 volts at the output.
6. Apply a 10 volt DC voltage to the inputs of X and Y. pots on 10.
7. Adjust R 8 for 10 volts at the output.

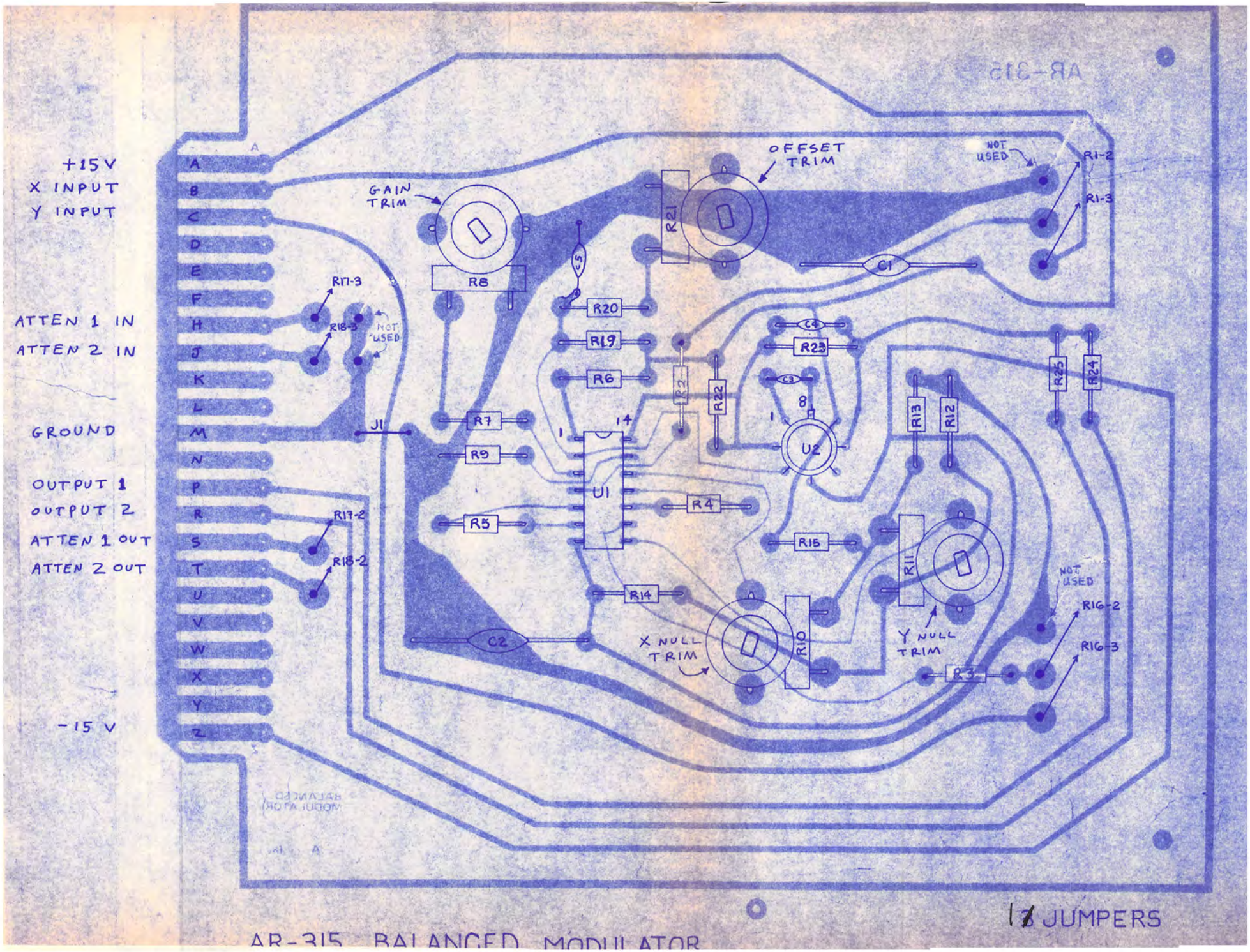
Your Balanced Modulator, Attenuators Modlue is ready to use.

THEORY OF OPERATION AR-315
BALANCED MODULATOR

The module has two inputs, called X and Y. Signals from these are fed to U1, which is a 4-quadrant multiplier I C. Its output is amplified by U2, an op amp connected as a differential amplifier. When trimmed, the output voltage should equal XY over 10.If either input, or both, are 0, the output will be 0.R10 trims the output to within a small fraction of a volt when Y is 0, and R11 does so when X is 0. When both inputs are 0, R21 is used to trim the output to 0 volts D C.

Finally, with 10 volts applied to BOTH inputs, R8 trims the gain for 10 volts output. By multiplying (modulating) two different audio waveform together, a wide variety of new sounds may be generated.The AR-315 module also has two independent controls with inputs and outputs, for use as a variable attenuator, or level control, anywhere in a synthesizer patch.


+15V TO ALL
C1 0.1
0.1 C2
-15V TO ALL
C4 330PF
R22 3.3K
R23 22K
3.3K R19
3.3K R6
R4 10K
R5 10K
±10V MAX
X
R1 100K LIN
R2 100K
1595 U1
LM301
U2
R24 1K
R25 1K
C5 330 PF
R20 12K
33pf C3
R7 6.8K
R8 10K
R9 12K
R10 10K
X NULL
Y NULL
GAIN
R11 10K
R12 2.2K
R13 2.2K
R14 10K
R15 10K
R21 10K
OFFSET
Y
R16 100K LIN
R3 100K
CW
R17 ATTEN #1 100K LIN
R18 ATTEN #2 100K LIN
Deleted R 2, 3.
11/8/74 V Cln
J1
R25
C4
U2
AR-315
BALANCED
MODULATOR
5-30-75


+15 V
X INPUT
Y INPUT
ATTEN 1 IN
ATTEN 2 IN
GROUND
OUTPUT 1
OUTPUT 2
ATTEN 1 OUT
ATTEN 2 OUT
-15 V
A
B
C
D
E
F
H
J
K
L
M
N
P
R
S
T
U
V
W
X
Y
Z
GAIN TRIM
OFFSET TRIM
NOT USED
R1-2
R1-3
R17-3
R18-3
NOT USED
J1
R17-2
R18-2
R8
R21
C5
C1
R20
R19
R6
R7
R9
R5
R2
R22
C4
R23
C3
U2
U1
R4
R15
R14
C2
X NULL TRIM
R10
R11
Y NULL TRIM
R3
R13
R12
R25
R24
NOT USED
R16-2
R16-3
1 JUMPERS
AR-315 BALANCED MODULATOR