Shure Brothers Incorporated
222 Hartrey Avenue
Evanston IL 60202-3696 U.S.A.

Model M267 User Guide

GENERAL

The Shure Model M267 is a microphone mixer-remote amplifier specifically designed for professional applications. The excellent performance, versatility and features of this complete, compact console make it an ideal choice for studio, remote, or sound reinforcement use, and as an add-on mixer for expanding existing facilities. It is also ideally suited for use with audio and video tape recorders to provide multiple microphone inputs.

Features:

- Wide, flat frequency response and extremely low distortion up to +18 dBm output
- Extremely low noise and RF susceptibility
- Four switchable microphone- or line-level balanced-line inputs with individual gain controls and low-frequency rolloff switches. MUMETAL shielding on input transformers
- Feedback-type input gain controls for maximum clipping levels and dynamic range
- Output switchable for line or microphone level
- Built-in switchable peak limiter cuts output overload distortion, adapts to power supply voltage
- LED indicator shows limiter operation or overload with limiter defeated
- Externally adjustable limiter threshold (–4 to +18 dBm)
- VU meter calibrated for +4 and +8 dBm with range switch. Illuminated with ac operation
- Ac or built-in battery operation. Noiseless automatic switchover to battery in case of ac line failure. Battery test without program interruption
- Front-panel headphone level control and monitor jack drives almost any stereo or mono headphones; output can be additional unbalanced line feed to drive a tape recorder or power amplifier
- Direct mix bus for stacking units
- Automatic muting prevents speaker damage during turn-on and -off
- Low distortion, high-stability tone oscillator for line test and level checks
- All connections phased. Line output terminals phase-indicated
- Compact and lightweight, with rugged, abrasion-resistant case
- Internally selectable 120 or 240 Vac, 50/60 Hz operation
- Underwriters' Laboratories Listed and Canadian Standards Association listed as Certified

SPECIFICATIONS

Frequency Response

30 Hz to 20,000 Hz, ±2 dB

Voltage Gain (at 1,000 Hz)

(Outputs terminated: line 600 Ω, microphone 150 Ω, mix bus 3.3 kΩ, headphone 200 Ω, tip-sleeve and ring-sleeve)

Input	OUTPUT		
	Line	Microphone	Mix Bus
Low-Impedance Microphone (150 Ω)	91 dB	41 dB	24 dB
Line	40 dB	–9 dB	–27 dB
Mix Bus	55 dB	5 dB	– –

Inputs

Input	IMPEDANCE		Input Clipping Level
	Designed for Use With	Actual (Internal)	
Microphone	19 to 600 Ω	1 kΩ	–32 dBV to –5 dBV* (25 mV to 0.56 V)
Line	Less than10 kΩ	66 kΩ	+20 dBV
Mix Bus	3.5 kΩ	3.5 kΩ	+7 dBV (2.2 V)

*Depending on input control setting

27A8376 (SE)

Printed in U.S.A.

Outputs

Output	IMPEDANCE		Output Clipping Level
	Designed for Use With	Actual (Internal)	
Microphone	Any low impedance microphone input	0.5	–34 dB (20 mV)
Mix Bus	3.5 kΩ	3.5 kΩ	–8 dBV (400 mV)
Headphones	8 - 2000 Ω 200 Ω recommended	400 Ω to 3 kΩ**	+10 dBV (3.3 V)
Line	600Ω	150Ω	+18 dBm (6.2 V)

**Depending on level control setting

Noise

Equivalent Input Hum and Noise: –126 dBV (low impedance microphone, 150 Ω - 20-20,000 Hz) into a 600 Ω load at full gain

Output Noise: –75 dBV (master control fully counterclockwise), –53 dBV (master fully clockwise), (input controls down, 300-20,000 Hz)

Output Hum and Noise: –70 dBV (master control down), –51 dBV (master control up) (input controls down, 20-20,000 Hz)

Distortion

0.35% or less THD from 30 to 20,000 Hz at +15 dBm output; 0.5% or less IM distortion up to +15 dBm output level

Common Mode Rejection

65 dB minimum with input of –20 dBV at 100 Hz

Control Interaction

Less than 1 dB with any control combination

Overload and Shorting Protection

Shorting the outputs, even for prolonged periods, will cause no damage; microphone inputs will not be damaged by signals up to 3 volts

Lo-Cut Filters

6 dB/octave rolloff at 150 Hz

Limiter

Threshold: +15 dBm (line output level; adjustable from –4 to +18 dBm)

Attack Time: 3 msec typical

Recovery Time: 500 msec typical

Peak Indicator

Lights 6 dB below clipping or at onset of limiter action

Headphone Output Clipping Level

3.16V (+10 dBV) into 200 Ω

Tone Oscillator

1,000 Hz, 1.5% or less THD

Phantom Power

30 Vdc open-circuit, 3.3 kΩ series resistance, input switches in MIC position only

Operating Voltage

Ac Operation: 120 or 240 volts ±10%, 50/60 Hz, 9.5W, internally switchable†

Dc Operation: 27 volts nominal at 15 mA typical no-signal, 18 mA typical at 0 VU (+4 dBm) output with headphone load; 21.5 volts minimum

Battery life: approximately 20 hours with alkaline batteries at +4 dBm output in continuous use; three 9-volt batteries, type NEDA 1604A (Duracell MN1604 recommended)

† Supplied wired for 120 Vac operation (See Service section for 240 Vac operation)

Temperature Range

Operating: –18º to 57º C (0º to 135º F)
Storage: –29º to 71ºC (–20º to 160º F)

Dimensions

See Figure 1

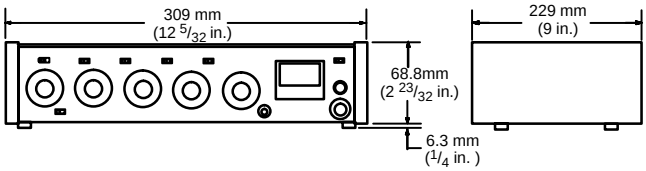


FIGURE 1

Weight

Net: 2.3 kg (5 lb 2 oz)

Packaged: 3.2 kg (7 lb 2 oz)

Certifications

Listed by Underwriters' Laboratories, Inc., and listed by Canadian Standards Association as Certified

CONTROLS AND CONNECTORS

WARNING

This apparatus must be earthed (grounded)! The M267 power supply is energized when the unit is connected to an ac source; disconnect mains (power) plug from supply when not in use.

Inputs

The four inputs are professional three-pin female XLR audio connectors located on the rear panel and designated INPUT 1 through INPUT 4. The inputs are balanced (internal transformer, MUMETAL shielded); pins 2 and 3 are "hot", and pin 1 is "ground". For microphone operation, the switches labeled LINE/MIC (directly above the input connectors) must be in the MIC position; for line level inputs, the switches must be in the LINE position. For impedance, clipping and operating signal levels, refer to the SPECIFICATIONS section.

Outputs

The rear-panel connector labeled OUTPUT is a professional three-pin male XLR audio connector. With the adjacent LINE/MIC switch in the MIC position, the OUTPUT connector is used to feed a low-impedance microphone line or a low-impedance microphone input. With the LINE/MIC switch in the LINE position, the OUTPUT connector feeds the line-level input of an amplifier, tape recorder, or another mixer. The OUTPUT connector is a balanced output with the LINE/MIC switch in either position; pin 1 is ground, pins 2 and 3 are "hot", and the connector is in phase with the corresponding pins of the input connectors.

The rear-panel binding-post connector designated LINE OUTPUT is in parallel with the OUTPUT connector and can be used as a line-level output feed simultaneously with the OUTPUT connector. The terminals are numbered 2 and 3 and are in phase with the corresponding pins of the input connectors. While the line outputs can be used to drive various impedance lines, the VU meter is calibrated for use with a 600 Ω line.

The line output transformer will operate properly with up to 100 mA dc in the line. This feature permits the use of standard "dialed-up" telephone lines with dc across them. (Since a slight distortion increase may occur at high output levels with maximum dc current, operation with the VU RANGE switch at +4 dBm is recommended.)

Input Gain Controls

The front-panel controls designated 1 through 4 are the individual active gain controls for correspondingly numbered inputs. Note that the input connectors are located on the rear panel directly behind their corresponding gain control. The controls set the preamplifier gain and provide preamplifier output attenuation. As the gain is reduced, the preamplifier input clipping level is increased for that channel.

Input control 1 serves an additional function as the level control for the tone oscillator when the INPUT 1/OCS 1 switch is in the OSC 1 position.

IMPORTANT: For optimum signal-to-noise ratio, the individual input controls should be operated at as high a setting as possible, consistent with maintaining adequate control range and input clipping level.

Master Gain Control

The front-panel control designated MASTER is the master gain control which sets the overall output level of the mixed sources (including signals applied to the MIX BUS input).

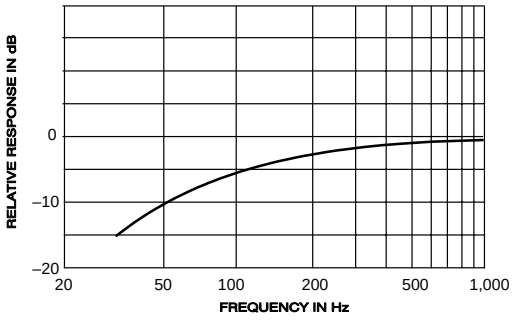
Limiter

The front-panel LIMITER IN/OUT switch turns on a fast-acting, peak-responding limiter circuit that cuts overload distortion during loud program intervals without affecting normal program levels. When the LIMITER switch is IN (operating), the mixer output is limited to approximately +15dBm. Increasing the individual or MASTER gain controls will increase the average output and the amount of limiting. The limiter threshold can be reset to any other output between –4 and +18 dBm if desired. With the limiter switched OUT and tone oscillator activated, adjust INPUT 1 and MASTER level controls to produce an output 0.5 dB higher than desired. Switch the limiter IN and set the LIMITER THRESHOLD ADJUST control (accessible though the bottom of the chassis) for the desired level.

The front-panel PEAK LED indicator shows limiter operation with the limiter in, and operates when program levels approach overload with the limiter out. The indicator is much faster than a meter and will be activated by the shortest transient peak, but it remains on long enough to provide easy recognition.

Low-Cut Filters

The low-cut filters provide a low-frequency rolloff to the response curve as shown in Figure 2. The filters are activated by the LO-CUT IN/OUT switch above each individual input gain control and can be used individually with each control to reduce wind noise or undesirable low-frequency signals such as from condenser microphones or turntable rumble.



LOW-CUT FILTER ACTION
FIGURE 2

Mix Bus

Direct access to the mixing bus is provided through the rear-panel MIX BUS phono pin jack. This provision is made primarily to facilitate stacking or "multing" M267s to achieve additional input capacity without losing any inputs. With two M267s, for example, the two mixing buses are directly connected, providing two independent master gain controls and two isolated line amplifiers with eight individually controlled inputs. Since the buses are directly paralleled, a 6 dB drop in gain will occur; and the master or input controls must be increased to compensate. Noise specifications are not adversely affected by this interconnection. Mix bus interconnection can also be made with other Shure mixers, such as the M268, FP42. etc.

VU Meter

The VU meter is factory-calibrated for use with a 600 Ω terminated line. The VU RANGE switch on the rear panel selects either a +4 or +8 dBm output at 0 VU meter indication. (This switch changes the meter indication but does not change the actual output level.) Microphone output levels are 50 dB below line output. The +4 range is recommended for normal use to provide approximately 14 dB of headroom from operating level to clipping level.

The VU meter is illuminated by two No. 86 lamps operating well under their normal ratings for a life expectancy of greater than 10,000 hours. The lamps are only lit during ac operation. Consequently, the illumination serves as a visual alarm if the ac is interrupted and the unit has switched to battery.

The VU meter is connected on the primary side of the output transformer to assure protection from any dc level on a telephone line.

Headphones

The headphone outlet appears at the front-panel jack panel designated PHONES. The two-circuit phone jack will accommodate most stereo or mono headphones. The output level is sufficient to provide high volume for use in noisy environments.

Note that the headphone output level is also high enough to use as an auxiliary unbalanced line feed to drive a tape deck or a power amplifier.

The tip and ring connections of the headphone plugs are in phase with pin 3 of all input and output connectors, and with the tip of the MIX BUS jack.

Tone Oscillator

The highly stable, low-distortion tone oscillator provides for line test and level checks. The oscillator is instantly activated by the front-panel INPUT 1/OSC 1 switch; its level can then be controlled by the INPUT 1 gain control on the front panel. The tone oscillator frequency is 1,000 Hz, and the signal appears on both the line and microphone outputs, as well as the headphone and mix bus connectors. The oscillator should be switched off (INPUT 1 position) when not in use.

Phantom Power

The rear-panel PHANTOM OFF/ON switch controls the application of phantom power for condenser microphones, such as the Shure SM81 and SM87A, to all inputs. With the switch on and the rear-panel MIC/LINE switches in the MIC positions, +30 Vdc is applied to pins 2 and 3 of each input connection. Series current-limiting resistance is 3.3 kΩ for each input. When using other condenser microphones with the M267, verify that the voltage and resistance requirements are compatible.

Note that the phantom power cannot normally be applied to the inputs with the MIC/LINE switches in the LINE position.

IMPORTANT: Do *not* turn the PHANTOM switch on when using *unbalanced* low-impedance microphones; objectionable hum will result. Turn off the PHANTOM switch when condenser microphones are not being used.

Use only high-quality cable. Intermittent shorts between broken shield wires and balanced conductors will cause offensive noise transients in the system.

BATTERY OPERATION AND EXTERNAL POWERING

In addition to ac operation, the M267 can be operated from an internal battery pack. Current drain is typically 17 mA at +8 dBm output level and typically 15 mA at + 4 dBm. Battery power is recommended both for remote, on-location operation, and as an emergency backup source in case of failure of the ac power.

Access to the battery compartment is provided at the bottom of the chassis. Three 9-volt alkaline batteries power the M267 at full rated output. Use alkaline batteries for maximum life. Duracell MN1604A or Eveready 522 are recommended. Battery life is approximately 20 hours at +4 dBm continuos use. Note that battery operation with phantom power loads and high level headphone monitoring will increase battery drain.

With batteries in the battery compartment, the M267 will automatically and silently switch to battery operation should the ac voltage fall below a suitable level. If the ac power fails completely, the VU meter lamps will go out, providing a visual indication of line failure.

Battery condition can be determined by using the BATT CHECK switch on the front panel. Activate the BATT CHECK switch and observe the VU meter. A new set of batteries will give about a +2 VU indication. Battery condition is good if the reading is above 0 VU; a lower reading means that new batteries are required for proper operation. Note that the M267 power switch must be turned on to check battery condition.

Telephone Interconnection

When using the M267 connected directly to a telephone line, check to see whether the local telephone company requires an interface coupler between the M267 and the telephone line. If a coupler is required, make certain the coupler selected and the wiring arrangement are in compliance with the telephone company regulations.

Telephone Line Surge Protection

When using the M267 connected directly to a telephone line subject to lightning-induced voltage surges, the following commercially available part can be installed across the LINE OUT terminals to provide additional protection for output circuit components:

Metal Oxide Varistor, General Electric Co., Type No. V22ZA1

ACCESSORIES

A268R Rack Panel Kit. The Model A268R Rack Panel Kit includes a 19 in. x 3-$^1/_2$ in. (483 mm x 89 mm) precut rack panel and necessary hardware for rack-mounting the M267 (with its cover in place and end caps removed) in a standard 19 in. (483 mm) rack panel.

RKC169 Rack Panel Bracket Kit. The Model RKC169 Rack Panel Bracket Kit enables owners of the Shure A68R Rack Panel Kit (originally designed for the M67 and M68 Mixers) to rack-mount the M267 with the A68R.

SERVICE

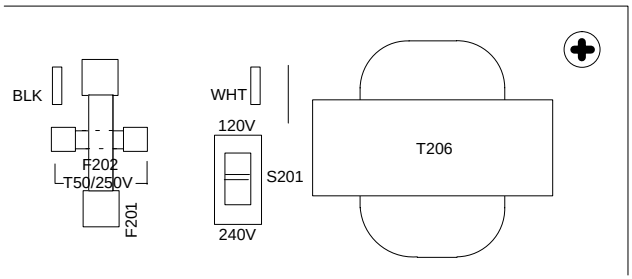
WARNING

Voltages in this equpment are harzardous!
Refer servicing to qualified service personnel.

240 Vac Operation

To change the M267 operating voltage from 120 Vac to 240 Vac, follow these steps:

1. Disconnect the M267 from the ac line.
2. Remove the end caps and cover.
3. Locate the voltage selector switch (S201) at the right rear of the main printed circuit board (Figure 3). Move SD201 to the 240V position (toward the front panel).



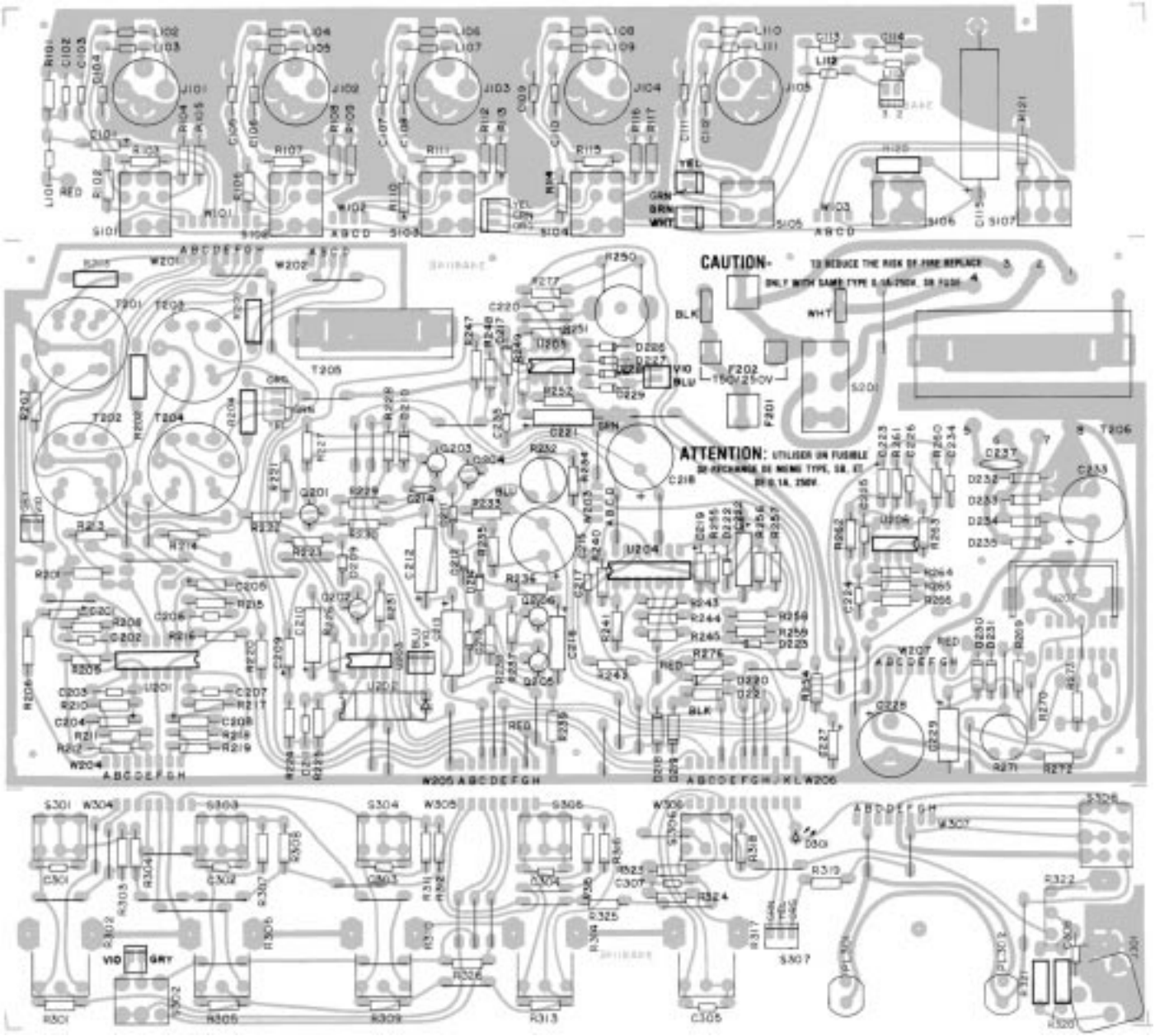
240 V WIRING
FIGURE 3

4. Remove fuse F201 (0.1A, 250V, time lag) and replace it with the supplied fuse F202 (0.05A, 250V, time lag). Note that the F202 fuse holder is at right angles to the F201 fuse holder.
5. Replace the ac line cord (if necessary) with one designed for the 240 Vac source. If the M267 is to be used outside the U.S. and Canada, local regulations may require replacing the line cord with one having wire insulation colors as follows:

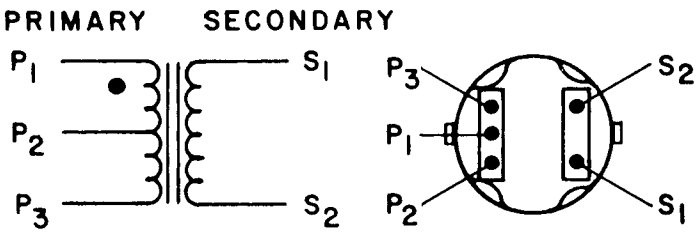
	"Live" or "Hot"	**Neutral**	**Earth or Ground**
U.S., Canada	Black	White	Green
Europe	Brown	Blue	Green/ Yellow

6. Replace the cover and end caps, and mark the rear panel to reflect the new operating voltage.

PRINTED CIRUCIT BOARDS
COMPONENT SIDE



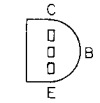
INPUT TRANSFORMERS T201-T204



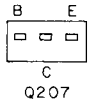
DC RESISTANCE (± 20%)

P_1 - P_3 75 OHMS
P_1 - P_2, P_2 - P_3 37.5 OHMS
S_1 - S_2 4300 OHMS

TRANSISTOR LEAD CODES

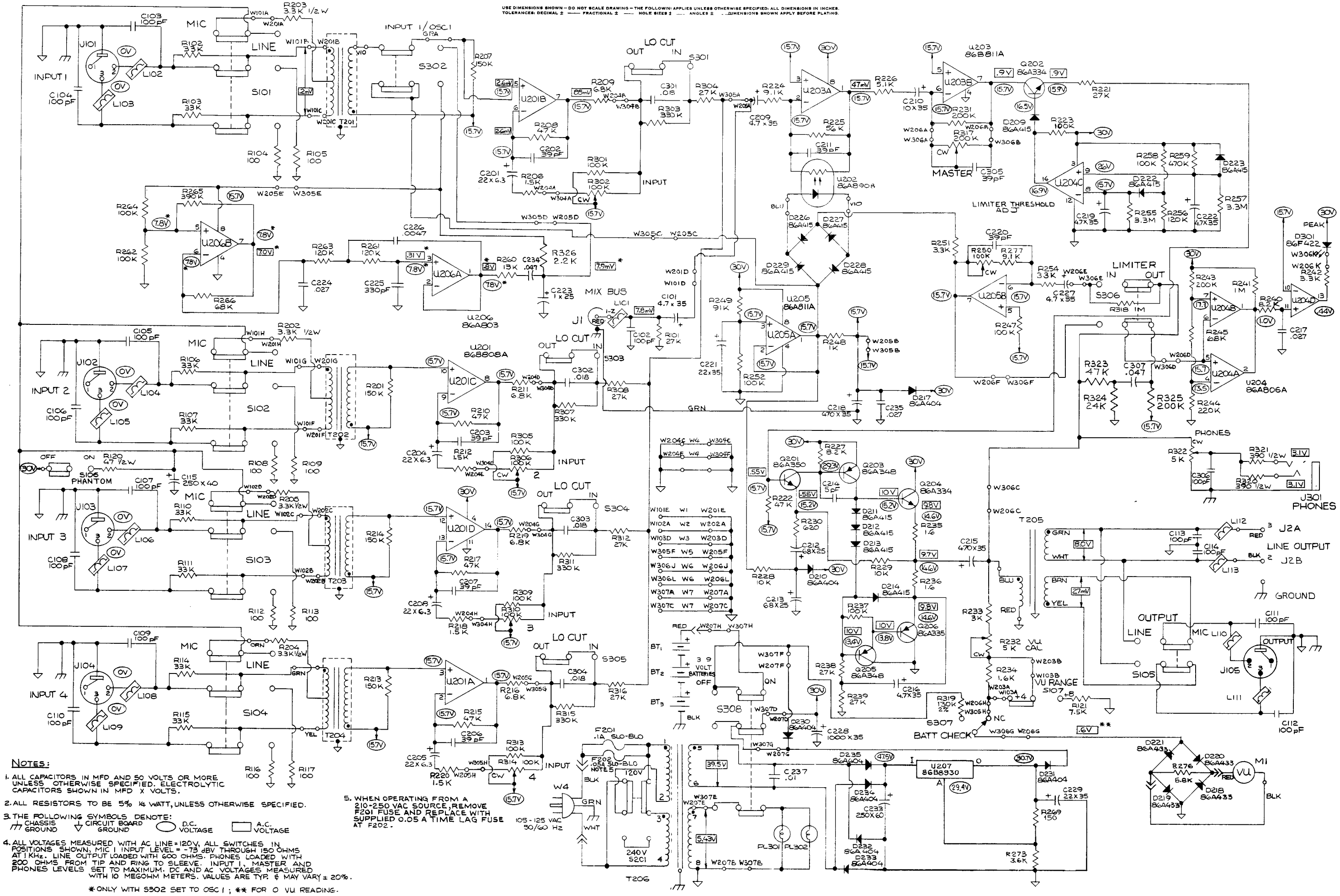


Q201 ~ Q206



Q207

USE DIMENSIONS SHOWN — DO NOT SCALE DRAWING — THE FOLLOWING APPLIES UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES.
TOLERANCES: DECIMAL ± —— FRACTIONAL ± —— HOLE SIZES ± —— ANGLES ± —— DIMENSIONS SHOWN APPLY BEFORE PLATING.



NOTES:

1. ALL CAPACITORS IN MFD AND 50 VOLTS OR MORE UNLESS OTHERWISE SPECIFIED. ELECTROLYTIC CAPACITORS SHOWN IN MFD X VOLTS.
2. ALL RESISTORS TO BE 5% ¼ WATT, UNLESS OTHERWISE SPECIFIED.
3. THE FOLLOWING SYMBOLS DENOTE:
   CHASSIS GROUND ⏚ CIRCUIT BOARD GROUND ⬭ D.C. VOLTAGE ▭ A.C. VOLTAGE
4. ALL VOLTAGES MEASURED WITH AC LINE = 120V, ALL SWITCHES IN POSITIONS SHOWN, MIC 1 INPUT LEVEL = -73 dBV THROUGH 150 OHMS AT 1 KHz. LINE OUTPUT LOADED WITH 600 OHMS. PHONES LOADED WITH 200 OHMS FROM TIP AND RING TO SLEEVE. INPUT 1, MASTER AND PHONES LEVELS SET TO MAXIMUM. DC AND AC VOLTAGES MEASURED WITH 10 MEGOHM METERS. VALUES ARE TYP. & MAY VARY ± 20%.
   * ONLY WITH S302 SET TO OSC 1 ; ** FOR 0 VU READING.
5. WHEN OPERATING FROM A 210-250 VAC SOURCE, REMOVE F201 FUSE AND REPLACE WITH SUPPLIED 0.05 A TIME LAG FUSE AT F202.

MODEL M267 CIRCUIT DIAGRAM

8059-11-20

REPLACEMENT PARTS LIST

REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION	COMMERCIAL ALTERNATE
C101,C209, C219, C227, C232	86T628	Capacitor, Electrolytic, 5 µF, 25V	Sprague TVA 1303
C115	86L628	Capacitor, Electrolytic, 250 µF, 50V	Sprague 501D227F063PR
C201, C204-C205, C208	86V628	Capacitor, Electrolytic, 22 µF, 6.3V	Sprague 501D226F016LL
C210	86M630	Capacitor, Electrolytic, 10 µF, 25V	Sprague TE 1204
C212-C213	86R630	Capacitor, Electrolytic, 68 µF, 25V	Sprague 501D686F025MN
C215, C218	86L626	Capacitor, Electrolytic, 470 µF, 35V	Sprague 503D477F035QE
C216, C222	86A630	Capacitor, Electrolytic, 5 µF, 35V	Sprague TE1303
C221, C229	86N630	Capacitor, Electrolytic, 22 µF, 35V	Mallory F226KM
C223	86S628	Capacitor, Electrolytic, 1 µF, 50V	Sprague TVA1300
D209, D211-D214, D222-D223, D226-D229	86A415	Diode, Silicon, Computer, 75V	TI 1N4148
D210, D217, D230-D235	86A404	Silicon Rectifier, 100V, 1/2A	Motorola 1N4002
D218-D221	86A405	Diode, Germanium, 30V	RCA 1N48, 1N60
D301	86F422	Diode,Light-Emitting	General Instrument MV5075C
F201	80F159	Fuse, Slow–Blow, 3AG, 0.1A, 250V	Littlefuse 313000 Series
F202	80C380	Fuse, Time Lag, 0.05A, 250V	Schurter 034.3104
J1	95C450	Jack, Phono	Switchcraft 3511A
J2A, B	90T2600	Connectors, Binding Post	None
J101-J104	95B8011	Connector, 3-Pin Female XLR	Switchcraft Y3FDPC
J105	95B8012	Connector, 3-Pin Male XLR	Switchcraft Y3MPC
J301	90BJ2600	Phone Jack	Switchcraft L-1128PC
L101-L113	80A365	Ferrite Bead Ring	Panasonic Exc-ELSA35
M1	RKC170 (95A8214)	Meter, 190 µA	None
MP1-MP5	90A8028	Knob, MIC 1-4, MASTER	None
MP6	90A8029	Knobs, PHONE	None
MP7	90A8027	Cover, Battery	None
MP8-MP9	65A8008	End Cap	None

REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION	COMMERCIAL ALTERNATE
PL301-PL302	95A8010	Lamp, 6.3V, 0.2A	Sylvania 86
Q201	86A350	Transistor, NPN	Motorola 2N5210
Q202, Q204	86A334	Transistor, NPN	Rohm TIS92
Q203, Q205	86A348	Transistor, PNP	Motorola 2N5087
Q206	86A335	Transistor, PNP	Rohm TIS93
Q207	86A8302	Transistor, PNP	Motorola TIP30A
R250	46A8016	Potentiometer, 100k	None
R302, R306, R310, R314	46B8000	Potentiometer, 100k	None
R317	46C8000	Potentiometer, 200k	None
R322	46D8000	Potentiometer, 5k	None
S101-S104	55B8008	Switch, Slide, 3PDT	None
S105, S302, S306	55B8007	Switch, Slide, DPDT	None
S106-S107, S301, S303-S305	55B8001	Switch, Slide, DPDT	None
S201	55A8035	Switch, Slide, DPDT	Switchcraft EPS1-PC1
S307	90CB2600	Switch, Pushbutton, SPDT	Switchcraft 953
S308	55A8009	Switch, Slide, 3PDT	None
T201-T204	95B8165	Transformer, Input	None
T205	51E235A	Transformer, Output	None
T206	51A8021	Transformer, Power	None
U201	86B808A	Integrated Circuit, Quad Op Ampl (Selected for NF)	Raytheon RC4156N
U202	86A8908	Opto-Isolator	None
U203	86A811A	Integrated Circuit, Dual Op Ampl	Raytheon RC4559NB
U204	86A806A	Integrated Circuit, Quad Comparator	Raytheon LM339DB
U205	86A811A	Integrated Circuit, Dual Op Ampl	Raytheon RC4559NB
U206	86A803	Integrated Circuit, Dual Op Ampl	Motorola MC1458C-P1
U207	86B8930	Integrated Circuit, Voltage Regulator	National Semiconductor LM317AT
W1	90A8045	Line Cord, AC	None

Parts listed as RKC Kits should be ordered by that kit number.