KORG POLY–6
MIDI Retrofit

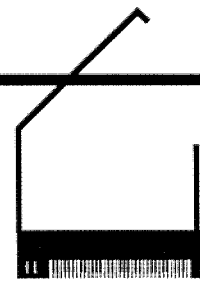# SERVICE/ INSTALLATION MANUAL

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Westbury, NY 11590

POLY–6 MIDI RETROFIT
SERVICE/INSTALLATION MANUAL

The Korg PS6–MRK MIDI Retrofit Kit for the Korg Poly–6 synthesizer is an authorized field-installed option for all versions of the Korg Poly–6 which will enable it to send and receive an extensive range of MIDI data.

The MIDI features supported by the Poly–6 Retrofit are listed on Page 1 of the Owners Manual enclosed with this package. (See also MIDI implementation information at the back of the Owners Manual.)

The Retrofit also adds certain hardware features to the Poly–6: an expanded 120 program memory, Damper/Sustain footswitch jack, All Notes Off command and an upgraded Tape Interface circuitry that reads, writes and verifies both 32-program and 120-program tapes.
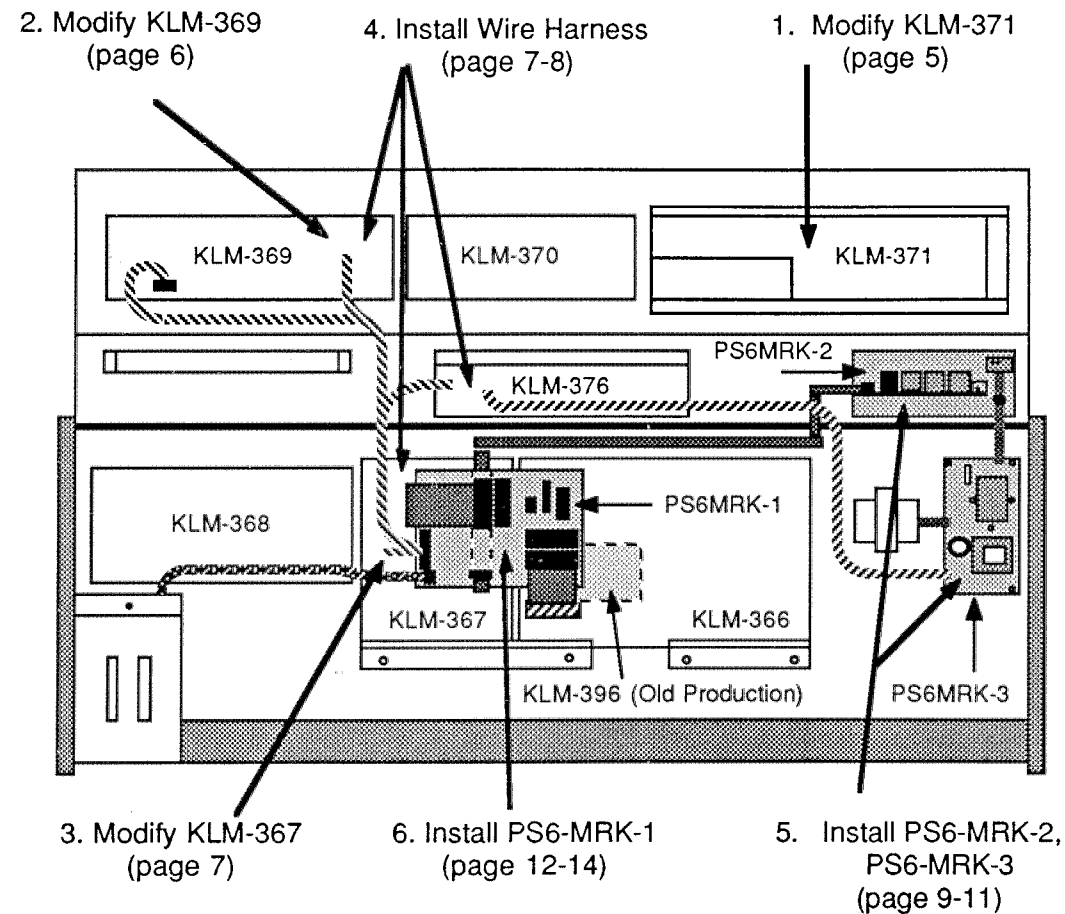
The installation procedure for the Poly–6 MIDI Retrofit is simple and straightforward. The same general procedure is used for *ALL* versions of the Poly–6 ("old" and "new" production). **NOTE:** NO PANEL DRILLING OR OTHER PHYSICAL MODIFICATION OF THE POLY–6 PANEL IS REQUIRED FOR INSTALLATION! Average installation time is approximately one hour, and the amount of time necessary will decrease as the technician becomes familiar with the procedure.

In order to install the PS–6 MIDI Retrofit, you will need the Korg PS–6 Service Manual for reference, a copy of which can be obtained from Korg U.S.A. (or, when outside of US, from the local Korg distributor).

WARNING!

This kit must be installed by an authorized Korg Service facility. Installation by non-authorized persons voids all warrantees.

INSTALLATION OVERVIEW

2. Modify KLM-369
(page 6)

4. Install Wire Harness
(page 7-8)

1. Modify KLM-371
(page 5)

KLM-369

KLM-370

KLM-371

PS6MRK-2

KLM-376

KLM-368

PS6MRK-1

KLM-367

KLM-366

KLM-396 (Old Production)

PS6MRK-3

3. Modify KLM-367
(page 7)

6. Install PS6-MRK-1
(page 12-14)

5. Install PS6-MRK-2,
PS6-MRK-3
(page 9-11)

PRELIMINARY PROCEDURES

◆ **IMPORTANT:** Make sure the unmodified Poly–6 is in proper working order *before* installing the Retrofit!

◆ **SAVE YOUR PROGRAMS!** *Make sure the user has saved his programs to tape BEFORE commencing Retrofit installation.* Installing the retrofit **IRRETRIEVABLY DESTROYS** all program data.

SUMMARY OF INSTALLATION PROCEDURE

(See OVERVIEW Diagram, opposite page.)

1. Open front panel; remove keyboard.
2. Modify KLM-371 PC Board (page 5).
3. Modify KLM-369 PC Board (page 6).
4. Modify KLM-367 PC Board (page 7).
5. Install Wire Harness (page 7).
6. Install PS6–MRK-2 and PS6–MRK-3 PC Boards (page 9).
7. Install PS6–MRK-1 Main PC Board (page 12).
8. Test/Calibrate the completed retrofit (page 14).
9. Reinstall keyboard; close front panel.

3. KLM-369 MODIFICATIONS

Two traces are cut on PC board, allowing use of the Poly–6's programmer's input multiplexers and A/D convertor for Pitch Bend and Modulation Wheels interpretation.

◆ **Note** that it is *not* necessary to remove this board from front panel. We recommend, however, positioning entire PS–6 on its back, to facilitate cutting PC traces.

1. Referring to KLM-369 Diagram below and on page 14 of the Poly–6 Service Manual, locate IC 2 (4051 multiplexer).

2. Carefully cut indicated foil traces leading to pins 2 and 4, using X-Acto knife or similar tool. Exercise care to not cut other traces or otherwise damage board.

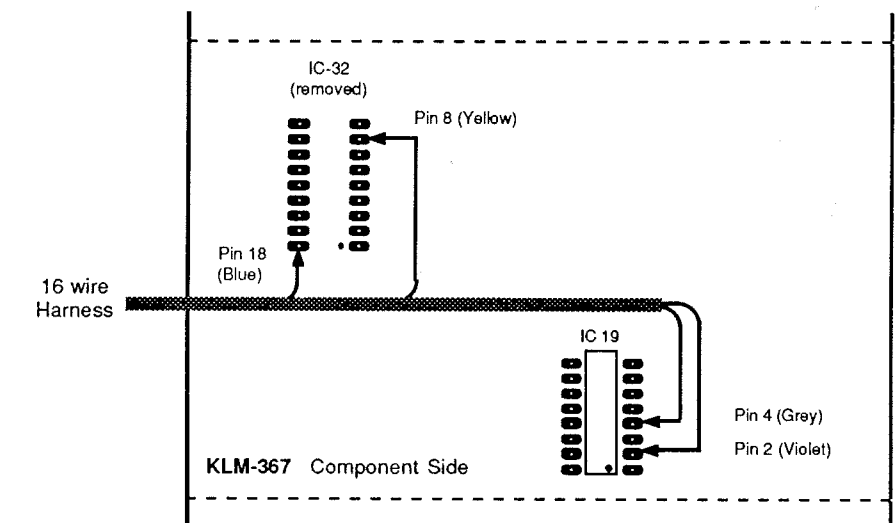   (Do not install wire harness yet; see pages 7-8.)

KLM-369 Foil Side

16-wire Harness

Orange   2   4   Brown

Cut foils here   IC 2
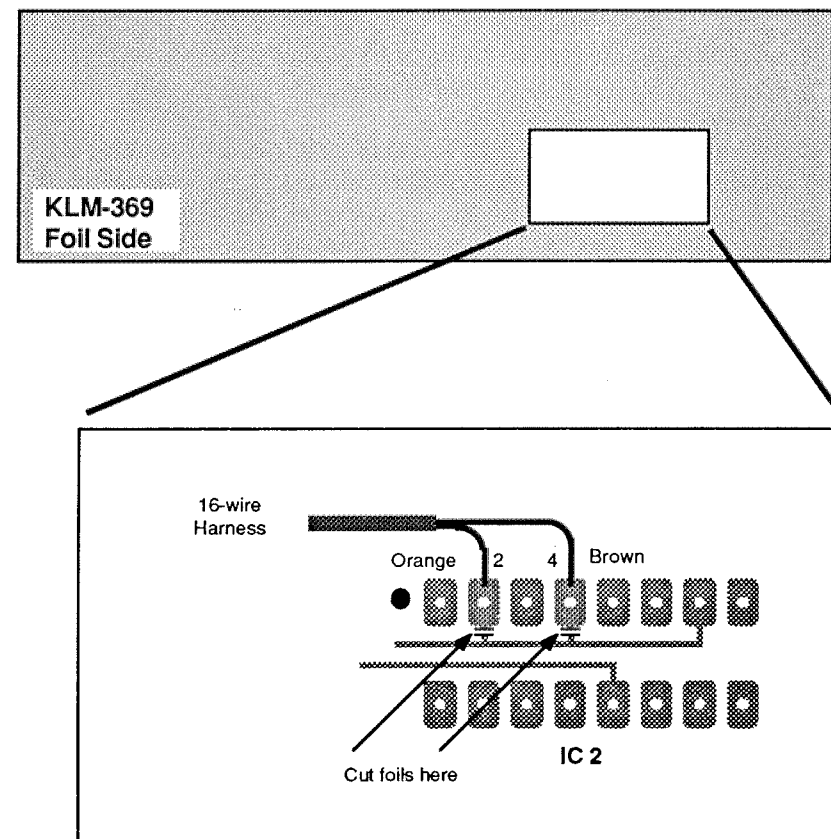
4. KLM-367 MODIFICATIONS

The PS–6 Programmer board is modified by removing the old 1K X 4 RAM IC and obtaining the converted output of the D/A circuitry for Pitch and Mod Wheels.

1. Referring to KLM-367 Diagram below and on page 12 of the Poly–6 Service Manual, remove and discard IC 32 (TC-5514 RAM).

   ◆ **NOTE:** If IC32 is soldered to PC board, in order to avoid board damage, we recommend cutting pins close to the IC body, removing IC body, then removing pins separately from PC board.

   If IC32 is socketed, remove IC and socket from PC Board.

IC-32 (removed)

Pin 8 (Yellow)

Pin 18 (Blue)

16 wire Harness

IC 19

Pin 4 (Grey)

Pin 2 (Violet)

KLM-367 Component Side

5. INSTALLING WIRE HARNESS

1. Locate 16 wire harness and connector assembly provided with Retrofit. Referring to above KLM-367 Diagram, connect harness wires to KLM-367 as follows:

   ◆ Connect **blue** wire to IC-32 pin 18 (IC-32 was previously removed).
   ◆ Connect **yellow** wire to IC-32 pin 8.
   ◆ Connect **violet** wire to IC-19 pin 2 (tack solder onto IC leads).
   ◆ Connect **grey** wire to IC-19 pin 4.

INSTALLATION PROCEDURE

||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||

1.

1. Unpack and inspect the PS–6 MIDI Retrofit kit. It should consist of the following parts:

1	PS6–MRK-1	Main Retrofit PC Board
1	PS6–MRK-2	Rear Panel MIDI PC Board
1	PS6–MRK-3	5 volt Power Supply PC Board
1		16-wire harness with 16-pin and 6-pin connectors
3		470 ohm 1/4 watt resistors
1		1 ohm 1/2 watt resistor
1		Kit of miscellaneous mounting hardware
1		Service/Installation Manual
1		Owner's Manual
1		120-Program Cassette Tape

2. Remove 8 screws securing front panel to unit and swing it back on its hinges.

3. Referring to structural diagram on page 2 of the Poly–6 Service Manual, remove 6 screws holding Keyboard Assembly into the unit, and lift keyboard out to the side of PS–6. (It is not necessary to disconnect keyboard.)

4. (As an additional maintenance precaution, check voltage/condition of NiCad Battery on KLM-367. Replacement is recommended if low voltage and/or excessively corroded.)

2.   KLM-371 MODIFICATIONS

||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||

Three jumpers are replaced with 470 ohm 1/4 watt resistors, to allow Bank LEDs to light in combination. Resistor R14 is replaced with a jumper.

1. Remove 8 front panel screws and Arpeggiator Speed knob, control nut and washer holding KLM-371 PC Board (see Structural Diagram, page 2 of Poly–6 Service Manual).

2. Carefully lower and turn over KLM-371, exposing mounted components. (Release cable clamp below PC board to allow greater movement.)

3. Referring to the diagrams of KLM-371 below and on page 15 of the Poly--6 Service Manual, locate and remove 3 jumpers (J-12, J- 13 and J-16) using solder wick and/or vacuum device. (Save jumpers.) Replace jumpers with supplied 470 ohm resistors.

4. Remove R-14; replace with a jumper from step 3 above.

5. Reinstall KLM-371 on front panel and fasten with control hardware, mounting screws and knob. (Reinsert wires into cable clamp.)

KLM-371   (Component Side)
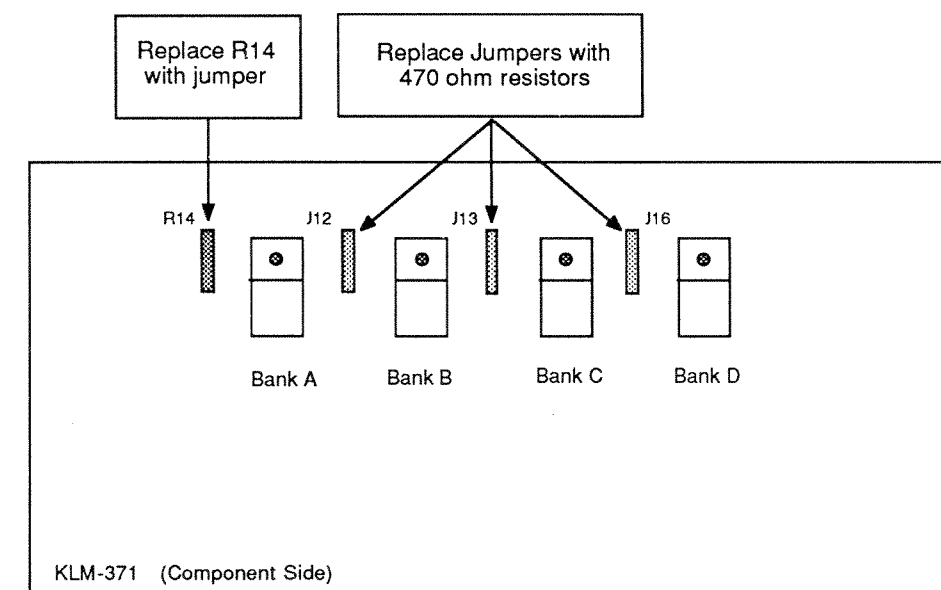
2. (Harness connections to KLM-369 - See diagram, page 6):

 ◆ Connect **orange** wire to pin 2 of IC-2.
 ◆ Connect **brown** wire to pin 4 of IC-2.
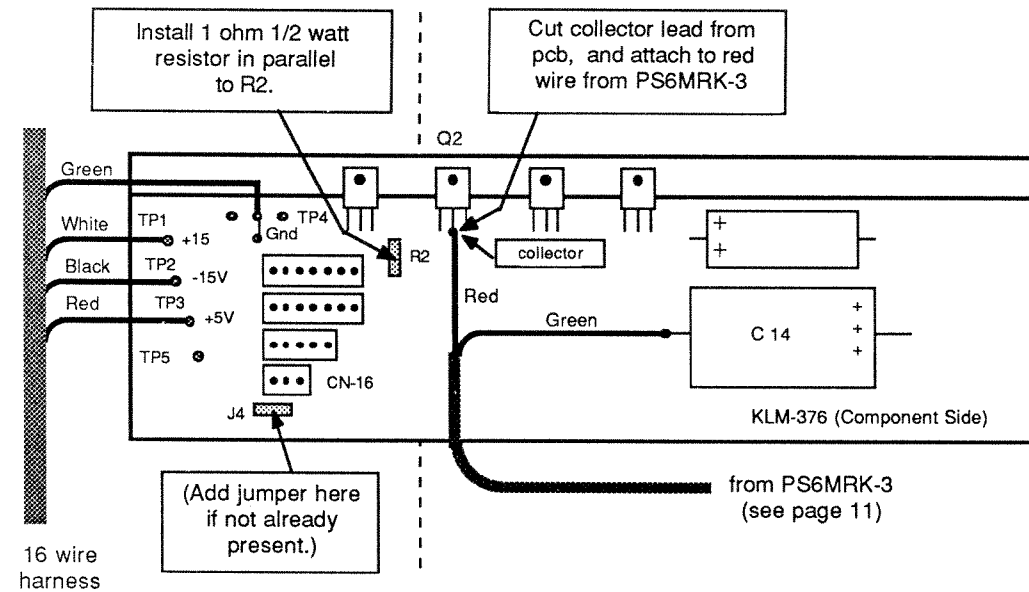
3. (Modifcations to KLM-376—see Diagram above):

 ◆ Install 1 ohm 1/2 watt resistor provided with kit in parallel with R2.

 ◆ Check for presence of Jumper J4 on KLM-376 at lower left (below connector CN 16). Install jumper from KLM-371 at this location if none present.

4. (Make indicated Harness connections to KLM-376 by soldering to Test Point loops if provided, or directly to PC board holes):

 ◆ Connect **green** wire to ground lug next to TP-4.
 ◆ Connect **white** wire to TP-1 (+15v).
 ◆ Connect **black** wire to TP-2 (-15v).
 ◆ Connect **red** wire to TP-3 (+5v).

 (NOTE: Wires from PS6-MRK-3 power supply will be installed later; see page 11.)

5. Let 16-pin and 6-pin cable connectors lie unattached for the time being.

At this point you are ready to install the Retrofit boards.

6. INSTALLING PS6–MRK-2 AND PS6–MRK-3 PC BOARDS

In this section, the old rear panel holding the AC line cord and power switch, and the A.C Transition PC Board (located in upper right corner of PS-6 bottom) will be removed and replaced by PS6-MRK-2 MIDI Transition PC board and PS6-MRK-3 Power Supply units, respectively.

◆ **NOTE:** The Poly-6 incorporates two basic Power Supply versions, with a number of variations. These versions utilize two different PC Boards (KLM-372 or KLM-425), two different Line (Noise) Filters (plastic, metal...or no filter at all) and a "Spark Killer" capacitor. The Line Filters and Spark Killer may be mounted on the PC board, on the floor of the PS-6 or on the AC Power Switch, depending on the version.

ALL VERSIONS ARE SUPPORTED BY THE POLY-6 MIDI RETROFIT. Refer to page 16 of the Poly-6 Service Manual for details of KLM-372 and KLM-425. The Installation Procedure is almost identical for all models.

◆ **NOTE:** The PS6-MRK MIDI RETROFIT KIT is available in both 120 Volt and 240 Volt versions. The voltage is labelled on the power transformer. Contact Korg USA to obtain a different version of Retrofit Power Supply, if necessary.

PROCEDURE

1. Cut all wires connected to KLM-372 or KLM-425 close to solder lugs. (Release any cable ties or wire clamps as necessary, to free wires.)

2. If not already done, cut AC Line Cord and metal Line Filter leads (if used), *at their termination point.* (Do NOT cut any remaining wires leading from AC Power Switch.)

3. Remove Rear Panel and KLM-372/KLM-425 PC Board from the Poly-6. (Cardboard PC Board Insulator may be discarded.)

4. Unsolder and remove the Line Filter (if used) and .033 ufd Spark Killer from their mounting position. (PC Board may be discarded.)

5. Remove AC Line Cord, AC Power switch (with any leads still attached), Serial Number Plate and Ground Screw hardware from Poly-6 Rear panel. (Rear panel may be discarded.)
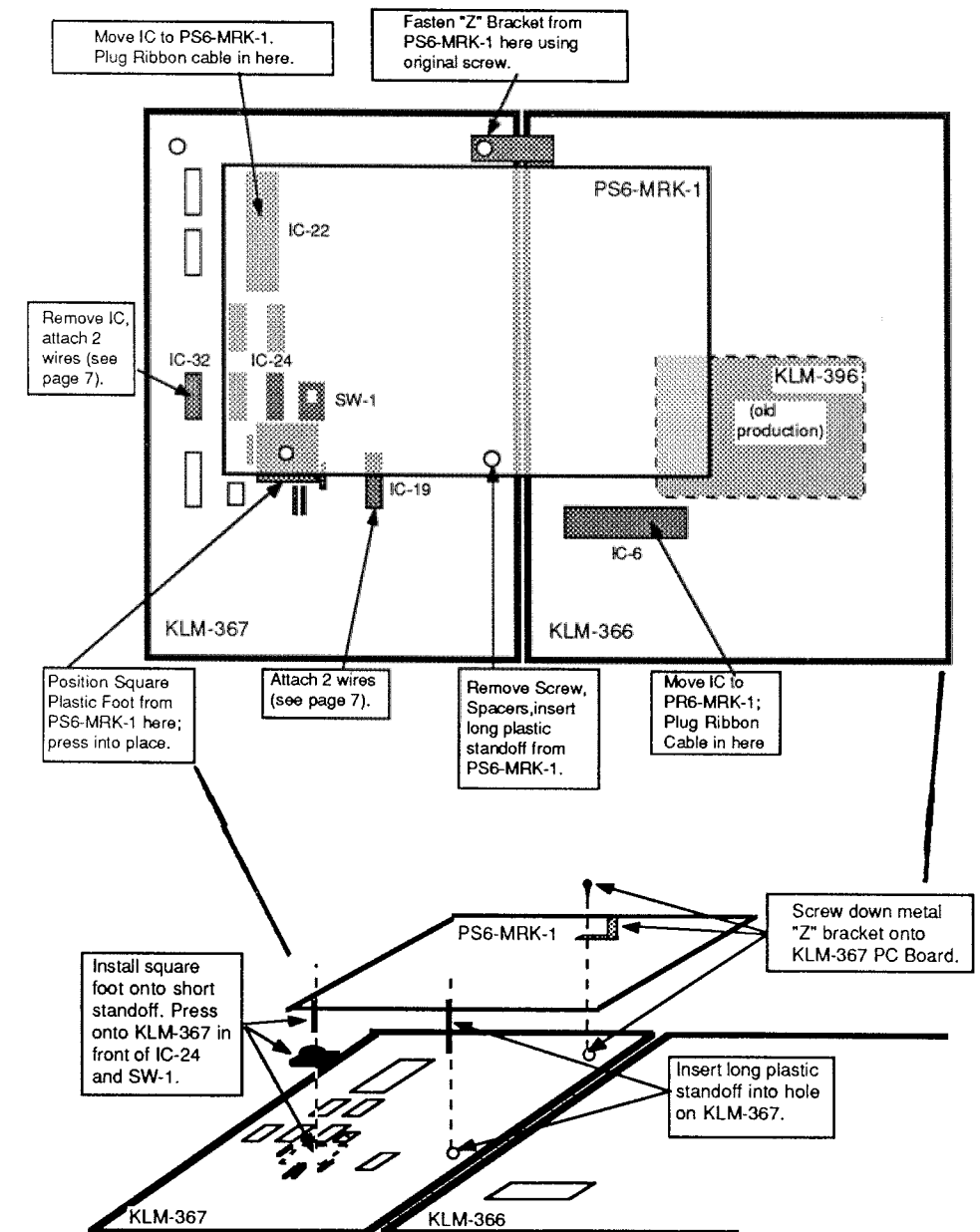
7. INSTALLING PS6–MRK-1 MAIN RETROFIT BOARD

1. Referring to the PS6-MRK-1 Layout diagram on page 22, carefully remove plug ends of the two 40-pin ribbon cables (P1 and P3) from the 8048 and 8049 microprocessor sockets (U1 and U7) on PS6-MRK-1 Retrofit Board.

   ◆ **NOTE:** 40 pin Ribbon Cables may have plugs on *both* ends, to facilitate service replacement. *Make sure* one end of each cable is plugged into P1 and P3 sockets, respectively, on PS6-MRK-1 PC Board.

2. Remove IC-22 (8048 Microprocessor) from KLM-367. Reinstall at location U1 on PS6-MRK-1 Retrofit Board, taking care to not bend any pins.

3. Similarly, remove IC-6 (8049 Microprocessor) from KLM-366 and install it at location U7 on PS6-MRK-1.

4. Referring to diagram on next page, remove two mounting screws (upper and middle) along righthand side of KLM-367 PC Board. Remove lower and upper plastic spacers from *middle* screw hole. (Leave both spacers in upper screwhole.)

   ◆ **NOTE:** To remove lower spacer, temporarily unscrew 2 left-hand screws on KLM-367 and lift up board from rear.

5. Obtain and install square plastic adhesive foot onto end of shorter standoff attached to PS6-MRK-1 by snapping it into place. Carefully peel off protective paper cover on bottom of adhesive foot.

6. (Reconnect Poly-6 keyboard connector to KLM-366 if disconnected.) Run Ribbon cable from PS6-MRK-2 Rear Panel assembly straight towards you from center rear to front, such that PS6-MRK-1 will be on top of cable when installed (plug pins up).

7. Referring to diagrams on next page, orient PS6-MRK-1 with two plastic standoffs toward you, and note orientation of PS6-MRK-1 relative to KLM-366 and -367. CAREFULLY plug the 2 ribbon cable plugs from Retrofit board into their respective sockets on KLM-366/367 (P1 to IC-22 on KLM-367; P3 to IC-6 on KLM-366), taking care to not bend any pins.

8. Place PS6-MRK-1 in indicated position over KLM-366/367. Insert longer unfooted plastic standoff into middle right-hand screwhole on KLM-367 until it snaps into place.

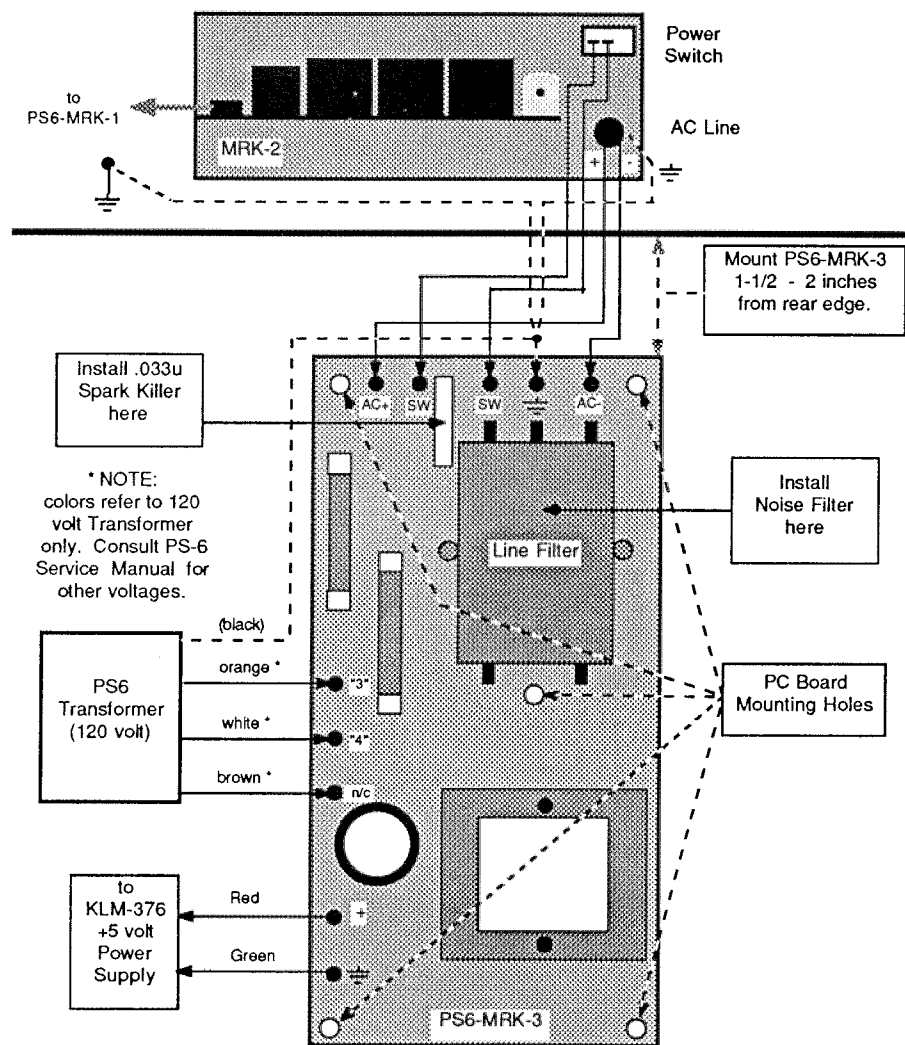   Position square adhesive foot in open space directly in front on IC-24 and SW-1 on KLM-367; press into place.

   (Do not fasten PS6-MRK-1 "Z" bracket down until all tests and calibration procedures are finished.)

◆ **NOTE** that the PS6-MRK-1 Retrofit board will clear the small KLM-396 board found in "old production" versions of the Poly–6. No additional modifications or repositioning of KLM-396 are needed, although the 8049 ribbon cable may have to be crimped slightly to clear front edge of KLM-396.)

PS6-MRK-1 Installation

PS6-MRK-2/3
Installation

to PS6-MRK-1

MRK-2

Power Switch

AC Line

Mount PS6-MRK-3 1-1/2 - 2 inches from rear edge.

Install .033u Spark Killer here

* NOTE: colors refer to 120 volt Transformer only. Consult PS-6 Service Manual for other voltages.

Install Noise Filter here

Line Filter

AC+ SW SW ≐ AC-

PS6 Transformer (120 volt)

(black)

orange *

white *

brown *

n/c

PC Board Mounting Holes

to KLM-376 +5 volt Power Supply

Red

Green

PS6-MRK-3

6. Install previously removed Line Filter and Spark Killer onto the PS6-MRK-3 PC Board at the positions indicated in the above diagram (note orientation of Line Filter on the PC board).

- ● **Metal Version:** cut and solder leads directly to PC board.

- ● **Plastic Version:** connect Line Filter lugs to PC board using bare wire supplied.

- ◆ **NOTE:** If the Poly-6 didn't use a Line Filter, contact Korg USA Service Department/local foreign Korg distributor to obtain a filter for installation into the Poly-6.

7. Install Serial Number plate on rear panel or on bottom of PS-6 using appropriate hardware.

8. Install AC Line cord, AC Power Switch and Ground Screw hardware onto PS6-MRK-2 Rear Panel assembly. (Note orientation of Power Switch lugs in diagram on previous page.)

- ◆ **NOTE:** We recommend repositioning Heyco connnector farther back on AC Line Cord toward plug end, to minimize possibility of wire breakage. Allow approximately 5" long leads inside Poly-6.

9. Install PS6-MRK-2 Rear Panel assembly to inside rear panel of Poly-6, using provided 6-32 hardware.

10. Connect leads from Poly-6 Power Transformer, AC Line Cord and AC Power Switch to PS6-MRK-3 Power Supply at indicated points. (Attach any ground wires present from AC Line Cord, Power Transformer, and/or rear panel ground lug to indicated ground point on pc board and/or middle ground terminal on Line Filter.

- ◆ **NOTE:** Color coded leads from Poly-6 Transformer in diagram on previous page are for U.S. VERSION (120 volts) ONLY. Consult Poly-6 Service Manual for other voltage versions of Poly-6.

11. Fasten PS6-MRK-3 Power Supply to floor of Poly-6 approximately 1-1/2" from rear of instrument, using 5 plastic spacers and wood screws supplied with kit (check that Poly–6 Keyboard assembly clears PS6-MRK-3 power transformer before screwing down).

12. Dress and run red and green leads from PS6-MRK-3 to KLM-376 Power Supply PC board, as shown in Overview diagram, page 2. Referring to KLM-376 Diagram, page 8, make following connections:

- ◆ Carefully cut and bend up center collector lead from Q2 Pass Transistor on KLM-376. Place spagetti tubing over **red** wire from PS6-MRK-3, and solder to Q2 collector lead. Cover solder joint with tubing.

- ◆ Connect **green** wire to negative side of C14 Filter Capacitor.

13. Cable all wires between PS6-MRK-2, PS6-MRK-3, and KLM-376 using cable clamps or provided tie wraps.

14. Run 14-conductor ribbon cable from PS6-MRK-2 Rear Panel assembly toward left side of PS-6, and leave unattached.

9. Remove 6-pin connector (CN-09) to KLM-369 from Pitch/Mod Wheels assembly. Release wires from tiewraps along left side of interior, and plug cable into provided receptacle (P5) on PS6-MRK-1 Retrofit board (blue wire toward you, brown wire away from you—see Layout Diagram, page 22.)

10. Connect 16-pin wiring harness plug (wires extend DOWN from plug) and ribbon cable from PS6-MRK-2 Rear Panel assembly to receptacles P2 and P4, respectively on PS6-MRK-1. Note cable orientation in Overview diagram, page 2.

11. Plug 6-pin connector attached to wiring harness into connector CN-09 on KLM-369. **Wires should extend UPWARDS from plug.**

12. Cable wires at appropriate places using provided tie wraps, *particularly* wires leading to KLM-369 and KLM-376.

This completes installation of Retrofit Kit. Follow below procedures for testing / calibration next.

TESTING THE COMPLETED RETROFIT

1. DOUBLE CHECK ALL CONNECTIONS, PARTICULARLY TO PS6-MRK-3 AND KLM-376 POWER SUPPLIES. A mistake here can ruin several PC boards in the Poly–6 and Retrofit.

2. Using Ohmmeter, measure resistance from pin 40 of 8048 on PS6-MRK-1 to chassis ground (should not read zero ohms).

3. Measure resistance from each blade of AC line cord plug to chassis ground (should read "infinity").

If all checks out, connect to AC, and turn on PS6. Test unit for proper operation, overheating, etc.

PS–6 RETROFIT CALIBRATION PROCEDURES

1. Check voltages at KLM-376 for proper range, particularly +5 volt supply. Adjust in accordance with instructions in Poly–6 Service Manual (page 19, #2).

2. Perform a *MIDI Parameter Reset* operation by turning power off, turning WRITE Switch **ON** and, while holding B, D and MANUAL BUTTONS, switching power on. (See Page 10 of Poly 6 MIDI Owners Manual for further details).

3. Perform KLM-367 D/A Calibration as described on page 19, #3(2) in Poly–6 Service manual.

> **NOTE**: When switching SW1 on KLM-367 from TEST to NORMAL and vice versa, it is necessary to TURN POWER SWITCH OFF AND ON to establish proper mode. Switching TAPE ENABLE no longer has any effect on the Poly–6 Test mode.

Make sure Pitch Bend wheel is in center position. Adjust VR6 so that the Bank C LED is lit (midway between changing B to C and C to D).

Fine adjustment can be made in NORMAL mode by monitoring voltage at U15-7 on Retrofit Board and adjusting VR6 for a reading of 0.000 Volts.

4. Using supplied Program Cassette tape, load in and verify new set of 120 programs into unit. (Customer's original programs may also be loaded into any one of three memory sections, if desired.)

> If the Poly–6 produces excessive noise following installation of the retrofit, install two .1 ufd 50/v capacitors on foil side of KLM-368 as follows:
> A) between pin 6 of IC-20 and junction of R162, R163;
> B) between pin 6 of IC-15 and junction of R127, R128.

5. ***MIDI Functions Test:*** After ascertaining normal Poly–6 operation, turn LOCAL CONTROL parameter to **OFF**, as follows:

   ◆ switch TAPE and WRITE switches to ENABLE;

   ◆ push program Buttons #1 and #2 on (#7 and #8 should light);

   ◆ turn off #7 LED by pressing button;

   ◆ switch TAPE and WRITE switches to DISABLE.

(See also page 13 of the Poly–6 MIDI Owners Manual for further details.)

Poly–6 should cease operating from its built-in keyboard. Next, connect the Poly–6's MIDI IN to its MIDI OUT jack using a MIDI cable, and verify normal operation of the Poly–6.
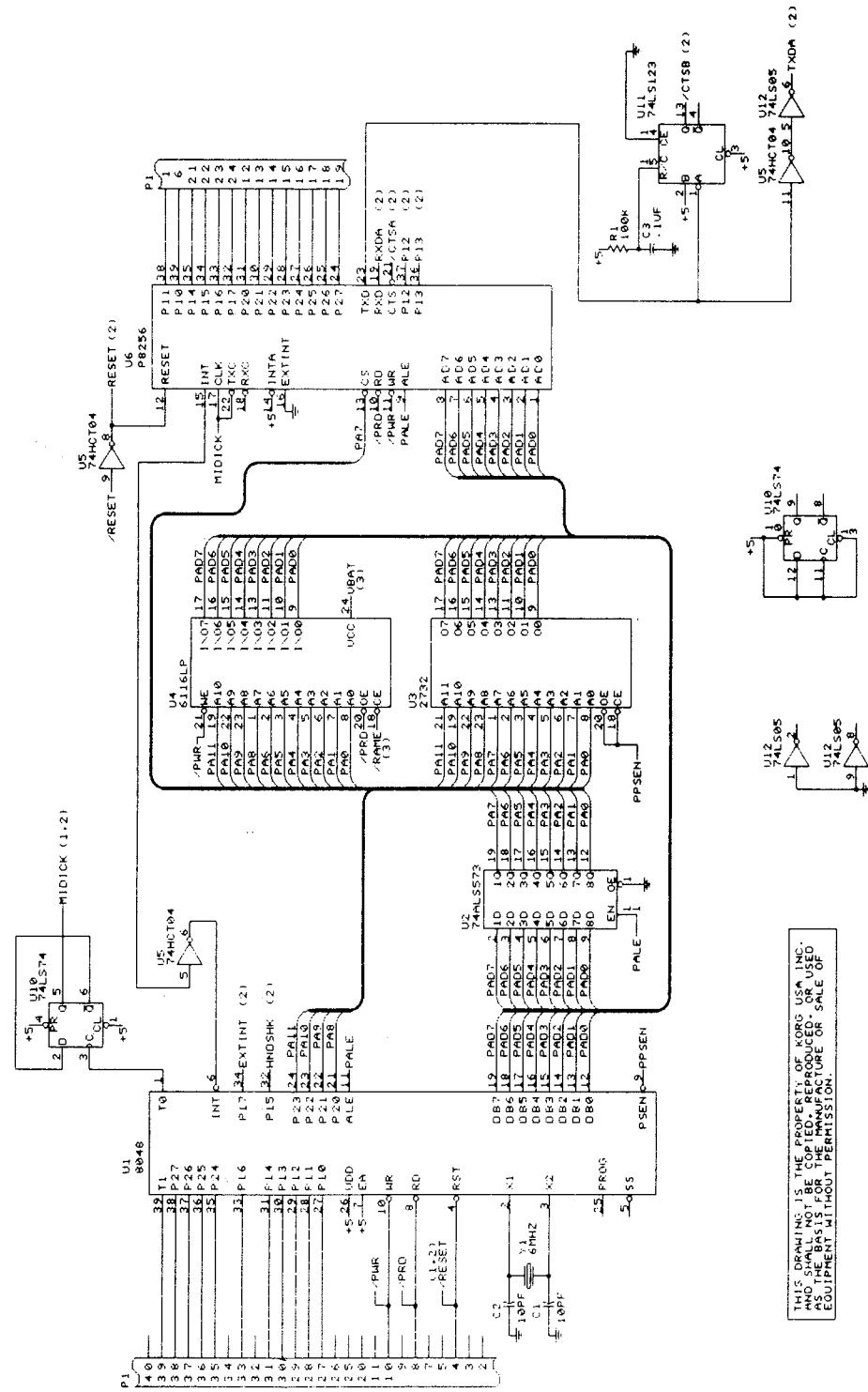
6. If necessary, perform Tune adjustment on Poly–6 in accordance with instructions in Poly–6 Service Manual, pages 20 and 25.

FINISHING

After testing and calibrating procedures are completed, fasten PS6–MRK1 Board down, reinstall keyboard into unit, then refasten front panel closed.
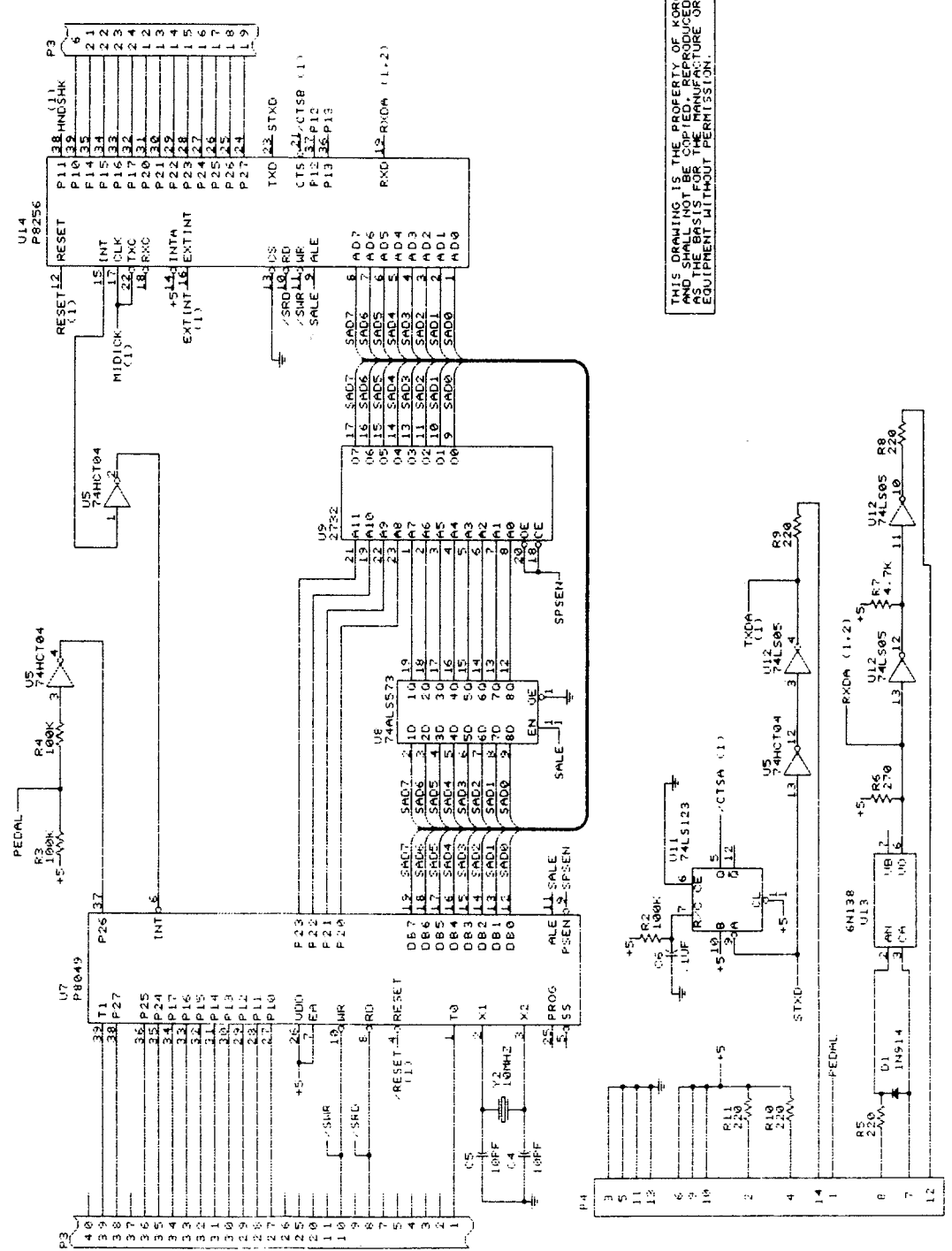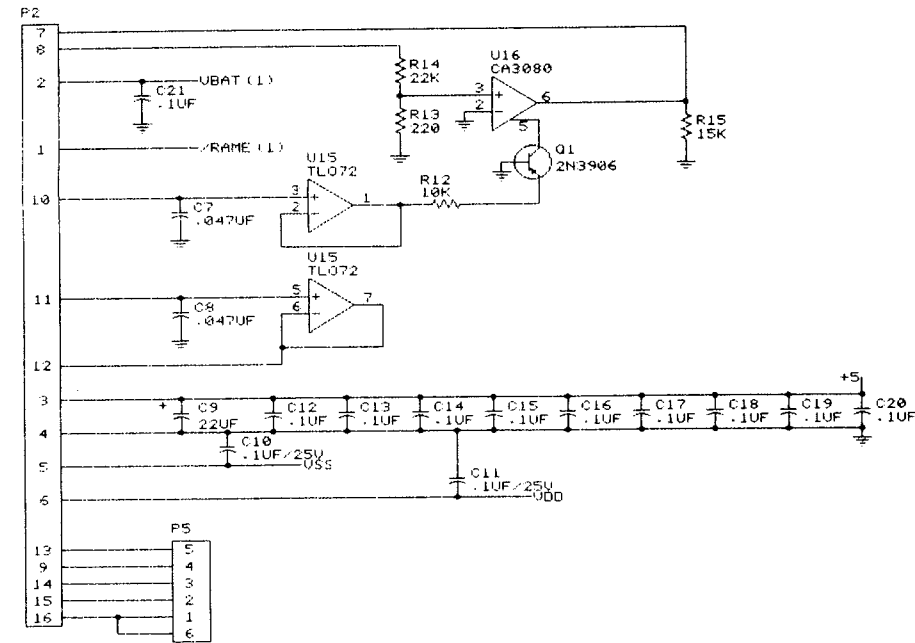
CIRCUIT DIAGRAMS
PS6-MRK-1

PS6–MRK–1 (cont.)

PS6–MRK–1 (cont.)

PS6–MRK–2 Transition Board
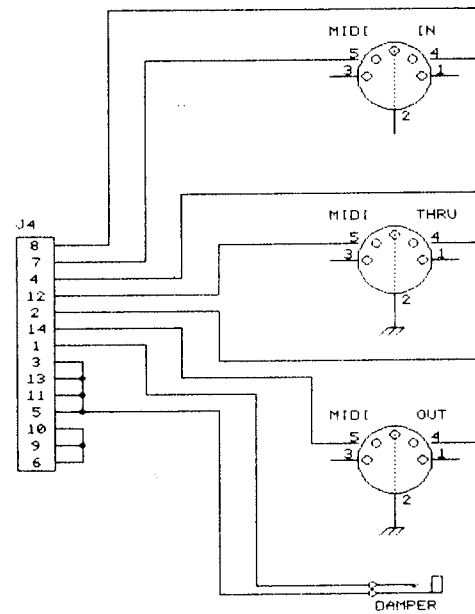
PS6–MRK–3

120 VOLT LINE VERSION
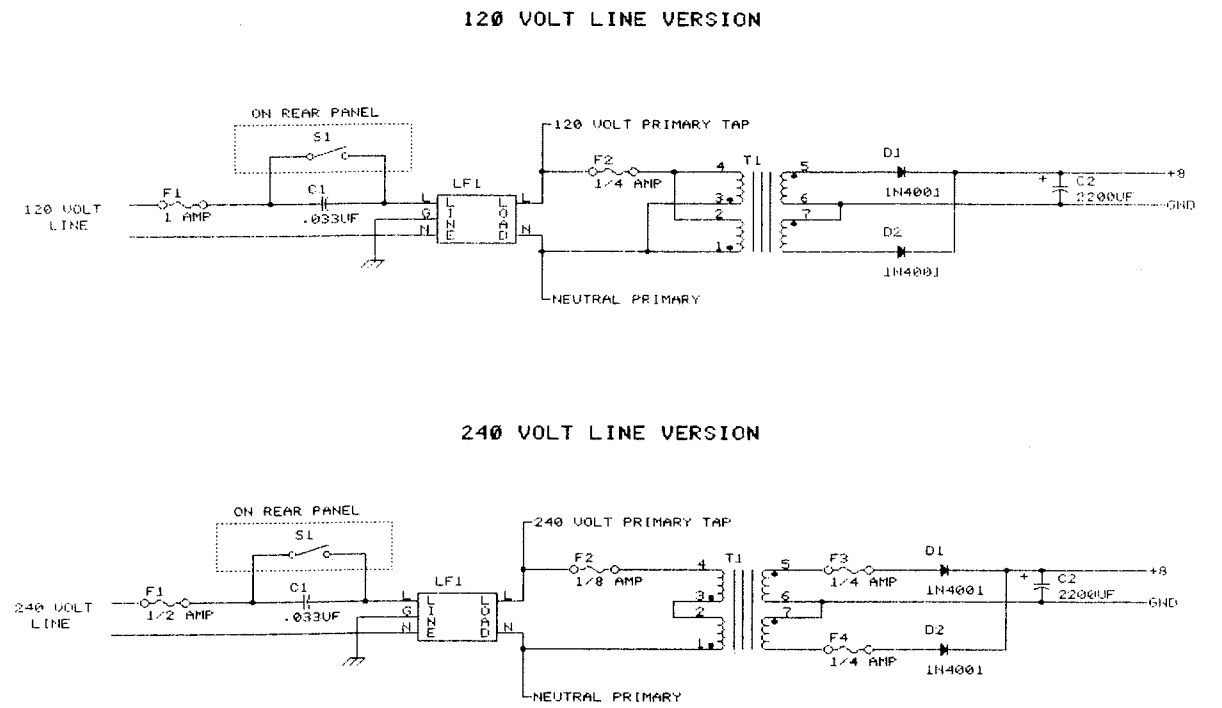
240 VOLT LINE VERSION

PC BOARD LAYOUT DIAGRAMS
PS6-MRK-1

PS6-MRK-1

- 2732 — U9
- ALS 573 — U8
- XTAL
- 8049 — U7
- 8256 — U14
- to KLM-366 IC-6
- 8256 — U6
- HCT04 — U5
- LS123 — U11
- LS05 — U12
- 6N138 — U13
- P4
- to PS6-MRK-2 MIDI In/Out/Thru
- P1
- 8048 — U1
- LS74 — U16
- 3080 — U16
- 2N3906
- 6116LP — U4
- 2732 — U3
- ALS 573 — U2
- XTAL
- TL072 — U15
- P2
- P5
- to KLM-367 IC-22
- 16 wire harness
- from Pitch/Mod Wheels
- Brown
- Blue

PC BOARDS — PS6-MRK-2

Damper Pedal | MIDI: In | Out | Thru | AC Power
to PS6-MRK-1

PS6-MRK-3

.033ufd "Spark Killer"

AC+ SW SW AC-
C1

F1 — 1 amp (120V Version)
     ½ amp (220V Version)
F2 — ¼ amp (120V Version)
     ⅛ amp (220V Version)

F1

LF-1 Line Filter

F2

PS6 Transformer * (120 volt-U.S. Version)

orange* — "3"
white* — "4"
brown* — n/c

C2

D1   D2

to KLM-376 +5 volt Power Supply

Red — +
+8 Volts
Green

f3
f4

Note: f3, f4 replaced by jumpers in 100-120 volt version

F3, F4 — ¼ AMP

PRINCIPLES OF OPERATION

The general method used to implement MIDI on the Poly–6 was to reprogram the original microcomputer ICs for MIDI functions. This approach has several advantages over conventional MIDI implementations:

◆ Greater number of features;
◆ Less circuitry and parts count;
◆ Lower additional power requirements;
◆ Easier installation.

The original Poly–6 utilizes two (2) single chip microprocessors: an 8049, used as the Key Assigner, and an 8048, used for all Synthesizer Programming functions. Both microprocessors are used in the Retrofit; however, their internal program (ROM) memories are disabled, and external 2732 EPROM memories are used instead, programmed for the additional MIDI functions.

A block diagram of the Retrofit is shown on the next page. The two microprocessors are removed from their original sockets and installed on the Retrofit. To handle MIDI transmission and reception chores, two 8256 UART ICs are employed. A new 6116LP 2Kbyte RAM Memory chip is used in place of the old memory IC, which is removed. Finally, Pitch and Mod Wheel transmission and reception is accomplished by using two unused D-to-A and A-to-D channels from the Poly–6's original programmer section, plus appropriate sample-and-hold circuitry and CA-3080 Transconductance amplifier for Modulation depth control.

A separate 5 volt Power Supply is incorporated into the PS–6 retrofit. The Poly–6's original KLM-376 Power Supply Regulation PC Board is "split," with the +5 volt section fed by the PS6–MRK–3 Power Supply. Since several ICs are moved to the Retrofit, the original PS–6 power supply runs cooler, yielding generally better reliability and longer component life.

BLOCK DIAGRAM