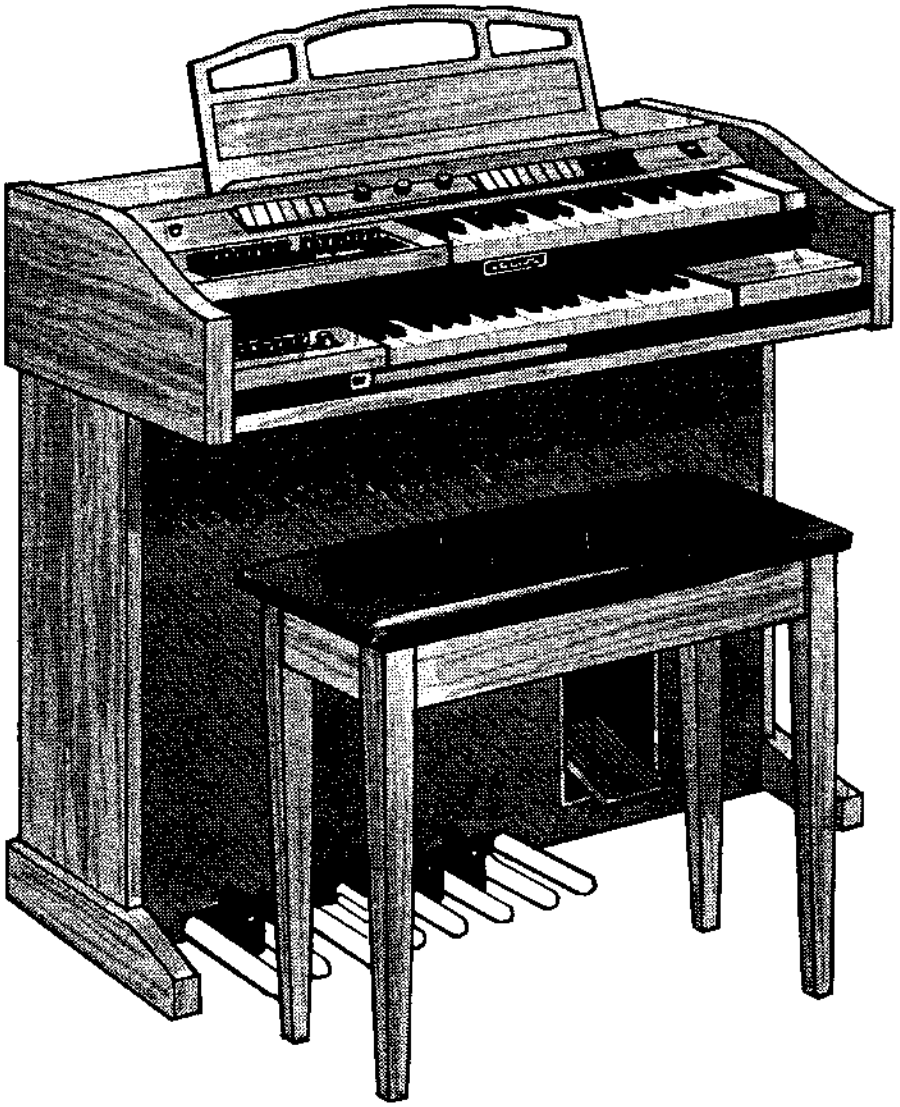
Baldwin®

Pianos Organs

TECHNICAL MANUAL



MODEL 127 SERIES Interlude WITH FUNMACHINE

Revised & Reprinted March 1978

Baldwin Piano & Organ Company 1801 Gilbert Avenue, Cincinnati, Ohio 45202 (513) 852-7000 Musical Instruments by Baldwin

Specifications (Model 127F)

Upper Keyboard Controls

Interlude gives you 8 different solo "instruments." You may choose the ones you want yourself, or you may use Baldwin's exclusive ASR which automatically programs (or registers) the correct solo voice for any of the 17 rhythms. You can also create a variety of unusual effects with Auto-Mute. A unique Baldwin feature, the Percussion Patterns affect the Piano, Guitar, Banjo and Harpsichord percussive solo voices. Percussion Pattern I continuously repeats (reiterates) these voices, while Pattern II provides a different syncopated pattern for each rhythm.

Solo Tabs

Flute	Trumpet	Guitar	Harpsichord
Accordion	Vibra Harp	Piano	Banjo

Auto-Mute
Percussion Patterns I and II
ASR (Automatic Solo Registration)

Lower Keyboard Controls

Interlude has 6 accompaniment voices, including 3 percussive effects, which you may select yourself if you wish. When you play FunMachine, an appropriate combination of accompaniment sounds is automatically programmed for you.

Accompaniment Tabs

Flute	String	Piano
Reed	Guitar	Banjo

FunMachine/ RealRhythm

Baldwin Interlude provides an automatic rhythm accompaniment in 17 different rhythm patterns. When you play Interlude and use the Rhythm Section controls, you have automatic drum rhythm accompaniment called RealRhythm. When you play FunMachine, each rhythm button automatically gives you a full orchestral rhythm section — drums and orchestral instruments — playing full chords, bass notes, and rhythm for a complete automatic accompaniment.

FunMachine automatically plays the appropriate major chords (or 7ths) for you in all 12 keys. With the Minor Bar, you can change any of these chords from major to minor (or minor 7th). You may play in Touch Rhythm, where the drums and orchestral voices will play as long as you hold a key down and stop when you release it, or in Continuous Rhythm, where the drums will continue to sound in rhythm when the key is released while the orchestral voices stop.

Rhythm Section

Fox Trot	Hoe-Down	Latin III	March
Swing	Pop Rock	Rhumba	Old-time Waltz
Dixieland	Soul Rock	Bossa Nova	Waltz
Ragtime	Hawaiian	Polka	Organ
Country			

RealRhythm
Touch Rhythm
FunMachine
Tempo —
Continuously Variable

Drum Volume —
Continuously Variable
Downbeat Indicator Light
Minor Bar
Key Selectors

Pedals

The pedals are on all the time with pedal sustain and will sound whenever you play them. When you are playing FunMachine, the pedals play automatically when you hold down a key on the Rhythm Section keyboard.

General Controls

Pedal-Accompaniment Volume —
Continuously Variable
Vibrato —
Continuously Variable

Expression Pedal
On-Off Switch

General Description

The Interlude spinet organ has a 37-note upper keyboard (Solo Manual), a 37-note lower keyboard (Accompaniment Manual) including a 13-note Rhythm Section keyboard, and a 13-note pedalboard. A headphone jack is standard. The organ is also available as the Model 127FC with cassette tape player/recorder.

Dimensions — Height 36¼" (92.08 cm), Depth 24¼" (61.6 cm), Width 41¾" (106.05 cm)
Weight — 140 pounds (63.5 kg)
Finish — Walnut

Amplification

The Interlude with FunMachine has a self-contained single-channel amplification system. Completely transistorized, the system has 25 watts (rms) of power and utilizes one 12-inch speaker and one 6-inch speaker.

FunMusic

With your Interlude with FunMachine, you will receive a complete Fun Music packet. The introductory book shows you step-by-step how to play the FunMachine with a complete song for each rhythm. You'll also receive a book of pop favorites and two books of sing-along songs. Four extra books with just the sing-along lyrics are included, too.

If your Interlude is equipped with cassette tape player/recorder, you'll also receive the FunMachine Cassette Program. This package of four tapes includes instructional tapes coordinated with the FunMachine Introductory Book, play-along and record-yourself tapes, and the Fun Playing Guide, a special book to help you polish your playing techniques.

TECHNICAL MANUAL

MODEL 127 SERIES ORGAN

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MODEL 127F SERIES (INCLUDES SPECIFICATIONS)

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VOLUME LEVEL SETTING PROCEDURE

FOR MODEL 127 SERIES ORGAN

1. Depress following controls:

   ORGAN, FUNMACHINE, C KEY SELECTOR, ASR TAB

2. Set the PED. ACC. VOLUME controls fully clockwise.

3. EXPRESSION PEDAL should be depressed fully down.

4. Play the low C, E, G, C chord on the Solo Manual and the Low C on the Accompaniment Manual.

   Keys to be played are indicated with (*) on Fig. 5.

5. Set the volume across the 12" speaker to 6.0 volts.

6. The voltage across the 6" tweeter speaker must be 1.0 to 2.0 volts.

   It should be noted that the above level setting will give satisfactory results for most conditions. However, it may be necessary to adjust setting slightly to compensate for individual taste or acoustical environment.

NOTE: Level set minipot is located on the Preamplifier Board assembly.

Refer to Fig. 4, Item 23 and Drawing No. C500-061064.

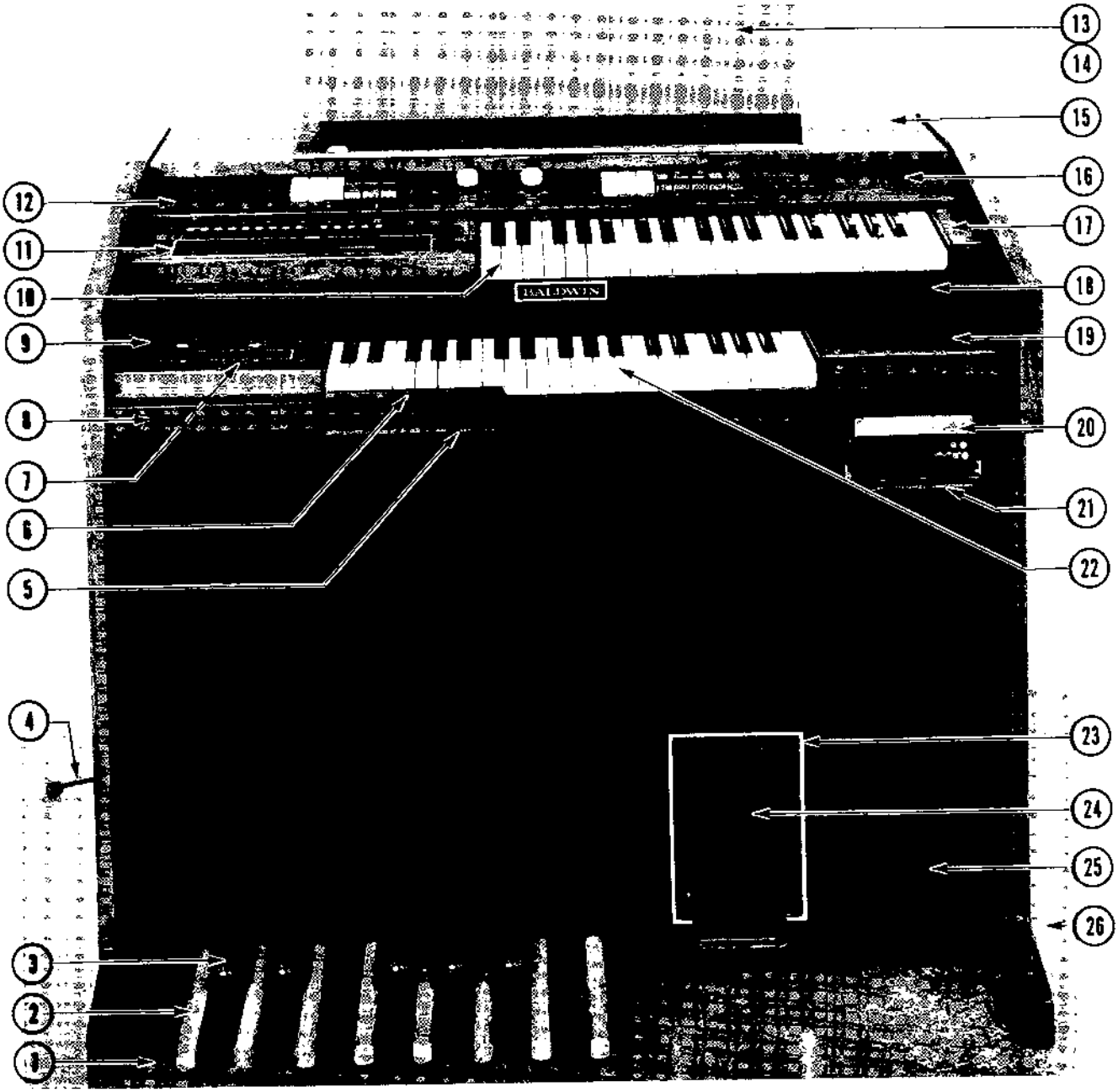


FIG. 1 — 127FC ORGAN FRONT VIEW

DESCRIPTION FIG. 1

ITEM	DESCRIPTION	PART NUMBER
1.	13 NOTE PEDAL ASSEMBLY	D500-059863
2.	NATURAL PEDAL KEY	C250-047968
3.	SHARP PEDAL KEY	C250-032686
4.	POWER CORD	B508-027658
5.	ACCOMPANIMENT KEYSWITCH DUST COVER	D502-060577
6.	MAJOR/MINOR TOUCH BAR	SEE FIG. 11
7.	PHONE JAX ASSEMBLY	B500-060236
8.	ACCOMPANIMENT KEYSLIP ASSEMBLY	C500-060833
9.	KEYCAP ASSEMBLY - ACCOMPANIMENT BASS	X500-060937
10.	SOLO MANUAL	
11.	KEYCAP ASSEMBLY - SOLO - BASS	X500-060938
12.	TONE COLOR PANEL ASSEMBLY	X500-060792
13.	MUSIC DESK - PLEXIGLASS	C105-053450
14.	MUSIC DESK (AVAILABLE ON SPECIAL REQUEST)	C105*54860
15.	LID ASSEMBLY	C060*60642
16.	POWER SWITCH (ROCKER)	A506-058601
17.	KEYCAP ASSEMBLY - SOLO - TREBLE	X500-052474
18.	KEYSLIP - SOLO	C528-060548
19.	KEYCAP ASSEMBLY - ACCOMPANIMENT - TREBLE	X500-052471
20.	CASSETTE RECORDER - REWORK (127FC ONLY)	B500-053627
21.	CASSETTE DRAWER - FINAL ASSEMBLY (127FC ONLY)	C500-053460
22.	ACCOMPANIMENT MANUAL	
23.	EXPRESSION PEDAL TRIM MOULDING	A518-052823
24.	EXPRESSION PEDAL ASSEMBLY	D500-053250
25.	GRILLE CLOTH	B244-053621
26.	BENCH (NOT SHOWN)	C160*53694

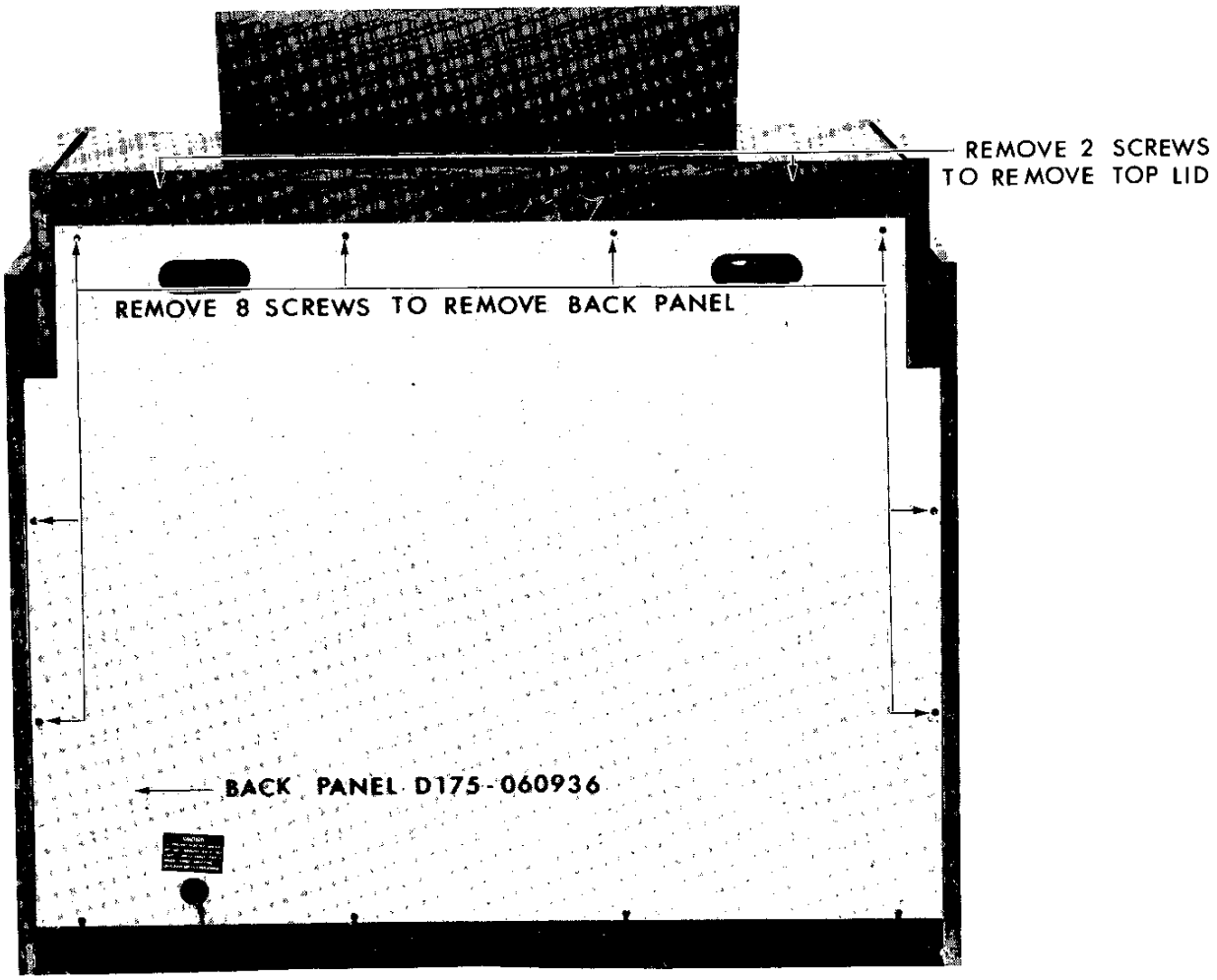


FIG. 2 — ORGAN REAR VIEW

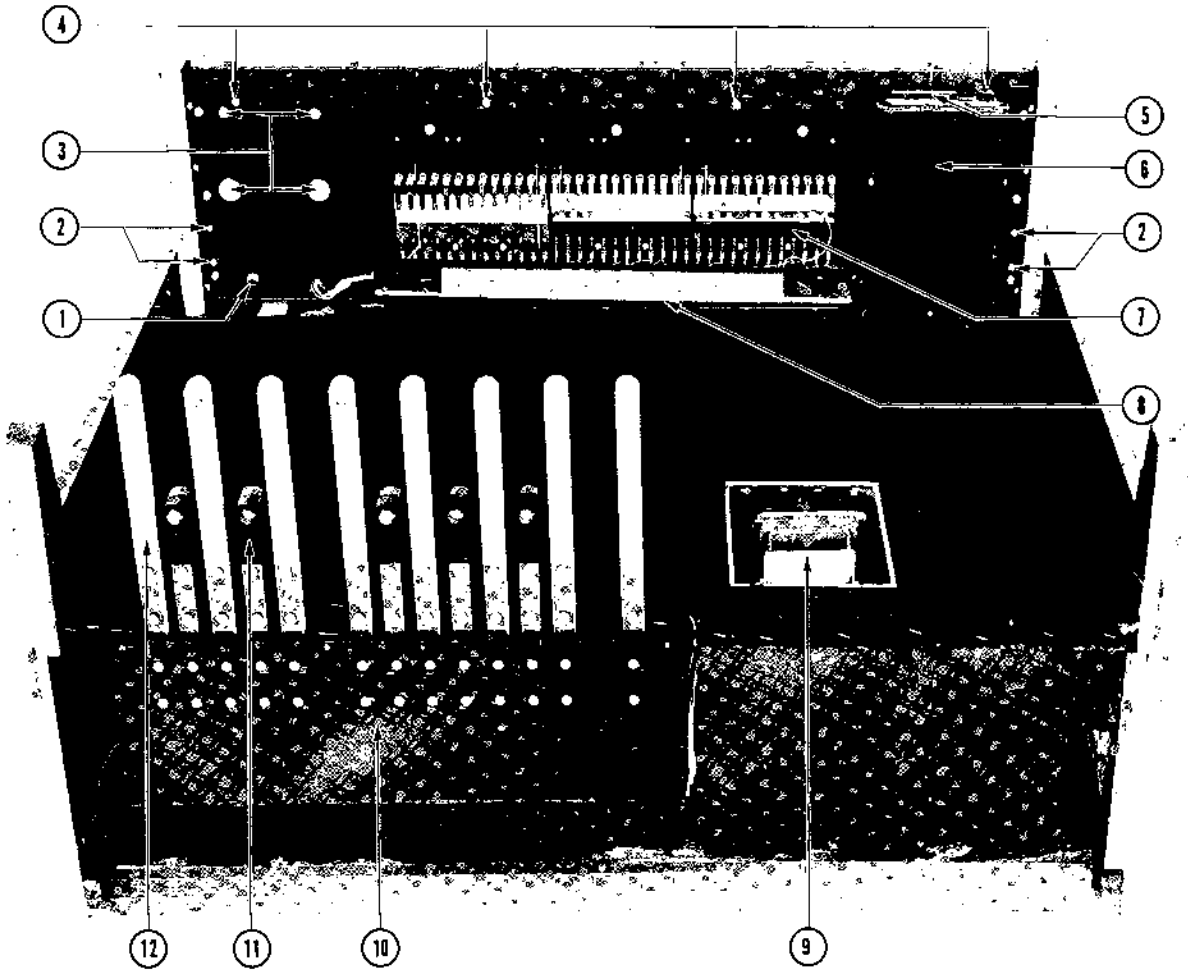


FIG 3 - UNDERACCOMPANIMENT VIEW

ITEM	DESCRIPTION	PART NUMBER
1.	PHONE JAX ASSEMBLY	B500-060236
2.	REMOVE FOUR (4) SCREWS TO RAISE SOLO MANUAL	
3.	SCREWS SECURING THE ACCOMPANIMENT BASS KEYCAP TO THE MANUAL	
4.	4 SCREWS SECURING THE MAJOR/MINOR TOUCH BAR SLIP RAIL TO THE MANUAL	
5.	CASSETTE RECORDER - REWORK - (127FC ONLY)	B500-053627
6.	CASSETTE DRAWER FINAL ASSEMBLY - (127 FC ONLY)	C500-053460
7.	ACCOMPANIMENT SWITCH ASSEMBLY	X500-060831
8.	ACCOMPANIMENT KEYSWITCH DUST COVER	D502-060577
9.	EXPRESSION PEDAL ASSEMBLY	D500-053250
10.	13 NOTE PEDAL ASSEMBLY	D500-059863
11.	SHARP PEDAL KEY	C250-032686
12.	NATURAL PEDAL KEY	C250-047968

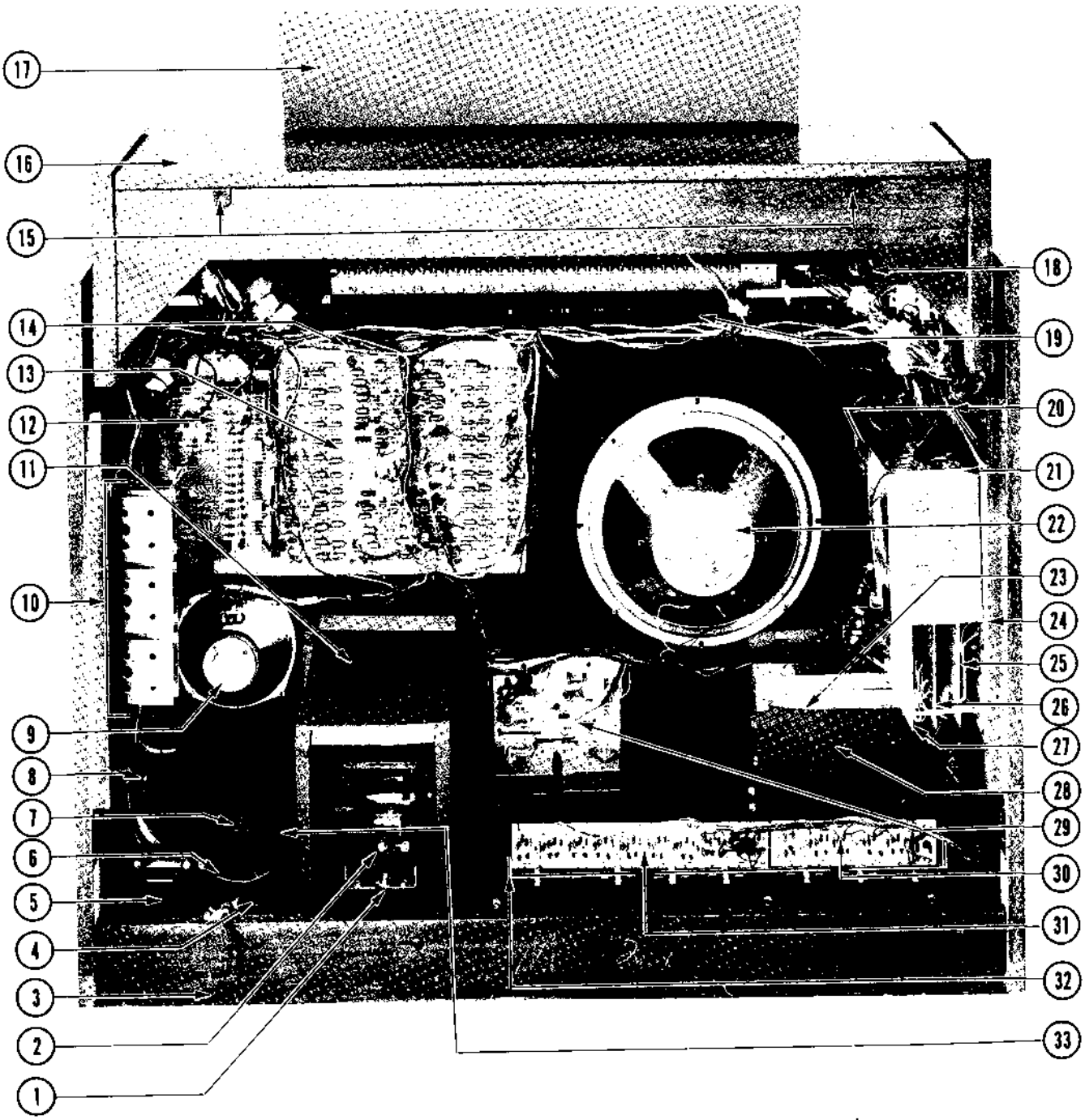


FIG. 4 — ORGAN REAR VIEW (BACK PANEL REMOVED)

DESCRIPTION FIG. 4

ITEM	DESCRIPTION	PART NUMBER
1.	EXPRESSION PEDAL ASSEMBLY	D500-053250
2.	EXPRESSION PEDAL POTENTIOMETER - 50K OHM, 180° - LIN. TAP.	B509-048890
3.	POWER CORD	B508-027658
4.	BALLAST, FLUORESCENT LAMP, 8W	B514-060909
5.	POWER TRANSFORMER	C512-053438
6.	DUPLEX POWER OUTLET (127FC ONLY)	A507-048409
7.	A.C. ADAPTER (127FC ONLY)	A512-048333
8.	SLOW BLOW FUSE, 2 AMP	A514-032101
	FUSE HOLDER	A154-059976
9.	SPEAKER - 6", 8 OHM	A513-054664
10.	POWER SUPPLY BOARD ASSEMBLY	D500-060603
11.	EXPRESSION PEDAL COVER	C502-060715
12.	T.O.F.G. BOARD ASSEMBLY	D500-060640
13.	GATE DIVIDER BOARD ASSEMBLY	D500-060170
14.	EXTRUSION (P.C. BOARDS)	A525-041016
15.	REMOVE TWO (2) SCREWS TO RAISE TOP LID	
16.	LID ASSEMBLY	C060*60642
17.	MUSIC DESK - PLEXIGLASS	C105-053450
18.	PHONE JAX ASSEMBLY	B500-060236
19.	SOLO KEYSWITCH DUST COVER	D502-060577
20.	FUN MACHINE BOARDS - FINAL ASSEMBLY	X500-060865
21.	FUN MACHINE COVER	B502-061038
22.	SPEAKER - 12", 8 OHM	A513-024925
23.	PREAMP BOARD ASSEMBLY	C500-061064
24.	RHYTHM SECTION VOICE BOARD ASSEMBLY	D500-060470
25.	FUN MACHINE LOGIC BOARD ASSEMBLY	D500-060479
26.	RIGHT HAND BOARD ASSEMBLY	D500-060663
27.	LEFT HAND BOARD ASSEMBLY	D500-060827
28.	PREAMP SHIELD	B502-060895
29.	25W POWER AMPLIFIER BOARD ASSEMBLY	B500-060514
30.	5 NOTE PEDAL SUSTAIN BOARD ASSEMBLY	C506-048860
31.	8 NOTE PEDAL SUSTAIN BOARD ASSEMBLY	C506-048866
32.	13 NOTE PEDAL - FINAL ASSEMBLY	D500-059863
33.	BALLAST, FLUORESCENT LAMP, 13W	B514-035094

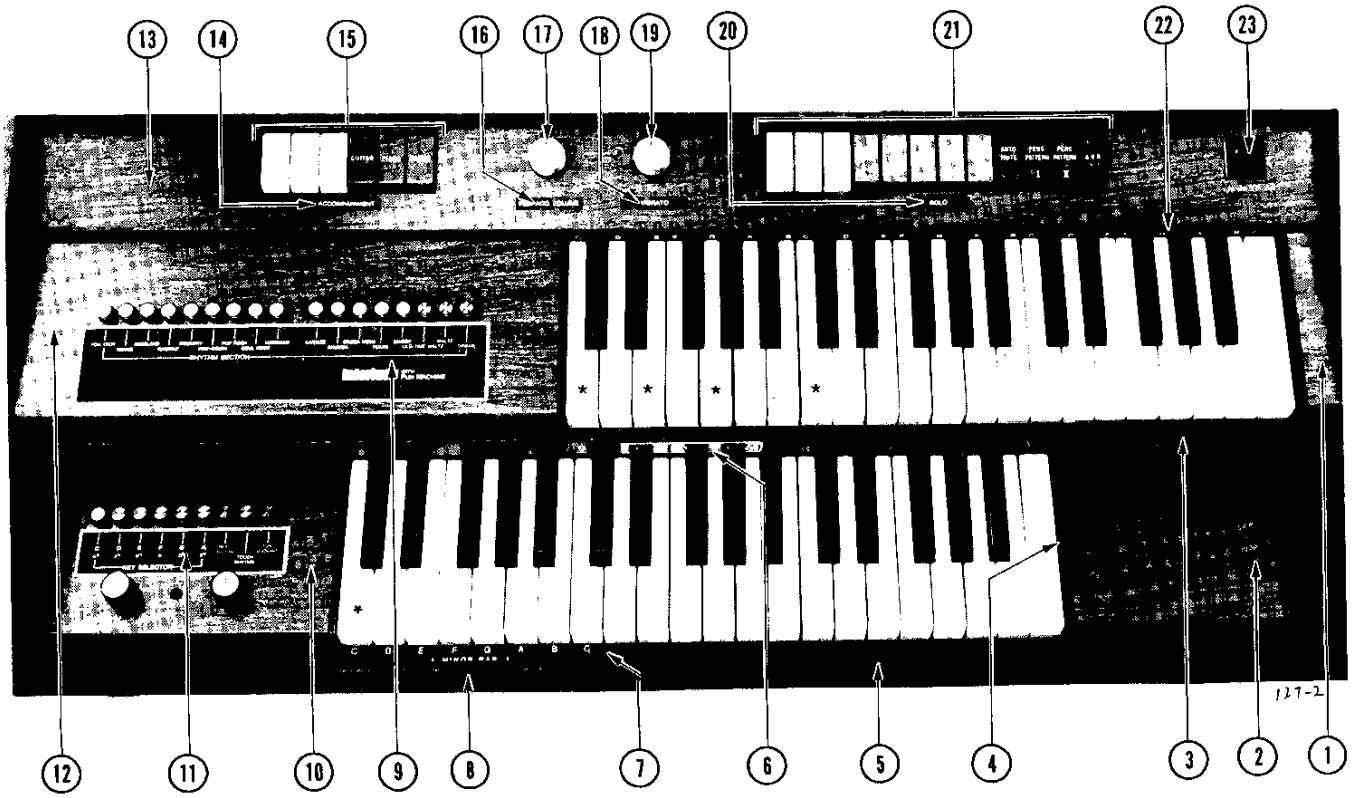


FIG. 5 - CONTROL PANELS

DESCRIPTION FIG. 5

ITEM	DESCRIPTION	PART NUMBER
1	KEYCAP ASSEMBLY - SOLO - TREBLE	X500-052474
2	KEYCAP ASSEMBLY - ACCOMPANIMENT - TREBLE	X500-052471
3	KEYSLIP - SOLO	C528-060548
4	END CAP (4 REQUIRED)	C250-052369
5	ACCOMPANIMENT KEYSLIP ASSEMBLY	C500-060833
6	NAMEPLATE - BALDWIN	A249-037744
7	NAMEPLATE - MINOR BAR	A249-061021
8	MAJOR-MINOR ACTUATOR BAR - RIVETED	B500-052666
9	NAMEPLATE - RHYTHM	B249-061022
10	KEYCAP ASSEMBLY - ACCOMPANIMENT - BASS	X500-060937
11	NAMEPLATE - KEY SELECTOR	A249-061020
12	KEYCAP ASSEMBLY - SOLO - BASS	X500-060938
13	TONE COLOR PANEL ASSEMBLY	X500-060792
14	NAMEPLATE - ACCOMPANIMENT	A249-061018
15	ACCOMPANIMENT TONE COLOR TAB SWITCH ASSEMBLY (COMPLETE)	C500-060783
16	NAMEPLATE - PED.-ACC. VOLUME	A249-061015
17	KNOB - PED.-ACC. VOLUME	A247-052042
18	NAMEPLATE - VIBRATO	A249-061017
19	KNOB - VIBRATO	A247-052042
20	NAMEPLATE - SOLO	A249-061019
21	SOLO TONE COLOR TAB SWITCH ASSEMBLY (COMPLETE)	C500-060779
22	NAMEPLATE - TONE COLOR PANEL (SOLO KEYS)	C249-061023
23	POWER SWITCH (ROCKER)	A506-058601

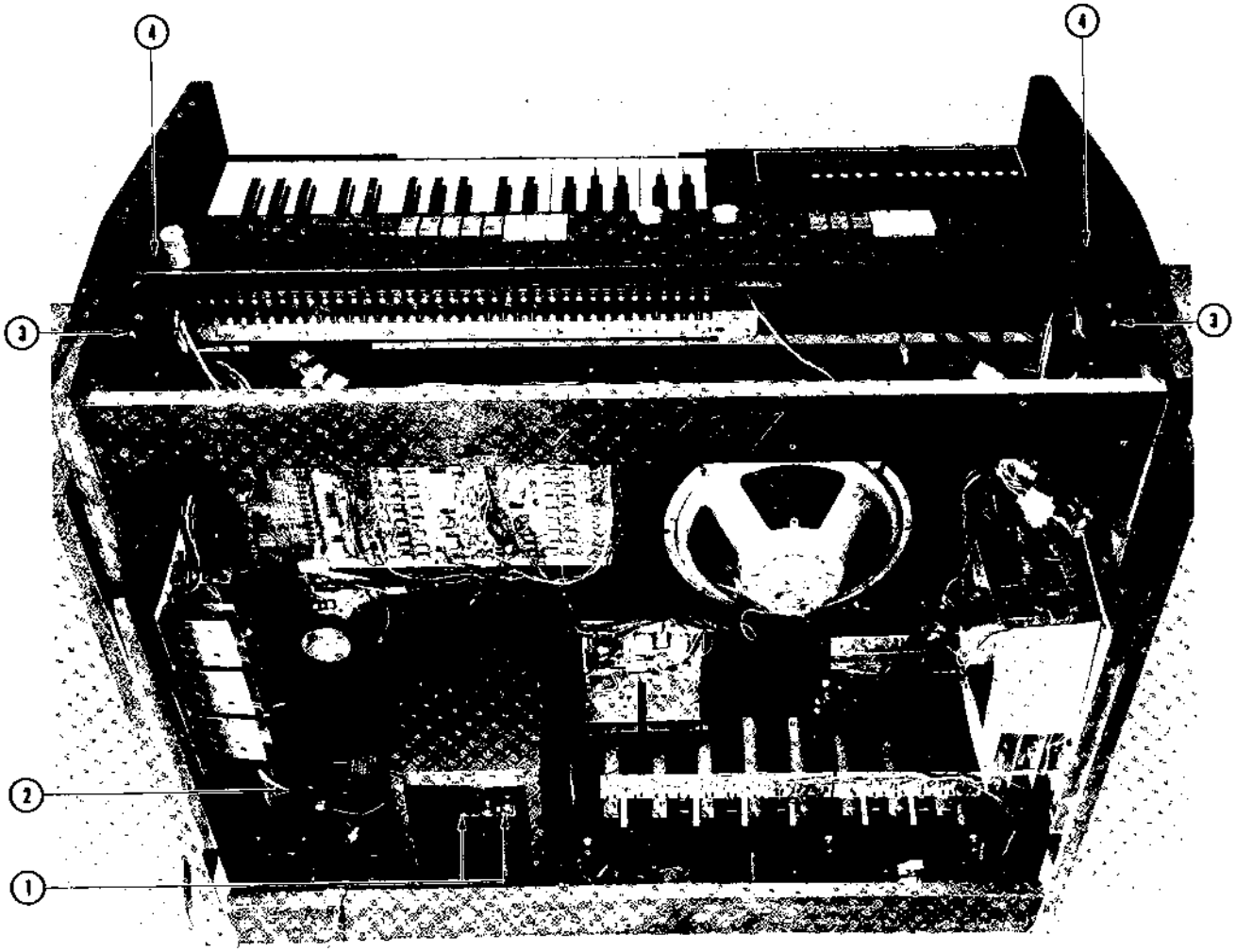


FIG. 6 - ORGAN REAR VIEW (TOP LID REMOVED)

ITEM	DESCRIPTION	PART NUMBER
1.	REMOVE TWO (2) SCREWS TO REMOVE EXPRESSION PEDAL	
2.	SLOW BLOW FUSE, 2 AMP	A514-032101
3.	REMOVE TWO (2) SCREWS TO RAISE TONE COLOR PANEL	
4.	TOP LID GUIDE SLOTS	

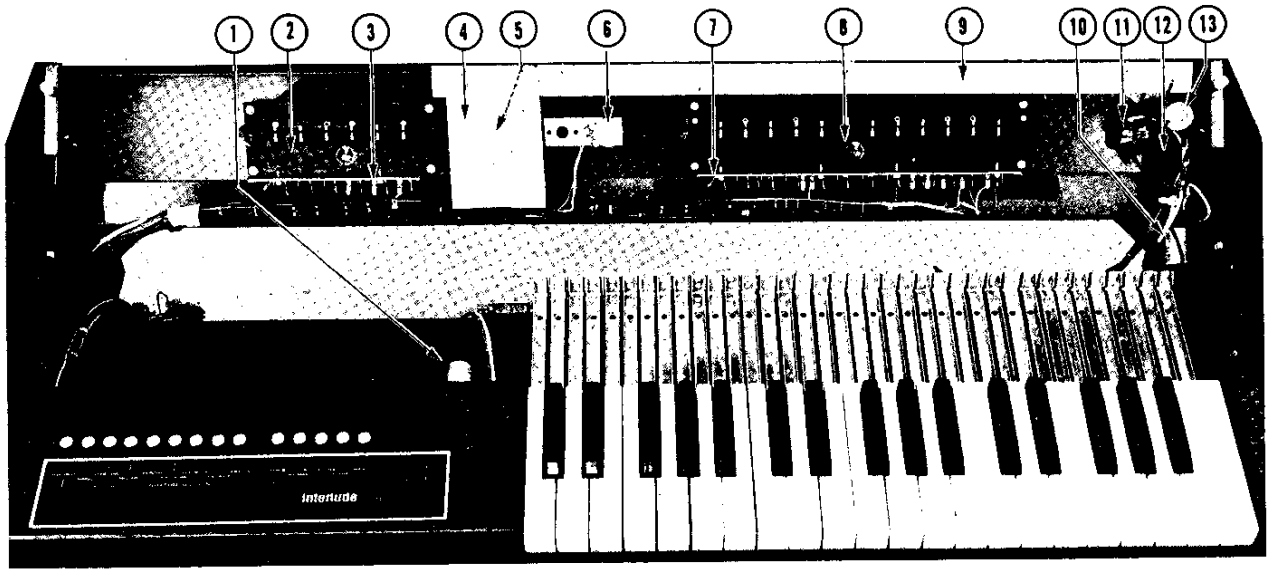


FIG. 7 - TONE COLOR RAISED

ITEM	DESCRIPTION	PART NUMBER
1	STARTER, FLUORESCENT LAMP 8W	A514-060854
2	ACCOMPANIMENT TONE COLOR TAB SWITCH ASSEMBLY	C500-060783
3	ACCOMPANIMENT TONE COLOR SWITCH BOARD ASSEMBLY	A506-060652
4	TONE COLOR SHIELD	B502-061037
5	PEDAL-ACCOMPANIMENT VOLUME POTENTIOMETER - 100k - REV. AUDIO	B509-039731
6	VIBRATO POTENTIOMETER - 5k OHM - LINEAR	B509-047956
7	SOLO TONE COLOR SWITCH BOARD ASSEMBLY	B506-060672
8	SOLO TONE COLOR TAB SWITCH ASSEMBLY	C500-060779
9	LAMP HOLDER BRACKET	B528-060620
10	STARTER, FLUORESCENT LAMP - 30W	A514-060529
11	POWER SWITCH (ROCKER)	A506-058601
12	CAPACITOR ASSEMBLY - .47 MFD/400V	A511-048788
13	CAPACITOR - CERAMIC DUAL - .01 MFD/1200V	A511-019093

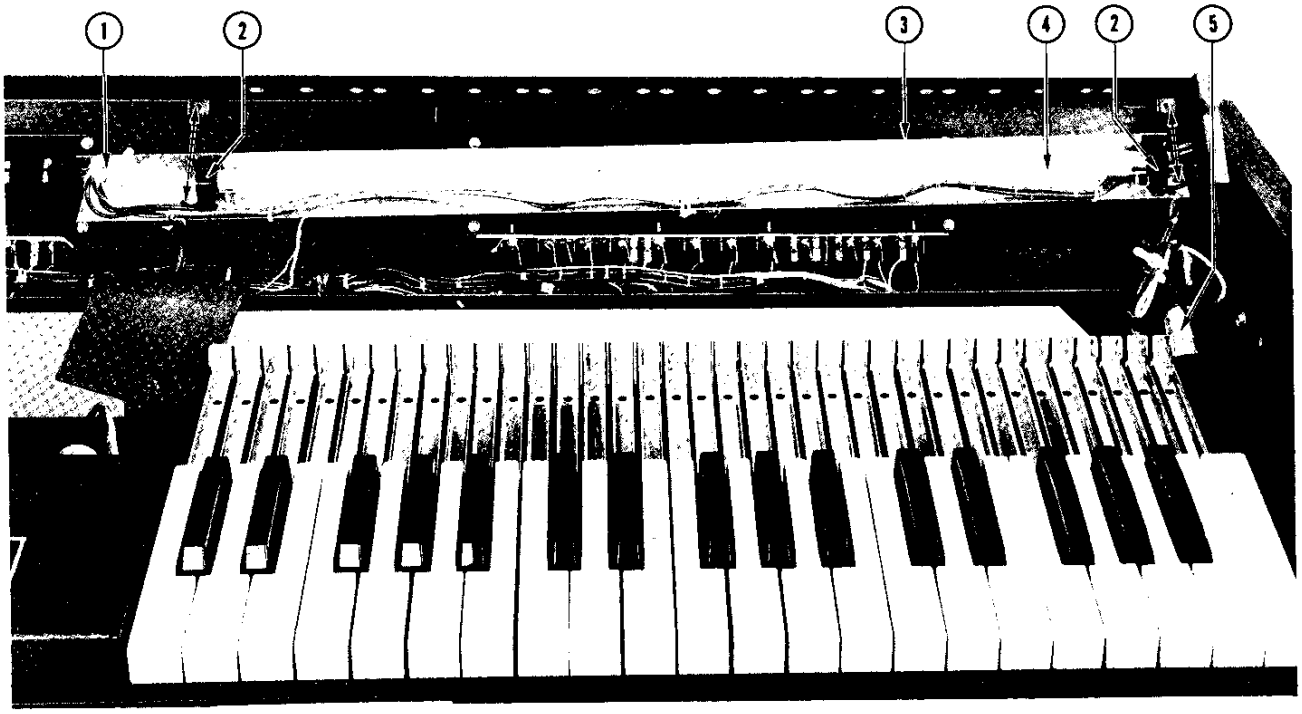


FIG. 8 - TONE COLOR FLUORESCENT LIGHT VIEW

ITEM	DESCRIPTION	PART NUMBER
1.	CLOSED END CONNECTOR	A507-035085
2.	BI-PIN LAMP HOLDER	A514-035044
3.	LAMP HOLDER BRACKET	B528-060620
4.	FLUORESCENT LAMP, 13W	A514-028148
5.	FLUORESCENT LAMP STARTER, 30W	A514-060529

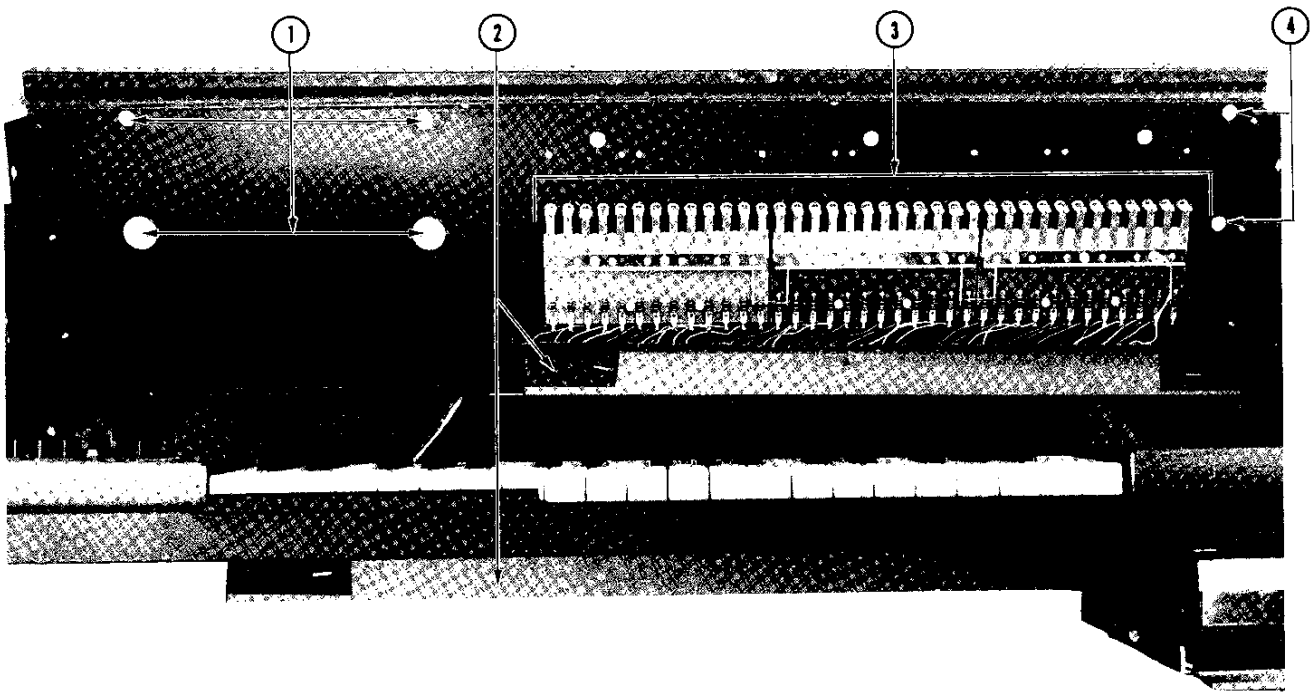


FIG. 9 - SOLO MANUAL RAISED

ITEM	DESCRIPTION	PART NUMBER
1.	FOUR (4) SCREWS SECURING THE SOLO BASS KEYCAP TO THE MANUAL	
2.	MANUAL SWITCH COVERS	D502-060577
3.	SOLO KEYSWITCH BOARD ASSEMBLY	SEE PARTS LIST
4.	TWO (2) SCREWS SECURING THE SOLO TREBLE KEYCAP TO THE MANUAL	

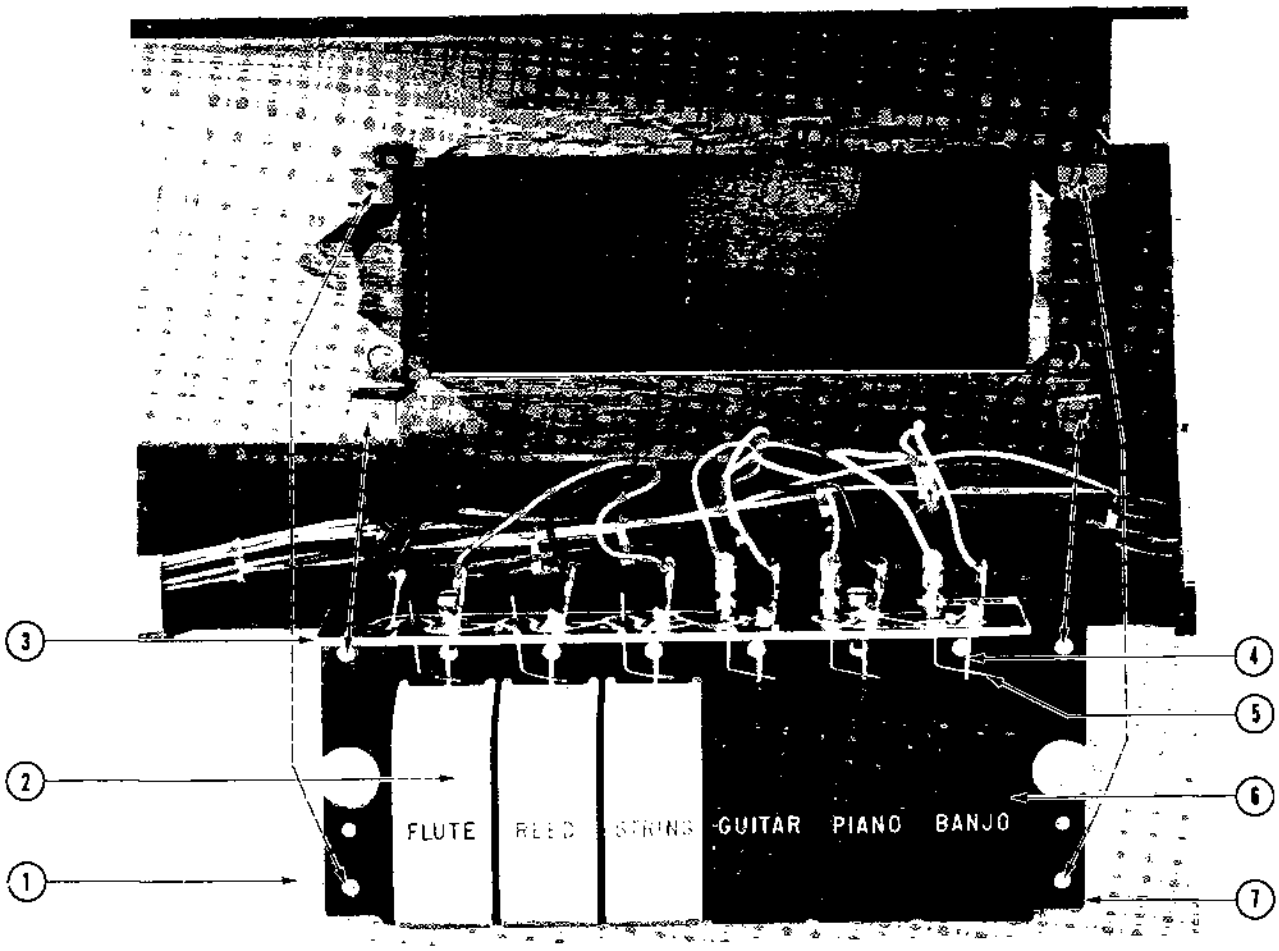


FIG. 10 - STOP TAB SWITCHES DISASSEMBLY

ITEM	DESCRIPTION	PART NUMBER
1.	ACCOMPANIMENT TAB SWITCH ASSEMBLY	C500-060783
2.	DETENT SPRING (ON UNDERSIDE OF TAB)	A237-037146
	TAB SPRING RETAINER	A237-037993
	TAB INSERT	A250-037943
	SCREW #6-32 SPECIAL	A247-037073
3.	ACCOMPANIMENT TONE COLOR TAB SWITCH BOARD ASSEMBLY	A506-060652
4.	SPRING CONTACT	A506-033399
5.	CONTACT WIRE	A506-037787
6.	SWITCH TAB	SEE PARTS LIST
7.	SWITCH MOUNTING PLATE - RIVETED - 6 TABS	B505-044931

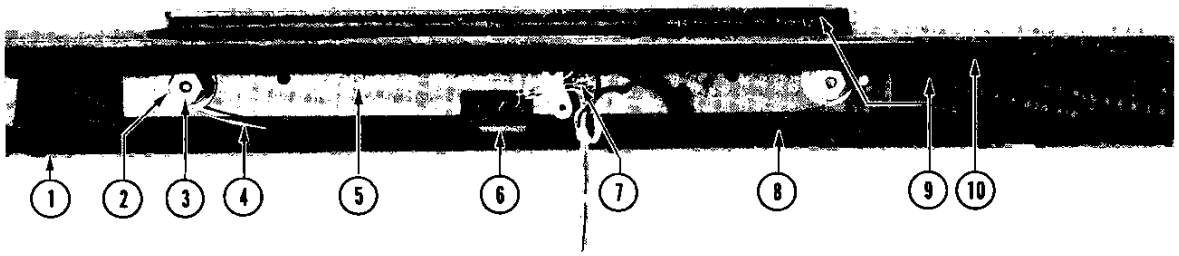


FIG. 11 - MAJOR/MINOR SWITCH ASSEMBLY

ITEM	DESCRIPTION	PART NUMBER
1	ACCOMPANIMENT KEYSLIP WELDED	C500-060142
2	NUT LOCK (6-32)	A247-028484
3	SPEED NUT	A247-052681
4	ACTUATOR DETENT	A237-052680
5	ACTUATOR BAR - RIVETED	B500-052666
6	RUBBER BUMPER	A244-040842
7	MICRO SWITCH	A506-052616
8	FELT 1/8 x 1/2, BROWN	A244-010008
9	FELT MAROON .035/.050 x 1/4	A244-006211
10	FELT MAROON .240/.260 x 5/16	A244-024941

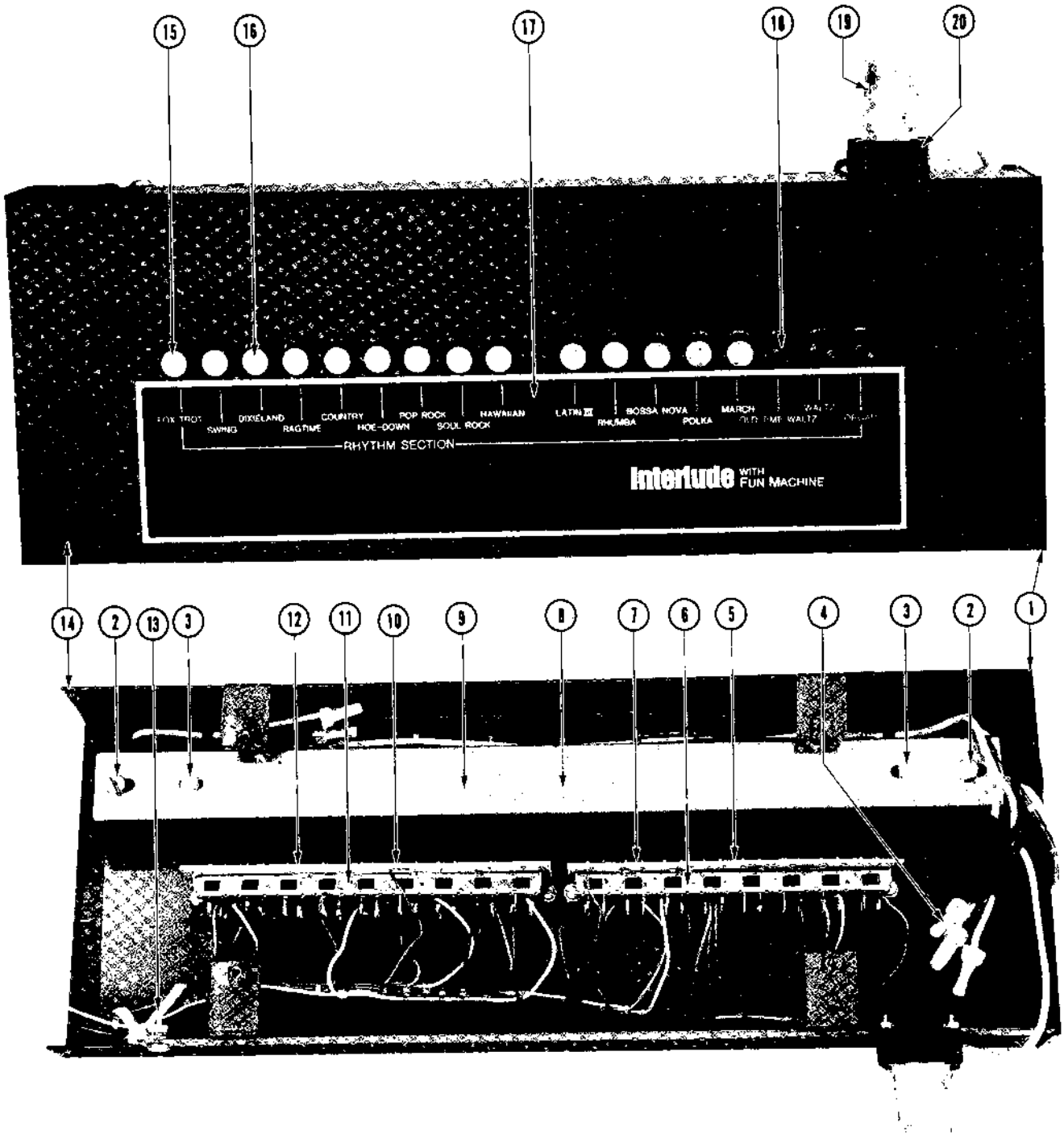


FIG. 12 — SOLO BASS KEYCAP TOP AND BOTTOM VIEW

DESCRIPTION FIG. 12

ITEM	DESCRIPTION	PART NUMBER
1.	END CAP	C250-052369
2.	LAMP HOLDER BRACKET SECURING SCREWS	
3.	BI PIN LAMP HOLDER SECURING AND ADJUSTING SCREWS	
4.	CLOSED END CONNECTOR	A507-035085
5.	PUSH BUTTON SWITCH - FINAL ASSEMBLY - 8 STATION	X500-060878
6.	PUSH BUTTON SWITCH - 8 STATION	B506-060718
7.	RHYTHM SWITCH BOARD #2 - D.E.M.	A575-060880
8.	FLUORESCENT LAMP - 8W (5/8" x 12" GE F8TS/CWX)	A514-060888
9.	LAMP HOLDER CHANNEL	B528-060710
10.	PUSH BUTTON SWITCH - FINAL ASSEMBLY - 9 STATION	X500-060881
11.	PUSH BUTTON SWITCH - 9 STATION	B506-047925
12.	RHYTHM SWITCH BOARD #1 - D.E.M.	A575-060877
13.	TIE ANCHOR	B237-040618
14.	SOLO BASS KEYCAP - FINAL ASSEMBLY	X500-060938
15.	PUSH BUTTON KNOB	A250-054568
16.	PUSH BUTTON INSERT - CLEAR	A247-054867
17.	NAMEPLATE - RHYTHM	B249-061022
18.	PUSH BUTTON INSERT - RED	A247-054868
19.	STARTER, FLUORESCENT LAMP - 8W (FS-5)	A514-060854
20.	STARTER BASE (SOCKET)	A507-060524

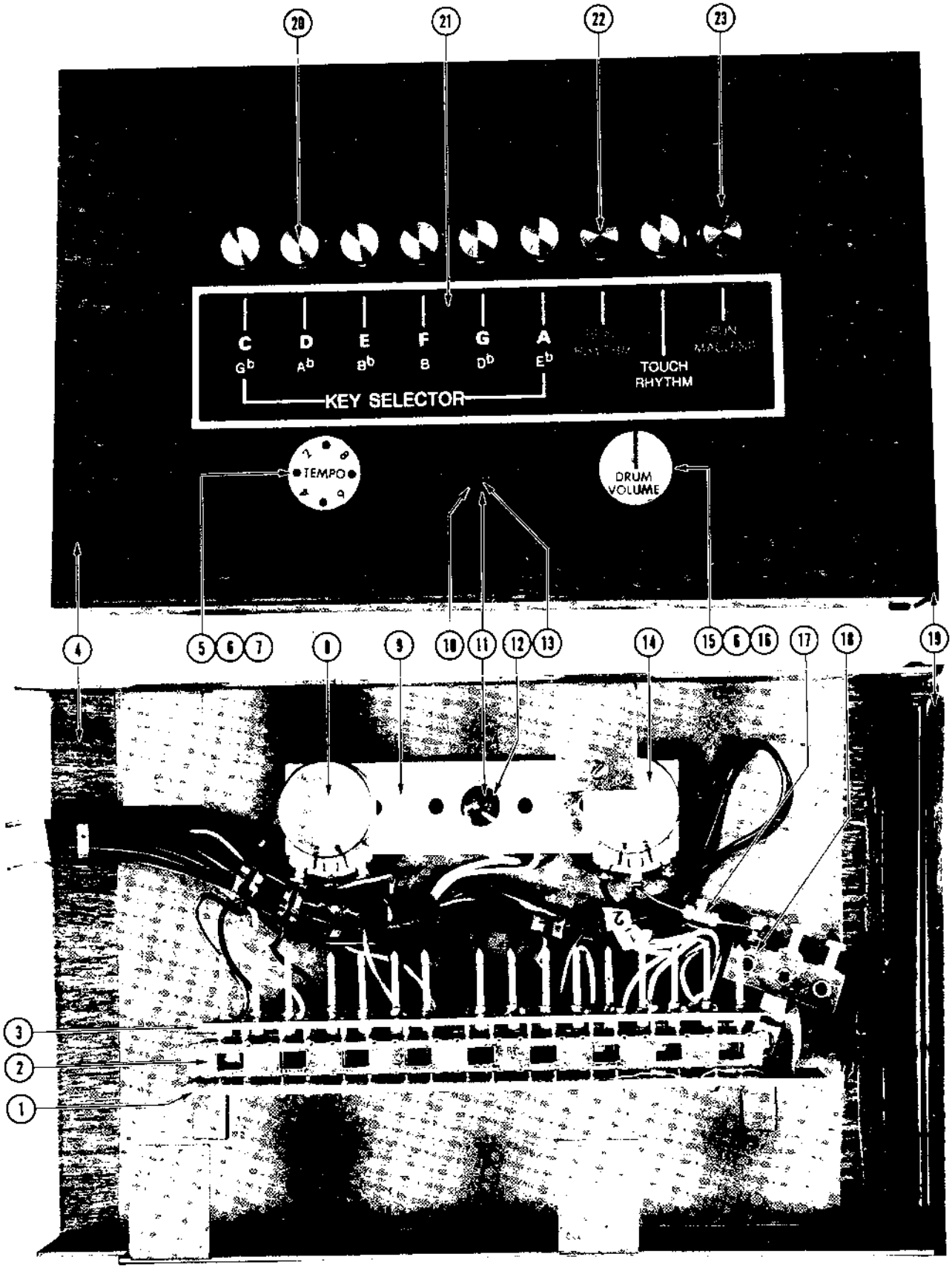
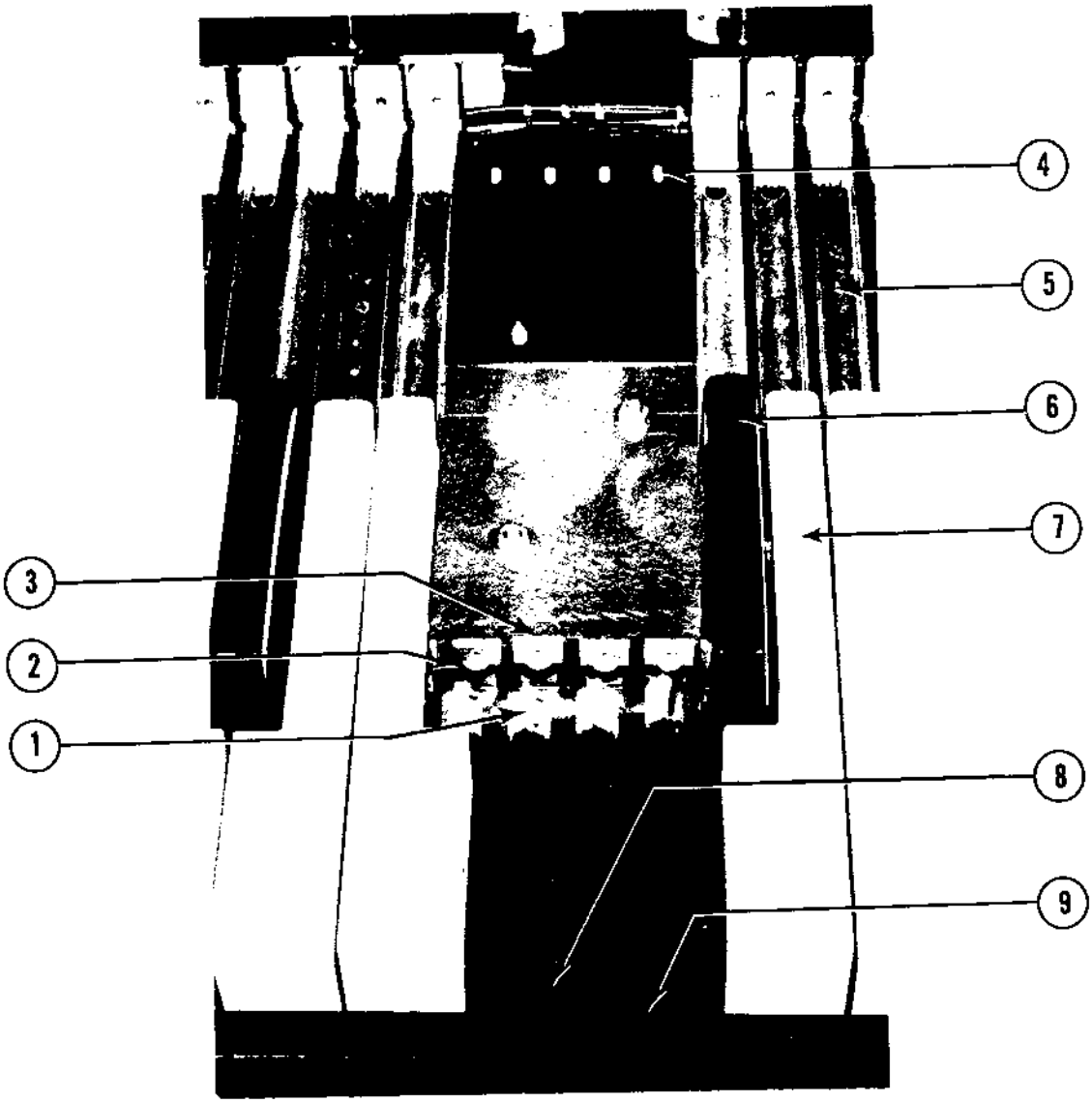


FIG. 13 — ACCOMP. BASS KEYCAP TOP & BOTTOM VIEW

DESCRIPTION FIG. 13

ITEM	DESCRIPTION	PART NUMBER
1.	KEY SELECTOR BOARD #2 D.E.	A575-061461
2.	PUSH BUTTON SWITCH - 9 STATION	B506-060717
	KEY SELECTOR SWITCH FINAL ASSEMBLY (SEE NOTE)	X500-061465
3.	KEY SELECTOR BOARD #1 D.E.	A575-061464
4.	ACCOMPANIMENT BASS KEYCAP FINAL ASSEMBLY	X500-060937
5.	KNOB ASSEMBLY "TEMPO"	A247-058982
6.	KNOB	A247-047794
7.	KNOB INSERT "TEMPO"	A249-058946
8.	TEMPO POTENTIOMETER - 100K OHM - LINEAR	B509-040783
9.	POTENTIOMETER MOUNTING PLATE	A528-060052
10.	L.E.D. MOUNTING CLIP	X514-059255
11.	L.E.D. FINAL ASSEMBLY	A514-058969
12.	L.E.D. MOUNTING RING	X514-059256
13.	LIGHT EMITTING DIODE (L.E.D.)	X514-059254
14.	DRUM VOLUME POTENTIOMETER - 100K OHM - LINEAR	B509-040783
15.	KNOB ASSEMBLY "DRUM VOLUME"	A247-060913
16.	KNOB INSERT "DRUM VOLUME"	A249-060892
17.	RESISTOR - R802, 120K OHM, 0.5W, 10%	S239-124-10
18.	TERMINAL STRIP 3 LUG	A514-026461
19.	END CAP (KEYCAPS)	C250-052369
20.	PUSH BUTTON INSERT - BLUE	A247-054867
21.	NAMEPLATE - KEY SELECTOR	A249-061020
22.	PUSH BUTTON INSERT - RED	A247-054868
23.	KNOB - PUSH BUTTON	A250-054568

NOTE: KEY SELECTOR SWITCH FINAL ASSEMBLY - X500-061465 AS SHOWN IN THIS FIGURE IS INSTALLED ON ORGANS STARTING WITH SERIAL NO. 1666.



ITEM	DESCRIPTION	PART NUMBER
1.	FELT	
2.	NEOPRENE WASHER	A244-019857
3.	KEYSWITCH PLUNGER	SEE PARTS LIST
4.	KEYCHANNEL SCREW (LOOSEN TO REMOVE KEY)	A247-024602
5.	KEYCHANNEL	B250-024146
6.	SHARP KEY	C250-025895
7.	NATURAL KEY	SEE PARTS LIST
8.	KEYSTOP FELT	A244-022607
9.	KEYSLIP FELT	A244-024941

FIG.14 KEYBED - 4 KEYS REMOVED

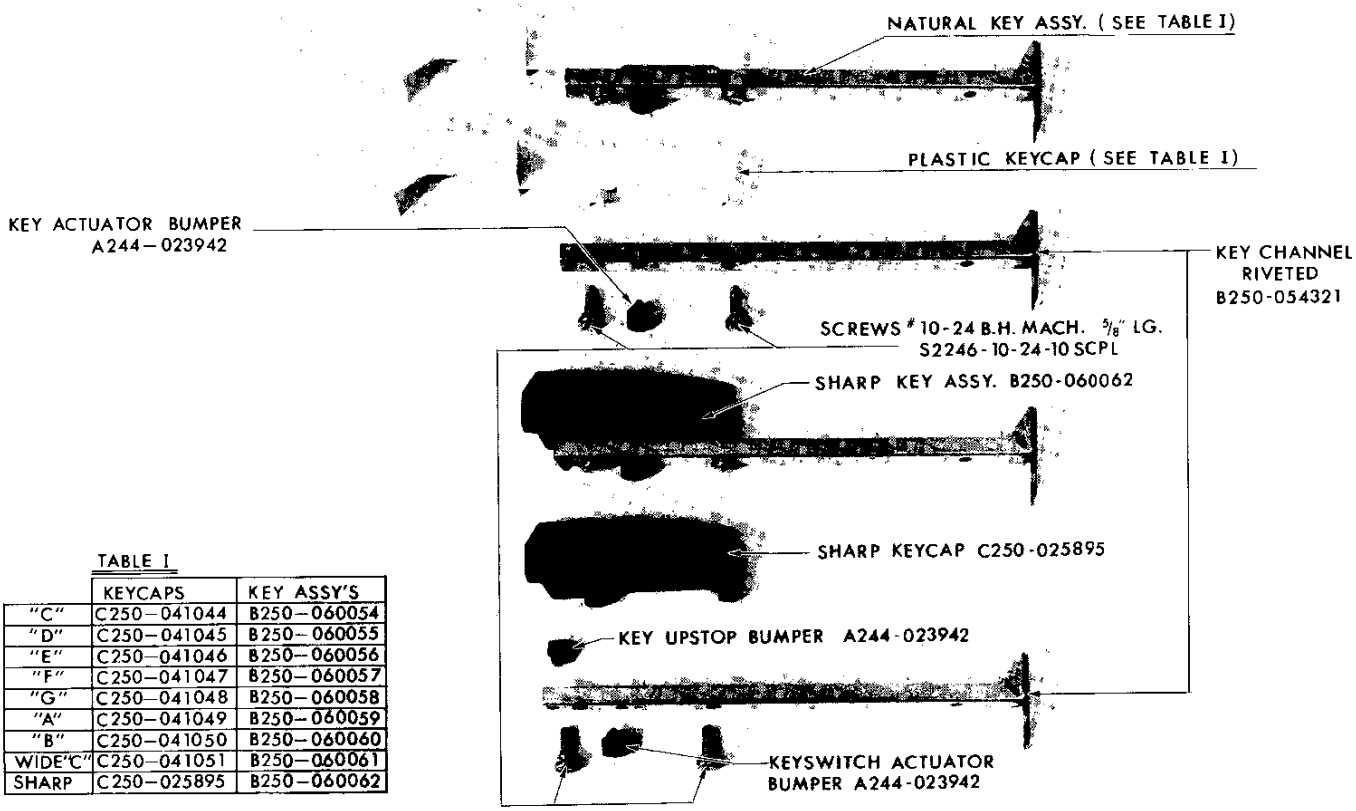


TABLE I

	KEYCAPS	KEY ASSY'S
"C"	C250—041044	B250—060054
"D"	C250—041045	B250—060055
"E"	C250—041046	B250—060056
"F"	C250—041047	B250—060057
"G"	C250—041048	B250—060058
"A"	C250—041049	B250—060059
"B"	C250—041050	B250—060060
WIDE"C"	C250—041051	B250—060061
SHARP	C250—025895	B250—060062

FIG.15 — KEY ASSEMBLIES

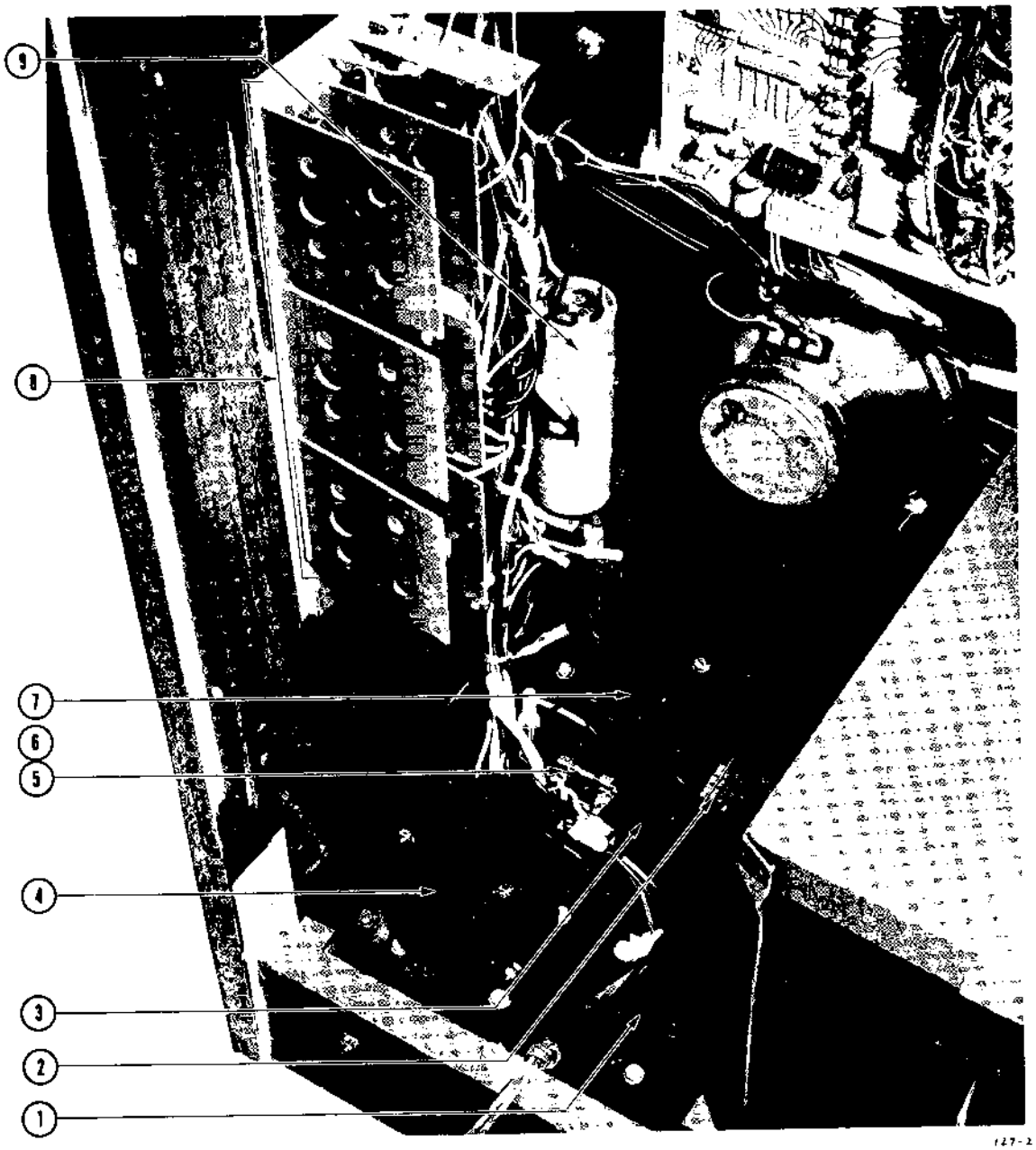


FIG. 16 - POWER SUPPLY VIEW

ITEM	DESCRIPTION	PART NUMBER
1.	BALLAST, FLUORESCENT LAMP - 8W	B514-060909
2.	AC ADAPTER	A512-048333
3.	DUPLEX POWER OUTLET (127FC ONLY)	A507-048409
4.	POWER TRANSFORMER	C512-053438
5.	SLOW BLOW FUSE - 2 AMP.	A514-032101
6.	FUSE HOLDER	A514-059976
7.	BALLAST, FLUORESCENT LAMP - 13W	B514-035094
8.	POWER SUPPLY BOARD ASSEMBLY	D500-060603
9.	CAPACITOR - 4000 MFD/60V	B517-038985

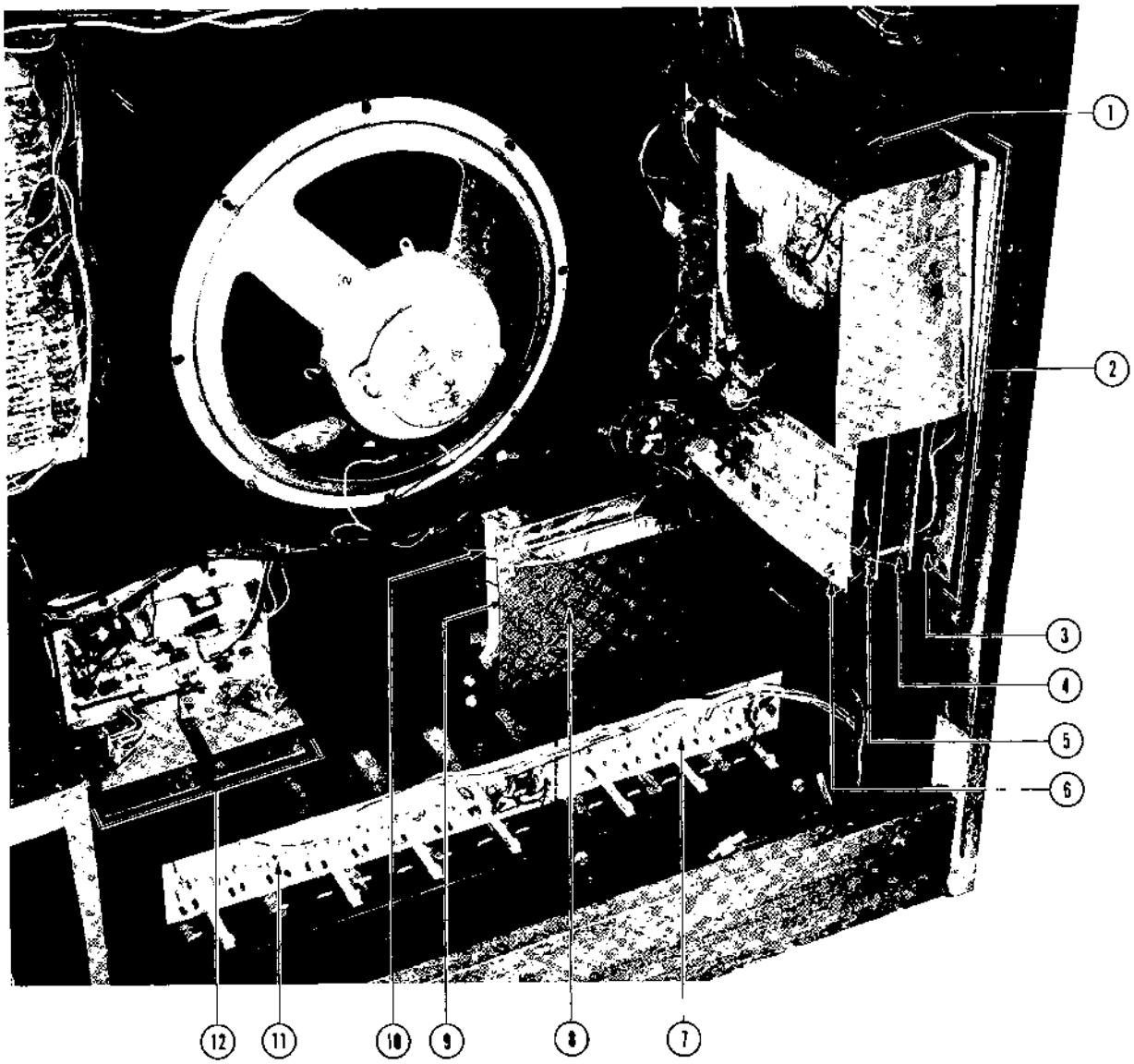


FIG. 17 LOWER BASS END VIEW

ITEM	DESCRIPTION FIG. 17	PART NUMBER
1.	FUN MACHINE COVER	B502-061038
2.	FUN MACHINE BOARDS FINAL ASSEMBLY	X500-060865
3.	RHYTHM SECTION VOICE BOARD ASSEMBLY	D500-060470
4.	FUN MACHINE LOGIC BOARD ASSEMBLY	D500-060479
5.	RIGHT HAND BOARD ASSEMBLY	D500-060663
6.	LEFT HAND BOARD ASSEMBLY	D500-060827
7.	5 NOTE PEDAL SUSTAIN BOARD ASSEMBLY	C506-048860
8.	PREAMP SHIELD	B502-060895
9.	OUTPUT LEVEL SET MINIPOT	
10.	PREAMP BOARD ASSEMBLY	C500-061064
11.	8 NOTE PEDAL SUSTAIN BOARD ASSEMBLY	C506-048866
12.	25W AMP BOARD ASSEMBLY	B500-060514

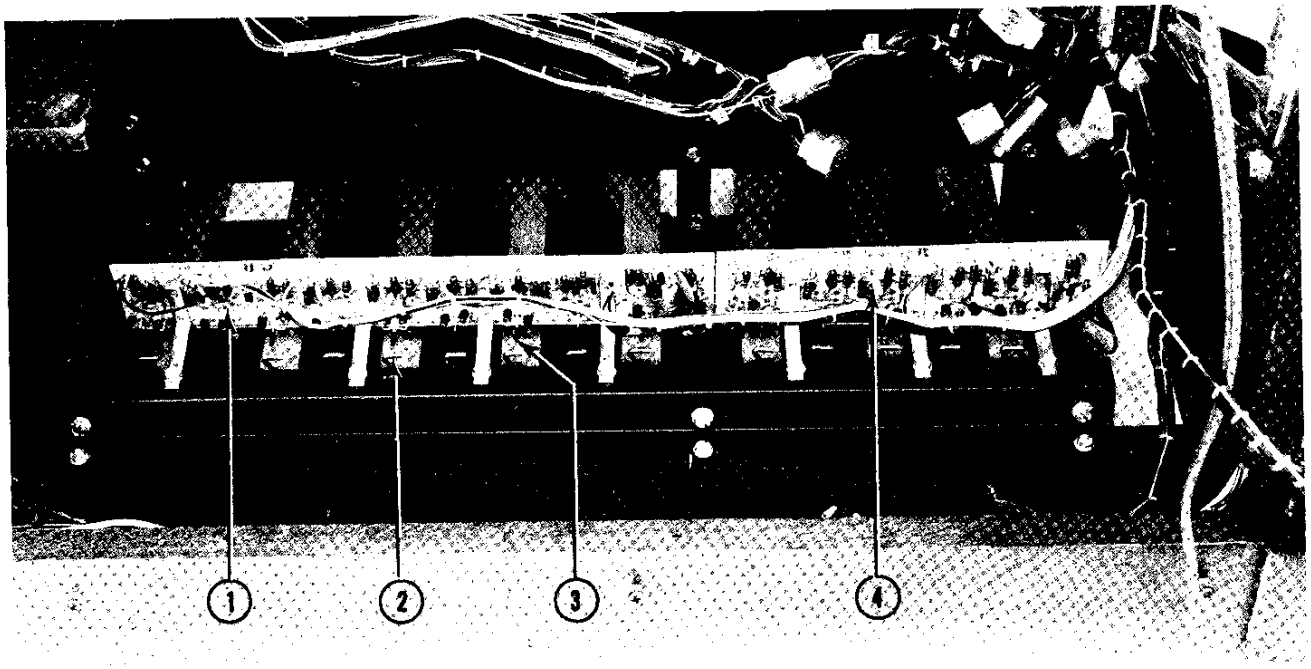


FIG. 18 — PEDAL SUSTAIN BOARDS ASSY.

ITEM	DESCRIPTION	PART NUMBER
1	8 NOTE PEDAL SUSTAIN BOARD ASSEMBLY	C506-048866
2.	PEDAL ACTUATOR	A237-039159
	VINYL TUBING (7/16" LONG)	A244-039801
3.	SPRING CONTACT ASSEMBLY	A500-035728
4.	5 NOTE PEDAL SUSTAIN BOARD ASSEMBLY	C506-048860

BALDWIN MODEL 127 SERIES ORGAN

DISASSEMBLY PROCEDURE

1. Back (Fig. 2)

    a. The back is secured by twelve (12) screws. Remove eight (8) screws from top and sides and loosen four (4) screws across the bottom slots. Lift upward and remove.

2. Lid Assembly (Figs. 4 & 6)

    a. Remove two (2) screws securing the angle brackets on back side of lid assembly to the top rail (Fig. 4, Item 15). Slide the lid toward back of console in order to clear the lid guide slots and lift from console.

3. Tone Color Panel Assembly (Figs. 5 & 6)

    a. Follow Step 2.

    b. Remove two (2) screws (Fig. 6, Item 3) securing the angle brackets to each side of the console. The Tone Color panel, hinged in the rear, will now pivot upward from the normal position.

4. Tone Color Stop Tab Switches (Figs. 5, 7 & 10)

    a. Follow Steps 2 and 3.

    b. Tab mounting block may be removed by removing screws from underside of Tone Color Assembly (Fig. 10); access to switch contacts may now be accomplished.

    c. Tab may be removed by removing tab detent spring from tab throw adjusting screw and lifting tab out.

    d. The tab throw adjustment screw is accessible for adjustment of tab throw.

5. Solo Keys and Keyswitches

    a. Follow Steps 2 and 3b.

    b. Keys may be removed by loosening mounting screw at the rear of key channel (Fig. 14, Item 4).

    Sharp or black keys must be removed first.

    c. Access to Solo keyswitch boards is achieved by removing four (4) screws, two (2) at the bass end and two (2) at the treble end, beneath Accompaniment manual (Fig. 3, Item 2).

    The Solo Manual, hinged in the rear, will now pivot upward from normal position (Fig. 9).

    d. Remove manual switch cover by loosening three (3) screws from front of keyswitches, sliding the cover from slotted holes and swinging dust cover toward back of console (Fig. 9).

    e. Keyswitch board assembly may be disassembled by removing nuts from switch posts.

6. Accompaniment Keys and Keyswitches

    a. Access to Accompaniment keyswitches is achieved by removing Accompaniment keyswitch dust cover (Fig. 3). Cover is removed by loosening three (3) screws from the front of the keyswitches, sliding the cover from the slotted holes and swinging downward.

    b. Keyswitch board assembly may be disassembled by removing nuts from switch posts.

    c. To accomplish access to Accompaniment keys, follow Step 2.

    Raise Tone Color as in Step 3b and raise Solo manual as in Step 5c.

    d. Keys may be removed by loosening mounting screw at the rear of key channel (Fig. 14, Item 4). Sharp or black keys must be removed first.

Disassembly Procedure
(Cont'd.)

7. Solo Bass Keycap - Fun Machine Rhythm Controls - (Figs. 5, 9 & 12)

   a. Follow Steps 2, 3b and 5c.

   b. To remove Solo bass keycap, remove four (4) screws (Fig. 9, Item 1) securing the keycap to Solo manual.

8. Accompaniment Bass Keycap - Fun Machine Key Selector Controls - (Figs. 3, 5 & 13)

   a. To remove Accompaniment bass keycap, remove four (4) screws (Fig. 3, Item 3) from underside of Accompaniment manual.

9. Major/Minor Switch - (Figs. 3, 5 & 11)

   a. Access to Major/Minor switch may be obtained by removing four (4) screws (Fig. 3, Item 4) securing the touch bar slip rail to Accompaniment manual.

10. Expression Pedal Assembly (Figs. 1, 3, 4 & 6)

    a. Follow Step 1.

    b. Remove two (2) wood screws (Fig. 6, Item 1) which secure the Expression Pedal assembly to the rear bottom board of the console.

    c. Pull the Expression Pedal assembly toward the rear of the console in order to clear the screws from slotted holes and lift out.

    d. For electrical adjustments on the Expression Pedal, refer to adjustment specifications on Drawing No. D500-053250.

11. Fun Machine Board Assembly (Figs. 4 & 17)

    a. Follow Step 1.

    b. To remove Fun Machine Boards assembly from console, remove ten (10) wood screws securing the Rhythm Voice board to the console.

    c. Disconnect the connectors and remove boards for servicing.

12. Pedal Clavier (Figs. 1, 3, 17 & 18)

    a. To obtain access to pedal clavier and pedal sustain boards, follow Step 1.

    b. Remove six (6) screws (Fig. 3) securing clavier to bottom board, lift console slightly backward, press natural keys down until sharp keys clear front of case and remove the clavier from the rear of the console.

13. Speakers (Fig. 4)

    a. Follow Step 1.

    b. For speaker access, refer to Fig. 4 to locate particular speaker.

       Remove solderless disconnects to voice coil terminals and remove nuts securing speaker to console.

    NOTE: For proper speaker phasing, observe wire color and speaker terminal numbers when removing speaker.

14. Fuse (Figs. 4, 6 ¢ 16)

    a. To obtain access to fuse, remove back as in Procedure Step 1. Fuse holder is located on the lower end of treble console side near the power transformer (See Fig. 16).

15. Solo Keyboard Fluorescent Light and Starter (Figs. 7 & 8)

    a. To obtain access to starter, remove back as in Procedure Step 1. Starter is located on the rear treble end of Tone Color (Fig. 4, Item 18).

    b. To remove starter from its base, turn starter counterclockwise for 1/4 turn and pull out.

    c. To obtain access to fluorescent bulb, follow Step 1.

       Also raise Tone Color as in Step 3b.

    d. Remove two (2) screws securing the lamp holder bracket to Tone Color (Fig. 8).

16. Solo Bass Keycap Fluorescent Bulb and Starter (Figs. 7 & 12)

    a. To obtain access to starter, remove back as in Procedure Step 1.

       Starter is located on the rear of the Solo bass keycap (Fig. 7, Item 1).

    b. To remove starter from its base, turn starter counterclockwise for 1/4 turn and pull out.

    c. To obtain access to fluorescent bulb, follow Step 1.

       Also raise Tone Color as in Step 3b and raise Solo manual as in Step 5c.

    d. Remove two (2) lamp holder bracket screws (Fig. 12, Item 3), securing the bracket to underneath side of Solo Bass keycap.

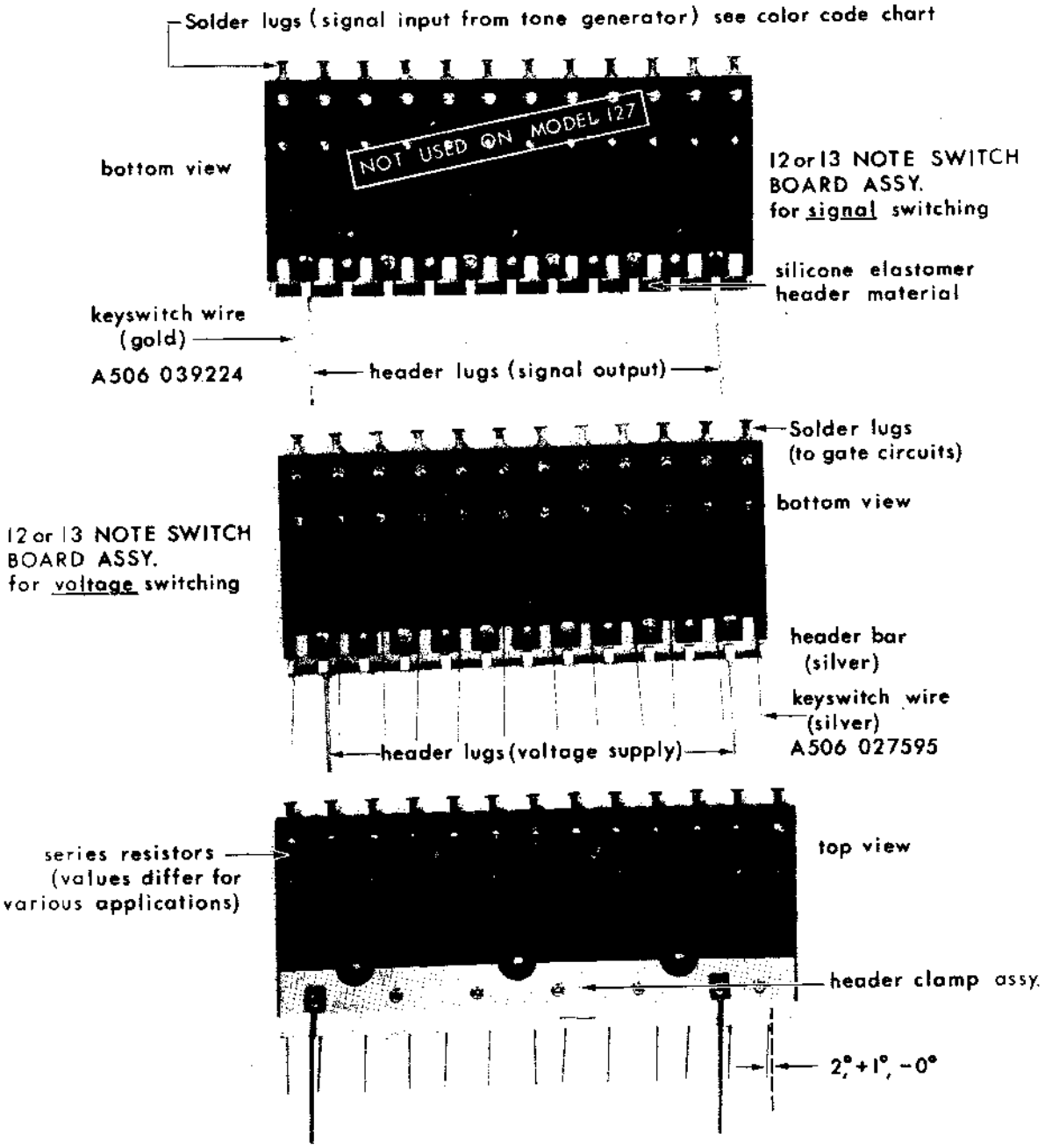
17. Cassette Unit - 127FC (Figs. 1, 3, 22 & 23)

    a. To remove, reach under treble arm and disconnect input, output and power plugs.

    b. Remove two (2) screws securing cassette drawer bottom front and bottom rear (Fig. 23, Item 9).

       Pull drawer forward and lift cassette out.

    c. To remove cassette drawer, remove four (4) screws securing drawer to keybed (Fig. 23, Item 2).

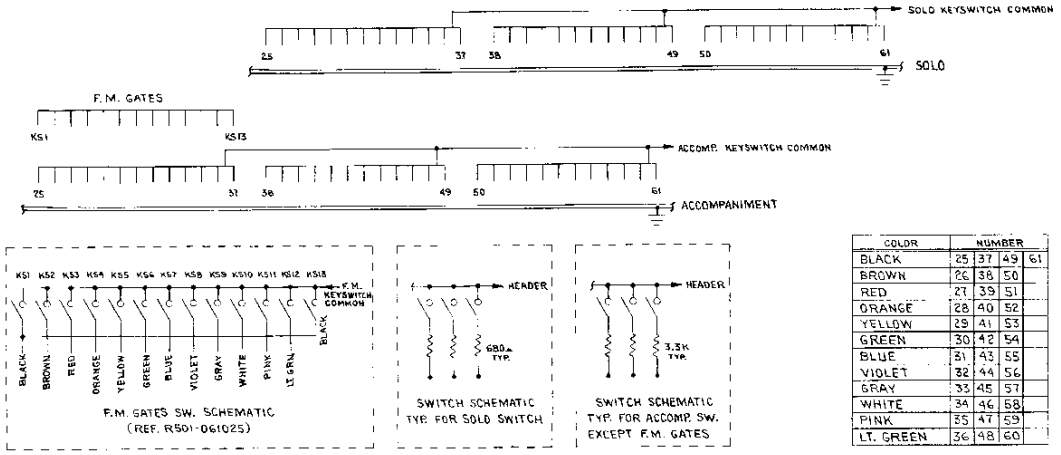


GENERATOR FREQUENCY COLOR CODE CHART

C - black	E - yellow	G# - gray
C# - brown	F - green	A - white
D - red	F# - blue	A# - pink
D# - orange	G - violet	B - lt. green

FIG. 19 – KEYSWITCH ASSEMBLIES

RELEASED
Ord. No. R.N. 648
Date 5/10/74
RECORD OF CHANGE



COLOR	NUMBER			
BLACK	25	37	49	61
BROWN	26	38	50	
RED	27	39	51	
ORANGE	28	40	52	
YELLOW	29	41	53	
GREEN	30	42	54	
BLUE	31	43	55	
VIOLET	32	44	56	
GRAY	33	45	57	
WHITE	34	46	58	
PINK	35	47	59	
LT. GREEN	36	48	60	

CABLE CONNECTIONS:

1. GATE SWITCH CABLE #1 (C508-060351) - ACCOMPANIMENT SWITCHES
   39 CONNECTIONS - 25 THRU 61, GROUND & ACCOMP. KEYSWITCH COMMON
   TO GATE & DIVIDER BD. (DIODE GATE)

#4 #1 PIN	WIRE	#5 #2 PIN	WIRE	#6 #3 PIN	WIRE
1	25	1	37	1	49
2	26	2	38	2	50
3	27	3	39	3	51
4	28	4	40	4	52
5	29	5	41	5	53
6	30	6	42	6	54
7	31	7	43	7	55
8	32	8	44	8	56
9	33	9	45	9	57
10	34	10	46	10	58
11	35	11	47	11	59
12	36	12	48	12	60
				13	61
				14	YEL.
				15	BLK.

#1, #2, #4 & #5 SOCKET

#3 & #6 SOCKET

2. GATE SWITCH CABLE #2 (C508-060853) - SOLO SWITCHES.
   39 CONNECTIONS - 25 THRU 61, GROUND & SOLO KEYSWITCH COMMON
   TO GATE & DIVIDER BD. (DIODE GATE).

3. F.M. GATE CABLE (C508-060897).
   13 CONNECTIONS AT F.M. GATE SWITCH AS SHOWN ABOVE & WHITE/BROWN
   CONNECTION AT F.M. KEYSWITCH COMMON.

DATE 2-25-74	DWN. D. DIEHL	CHK'D. DM	APP'D. Bob Bill	DIMENSIONS	USED ON ORGAN 127	PART NAME KEYSWITCH WIRING DIAGRAM			
PRINT	CIR.	CPL.	CON.	FAY.	DEG.	E. P. T.	REQ. —		
DISTRIBUTION	S			3BL |BR	S BL		FINISH	SIM 127-B	OR NOTED
							NEXT ASSEM.	SUPERSEDES	

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/16 ANGLE ± 1/2°

BALDWIN PIANO & ORGAN CO.
CINCINNATI, OHIO

C 501-061005

TOP OCTAVE FREQUENCY GENERATOR (T.O.F.G.) & DIODE GATE THEORY

The tone generation system consists of a master oscillator circuit (clock) and an integrated SYNCHRONOUS FREQUENCY DIVIDER. The master oscillator frequency is applied to the frequency divider via an oscillator buffer and driver circuit. The frequency divider provides 13 output frequencies, a full octave (C49 @ 523.25 Hz through B60 @ 987.77 Hz) plus one note (C61 @ 1046.5 Hz).

The master oscillator can be frequency modulated by the vibrato oscillator via the Current Source, thus the frequencies produced by the frequency divider will also be modulated.

The thirteen (13) frequencies produced by the frequency divider are applied to the corresponding diode gate circuits and to four (4) additional divide-by-two integrated frequency dividers (IC1 through IC4) via buffer amplifiers. Thus, the divide-by two dividers provide an additional two full octaves (C25 @ 130.81 Hz through B58 @ 493.88 Hz).

This type of generation system produces a total of 37 frequencies. All 37 frequencies are applied to their corresponding diode gate circuits. One octave (12 notes), F#31 through F42, is applied to the FUN MACHINE (F.M.) Logic Board via twelve (12) buffer amplifiers.

MASTER OSCILLATOR (CLOCK)

The Master Oscillator (Clock) circuit, consisting of an NPN transistor (Q6) and associated circuits, is an L-C type oscillator. The frequency is adjustable and can be set by variable inductor L1. Due to the capability of using either of two different types of T.O.F.G. frequency dividers which require a different clock input frequency, the master oscillator frequency can be set to 250.113 kHz for MOSTEK, and 365.338 kHz for MOTOROLA IC dividers. The Master Oscillator tuning procedure is indicated on the T.O.F.G. Schematic D501-060684, which specifies that L1 should be tuned (adjusted) to set the frequency of C61 to 1046.5 Hz.

Master oscillator output is buffered by Q7 and shaped by Q8 and Q9 into a waveform similar to a squarewave with a fast rise time, which is required to drive the frequency divider. Output of the master oscillator can be frequency modulated by means of a variable Current Source (Q5) and the Vibrato Oscillator voltage.

VIBRATO OSCILLATOR

The Vibrato Oscillator, located on the T.O.F.G. board assembly, consists of Q3 and associated circuitry, and produces a 6.4 Hz output signal. Resistor RS12 is factory selected to set the vibrato oscillator frequency. The vibrato oscillator voltage, applied to the master oscillator via R13, R3 potentiometer, and C7 to current source Q5, shifts the oscillator frequency at the 6.4 Hz rate. The vibrato potentiometer controls the master oscillator frequency deviation. At full vibrato the total frequency deviation is 2.5%.

A delayed vibrato effect is provided by Q1 and Q2 and associated components located on the T.O.F.G. board. This effect is controlled by Q109 and Q112 and associated circuits for the RIGHT HAND (SOLO) keyboard and by Q137 and associated components for the LEFT HAND (ACCOMPANIMENT) keyboard.

When no keys are played, transistor Q112 is unsaturated, permitting the +27 volts to be applied to the base of Q1 via R576, D133, D234, and R2. Both transistors, Q1 and Q2, will saturate and hold the vibrato oscillator off. When any key on the Solo keyboard is played, Q109 saturates, providing two bits of information for the vibrato oscillator circuit.

Q112 goes out of saturation, removing, via D234 and D133, the saturation bias for Q1, normally supplied when a key is not played. At the same time, Q109 provides a trigger via D129, C1, and R2 to the base of Q1, which will remain saturated for a given period of time, holding the vibrato oscillator off. After that period of time, Q1 and Q2 will unsaturate, permitting the vibrato oscillator to operate.

The LEFT HAND VIBRATO CONTROL circuit of Q137 and the LEFT HAND CONTINUOUS VOICE TRIGGER circuit of Q141 affect the Vibrato Oscillator in the same way as the RIGHT HAND VIBRATO CONTROL circuit action of Q112 and Q109, when a key on the Accompaniment keyboard is depressed. However, the Solo overrides the Accompaniment delayed vibrato action.

When a key played is released, Q112 will remain saturated until C470 discharges through D132, R599, and Q87. This action permits the vibrato oscillator to operate until played signals have sustained away.

T.O.F.G. FREQUENCY DIVIDER

The MOSTEK MK 0524 is an ION-IMPLANTED, P-CHANNEL MOS, SYNCHRONOUS FREQUENCY DIVIDER, with thirteen (13) output frequencies forming a full octave plus one note of the equal tempered scale. This divider is packaged in a 16 Pin CDIP (Ceramic Dual In-Line Package), and requires only a single power supply source (+14 VDC). The Clock input freuquency required for the MOSTEK divider is 250.113 kHz with a rise time of, at most, 30 ms.

The MOTOROLA MC 6520 is an NMOS TOP OCTAVE SYNTHESIZER also providing thirteen (13) output frequencies. This Motorola divider is packaged in a 22 pin IC and requires +5V and -3V supply source. The -3V supply source is derived from -9V supply via resistive dividers R355, R36 and R37, and base emitter forward drop of Q11 transistor. The Clock Input Frequency requirement for MOTOROLA divider is 365.228 kHz.

Output frequencies from the divider are buffered by buffer amplifiers Q12 through Q24 before application to the gate and divider circuits.

GATE AND DIVIDER CIRCUIT

For reference of note generation and distribution, refer to Drawing C579-412.

Twelve (12) frequencies, C49 through B60 from the T.O.F.G. buffer amplifiers are divided by four (4) divide-by-two IC dividers, thus establishing an additional two octaves of frequency.

A total of 37 signals is applied to seventy-four (74) Diode Gate "Signal In" inputs and later are used for Solo and Accompaniment voicing. This diode gate system employs a pair of diodes (typically D2 and D3 - Refer to Schematic C501-060143), a timing capacitor (C4), and a short sustain network (R37 and D1) for each of 37 signals. Capacitor C changes the squarewave input to a sawtooth waveform and aids in reducing any "Bleed-Through".

With no gate voltage applied, D2 is biased off with respect to the incoming signal, causing it to appear as a high resistance. Application of a gate voltage from the keyswitch common buss by closing the keyswitch, applies a positive voltage to the anodes of D2 and D3, forward biasing them and allowing the "Signal In" to be conducted to the output header. At the same time, capacitor C4 (2.2 mfd) is charged by the gating voltage.

When a key is released (keyswitch open), the forward bias on the diodes will decrease as capacitor C4 discharges through R38, R39 and filter components following. As this forward bias decreases, the diode resistance increases with respect to the incoming signal, until the signal reduces to inaudibility and the circuit returns to its original unkeyed state.

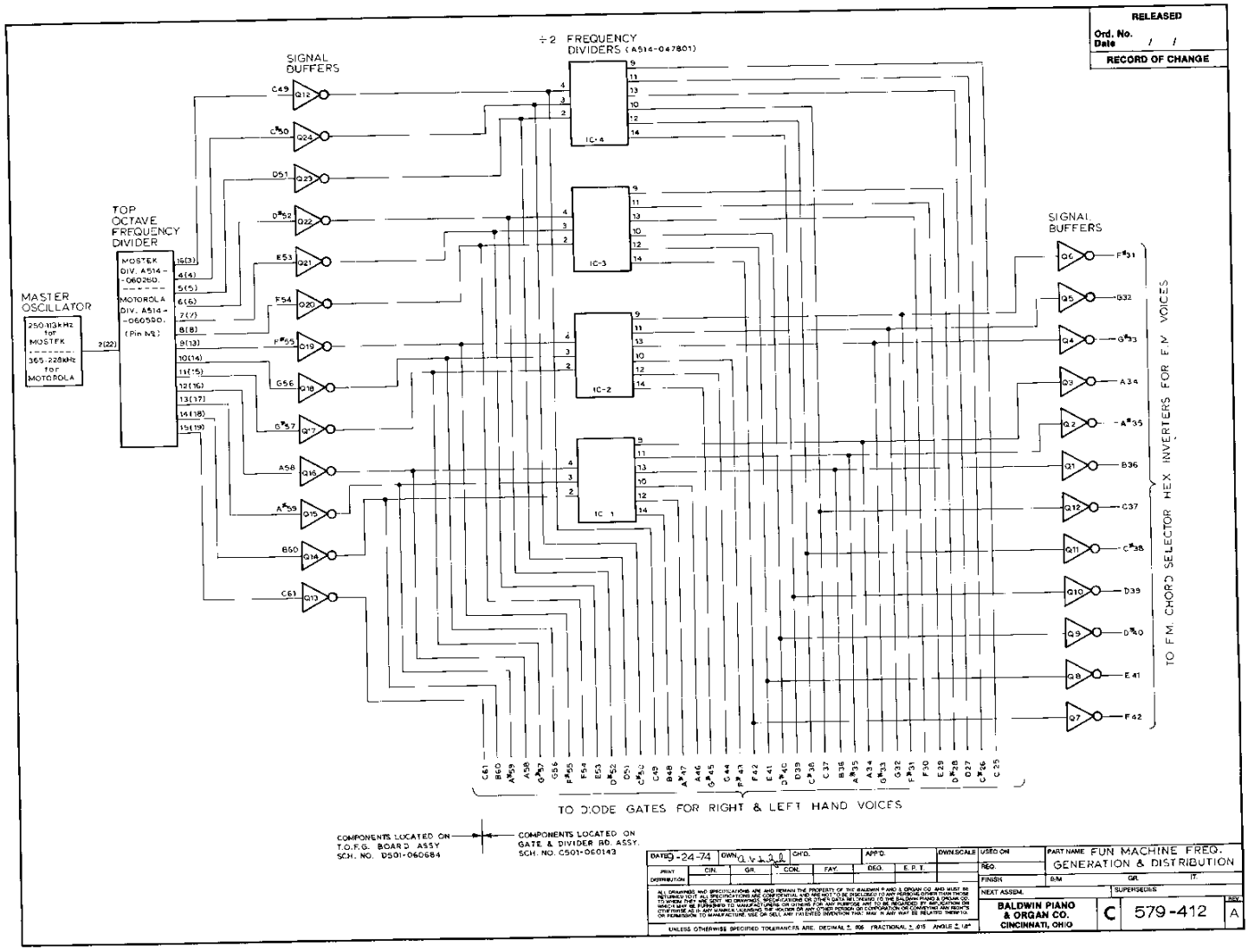
Diode D3 is used to isolate the gate from other gates, preventing the gate from being operated by other gates connected in common.

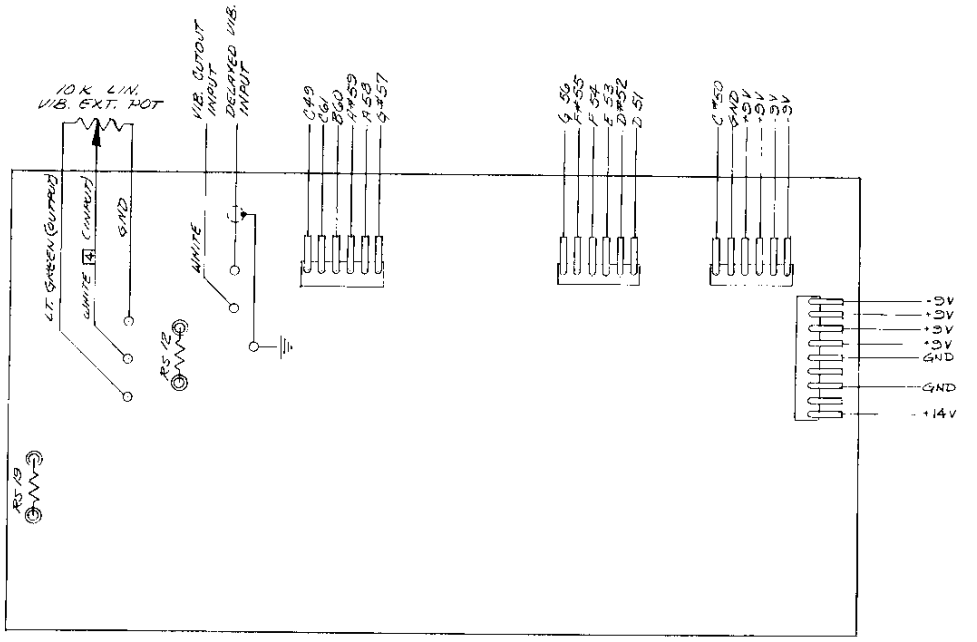
Short sustain is accomplished by returning the resistor-diode network (R37-D1) to ground through short sustain buss in the Right Hand (Solo) circuit, thus, shortening the sustain time by providing an additional discharge path.

The Left Hand (Accomp.) diode gate circuits are similar to the Right Hand diode gates with the exception of the sustain network. Tantalum capacitor C5 (.39 mf) establishes the fixed sustain, thus, R37 and D1, the short sustain buss, is not incorporated for these diode gates.

Outputs of the gate circuits are collected in two separate sets of five (5) headers (groups) of 6 diode pairs each and one header consisting of 7 diode pairs. Outputs from one set of headers are fed into a three section ladder filter on the Right Hand voice board assembly; the outputs from the other set of headers are fed into a three section ladder filter on the Left Hand voice board assembly.

One octave, F#31 through F42, from the divide-by-two IC dividers is buffered by the buffer amplifiers Q1 through Q12 and is used as the Fun Machine (Left Hand) signal source.


RELEASED
Ord. No.
Date / /
RECORD OF CHANGE
÷2 FREQUENCY DIVIDERS (A514-047801)
SIGNAL BUFFERS
TOP OCTAVE FREQUENCY DIVIDER
MOSTEK DIV. A514-060260.
MOTOROLA DIV. A514-060590. (Pin No.)
MASTER OSCILLATOR
250.113kHz for MOSTEK
365.228kHz for MOTOROLA
IC-4
IC-3
IC-2
IC-1
SIGNAL BUFFERS
TO F.M. CHORD SELECTOR HEX INVERTERS FOR F.M VOICES
TO DIODE GATES FOR RIGHT & LEFT HAND VOICES
COMPONENTS LOCATED ON T.O.F.G. BOARD ASSY SCH. NO. D501-060684
COMPONENTS LOCATED ON GATE & DIVIDER BD. ASSY. SCH. NO. C501-060143
DATE 9-24-74
PART NAME FUN MACHINE FREQ. GENERATION & DISTRIBUTION
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
C 579-412 A



RELEASED

Ord. No. K.N. 650
Date 11/18/74

RECORD OF CHANGE

(B) REDRAW, NO CHANGE
3-3-73 K/MB

(C) REVISED TO DELETE MOTOROLA TOGF DEVICE
3-13-75 - DRB CN 16,213

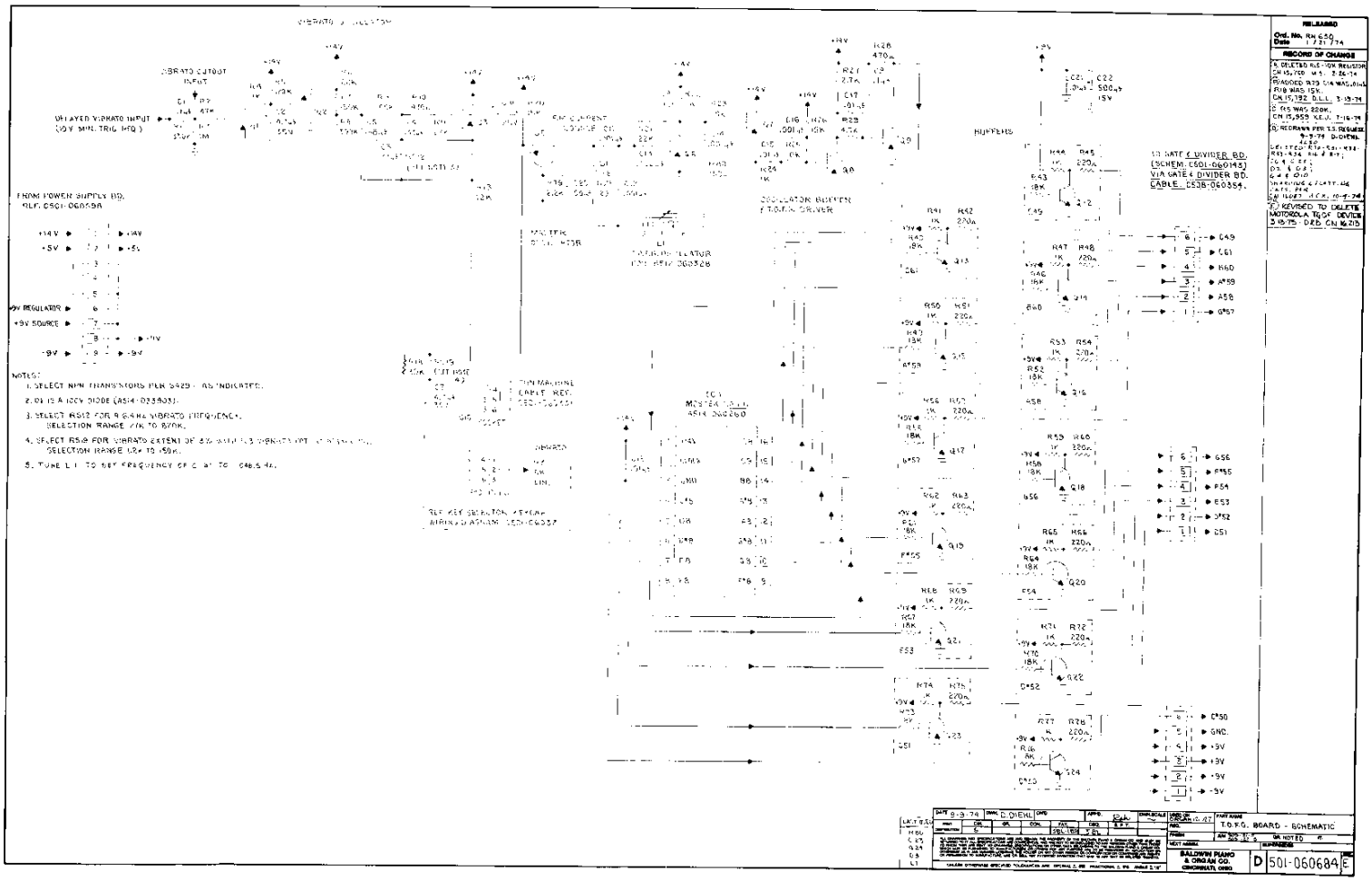
MICRO FILMED BY TS

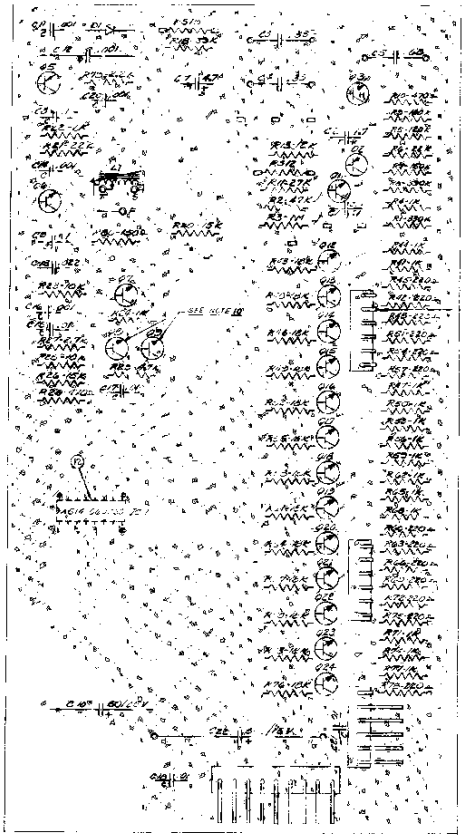
DATE 3-3-73	DWN. BRADY	CHKD. [illegible] 3-3-74	APP'D. Pete.	DWN.SCALE FULL	USED ON ORGAN 121 127	PART NAME T.O.F.G. B'D.-PIN WIRING DIA.			
PRINT DISTRIBUTION	CIN.	GR.	CON.	FAY.	DEQ.	E.P.T.	REQ. —		
	S			X	X		FINISH	B/M 505-121 5 505-127 5	GR. NOTED IT.
							NEXT ASSEM.		SUPERSEDES

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/64 ANGLE ± 1/2°

BALDWIN PIANO & ORGAN CO.
CINCINNATI, OHIO

B 501-060641 C


VIBRATO & CUTOFF
VIBRATO CUTOFF INPUT
DELAYED VIBRATO INPUT (10 V MIN. TRIG REQ.)
FROM POWER SUPPLY BD. (SCHEM. C501-060458)
+14V
+5V
-9V REGULATOR
+9V SOURCE
-9V
NOTES:
1. SELECT NPN TRANSISTORS PER 5429 - AS INDICATED.
2. D1 IS A 12V DIODE (AS14-023903).
3. SELECT R512 FOR 9.94 Hz VIBRATO FREQUENCY. SELECTION RANGE 7.7K TO 870K.
4. SELECT R516 FOR VIBRATO EXTENT OF 6% MIN. TO 3 VIBRATO EXT. SELECTION RANGE 12K TO 150K.
5. TUNE L1 TO 697 FREQUENCY OF C at TO 698.5 Hz.
MASTER OSCILLATOR
L1
TUNE OSCILLATOR (PC) ASSY. 060328
OSCILLATOR BUFFER & TOUCH DRIVER
MASTER (PC) ASSY. 060260
TO MAIN LINE CABLE REF. C501-060450
TO KEY SELECTION MATRIX (SCHEM. C501-060387)
BUFFERS
TO GATE & DIVIDER BD. (SCHEM. C501-060148) VIA GATE & DIVIDER BD. CABLE C53B-060354.
RELEASED
Chg. No. RN 6240
Date 1/21/74
RECORD OF CHANGE
A. DELETED R516 ON RELEASE CN 15,700 M.S. 2-26-74
B. ADDED R59 5.1K WAS 6.04K R18 WAS 15K CN 15,192 D.L.L. 3-15-74
C. R45 WAS 220K. CN 15,955 K.E.U. 7-16-74
D. REDRAWN PER T.S. REQUEST 9-3-74 D. DIEHL
E. REVISED TO DELETE MOTOROLA TRIAC DEVICE 2-18-75 - DRB. CN 16215
T.O.G. BOARD - SCHEMATIC
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
D 501-060684 E



NOTES:

1.

2. REFERENCE SCHEMATIC - USDI-060584

3. PW WIRING DIAGRAM - BEGI-060681

4. SELECT R512 FOR A GAIN OF 176 (FREQUENCY CORRECTION RANGE 17K TO 18.2K

5. SELECT R513 FOR VIB EXTENT OF 3% WITH R13 IN MAX. VIBRATO SELECTION RANGE 12K TO 13.3K.

7. TUNE TO 1046.5 HZ @ "C" 61

8. SELECT C3 PER SPEC AS INDICATED.

9. PANEL NO. MUST INCLUDE PART NUMBER SEE DETAIL H

10. Q8 & Q9 DO NOT USE S.C. TRANSISTOR.

RELEASED
Ord. No. P-1660
Date 11-12-74

RECORD OF CHANGE

① RELEASED P-1660 11-12-74 E.M. DAVIS
DELETED COMPONENTS NECESSARY FOR SERIAL FEATURE P.W. P-1660 11-8-74

② DELETED ITEMS @ 13 613
IT 8 WAS #307-057032
IT 12 WAS #307-060691
IT 13 WAS #307-060150
ADDED NEW IT. 12
05-16-75 1:15 PM DP

③ REVISED TO DELETE MOTOROLA TOFC DEVICE
D-15-75 DRB CN 16613

49				
50				
51	1	2222-134-10	RES-33OK .25W 10%	
52	1	2228-161-10	RES-10K .5W 10%	
53	1	2233-152-10	RES-51OK 1% .5W FILM	
54	1	1134-4	SOLDER IRON	
55	1	2104-3	SOLDER GUN	
56				
57	2	5034-30-475-2	CAP. - 47 uf TANTALUM	
58	1	5611-01-510	51OPF 1KV ELECT	
59		5611-025-050	50 uf 25V ELECT	
60				
61	5	5210-04	.1 CERAMIC	
62	4	5102-102	.001 CERAMIC	
63	1	5223-01-224	.22 MYLAR	
64	2	5222-01-394	.39 MYLAR	
65	1	5232-01-823	.022 MYLAR	
66	1	5611-01-106	CAP. 10 MULTIVOLT	
67	2	2201-[illegible]	RESISTOR 5% .2W FILM	
68	1	324	320K	
69	1	294	290K	
70	1	154	150K	
71	1	114	110K	
72	1	1.4	100K	
73	1	771	77K	
74	1	472	47K	
75	1	272	27K	
76	1	222	22K	
77	13	183	18K	
78	1	153	15K	
79	1	122	12K	
80	6	103	10K	
81				
82	1	472	4.7K	
83	1	272	2.7K	
84	1	222	2.2K	
85	10	102	1K	
86	6	471	470Ω	
87	12	2222-[illegible]-10	RESISTOR 470Ω 1W 10%	
88	1	5IA 061091	DIP SOCKET-16 CONN. PER DIM 061B, PS16-061889	
89	1	[illegible]	WIRE WIRE ASSY 9 AWG	
90	1	[illegible]	WIRE ASSEMBLY 9 AWG	
91	1	8656-[illegible]	FIELD COIL ASS'Y	
92				
93				
94	1	RE-4-21 1560	MOTOR 1/4 HP (7.5 A)	
95	1	15-41-[illegible]	PULLEY HIGH SPEED	
96				
97	1	RE-4-[illegible]	TRANSISTOR MODULE	
98	1	[illegible]	TERMINAL PLATE	
99	1	PC-[illegible]	PRINTED CIRCUIT ASS'Y	
100		WHAT NO	PART NAME	

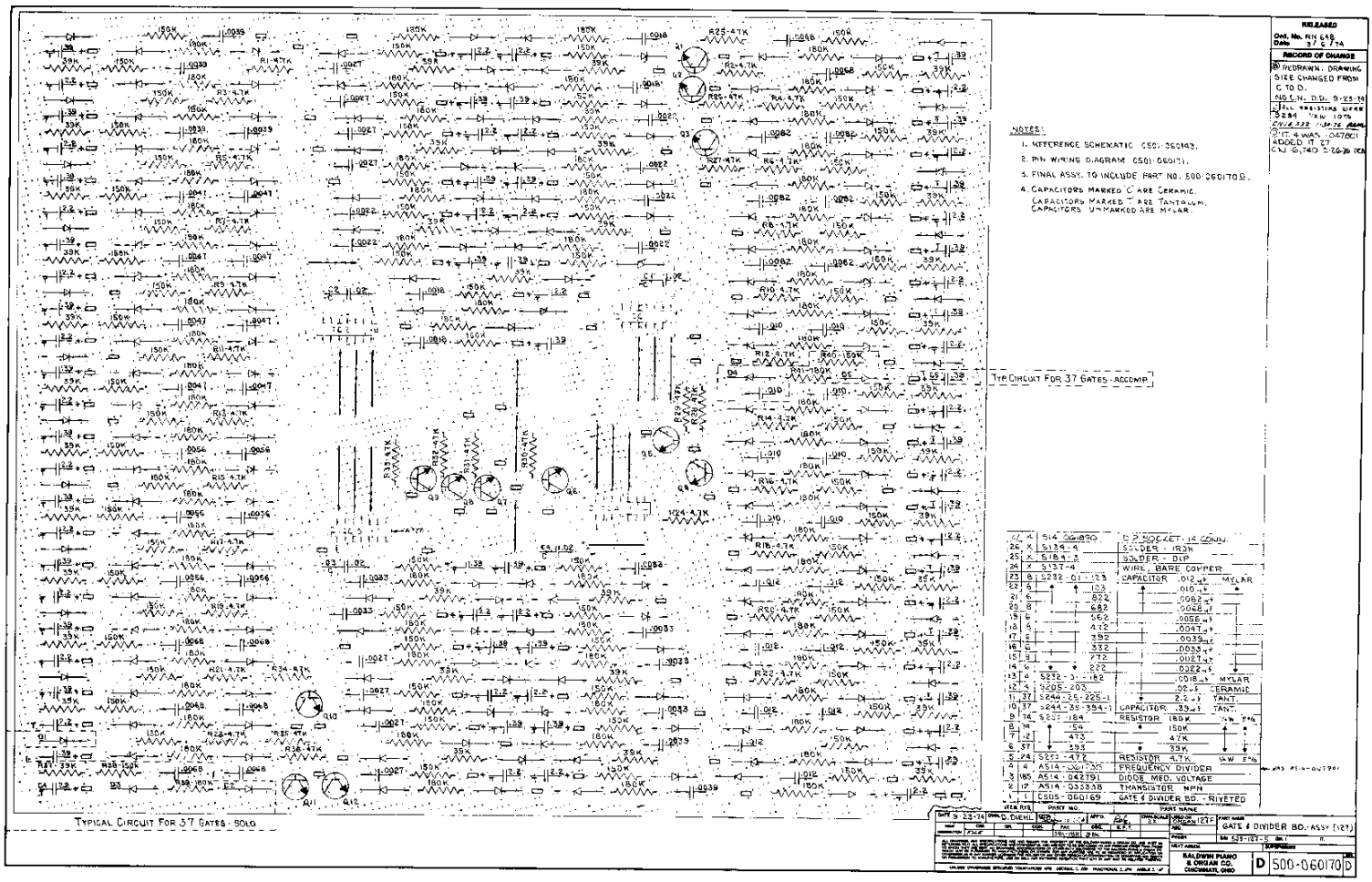
LEGEND:
E DENOTES CERAMIC CAPACITOR
E DENOTES TANTALUM CAPACITOR

"P" DENOTES POLYMYLAR CAPACITOR
DIRECTIONS INDICATES SHE MYLAR
CONNECTIONS INDICATE IN POLARITY
ALL ARE ELECTROLYTIC

DATE	DRWN	APPD	DRAWING SCALE	USED ON	PART NAME	TONE CHANGE ASSEMBLY					
					MATERIAL						
					FINISH	SIZE					
					NEXT ASSY	SUBORDERS					

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

D C-060640 K



TYPICAL CIRCUIT FOR 37 GATES - SOLO

THE CIRCUIT FOR 37 GATES - ACCOMP

NOTES:

1. REFERENCE SCHEMATIC C501-360143.
2. PIN WIRING DIAGRAM C501-060173.
3. FINAL ASSY. TO INCLUDE PART NO. 500-060170 D.
4. CAPACITORS MARKED C ARE CERAMIC.
   CAPACITORS MARKED T ARE TANTALUM.
   CAPACITORS UNMARKED ARE MYLAR.

RELEASED
Ord. No. RN 648
Date 3 / 6 / 74

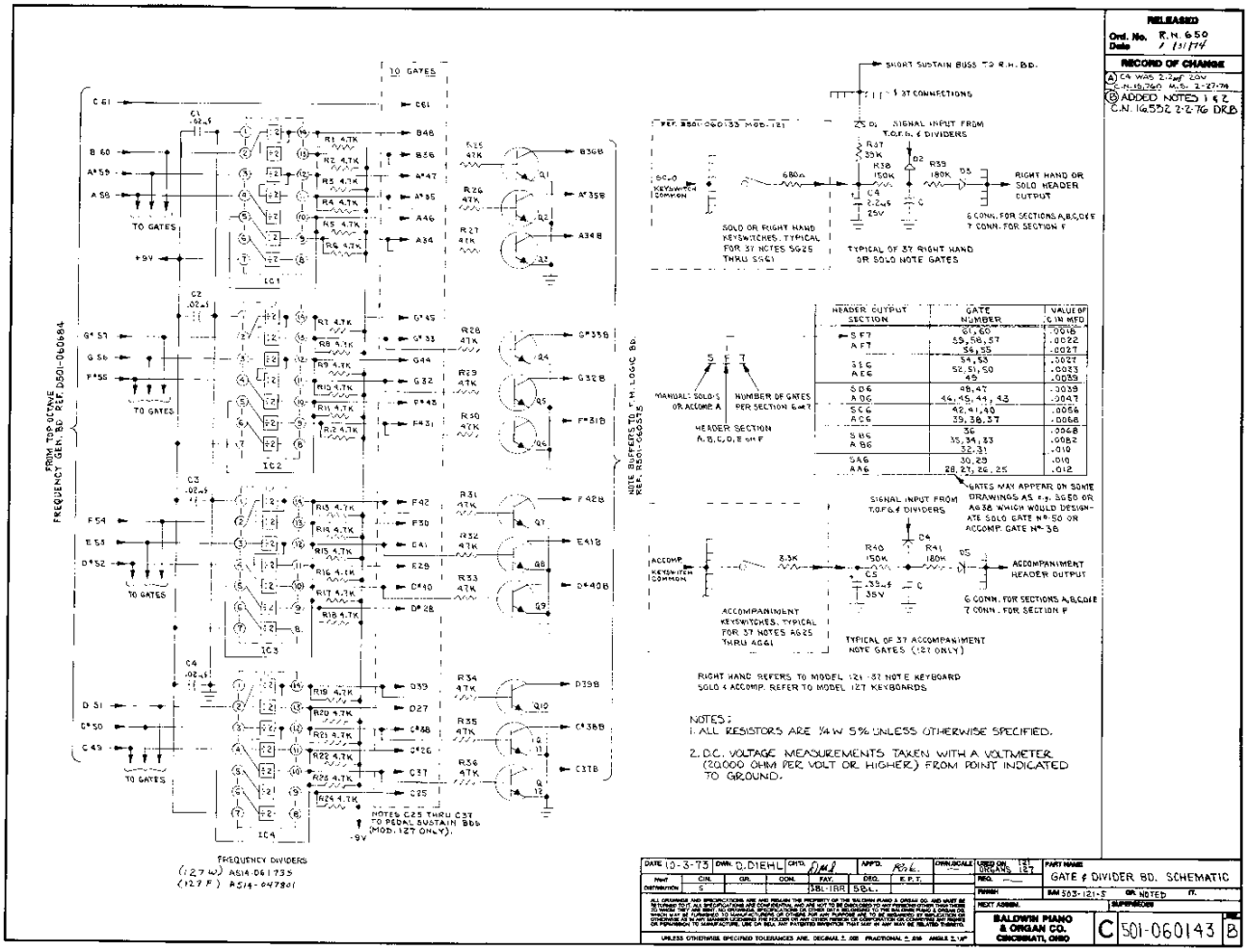
RECORD OF CHANGE

(D) REDRAWN. DRAWING SIZE CHANGED FROM C TO D.
NO S.N. D.D. 9-23-74

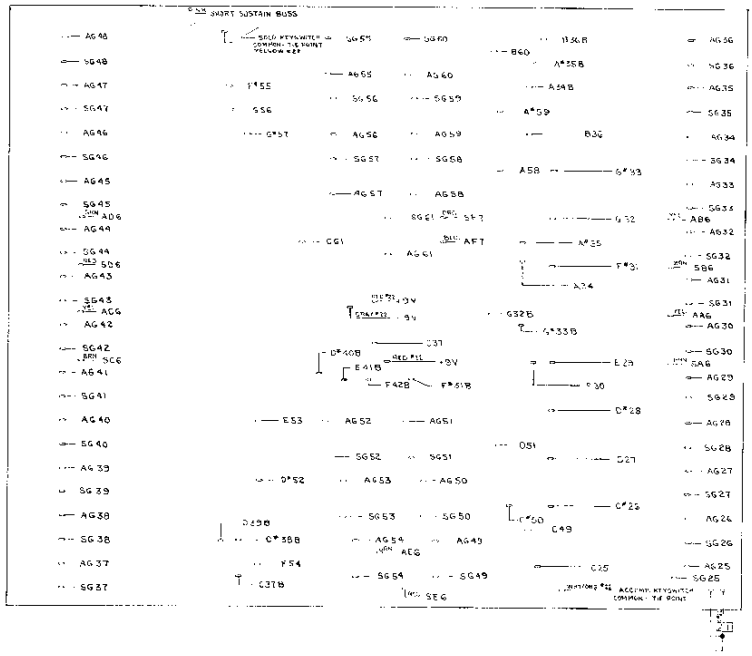
(E) ALL RESISTORS WERE 5.6K 1/4W 10% CHANGED TO 4.7K 1/4W 5% (WAS P/N 047801) ADDED IT 37 C.N.J. 60,740 2-26-76 DEA

ITEM	REQ.	PART NO.	PART NAME
26	K	514-260890	D.I.P. SOCKET - 16 CONN.
25	X	5139-4	SOLDER - IRON
24	X	5137-4	SOLDER - DIP
23	6	5232-01-103	WIRE, BARE COPPER
22	5	" 103	CAPACITOR .012 ±5% MYLAR
21	6	" 822	.010 ±5%
20	8	" 682	.0082 ±5%
19	5	" 562	.0068 ±5%
18	5	" 472	.0056 ±5%
17	6	" 392	.0047 ±5%
16	5	" 332	.0039 ±5%
15	8	" 272	.0033 ±5%
14	6	" 222	.0027 ±5%
13	8	5232-3-182	.0022 ±5%
12	4	5205-203	.0018 ±5% MYLAR
11	37	5244-35-225-1	.05 ±5% CERAMIC
10	37	5244-35-354-1	2.2 ±5% TANT.
9	74	5237-184	CAPACITOR .33 ±5% TANT.
8	98	" 154	RESISTOR 180K 1/4W 5%
7	12	" 473	150K
6	37	" 393	47K
5	74	5232-472	33K
4	6	A514-042795	RESISTOR 4.7K 1/4W 5% (WAS P/N 047801)
3	185	A514-042791	FREQUENCY DIVIDER
2	12	A514-033838	DIODE MED. VOLTAGE
1	1	C505-060169	TRANSISTOR NPN
			GATE & DIVIDER BD. - RIVETED

DRAWN D. DUEHL 9-23-74
CHK
ENGR
MFG
APPD
ORIGINATED 12-7-73
NEXT ASSY
PART NAME GATE & DIVIDER BD. ASSY (127)
PRINT SH 525-127-5 REV
SIZE D
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
D 500-060170 D


RELEASED
Ord. No. R.N. 650
Date 1/31/74
RECORD OF CHANGE
A C4 WAS 2.2μF 25V
C.N. 16,756 M.S. 2-27-74
B ADDED NOTES 1 & 2
C.N. 16,552 2-2-76 DRD
FROM TOP OCTAVE FREQUENCY GEN. BD. REF. 050I-060694
TO GATES
IC1
IC2
IC3
IC4
FREQUENCY DIVIDERS
(127 W) A514-061735
(127 F) A514-047801
NOTES C23 THRU C37 TO PEDAL SUSTAIN BUS (MOD. 127 ONLY).
NOTE BUFFERS TO T.G. LOGIC BD. REF. 050I-060835
SHORT SUSTAIN BUSS TO R.H. BD.
37 CONNECTIONS
SIGNAL INPUT FROM T.G.F.G. & DIVIDERS
SOLO OR RIGHT HAND KEYSWITCHES, TYPICAL FOR 37 NOTES SG25 THRU SG61
TYPICAL OF 37 RIGHT HAND OR SOLO NOTE GATES
RIGHT HAND OR SOLO HEADER OUTPUT
6 CONN. FOR SECTIONS A,B,C,D,E
7 CONN. FOR SECTION F
HEADER OUTPUT SECTION
GATE NUMBER
VALUE OF R IN MEG
MANUAL: SOLO-S OR ACCOMP A
NUMBER OF GATES PER SECTION 6 or 7
HEADER SECTION A,B,C,D,E or F
GATES MAY APPEAR ON SOME DRAWINGS AS e.g. AG50 OR AG38 WHICH WOULD DESIGNATE SOLO GATE N° 50 OR ACCOMP. GATE N° 38
SIGNAL INPUT FROM T.G.F.G. & DIVIDERS
ACCOMP KEYSWITCHES, TYPICAL FOR 37 NOTES AG25 THRU AG61
TYPICAL OF 37 ACCOMPANIMENT NOTE GATES (127 ONLY)
ACCOMPANIMENT HEADER OUTPUT
6 CONN. FOR SECTIONS A,B,C,D,E
7 CONN. FOR SECTION F
RIGHT HAND REFERS TO MODEL 121 - 37 NOTE KEYBOARD
SOLO & ACCOMP. REFER TO MODEL 127 KEYBOARDS
NOTES:
1. ALL RESISTORS ARE ¼W 5% UNLESS OTHERWISE SPECIFIED.
2. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHM PER VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.
DATE 10-3-73
DWN. D. DIEHL
CHK'D.
APP'D. R.B.L.
DWN. SCALE
USED ON ORGANS 121 127
PART NAME GATE & DIVIDER BD. SCHEMATIC
REQ.
FINISH
DWG NO. B.M. 503-121-S
NEXT ASSEM.
SUPERSEDES
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
C 501-060143 B

RELEASED	
Ord. No.	R.N. 648
Date	5/10/74
RECORD OF CHANGE	



LEAD COLOR	FREQUENCY NOTATION			
BLACK	25	37	49	C
BROWN	26	38	50	
RED	27	39	51	
ORANGE	28	40	52	
YELLOW	29	41	53	
GREEN	30	42	54	
BLUE	31	43	55	
VIOLET	32	44	56	
GRAY	33	45	57	
WHITE	34	46	58	
PINK	35	47	59	
LT GRN	36	48	60	

DATE 10-11-73	DWN. D. DIEHL	CHD.	APP'D.		DWG SCALE	NEED ON ORGAN 127	PART NAME GATE & DIVIDER BD. - WIR. DIA. (127)		
PRINT DISTRIBUTION	ORIG. FILE	GR.	CON.	FAY. ABL-JBR	DEG. S RL	E.P.T.	REQ.		
							FINISH	B/M 503-127-5	GR. W/YED
							NEXT ASSEM.	SUPERSEDES	

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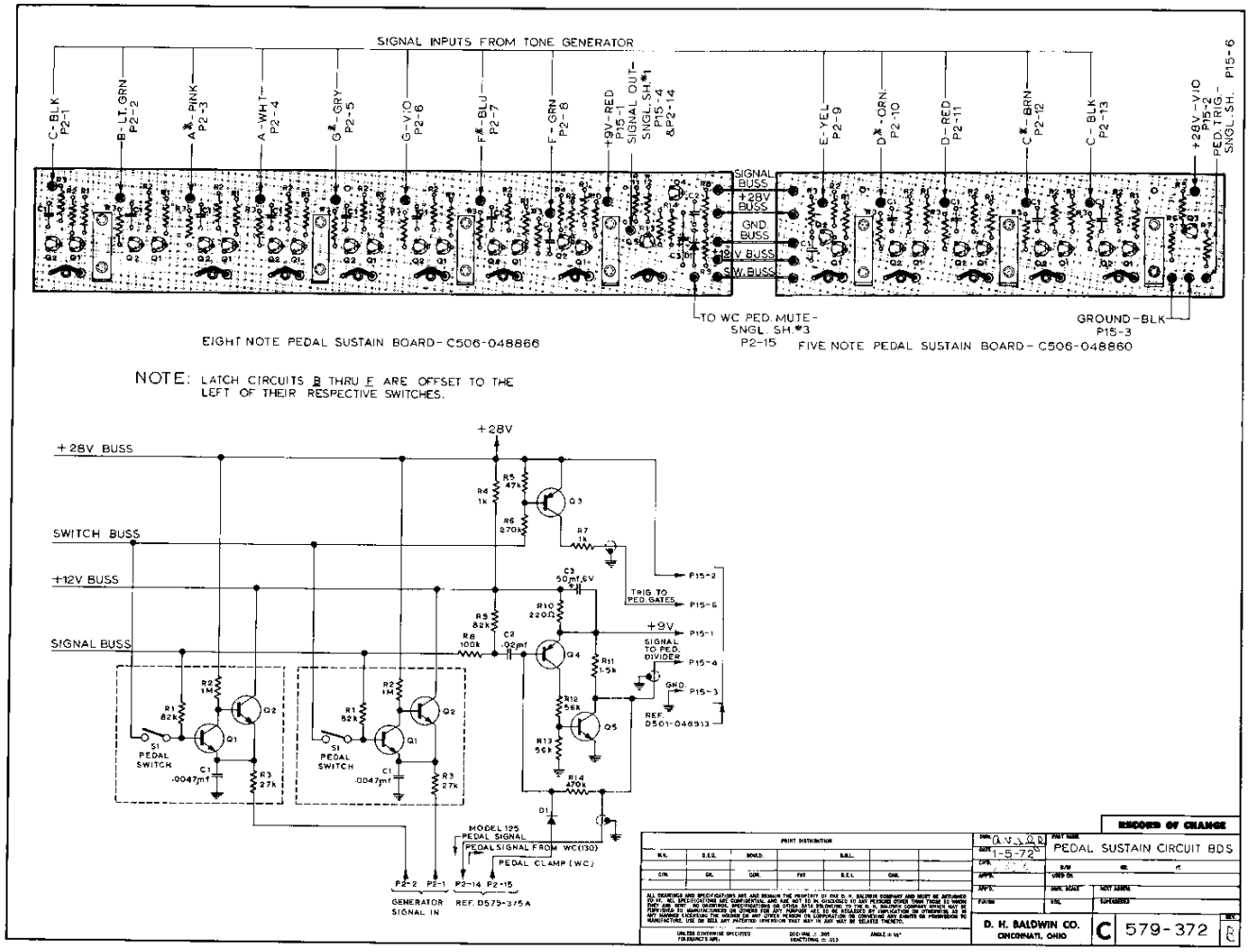
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/64 ANGLE ± 1/8°

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

C 501-060171



NOTE: LATCH CIRCUITS B THRU E ARE OFFSET TO THE LEFT OF THEIR RESPECTIVE SWITCHES.

PRINT DISTRIBUTION						
M.K.	B.E.E.	BOARD		B.B.L.		
CHK.	CK.	QUAL.	FAB	B.E.L.	CHAS.	

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UNLESS OTHERWISE SPECIFIED: FRACTIONAL ± 1/32 — ANGLE ± 1/2°

DRN.	A.V.A.R.
DATE	1-5-72
CHK.	
APPR.	
APPD.	
FINISH	

RECORD OF CHANGE

PART NAME: PEDAL SUSTAIN CIRCUIT BDS

D. H. BALDWIN CO. CINCINNATI, OHIO

C 579-372 REV. B

PEDAL SUSTAIN CIRCUIT

Schematic C579-372

The 13 Note Pedal Sustain circuit, combined on two board assemblies, consists of 13 pairs of switching transistors (typically Q1 and Q2) a pedal gate trigger (Q3), and a pedal signal amplifier (Q4 and Q5).

This circuit provides the latch and the wipeout action on the pedal signals. The latch action, necessary for the pedal sustain feature, allows the pedal signal to be available (applied to pedal circuits) even after the pedal key has been released. The wipeout action, necessary for the monophonic pedal system, prevents two pedal notes from being latched (sounded) simultaneously.

This circuit works in conjunction with 8' and 16' pedal divider and associated circuits.

Thirteen generator frequencies, C25 through C37, are applied via isolation resistors (typically R3) to the joined emitters of the switching transistor pairs. The signal is a squarewave.

In normal state when the pedal key is not depressed (typically S1 switch is open), transistor Q2 is saturated by the application of +28V to its base via R2. Transistor Q1 will be cut off, with its emitter at about +12V, supplied via saturated Q2 from the +12V BUS. The SIGNAL BUS is also set to about +12V; this, when applied via resistor R1, will not affect Q1.

When the pedal keys are not depressed, the SWITCH BUS will be at the same potential as the +28V supply voltage, because there is no current flowing through R5 and R6, thus, there is no voltage drop. The Pedal Trigger transistor, Q3, will be in the cut off state.

If the pedal key is depressed, one of the pedal switch contacts will be closed (typically S1), switch bus +28V initial potential will be of enough magnitude to saturate Q1. Due to a conduction through Q1, the base of Q2 will be less positive, causing Q2 to unsaturate. The signal frequency will be applied to the SIGNAL BUS via the emitter-base junction of Q1 and R1.

This is the "on stable state" of Q1 and Q2, characterized by Q1 being saturated and Q2 unsaturated. The remaining twelve pairs will be in the "off stable state"; the transistors in opposite states.

When a pedal key is held depressed, as just described, the SWITCH BUS voltage will be lowered to about +17V, due to a current path from the +28V supply via R5, R6, closed S1 pedal switch contact and Q1. If one or more additional pedal keys are depressed at the same time, this SWITCH BUS potential will be too low to saturate any of the transistors (similar to Q1) of the other pairs; thus, the other pedal frequencies will not be applied to the SIGNAL BUS.

If the pedal keys are released, the one pair that was in the on stable state will remain unaffected, so that the pedal signal of the last key played will still be applied to the signal bus. This is necessary for the pedal sustain mode of operation, to assure that the pitch of the last key depressed is still available. The pedal signal present on the signal bus is applied via R8 and C2 to the signal amplifier Q4 and Q5, and then via Q143 (on Left Hand Voice Board) to the 8' and 16' pedal divider circuits. As long as a pedal key is depressed, voltage drop across R5 forward biases Q3, which saturates, supplying +28V gating voltage via R7 to the pedal trigger (Q125 Left Hand Board).

When the pedal key is released, the SWITCH BUS potential is removed.

When the next pedal is depressed, both the new pedal frequency and the previous pedal frequency will be transferred to the signal bus, because the first stage transistor (typically Q1) of the previous transistor pair and the new transistor pair are both saturated.

The turn off time of the transistor corresponding to the previously depressed pedal will be determined by the phase difference of the two signal frequencies. This will occur inside half a cycle. As soon as the signal at the emitter of such stage has a reversed phase - more positive than the new latched signal on the signal bus - the transistor will be back biased and unsaturate. Its complement (typical Q2) will saturate, thus their emitter potentials will be at the +12V bus voltage, which actually removes the pedal signal and prevents any additional switching.

Referring to the Block Diagram Fig. 20, the pedal signal output is applied to the 8' and 16' pedal transistor gates via DUAL J-K FLIP-FLOP PEDAL DIVIDER (IC17).

The pedal gate voltage is applied to Q71 and also to capacitor C229, which controls the pedal sustain time.

FUN MACHINE THEORY

The Fun Machine circuitry can be divided into the following functional circuits:

AUTOMATIC CHORDING CIRCUIT
RHYTHM CIRCUIT
RIGHT HAND CIRCUIT
LEFT HAND CIRCUIT

Following is a brief circuit operation description of the above circuit groups.

AUTOMATIC CHORDING CIRCUIT (LEFT HAND)

The twelve (12) signal frequencies are supplied in groups of 5 to 12 F.M. CHORD SELECTOR HEX INVERTERS, IC3 through IC14. When one key in the Automatic chording range is played, the hex inverter corresponding to the note played is activated, providing the five (5) frequencies to the following signal busses:

ROOT BUSS
MINOR THIRD BUSS
MAJOR THIRD BUSS
FIFTH BUSS
SEVENTH BUSS

The voltage from the automatic chording keyswitches also operates the NOTE PLAYED DETECTOR circuit, providing a logic level "0" output (0 V) on the NOTE PLAYED TRIGGER BUSS Ⓐ when one key is played.

The signals from the above busses are applied directly to four (4) PULSE SHAPER circuits (Q65 through Q68) and via the QUAD 2 INPUT NAND GATE (IC15) and the HEX INVERTER (IC16), to the PEDAL, ROOT FIFTH DIVIDER (IC17).

The application of the Seventh signal buss to pulse shaper circuit Q65 is additionally controlled by the function of the KEY SELECTOR SWITCHES.

The PEDAL, ROOT/FIFTH DIVIDER (IC17) divides the incoming signal and provides 8' and 16' signals for the BASS GUITAR PULSE SHAPERS (Q72 and Q73), which, when gated on by the BASS GUITAR TRIGGER AMP. (Q71), apply the common signal output to the BASS GUITAR FILTER CIRCUIT. Q71 is triggered on continuously in the ORGAN rhythm pattern mode; transiently in any other mode by the BASS GUITAR & BASS DRUM TRIGGER, Q18, which is triggered by ROM output #18, or in the normal organ mode by the pedal latch circuit.

The PULSE SHAPER circuits, Q65 through Q68, supply signal to four (4) diode gate circuits for the following voices:

RHYTHM GUITAR
F.M. PIANO
ELECTRIC GUITAR
F.M. BANJO

The diode gates are rhythmically gated on by the ROM via trigger amplifier circuits controlled by the diode matrix on the rhythm pattern selector switches. The signals from the diode gates are applied to the corresponding active filter circuits of Q55, Q60, Q62 and Q64.

The combined outputs from these filters are connected together with the output of the BASS GUITAR FILTER circuit and are applied via R713 to the PED.-ACC. VOLUME potentiometer.

RHYTHM

The CLOCK OSCILLATOR, consisting of Q36, Q38 and Q37, supplies clock pulses to STROBE OUTPUT AMP. Q39, and to the RESETTABLE RHYTHM COUNTER DIVIDERS of IC2. The operation of the CLOCK OSCILLATOR is controlled by the NOTE PLAYED DETECTOR (Q47 and Q48) via the START/STOP FLIP-FLOP (Q1 and Q3); frequency is controlled manually by means of the TEMPO POTENTIOMETER.

The Strobe Output pulses are applied to the ROM input via rhythm pattern selector switches and the diode matrix. The RESETTABLE RHYTHM COUNTER DIVIDERS of IC2, divide the clock frequency five times, providing the five bit information of A0, A1, A2, A3 and A4 for ROM programming.

The negative pulses appearing at the output pins, #15 through #21, of the ROM are used to trigger the automatic chord voices (left hand), rhythm voices, and right hand voices in PERC. PATTERN II mode.

In PERC. PATTERN 1 mode of operation, the STROBE OUTPUT AMP., Q39, is used for right hand voice triggering.

In the TOUCH RHYTHM mode of operation, the circuit of Q4 permits the CLOCK OSCILLATOR operation only while the key in the automatic chording range is being depressed.

Counter divider outputs A0, A1 and A3 are used to operate 4/4 - 3/4 CONTROL GATES, Q44 and Q45, in OLD TIME WALTZ and WALTZ rhythm pattern modes. The A3 output is used to operate TEMPO LIGHT FLASHER circuit (Q42 and Q43) and the ROOT/FIFTH CONTROL circuit (Q41) in 4/4 time rhythms. The A4 output is used to operate the ROOT/FIFTH CONTROL circuit (Q41) in 3/4 time rhythms of OLD TIME WALTZ and WALTZ patterns.

The +12V REGULATOR circuit of Q40 is utilized for rhythm voice section circuits.

The rhythm voice trigger gates, operated by the ROM, provide a trigger pulse for the following rhythm voice oscillators:

BASS
STRIKE
CLAVE
ACCENT
SNARE
CYMBAL

The Rhythm Oscillator outputs are joined together and, via R802, to the wiper of DRUM VOLUME potentiometer R801. When the DRUM VOLUME potentiometer is rotated to full counter clockwise position, rhythm voices are inhibited from being applied to the preamplifier circuit.

RIGHT HAND (SOLO) CIRCUIT

Thirty-seven (37) frequencies are applied to individual signal diode gates, which, when gated by the voltage supplied from the Right Hand (Solo) keyswitches, conduct signals to a three stage LADDER FILTER circuit. Signals from the LADDER FILTER circuit are applied via active filter circuits to the Right Hand (Solo) voice diode gate for the continuous voices such as FLUTE, ACCORDION, and TRUMPET, and for the percussive voices of PIANO, GUITAR, HARPSICHORD, and BANJO.

The voice diode gates are gated by the CONTINUOUS VOICE TRIGGER circuit, Q109, Q108 and Q113, and by the PERCUSSIVE VOICE TRIGGER circuit Q110, Q111, and Q116, via the voice selector switches when a key in the Right Hand (Solo) keyboard is depressed.

In ASR mode of operation, voice diode gates are also gated on selectively (See F.M. RHYTHM PATTERN VOICE SELECTION CHART) by +27V applied via rhythm pattern selector switches and the diode matrix.

When not in ASR mode, the above ASR gating paths are inhibited by the clamping action of CONTINUOUS VOICE ASR CLAMP, Q107, and PERC. ASR CLAMP, Q115.

Percussive voices are also triggered by ROM output #20 when in PERC. PATTERN II mode, and the STROBE OUTPUT AMPLIFIER Q39 at the clock rate when in PERC. PATTERN I mode.

The sustain buss of 37 diode gates is controlled by the SHORT/LONG SUSTAIN GATE, Q87. Diode gates are placed in short sustain mode for all voices except VIBRA HARP. In PERC. PATTERN I or II modes, the sustain time for the percussive voice gates (BANJO, PIANO, etc.) is shortened by action of Q80 when REAL RHYTHM is operating.

The outputs of all RightHand (Solo) voice diode gates are applied to the RIGHT HAND OUTPUT AMPLIFIER circuit, Q83 and Q84. This output is normally supplied to the organ preamplifier via AUTO MUTE switch contacts and also to the input of the AUTO MUTE circuit. If AUTO MUTE switch is selected, output of the AUTO MUTE circuit from IC18 is switched to the organ preamplifier. The D.C. voltage from each voice diode gate, applied to AUTO MUTE TRIGGER Q82, will control the muting effect.

LEFT HAND (ACCOMPANIMENT) CIRCUIT

Thirty-seven (37) frequencies are applied to individual signal diode gates, which, when gated by the voltage supplied from Left Hand (ACCOMPANIMENT) keyswitches, conduct signals to a three stage LADDER FILTER circuit. Signals from the LADDER FILTER circuit are applied via active filter circuits to the Left Hand (ACCOMPANIMENT) voice diode gate for the continuous voices such as FLUTE, REED, and STRING, and for the percussive voices of GUITAR, PIANO and BANJO.

The voice diode gates are gated by the CONTINUOUS VOICE TRIGGER circuit, Q135, Q134 and Q141, and by the PERCUSSIVE VOICE TRIGGER circuit Q136, Q139, and Q142, via the voice selector switches when a key in the Left Hand (ACCOMPANIMENT) keyboard is depressed.

The outputs of all Left Hand (ACCOMPANIMENT) voice diode gates are applied to the LEFT HAND OUTPUT AMPLIFIER circuit, Q130 and Q131. This output is supplied to the organ preamplifier via C648 and R714 to PED.-ACC. VOLUME potentiometer.

AUTOMATIC CHORDING CIRCUIT DESCRIPTION

NOTE PLAYED DETECTOR

The NOTE PLAYED DETECTOR, consisting of Q47, Q48 and associated circuits, provides at its output (NOTE PLAYED TRIGGER BUSS) a logic level "1" (+5V) when no key or more than one key in the Automatic Chording keyboard range is depressed, and logic level "0" (0V) when only one key is depressed.

This logic level information, identified by Ⓐ, is supplied to the following circuits:

ROOT ONLY CONTROL (Q70)
4 HEX INVERTERS (IC16, Inputs 3, 13, 9 and 5)
START/STOP FLIP-FLOP (Base of Q3)
KEY RELEASE DAMP CONTROL (Q52)

With no keys in the Automatic Chording keyboard range depressed, there is no base current available for Q47, which will remain off so that the NOTE PLAYED TRIGGER BUSS (A) will be at the "1" logic level (+5V via R222). +5V is supplied to F.M. KEYSWITCH COMMON by FUN MACHINE function switch contacts. When a key is depressed, +5V, via associated keyswitch contacts and resistors (R200 through R211), will apply current through R221 to the base of Q47, causing it to saturate; thus, placing the NOTE PLAYED TRIGGER BUSS (A) at "0" (0V) logic level. Some current also flows through D38 and the parallel combination of R219 and R220, but is insufficient to create enough forward bias to turn transistor Q48 on. If more than one key is played, additional current is supplied by additional keyswitch resistors to the parallel network of R219 and R220, creating sufficient bias to turn Q48 on. In this case, the base of Q47 is shunted to ground, causing it to unsaturate and provide a logic "1" at NOTE PLAYED TRIGGER BUSS (A)

Resistor R219 is factory selected so that Q48 turns on when 1-1/2 keys are played at the same time.

AUTOMATIC CHORDING & KEY SELECTORS

Twelve (12) frequencies ($F^{\#}31$ through F42) are supplied to twelve (12) F.M. CHORD SELECTOR HEX INVERTERS (IC3 through IC14) in groups of five (5) (Root, Minor Third, Major Third, Fifth and Seventh) to form the major or minor triad or seventh chords corresponding to the key played in the Automatic Chording keyboard range.

The CHORD SELECTOR HEX INVERTERS employ Type 7405 integrated circuits, which contain six (6) independent inverters with "open-collector" outputs.

The "open-collector" indicates that the output terminal is the collector of a transistor without any internal bias supply. The logic "0" output state is a saturated transistor which clamps the output to ground. The logic "1" is effectively an open circuit representing a cutoff transistor. An external resistor (in our case R316, R312, R310, R315 and R311) must be provided to bring the output to +5V for logic "1". This arrangement allows the connection of many inverter outputs to the same bias resistor, which permits grounding of the signals (logic "0") on one inverter output without affecting signals of the other inverter outputs.

The +5V supply voltage for these IC's is supplied via the keyswitches of the Automatic Chording range, so when a key is not played, all six outputs of all IC's are open circuits, thus, preventing the input frequencies from passing.

If one key is played, the +5V will be provided for one IC so that the inverters in that package will be activated. All five input frequencies will be inverted by this IC and applied to the appropriate output busses.

For example, if Note B is played, the following conditions will exist:

Note B36	will be inverted by IC14	(Pins 3 to 4)	and will appear on the	ROOT BUSS
Note D39	"	(Pins 5 to 6)	"	MINOR THIRD BUSS
Note $D^{\#}40$	"	(Pins 9 to 8)	"	MAJOR THIRD BUSS
Note $F^{\#}31$	"	(Pins 11 to 10)	"	FIFTH BUSS
Note A34	"	(Pins 13 to 12)	"	SEVENTH BUSS

The sixth inverter input is left open (representing logic "1") so that when a key is played, its output is set to logic "0" level. This information, together with the KEY SELECTOR switches, is used to determine the seventh chord for a particular note played. This operation will be described later.

The ROOT, FIFTH, and SEVENTH signals are applied to PULSE SHAPER circuits Q68, Q66 and Q65, respectively. These signals, together with the THIRD buss, are also controlled by four (4) inverters of IC16, via output Pins 4, 12, 8 and 6. As long as the key is depressed, the NOTE PLAYED TRIGGER BUSS (A) is at the "0" logic level and is applied to the above inverter inputs (Pins 3, 13, 9 and 5). This sets the inverter outputs to "1" logic level, having no effect on the above signal busses. The +5V supply for IC15 (QUAD 2 INPUT NAND GATE), applied by FUN MACHINE control switch, provides additional control for the chord signal busses.

The THIRD PULSE SHAPER receives either the MAJOR or MINOR THIRD signal, as determined by the action of the MINOR BAR, MAJOR/MINOR NAND GATES in IC15, and inverter action of IC16. For a detailed description, refer to the MAJOR/MINOR circuit operation paragraph.

The presence of the SEVENTH signal in the chord is controlled by the KEY SELECTOR switches. If none of the switches are depressed, the SEVENTH signal is inhibited by the application of ground from connector E3, via normally closed contacts of the KEY SELECTOR switches, and connector E1 to the SEVENTH BUSS.

In our case, with key "B" depressed, the SEVENTH signal, Note A34, appearing on Pin #12 of IC14 will be inhibited by ground application via E1, KEY SELECTOR SWITCHES, and E3. If any KEY SELECTOR SWITCH is depressed, except C-C^{b} and F-B, the SEVENTH signal, A34, will not be inhibited. When C-G^{b} or F-B is selected, the SEVENTH signal, A34, will again be inhibited by IC14 sixth inverter output (Pin #2), logic level "0", which is applied, via connector E8, and the closed contacts of C-G^{b} or F-B switches, to the SEVENTH BUSS common output.

The following chart indicates which chords are TRIADS and which chords are SEVENTHS in relation to the selection of the KEY SELECTOR SWITCHES.

KEY SELECTED	KEY DEPRESSED	KEY PLAYED C	C#	D	D#	E	F	F#	G	G#	A	A#	B
	NONE	3	3	3	3	3	3	3	3	3	3	3	3
	C-G^{b}	3	7	7	7	7	3	3	7	7	7	7	3
	D-A^{b}	7	3	3	7	7	7	7	3	3	7	7	7
	E-B^{b}	7	7	7	3	3	7	7	7	7	3	3	7
	F-B	7	7	7	7	3	3	7	7	7	7	3	3
	G-D^{b}	3	3	7	7	7	7	3	3	7	7	7	7
	A-E^{b}	7	7	3	3	7	7	7	7	3	3	7	7

3 indicates TRIAD Chord

7 indicates SEVENTH Chord

ROOT/FIFTH CIRCUIT

A QUAD 2-INPUT NAND GATE with open collector (IC15) and a HEX INVERTER with open collector (IC16) are used for ROOT/FIFTH or ROOT ONLY operations.

IC15 consists of four (4) identical, independent 2-input nand gates. IC15 is enabled only when +5V is supplied by FUN MACHINE control switch contacts - (in F.M. mode only). The Logic Truth Table and Logic Levels for this device are shown below:

LOGIC LEVELS

"0" = 0V

"1" = +5V

TRUTH TABLE (TYPICAL)

PIN 1 INPUT	PIN 2 INPUT	PIN 3 OUTPUT
1	1	0
0	1	1
1	0	1
0	0	1

The ROOT signal applied to ROOT INHIBIT NAND GATE input Pin #1 is a squarewave containing continuously changing logic levels of "1"s and "0"s (+5V and 0V). Referring to the truth table it is evident that, when logic level "0" is applied to Pin #2 of the nand gate, the nand gate output at Pin #3 will be set to logic level "1", regardless of the logic level applied to Pin #1. However, with logic level "1" applied to Pin #2 of the nand gate, the output at Pin #3 will be the inverse of the squarewave applied to the input at Pin #1.

Therefore, with logic level "0" at Pin #2, the ROOT signal is inhibited; with logic level "1" at Pin #2, the ROOT signal is allowed to be transferred and inverted by the nand gate.

ROOT ONLY OPERATION

With the ORGAN switch depressed, +27 volts is supplied via the ORGAN switch contacts, connector P1-2, R218, and R308 to the base of Q70, causing it to saturate. The collector of Q70, now at ground potential, disables the ROOT/FIFTH information supplied by Q41 and unsaturates Q69.

+5V (logic level "1") is supplied via R306 to input Pin #2 of the ROOT INHIBIT NAND GATE, which allows the ROOT signal to be applied to the DUAL J-K FLIP-FLOP ROOT/FIFTH DIVIDER, providing that one key is played in the Automatic Chording range. Logic level "1" (+5V) for IC15 on Pin #2 is, at the same time, inverted by HEX INVERTER IC16 (Pins 11 to 10) to "0" (0V) logic level, which is the inhibit information for the FIFTH INHIBIT NAND GATE. In this mode of operation, only the ROOT signal will be applied to the ROOT/FIFTH DIVIDER.

ROOT/FIFTH OPERATION

The ROOT/FIFTH operation is accomplished by the operation of the ROOT/FIFTH CONTROL, Q41 and Q69, in all rhythm pattern modes of operation except ORGAN. When one key in the Automatic Chording range is depressed, Q70 goes out of saturation allowing the ROOT/FIFTH GATE, Q69, to receive information from ROOT/FIFTH CONTROL Q41, which in turn, receives its information from the rhythm section.

With any of the rhythm pattern switches except OLD TIME WALTZ or WALTZ selected, there is no voltage applied to the 3/4 TIME CONTROL BUSS, and the state of Q41 is determined by the voltage of information bit A3 (IC12 Pin #12).

During the first half of each measure (Refer to Drawing No. D579-411), the voltage on A3 buss is +27V; Q41 will be held off via D21, no voltage will be applied to the base of Q69, and the ROOT signal will be passed by the ROOT NAND GATE to the J-K FLIP-FLOP divider.

During the second half of each measure (Refer to Drawing No. D579-411), the A3 buss is at +12V; Q41 turns on via D22, D23, and R178, providing saturating voltage for Q69. A logic level "0" (0V) from the collector of Q69 is applied to input Pin #2 of the QUAD 2 INPUT NAND GATE (IC15) and to Pin #11 of the HEX INVERTER (IC16). The input of Pin #2 of IC15 inhibits the Root signal; the input of Pin #11 of IC16 is inverted to logic level "1" (+5V) and applied to Pin #4 of IC15, which permits the FIFTH INHIBIT NAND GATE to operate, allowing the FIFTH signal to appear on the ROOT/FIFTH BUSS.

In 3/4 time operation, when WALTZ or OLD TIME WALTZ rhythm selector switch is selected, the 3/4 TIME CONTROL BUSS is at +27 volts potential, which saturates Q44 and defeats the above mentioned turn on path for Q41 via the clamping action of D24. The state of Q41 is now determined by the voltage of the A4 buss (Pin #13 of IC2). On all odd numbered measures, first, third, fifth, etc. (Refer to Drawing No. D579-411), A4 buss is at +27 volts potential. This voltage applied via D25 and R181 will prevent Q41 from turning on. On all even numbered measures, the voltage on A4 buss is +12 volts, which will cause Q41 to turn on via R181, R181A and saturated transistor Q44. Now Q41 will supply voltage to ROOT/FIFTH GATE Q69 and fifth signal will be heard as previously described.

It is also important to mention that the action of the ROOT/FIFTH GATE Q69 is inhibited by Q70, which remains saturated via NOTE PLAYED TRIGGER BUSS (A) and R309, until a key in the Automatic Chording keyboard range is depressed.

MAJOR/MINOR OPERATION

When one key in the Automatic Chording range is depressed, the HEX INVERTER corresponding to the note played provides five (5) frequencies. It then becomes necessary to form either a major chord (C-E-G-A#) or a minor chord (C-D#-G-A#). This function is controlled by the MINOR BAR.

For a major chord, the MINOR BAR, containing a single pole switch with normally open contacts, is not depressed.

The MAJOR THIRD BUSS is supplied to one of the inputs (Pin #9) of the MAJOR THIRD INHIBIT NAND GATE, while the other input (Pin #10) receives logic level "1" (+5V) via R313. This nand gate will operate, applying the major third signal from its output (Pin #8) to the THIRD BUSS PULSE SHAPER, Q67.

The minor third signal is inhibited by the action of the MINOR THIRD INHIBIT NAND GATE, which cannot change its state because both its inputs (Pins #12 & 13) are connected together and are at logic level "1" (+5V) via R313.

The minor chord sounds when the MINOR BAR is depressed. With the MINOR BAR depressed, logic level "0" (ground) is applied to the three connnected nand gate inputs (Pins #10, 12 & 13). The MAJOR THIRD INHIBIT NAND GATE will not operate, thus preventing the major third signal from appearing on the THIRD BUSS. The MINOR THIRD INHIBIT NAND GATE will now allow the minor third signal to be applied to HEX INVERTER IC16 (Pins #1 and 2) where it is inverted and applied via the THIRD BUSS and PULSE SHAPER, Q67.

BASS GUITAR VOICE CIRCUIT

The Root or Fifth frequency appearing on the ROOT/FIFTH BUSS is applied to the DUAL J-K FLIP-FLOP ROOT/FIFTH DIVIDER IC17 (Type 74107), which is interconnected in such a way as to produce two divider stages; thus, establishing the 8' and 16' Bass Guitar signals for the BASS GUITAR PULSE SHAPERS, Q72 and Q73. The BASS GUITAR TRIGGER AMP., transistor Q71, is normally off, leaving collector resistors R323 and R327 of the BASS GUITAR PULSE SHAPERS without D.C. supply so that Q72 and Q73 are inoperative. In ORGAN mode of operation, Q71 is turned on continuously by the application of +27V via ORGAN switch contacts, connector P1-2, R218, D35, Q128 and D216, to its base. The saturated Q71 now effectively provides a D.C. supply of +27V for R323 and R327, enabling Q72 and Q73 to operate as pulse shaping circuits, providing signals at collectors with a pulse width of 1.5 m sec. These signals are combined by D77 and D78 and are applied to the Bass Guitar passive filter circuit.

In all rhythm patterns, except ORGAN, Q71 is pulsed on via D11, R65, D220, D128 and D216 by the BASS GUITAR and BASS DRUM TRIGGER, Q18, when it is triggered by the ROM #18 pulse for a duration of 10 ms. The voltage on the CONTINUOUS BASS GUITAR BUSS, in this case, is inhibited by the saturated Q46 transistor. Diodes D11 and D35 operate as blocking diodes.

CONTINUOUS BASS GUITAR AND ROOT ONLY INHIBIT transistor Q46 is saturated by the application of +27V via rhythm pattern selector switches and diode matrix to one of the Continuous Bass Guitar and Root Only Inhibit busses, as indicated in the DIODE MATRIX CHART under the CONTINUOUS BASS GUITAR INHIBIT section.

AUTOMATIC CHORDING VOICE CIRCUIT

The four (4) buffer stages, Q68, Q67, Q66 and Q65, convert "root", "third", "fifth" and "seventh" squarewave signals into pulse wave signals, with a pulse width of 1 ms. All of these buffered stage outputs are applied to the diode gates of the Automatic Chording voices:

RHYTHM GUITAR
F.M. PIANO
ELECTRIC GUITAR
F.M. BANJO

The common outputs of these diode gates are applied respectively to the active filter circuit inputs of Q55, Q60, Q62 and Q64. The outputs of all voices, via level set resistors and decoupling capacitors, are summed together (including the output of the BASS GUITAR FILTER) and applied to the organ preamp via R713, through the PED.-ACC. VOLUME potentiometer and P30-4 connectors.

RHYTHM GUITAR VOICE

The RHYTHM GUITAR DIODE GATES, D40 through D47, are gated on by the RHYTHM GUITAR TRIGGER AMP., Q50. This transistor is continuously or transiently turned on, providing +27V supply from its collector to emitter and, via R235, R236, R237 and R238, to the anodes of D40/D44, D41/D45, D42/D46 and D43/D47, respectively.

RHYTHM GUITAR TRIGGER AMP Q50 is turned on continuously in ORGAN rhythm pattern mode of operation by the application of +27V to its base via ORGAN switch contacts, connector P1-2, D36 and R227.

The transient operation of Q50 is achieved by the action of RHYTHM GUITAR PULSE GATE Q54. When triggered by the ROM #16 negative pulse, Q54 will provide a positive voltage to the base of Q50, via R230, emitter to collector, and R227 for a time period determined by C201 and R229. This time constant is shortened by placing R226 in parallel with R229 when the RHYTHM GUITAR DAMP CONTROL CIRCUIT Q49 and Q51 is operated by the ROM #15 pulse, thus shortening, or damping, the RHYTHM GUITAR voice. This is equivalent to the effect created on the regular guitar instrument when damping the sound out by placing a hand across the strings. The operation of that circuit commences when the ROM negative pulse #15 is applied to the base of PNP transistor Q49, which will saturate transiently and supply turn-on voltage to the base of Q51, via R224, emitter to collector, and R225. Transistor Q51 will saturate for a time period determined by C200 and will place R226 effectively in parallel with R229.

A similar damping effect of the Rhythm Guitar voice is accomplished by the action of the KEY RELEASE DAMP CONTROL, Q52, when the key on the Automatic Chording keyboard is released. The voltage of NOTE PLAYED TRIGGER BUSS Ⓐ, when the key is released, is at +5V level, and when applied via R233 to the base of Q52, will cause it to saturate. Any bias supplied to the base of Q50 will, in this case, be grounded via R228, D37, and collector to emitter circuit of Q52. The F. M. Piano voice is also damped out by the action of Q52, via R249 and D48.

In certain rhythm pattern modes of operation it becomes necessary to inhibit the Rhythm Guitar voice. This is accomplished by the application of +27 volts from the rhythm pattern switches via the diode matrix and RHYTHM GUITAR DEFEAT BUSS to the RHYTHM GUITAR DEFEAT GATE, Q53, as indicated in the DIODE MATRIX CHART under the RHYTHM GUITAR INHIBIT section.

Transistor Q53, when saturated, will prevent the operation of RHYTHM GUITAR TRIGGER AMP. Q50 by placing its base to ground.

F. M. PIANO VOICE

The F. M. PIANO DIODE GATES, D52 through D59, are gated on by the voltage provided by the collector to emitter circuit of F. M. PIANO TRIGGER AMP. Q57, when it is saturated. Q57 is turned on transiently by the F. M. PIANO PULSE GATE, Q58, and continuously by the voltage applied to the CONTINUOUS PIANO BUSS.

The continuous operation of the F. M. Piano voice is accomplished by the application of a positive voltage to the base of Q57 via R253, the diode matrix, and Rhythm Pattern selection switches. See the DIODE MATRIX CHART under CONTINUOUS F. M. PIANO section.

For transient operation of F. M. PIANO TRIGGER AMP. Q57, the F. M. PIANO PULSE GATE, Q58, is incorporated. The voltage supply for the emitter and base of Q58 is supplied by R251 and R252, respectively, via the F. M. PIANO ADD BUSS, diode matrix and Rhythm Pattern switches, thus allowing the transient operation of this stage only in some rhythm patterns. For its operation, refer to the DIODE MATRIX CHART under the TRANSIENT F. M. PIANO section.

The application of ROM Pulse #17 via D49 to the base of Q58 causes it to saturate, providing base voltage for Q57, which turns on PIANO DIODE GATES D52 through D59, as previously described.

The sustain of the F. M. PIANO voice is determined by C207 and R254. As in the case of Rhythm Guitar, if a key is released, Q52 is saturated, which effectively shunts R254 with D48 and R249, providing a very short sustain. This eliminates the sustain when a key is released.

In the FOX TROT rhythm pattern only, the sustain time of the F. M. PIANO voice is prolonged by the action of the PIANO SHORT SUSTAIN circuit of Q56 and R250. When FOX TROT switch is depressed, the +27V otherwise supplied via switch contacts and R248 to the base of Q56 will be removed. Q56 will cut off, disconnecting R250 from the parallel connection of R254, thus prolonging the sustain time for Q57.

Additional triggering of the F. M. PIANO voice is accomplished by the circuit of Q59 when the chord that is being heard contains the seventh signal. ROM output buss #18 is applied via D50 to the junction of R255 and R256. In the absence of a seventh signal, Q59 is cut off, opening a current path for D50 and ROM #18 pulse. Therefore, ROM Pulse #18 has no effect on the state of Q58. When the seventh signal is present on the SEVENTH BUSS, it is rectified by D51, filtered by C208, and applied to the base of Q59 via R257, causing it to saturate. Now, when ROM Output #18 supplies a negative pulse, transistor Q58 will turn on, providing a bias for Q57 and F. M. PIANO DIODE GATES.

ELECTRIC GUITAR VOICE

The ELECTRIC GUITAR DIODE GATES, D61 through D68, when gated by the ELECTRIC GUITAR TRIGGER AMP., Q61, conduct the chord signals to the ELECTRIC GUITAR ACTIVE FILTER circuit of Q62. This voice is operated percussively only. The operation of ELECTRIC GUITAR TRIGGER AMP. Q61, is achieved by the application of negative ROM pulse #22 at the time when bias for its emitter and base circuit, via R271 and R272, respectively, is supplied by the ELECTRIC GUITAR ADD BUSS. Refer to the TRANSIENT ELECTRIC GUITAR section of the DIODE MATRIX CHART to establish the Rhythm Patterns, in which the ELECTRIC GUITAR voice is operated.

F. M. BANJO VOICE

The F. M. BANJO TRIGGER AMP., Q63, operates F. M. BANJO DIODE GATES D69 through D76 in percussive (transient) mode only. Upon reception of the positive bias for the emitter and base circuit, via R286 and R287, respectively, and upon reception of ROM #20 output negative pulse to the base, Q63 turns on, supplying the necessary bias for the F. M. BANJO DIODE GATES. The application of the voltage for the F. M. BANJO ADD BUSS is achieved via the diode matrix in some rhythm pattern modes of operation which can be determined from the DIODE MATRIX CHART under F. M. BANJO TRANSIENT operation.

RHYTHM CIRCUIT DESCRIPTION

Logic voltage levels used for the RHYTHM circuits are +27 volts and +12 volts. In the following writeup, reference for these voltage values is given in logic terminology:

+27V is "0" +12V is "1"

+12 V.D.C. SUPPLY

The +12 volt source is derived from the organ +27 volt regulated supply via resistor divider R173/R175 and the base emitter circuit of Q40 transistor.

START/STOP CIRCUIT

The START/STOP FLIP-FLOP, consisting of Q1 and Q3 and associated circuitry, operates as a bistable flip-flop, with its state controlled by the voltage on NOTE PLAYED TRIGGER BUSS Ⓐ and by TOUCH RHYTHM START/STOP CONTROL Q4.

With no key played in the Automatic Chording keyboard range, NOTE PLAYED TRIGGER BUSS Ⓐ is +5 volts, which provides base current via R11, R10A, and D3 to hold Q3 in saturation and Q1 cut off. Q1 collector voltage of +27V, supplied via R167, TEMPO potentiometer, and R168 to the base of Q38, will disable the CLOCK OSCILLATOR.

When any key in the Automatic Chording range is depressed and the FUN MACHINE push button switch is on, NOTE PLAYED TRIGGER BUSS Ⓐ , which is the only base current available for Q3, becomes ground. Q3 therefore turns off, and its collector voltage applied to the base of Q1 causes it to turn on. When Q1 turns on, a negative pulse is applied to the RESETTABLE RHYTHM COUNTER DIVIDER START RESET BUSS via D19 and C71, which resets all COUNTER CLOCK DIVIDER outputs to "0" condition, corresponding to the first beat in the measure, or the downbeat. The 1st and 5th CLOCK DIVIDER reset inputs, appearing on Pins #3 and #5, are externally connected together and directly coupled to C71. The 2nd, 3rd, and 4th CLOCK DIVIDER reset inputs are internally connected to Pin #6 and are coupled via D18 to C71. This reset buss separation is necessary for 3/4 time reset operation, which is described under 4/4 and 3/4 CONTROL CIRCUIT paragraph.

When Q1 turns on, a ground is applied to the base of Q38 via the CLOCK START/STOP CONTROL BUSS, R167, TEMPO CONTROL, and R168, allowing the CLOCK OSCILLATOR to operate.

The positive collector voltage of Q3 is supplied via R14, connector J1-8, the TOUCH RHYTHM normally closed switch contacts, D235, FUN MACHINE normally open contacts, connector J7-7, and R9 to the base of Q4 transistor, causing it to turn on, which effectively places a ground potential at the junction of R11 and R10A resistors. This action will prevent the START/STOP FLIP-FLOP from changing its state to stop mode when a key in the Automatic Chording range is released. However, if in TOUCH RHYTHM mode, this current path for the base of Q4 will be disconnected and the condition of START/STOP FLIP-FLOP will be determined by the NOTE PLAYED TRIGGER BUSS voltage level. The START/STOP FLIP-FLOP will be in start mode as long as a key in the Automatic Chording range is depressed, and in stop mode when a key is released.

If REAL RHYTHM mode is selected, +5V is supplied via P9-9, FUN MACHINE normally closed switch contacts, REAL RHYTHM normally open switch contacts, J7-7 and R9, saturating Q4. When Q4 is saturated, the NOTE PLAYED TRIGGER BUSS can have no influence on START/STOP FLIP-FLOP circuit, so the clock will run continuously.

In addition, the PERC. PATTERN SHORT SUSTAIN GATES, Q124, Q18, and Q80, are controlled by voltage at the collector of Q3 in the START/STOP FLIP-FLOP circuit. When REAL RHYTHM is operating, Q3 positive collector voltage is supplied via R14 and R640 to the base of Q124, causing it to saturate and Q81 to cut off.

In PERC. PATTERN I or II mode, positive voltage (+27V or +12V) from the STROBE OUTPUT BUSS or ROM OUTPUT BUSS #20, respectively, will be applied to the base of Q80, saturating it. When Q80 is saturated the PERCUSSIVE VOICE DIODE GATES will be in short sustain mode.

CLOCK CIRCUIT

The CLOCK OSCILLATOR, consisting of Q36, Q37, and Q38, operates as a free running multivibrator and is controlled by the output state of the START/STOP FLIP-FLOP. The output of this Flip-Flop is coupled to the clock circuit via R167, the TEMPO potentiometer, and R168 to the base of Q38. The emitter of Q38 is referenced to "0" (+27V) logic level, so with the START/STOP FLIP-FLOP output at "0", Q38 will be held off, thus disabling the oscillator.

When the START/STOP FLIP-FLOP output changes its state from "0" to ground as a key in the Automatic Chording range is depressed, the resulting negative pulse is coupled to the base of Q38 via C73 and R168. Q38 saturates, and its positive going collector voltage is coupled to the base of Q36 via C75, causing Q36 to go out of saturation. This condition will exist for a time period determined by the time constant of C75 and R161. When the charging current of C75 decreases to a point where the voltage across R161 is no longer sufficient to keep Q36 cut off, Q36 will go into conduction again. As Q36 starts conducting, the positive going voltage developed at its collector is coupled via C72 to the base of Q38, thereby unsaturating Q38. Q38 will remain unsaturated for a period of time determined by the time constant of C72, R168, the TEMPO potentiometer and R167. When the charging current of C72 decreases to a point at which the base of Q38 is no longer back biased, Q38 will again saturate and the cycle will repeat itself.

The clock output positive pulses are developed at the collector of Q38 when it conducts. These pulses have a fixed width of 10 ms. The time duration between the clock pulses, determined by the off time of Q38, is adjustable by the TEMPO potentiometer.

Transistor Q37 also unsaturates as Q36 conducts. Q37 provides additional base current for Q38, assuring its full saturation, especially at low frequency settings.

As long as the CLOCK START/STOP CONTROL BUSS is at ground potential, the clock will run as a free running multivibrator.

The clock pulses from the collector of Q38 are applied to the input of the CLOCK DIVIDERS via Pin #4 of the Counter, IC2. In addition, the clock pulses are applied to Q39, an emitter follower which acts as a buffer amplifier and a delay stage. Delay for these pulses, now referred to as "Strobe" pulses, is accomplished by R171A and C76, which puts them slightly behind the clock pulses that are fed into the counter. This slight delay allows the counter to set its next binary address prior to the time of application of Strobe pulses. The Strobe pulses are fed to the rhythm switch pattern common buss and are directed to the ROM input by the particular Rhythm Pattern switch or switches that are depressed.

RESETTABLE RHYTHM COUNTER DIVIDER CIRCUIT

As previously described, the RESETTABLE RHYTHM COUNTER DIVIDER IC contains six (6) divide-by-two stages. The first divider is not used. The remaining five dividers, the 1st CLOCK DIVIDER through the 5th CLOCK DIVIDER, are used as binary counters which divide the clock oscillator output into a five bit binary address to the ROM. The bits are designated as A0, A1, A2, A3, and A4.

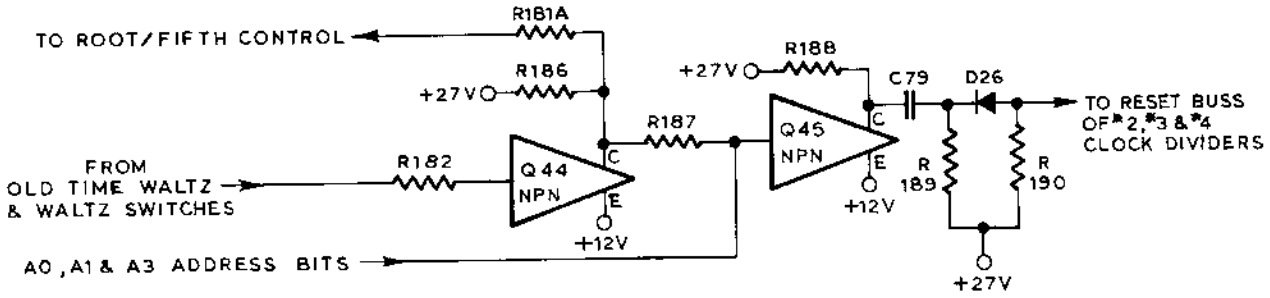
Only a "1" to "0" transition at the input of the dividers causes the divider to change its output state. Also, only the "0" to "1" transition applied to the counter reset input sets the output of the counter to "0". At the same time, the reset input will override any additional input to the counters.

To analyze the action of the Clock Dividers, we will assume that a key on the Automatic Chording range has just been depressed and the clock is running. The first clock pulse, applied to the counters at the same time with the reset pulse from the START/STOP FLIP-FLOP, will not have any effect. The outputs of all counters will remain at "0" level. This is the first beat of the measure, or the downbeat.

The next clock pulse (transition "1" to "0") applied to the 1st Clock Divider input will cause it to change its output state from "0" to "1". This corresponds to the second beat of a measure with the count address to the ROM now set to "0", "0", "0", "0", "1". The further progression of these changes is shown on the REAL RHYTHM COUNTING SEQUENCE CHART and on the REAL RHYTHM LOGIC WAVEFORM CHART, Drawing No. D579-411. Note that the counters provide 32 different binary addresses before the cycle repeats. Each clock pulse corresponds to a 1/16 note; therefore, two measures of rhythm can be produced during one binary cycle of the counter. This means that a full two measures of rhythm are produced by the Rhythm section before the Rhythm Pattern repeats itself.

4/4 & 3/4 TEMPO CONTROL CIRCUIT

Alteration of the counter divider counting sequence, from 4/4 time to 3/4 time for WALTZ and OLD TIME WALTZ rhythm patterns, is accomplished by Q44, Q45, and associated circuits shown below:



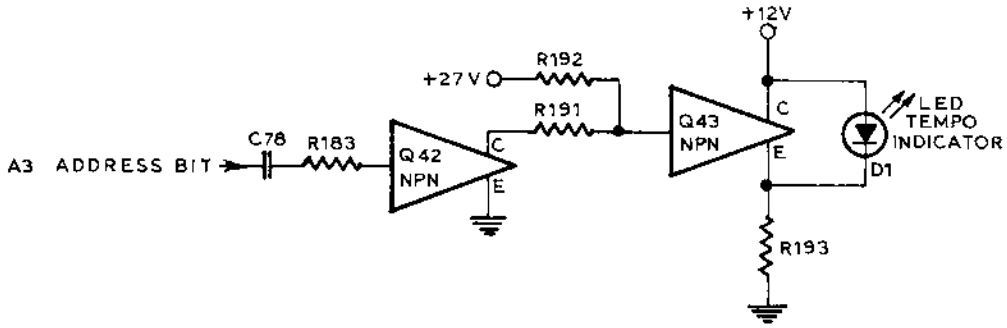
In any Rhythm Pattern mode of operation, except WALTZ or OLD TIME WALTZ, Q44 base does not receive any positive voltage by the 3/4 TIME CONTROL BUSS from the Rhythm Pattern switches; therefore, Q44 remains unsaturated. Its positive collector voltage applied via R187 to the base of Q45 causes Q45 to be saturated. Depressing the WALTZ or OLD TIME WALTZ pattern switches applies a positive voltage, via D185 or D182, to the base of Q44 via R182, causing Q44 to saturate. Now that Q44 is saturated, Q45 loses its base supply and is under the influence of the voltage applied to its base by binary bits A0, A1, and A3 from the counter. When any of the above binary bits are at "0" level, Q45 will saturate; when all three binary bits are at "1" level, Q45 will unsaturate.

Referring to the REAL RHYTHM COUNTING SEQUENCE CHART, it can be seen that between beats #1 and #11, at least one of the address bits (A0, A1 or A3) is at "0" level; therefore, Q45 remains saturated. The first time the above address bits are all at "1" level is on beat #12, at which time Q45 goes out of saturation. This causes the collector of Q45 to change its level from "1" to "0". Diode D26 will prevent this positive voltage transition from being transferred to the counters. However, on beat #13, A0 and A1 both become "0" and Q45 again saturates. The resulting negative excursion at the collector of Q45 is coupled via C79 and D26 to the 3/4 TIME RESET BUSS for Counters #2, #3 and #4, causing Counters #3 and #4 (A2 and A3) to reset their outputs to "0". Counter #2 (A1) is already at "0" level. Because of the internal connection, when Counter #4 (A3) is reset from "1" to "0", Counter #5 (A4) output will also change its state from "0" to "1".

Now the new binary address, 1-0-0-0-0, corresponds to beat #17. As a result of this instantaneous circuit action, beat #17 occurs immediately after beat #12. Beats #13, #14, #15, and #16 are therefore skipped. A similar situation occurs on beat #28, causing beats #29, #30, #31 and #32 to be omitted.

The overall effect in omitting the four 1/16 beats on each measure is that the measure is now reduced to twelve (12) 1/16 beats, or 3/4 time.

The TEMPO LIGHT circuit illustrated below consists of Q42, Q43, a solid state indicator (light emitting diode, LED), and associated circuitry.



Normally, in the absence of an input signal to Q42, the lamp driver transistor Q43 is saturated by the positive voltage applied to its base via R192 from the +27 volt supply. Under these conditions, the current from the +12 volt supply flows through the saturated transistor and R193. Therefore, there is no forward bias for the LED (D1) and it does not emit light.

The base of normally non-conducting transistor Q42 is connected via C78 and R183 to the output of the 4th Clock Divider, A3 binary bit. Each time A3 changes from "1" to "0" binary state, the positive excursion will pulse Q42 on for a short period of time. As Q42 is pulsed on, Q43 is pulsed off. When Q43 is not saturated, the current from the +12 volt supply will flow through the light emitting diode, D1, causing it to emit light. D43 and D1 form a constant load on the +12 volt supply, thus cancelling otherwise undesirable voltage changes (transients) introduced by the load switching.

In summary, the TEMPO LIGHT will flash each time address bit A3 changes from "1" to "0". Referring to the REAL RHYTHM COUNTING SEQUENCE CHART, it can be seen that A3 changes from "1" to "0" when beats #17 and #1 occur. These beats correspond to the downbeat of each measure in 4/4 time. The TEMPO LIGHT will also flash at the correct time when in WALTZ or OLD TIME WALTZ modes because A3 changes state from "1" to "0" at the end of both 3/4 time measures. When the unit is first started by the key depressed in the Automatic Chording range, the TEMPO LIGHT will not flash at the downbeat of the first measure, but it will continue to flash until the unit is shut off or when the TOUCH RHYTHM switch is depressed.

READ ONLY MEMORY (ROM) CIRCUIT

The READ ONLY MEMORY (ROM) acts as a diode matrix. The ROM is programmed for eight (8) different rhythm patterns, and by the help of a diode matrix on the RHYTHM PATTERN selector switches, 16 different rhythm patterns are established.

The STROBE OUTPUT GATE, Q39, supplies the Strobe pulses via selected Rhythm Pattern switches and isolation resistors R149 through R155 to ROM pin Pins 2, 3, 9, 10, 11, 12, 14 and 23.

The five bit binary address A0, A1, A2, A3, and A4 provided by the Clock Dividers is applied to ROM Pins 4, 5, 6, 7, and 8. This binary address directs the Strobe pulse, which is inverted by the ROM, to one or more of the eight (8) ROM outputs on Pins #15 through #22. The ROM output busses are applied via resistors to the rhythm voice trigger gates.

The triggers for the above voices can be separately inhibited by the diode matrix busses. The cancellation of these rhythms is shown in the DIODE MATRIX CHART.

The progression of the ROM output trigger pulses to the Rhythm voices on each beat of the 1st and 2nd measures for all rhythm patterns is indicated on the F. M. RHYTHM MASTER PATTERN CHART No. D579-410.

RHYTHM VOICE CIRCUITS

The RHYTHM VOICE circuits contain a noise source used for the BRUSH, CYMBAL, and SNARE DRUM voices, as well as a series of gated-on oscillators used for the BASS, CLAVE, ACCENT, STRIKE, and SNARE DRUM voices.

The BASS, STRIKE, CLAVE, and ACCENT oscillators and their gates operate identically, therefore, only one of these voices, the BASS, will be discussed.

BASS TRIGGER GATE transistor Q18 is normally off, leaving collector resistor R66 with no D.C. path. Therefore, BASS OSCILLATOR Q19 is inoperative. When a negative ROM #18 pulse is applied to the base of Q18, Q18 saturates for a period of time determined by the input pulse. This effectively provides a D.C. path for R66, enabling Q19 to function as an oscillator.

When Q18 is no longer held in saturation, C34 gradually charges through Q19 until the charge is sufficient to cut off Q19. In this manner the cut off of the oscillator is controlled with the decay envelope determined by C34 and R68.

The BASS OSCILLATOR output is applied via level set resistor R71 in series with D.C. blocking capacitor C38 to a buss common to all other rhythm voice oscillator outputs, and then, via R802 to the wiper of DRUM VOLUME potentiometer R801, located on the Accompaniment bass keycap.

As previously described, Q18, when triggered on, also supplies the necessary trigger voltage, via D11, R65, D220, Q128 and D216, for BASS GUITAR TRIGGER AMP. Q71.

The noise circuit, consisting of noise source stage Q32 and the high pass amplifier Q33 through Q35, is the signal source for the CYMBAL, BRUSH, and SNARE DRUM rhythm voices.

The CYMBAL sound is achieved by simultaneously gating on two noise gates and the STRIKE OSCILLATOR GATE. CYMBAL TRIGGER GATE Q22, when triggered, saturates Q24 and Q28 by applying positive voltage through R88 and R107 to their bases. Q24 and Q28 supply ground paths for noise amplifier stages Q25 and Q29, respectively, allowing them to operate. Q25 applies its noise output to the high frequency amplifier circuit of Q26-Q27, while Q29 applies its noise output to the lower frequency amplifier Q30-Q31. Outputs from both amplifiers are resistively summed to a common point and, via level set components, applied to the common RHYTHM OUTPUT BUSS.

When triggered, Q24 also supplies a negative trigger to STRIKE TRIGGER GATE Q20, which, together with STRIKE oscillator Q21, operates identically as the previously described Bass circuit.

Operation of CYMBAL TRIGGER GATE Q22 can be inhibited in some Rhythm Pattern modes (See DIODE MATRIX CHART) when transistor Q23 is saturated by the application of a positive voltage to its base, via the Rhythm Pattern switches and diode matrix.

When BRUSH TRIGGER GATE Q5 is triggered, it turns on Q6 to complete the emitter circuit of Q7, which feeds noise via D5, C12, and buffer stage Q8 to the output.

The remaining rhythm voice to be discussed is the SNARE DRUM. The SNARE DRUM sound is obtained by simultaneously gating on the SNARE BRUSH and DRUM voices. When a negative pulse is applied to the base of Q9, and its emitter and base receive supply voltage by rhythm switches, it saturates transiently, providing both a positive trigger for Q12 via R38 and a D.C. path for DRUM OSCILLATOR Q13 via D7, enabling it to oscillate.

When Q12 saturates, it provides a D.C. path for noise amplifier Q10, enabling it to supply its noise output to Q8 via D6. Q8 is the common noise amplifier for the BRUSH voice and the BRUSH portion of the SNARE DRUM.

The NOISE SOURCE output is adjusted by the level set minipot R129 to give the most authentic SNARE DRUM sound. Once this control has been set, the level of the BRUSH and CYMBAL cannot be changed without destroying the authenticity of the SNARE DRUM voice.

The BRUSH portion of the SNARE DRUM is inhibited by the SNARE (NOISE) INHIBIT GATE, Q11, when some Rhythm Patterns are selected: Refer to DIODE MATRIX CHART. The SNARE (NOISE) INHIBIT GATE, Q11, is saturated by the positive voltage applied to its base via switch contacts and via the diode matrix. The collector of Q11, in this case, will remove the trigger pulse from the base of Q12, therefore disabling the BRUSH portion of the SNARE DRUM sound.

The output of all voices, via level set resistors and decoupling capacitors, are summed together and applied via R802 to DRUM VOLUME potentiometer R801 and, via its wiper, to the preamplifier.

Approximate readings for the Rhythm voice circuits are given in the chart below:

RHYTHM VOICE	STAGE	FREQUENCY	DURATION OF OSCILLATION
BASS	Q19	111 Hz	50 ms
CYMBAL	Q29-Q30-Q31	Lower Freq. Noise	1.0 Sec.
	Q25-Q26-Q27	Higher Freq. Noise	1.0 Sec.
	Q21	5555 Hz	3.5 ms
CLAVE	Q17	2000 Hz	20 ms
BRUSH	Q7-Q8	White Noise	65 ms
ACCENT	Q15	250 Hz	30 ms
SNARE DRUM	Q10-Q8	White Noise	110 ms
	Q13	238 Hz	40 ms

The NOISE SOURCE, Q32-Q35, supplies approximately 200 mV (P-P) of white noise to the NOISE BUSS when the minipot is set at maximum C.W. position.

RELEASED
Ord. No.
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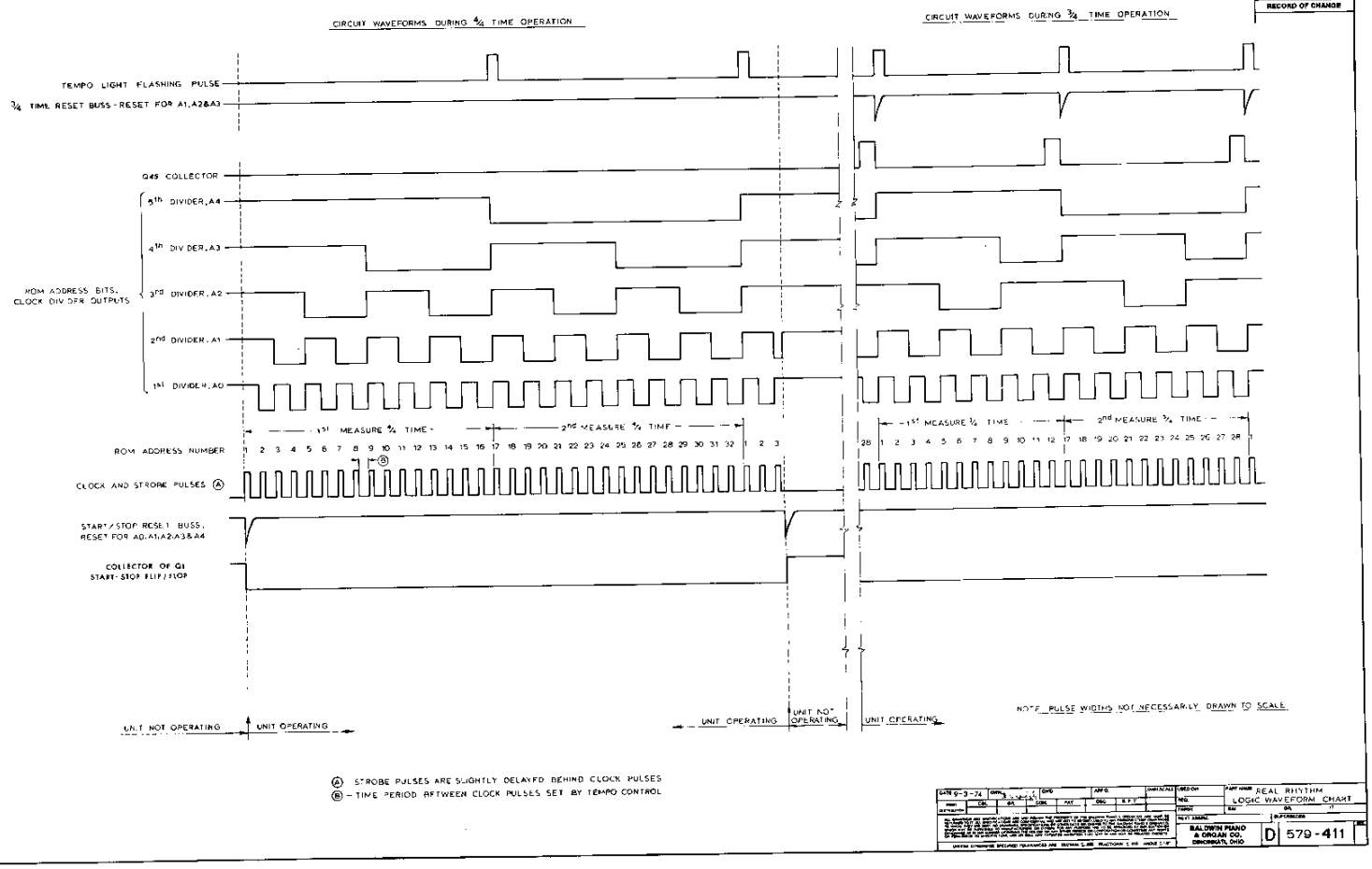
RECORD OF CHANGE



(A) STROBE PULSES ARE SLIGHTLY DELAYED BEHIND CLOCK PULSES
(B) - TIME PERIOD BETWEEN CLOCK PULSES SET BY TEMPO CONTROL

DATE 9-3-74	DWN.	CHKD.	APP'D.	OVER SCALE	USED ON	PART NAME REAL RHYTHM LOGIC WAVEFORM CHART					
PROJ.	DR.	CHK.	QUAL.	MAT.	DES.	R.P.T.		REQ.			
DETAILED								TRACED		DR.	IT
								NEXT ASSY.			INTERCHGE
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE DECIMAL 2 PLS. FRACTIONAL 1/64 ANGLE 1°								BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO		D 579-411	REV

Real Rhythm Counting Sequence Chart

Measure	4/4-Time Rhythms			Count Address Inputs To ROM					3/4-Time Rhythms		
	1/4 Notes	16th Notes	ROM Address Number	A_4	A_3	A_2	A_1	A_0	ROM Address Number	16th Notes	1/4 Notes
1	1	1	1	0	0	0	0	0	1	1	1
		2	2	0	0	0	0	1	2	2	
		3	3	0	0	0	1	0	3	3	
		4	4	0	0	0	1	1	4	4	
	2	5	5	0	0	1	0	0	5	5	2
		6	6	0	0	1	0	1	6	6	
		7	7	0	0	1	1	0	7	7	
		8	8	0	0	1	1	1	8	8	
	3	9	9	0	1	0	0	0	9	9	3
		10	10	0	1	0	0	1	10	10	
		11	11	0	1	0	1	0	11	11	
		12	12	0	1	0	1	1	12	12	
	4	13	13	*0*	*1*	*1*	*0*	*0*	N O T U S E D		
		14	14	*0*	*1*	*1*	*0*	*1*			
		15	15	*0*	*1*	*1*	*1*	*0*			
		16	16	*0*	*1*	*1*	*1*	*1*			
2	1	1	17	1	0	0	0	0	17	1	1
		2	18	1	0	0	0	1	18	2	
		3	19	1	0	0	1	0	19	3	
		4	20	1	0	0	1	1	20	4	
	2	5	21	1	0	1	0	0	21	5	2
		6	22	1	0	1	0	1	22	6	
		7	23	1	0	1	1	0	23	7	
		8	24	1	0	1	1	1	24	8	
	3	9	25	1	1	0	0	0	25	9	3
		10	26	1	1	0	0	1	26	10	
		11	27	1	1	0	1	0	27	11	
		12	28	1	1	0	1	1	28	12	
	4	13	29	*1*	*1*	*1*	*0*	*0*	N O T U S E D		
		14	30	*1*	*1*	*1*	*0*	*1*			
		15	31	*1*	*1*	*1*	*1*	*0*			
		16	32	*1*	*1*	*1*	*1*	*1*			

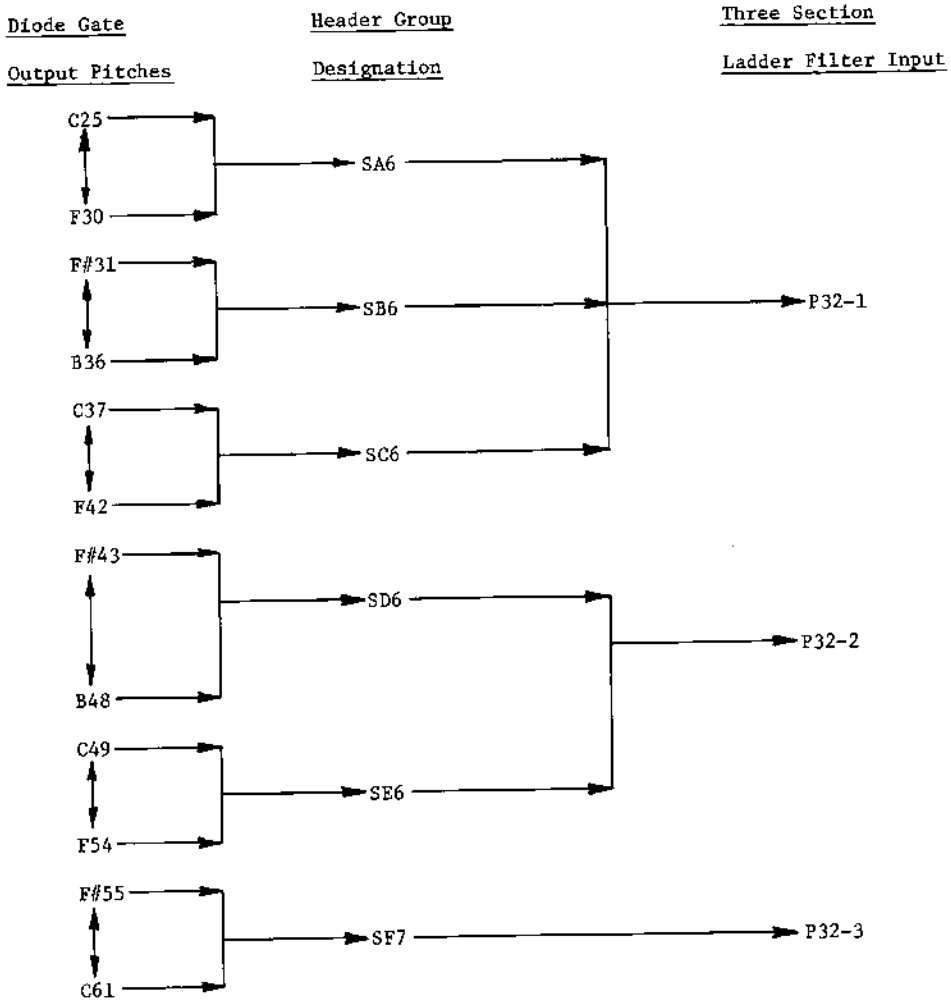
RIGHT HAND CIRCUIT DESCRIPTION

SIGNAL SOURCE

Thirty-seven (37) frequencies, C25 through C61, are conducted to thirty-seven (37) individual DIODE GATE circuits located on the GATE AND DIVIDER BOARD assembly. The state of these DIODE GATES is controlled by thirty-seven (37) keyswitches in the RIGHT HAND (SOLO) keyboard range.

These diodes are gated by application of +14 volts via R565, R567, and a 680 ohm keyswitch resistor when a key or keys are depressed in the RIGHT HAND (SOLO) keyboard range. The outputs of the DIODE GATE circuits are collected in five (5) header groups of six (6) diode pairs each and one (1) header consisting of seven (7) diode pairs. This header output is further applied to a THREE SECTION LADDER FILTER circuit located on the RIGHT HAND BOARD assembly.

The following chart illustrates the signal grouping and distribution:



The THREE SECTION LADDER FILTER contains two outputs: one supplies the FLUTE ACTIVE FILTER circuit of Q78 and Q79; the other, the ACCORDION ACTIVE FILTER circuit of Q77. The ACCORDION FILTER circuit is the signal source for all other right hand (Solo) voice active filter circuits, Q74, Q75 and Q76.

The FLUTE FILTER circuit of Q78 and Q79 supplies its output, via C444 and R484, to the FLUTE DIODE GATE consisting of D101, D102, and associated components. The ACCORDION FILTER, Q77, supplies its output, via Q74, and R474, to ACCORDION DIODE GATE D98/D99 and, also, via C400, C406 and C413, to active filter circuits Q74, Q75, and Q76, respectively.

The TRUMPET AND PIANO FILTER, Q74, output is supplied via R406 and C403 to the TRUMPET DIODE GATE, D79/D80, and via C405 and R407 to PIANO DIODE GATE D81/D82.

The GUITAR AND HARPSICHORD FILTER, Q75, output is supplied via C411 and R414 to GUITAR DIODE GATE D84/D85, and via C410 to HARPSICHORD DIODE GATE D88/D89. The BANJO FILTER, Q76, output is supplied via C416 to BANJO DIODE GATE D94/D95.

When a key or keys in the right hand (Solo) keyboard range are depressed, all of the above voice diode gates are gated on via voice selector switches and continuous or percussive trigger circuits, which will be discussed later.

CONTINUOUS VOICE TRIGGER CIRCUIT

The CONTINUOUS VOICE TRIGGER circuit, consisting of Q109, Q108, Q113 and associated components, creates a positive voltage when a key in the Right Hand (Solo) range is depressed. This voltage is supplied via the common buss on the FLUTE, ACCORDION, and TRUMPET selector switches to the corresponding voice diode gate circuits.

When a key in the Right Hand (Solo) range is depressed, a current path is established from the +14 volt source via R565 and R567 through the SOLO KEYSWITCH COMMON BUSS. A voltage drop across R565, caused by this current, will provide turn-on bias for Q109. The +14 volts applied by Q109 emitter to collector circuit via R566 to the base of Q108 will cause Q108 to saturate. When Q108 saturates a current path is established from +27V via ASR normally closed switch contacts, R577, D134 and Q108 collector-emitter circuit to ground, saturating Q113. When Q113 saturates, it will provide gating voltage for CONTINUOUS VOICE DIODE GATES via the voice selector switches. Capacitor C483 slows the voltage rise at the collector of Q113, which helps to lessen the thump on the attack of the voice. When ASR mode is selected, +27 volts supply is removed from the emitter on base of Q113, thus defeating its operation. The ASR (Automatic Solo Registration) mode of operation will be discussed elsewhere in the circuit description.

FLUTE, ACCORDION AND TRUMPET VOICES

The positive voltage supplied by Q113 when a key in the Right Hand (Solo) range is depressed, is supplied via connector J6-1 to normally open switch contacts of the above voices. With FLUTE, ACCORDION, or TRUMPET voices selected, this positive voltage is coupled to the corresponding diode gates via the following circuit paths: with FLUTE voice selected, via D192, connector J6-2, D104 and R488; with ACCORDION, via connector J6-3, D109, D106 and D479; and with TRUMPET, via connector J6-4, D112, D113 and R448.

As long as the key in the Right Hand (Solo) range is depressed, these voice diode gates will be continuously gated via the described circuit paths.

The signal or signals corresponding to the key or keys depressed will be supplied by the signal diode gates to the LADDER FILTER and voice active filters. The output of the selected voice diode gate will be applied to the RIGHT HAND OUTPUT AMPLIFIER circuit of Q83 and Q84.

The SIGNAL DIODE GATE SUSTAIN BUSS for the above voices is placed in short sustain mode by the saturated SHORT/LONG SUSTAIN GATE, Q87. The saturation voltage for Q87 is the +27 volt source applied to its base via normally closed contacts of the ASR and VIBRA HARP switches, connector J6-10, and R532.

When a key is released, the above voice will not be heard (sustained), because the signal diode gates are operating in the short sustain mode, thus disabling the signal source for voice diode gates.

FLUTE, ACCORDION AND TRUMPET VOICES ASR MODE

In the ASR mode of operation, the CONTINUOUS VOICE TRIGGER circuit is defeated and the gating of the voice diode gates is accomplished by the voltage supplied by the ASR busses.

Depressing the ASR switch removes the supply voltage for emitter and base circuit of Q113 which is necessary for CONTINUOUS VOICE TRIGGER circuit operation. Even if the Right Hand (Solo) voice switches are selected, Q113 will not be able to reproduce a trigger pulse to gate the voice diode gates.

The signal diode gate will be maintained in a short sustain mode by the saturated Q87, which now receives its saturation voltage from the +27 volt source via the closed ASR switch contacts, R531, and R530.

When not in the ASR mode, the gating voltage supplied by the FLUTE, ACCORDION, and TRUMPET ASR busses to the corresponding diode gate circuits is inhibited by the clamping action of the CONTINUOUS VOICE ASR CLAMP transistor, Q107, through D108, D111, and D114. In the ASR mode, the +27 volt saturation voltage for Q107 is removed via the ASR switch contacts, D128, and R562. This defeats its clamping action for these busses.

Referring to the DIODE MATRIX CHART ASR section, whenever the +27 volts is applied via the diode matrix and described ASR busses, the specific voice diode gate will be gated on. When a key on the Right Hand (Solo) keyboard is depressed, the signal will be applied and gated through such diode gates. These ASR busses are selective and are controlled by the Rhythm Pattern switches. Further information on the ASR voice selection by the Rhythm Pattern modes is supplied in the FUN MACHINE RHYTHM PATTERN AND VOICE SELECTION CHART.

VIBRA HARP VOICE

The FLUTE DIODE GATE circuit is used for FLUTE and/or VIBRA HARP voices. However, the VIBRA HARP gating voltage will always override the FLUTE if both voices are selected simultaneously.

When the VIBRA HARP voice is selected, +27 volts is applied via ASR switch contacts, D193, and connector J6-2 to the FLUTE DIODE GATE, causing it to be gated on continuously. VIBRA HARP switch contacts will also remove the voltage from the base of Q87, causing it to unsaturate and place the Signal Diode Gates in long sustain mode.

Now, if the key on the Right Hand (Solo) keyboard is depressed, the signal will be conducted by the already gated on FLUTE DIODE GATE and applied to the output circuit. After the key is released, due to the long sustain of signal diode gates and continuous gated on condition of the FLUTE DIODE GATE, the signal will slowly die away.

VIBRA HARP ASR MODE

In the Vibra Harp ASR mode of operation, the continuous gating voltage for the FLUTE DIODE GATE and saturation voltage for Q89 is removed by the open ASR switch contacts. Transistor Q89 will unsaturate and remove the ground clamp from the junction of R535 and D105, permitting the FLUTE DIODE GATE to be gated on by the voltage applied by the VIBRA HARP ASR TRIGGER BUSS in certain Rhythm Pattern modes (See DIODE MATRIX CHART). That positive voltage is also applied, via R533 to the base of Q88, causing it to saturate, placing the ground clamp at the junction of R530 and R531. Positive voltage otherwise supplied by ASR switch contacts, R531, and R530 to the base of Q87, will be removed, causing Q87 to unsaturate, thus, effectively placing the Signal Diode Gates in long sustain mode, which is the right condition for the Vibra Harp voice.

PERCUSSIVE VOICE TRIGGER CIRCUIT

The PERCUSSIVE VOICE TRIGGER circuit, consisting of Q110, Q111, Q116, and associated components, creates a positive trigger voltage transiently, when a key on the Right Hand (Solo) keyboard is depressed. This trigger pulse is supplied, via percussive voice PIANO, GUITAR, HARPSICHORD, and BANJO selector switches to their voice diode gates. Transistor Q110 is normally turned on by the forward bias supplied to its base from the +27 volt source via R574 and D238. When a key in the Right Hand (Solo) range is depressed, a negative pulse is coupled via R570, C468, and D131, to the base of Q110, causing it to cut off for the duration of the pulse. Ground clamp from the junction of R568 and R572 will be removed, permitting Q111 to be saturated by the application of +14 volts source to its base, via now saturated Q109. A negative voltage excursion at the collector of Q111, coupled to the anode of D238, removes the base bias for Q110, which holds this transistor off until C471 recovers from this negative pulse through R574. This 10 ms pulse supplied to the base of Q116 will cause Q116 to saturate, thus, producing a positive 10 ms pulse, which is slowed down by C485 in order to lessen the thump on the attack of the voice.

In the ASR mode, the operation of Q116 is defeated by removal of its base and emitter voltage supplied by ASR switch contacts to R582 and R583.

PERCUSSIVE VOICES

The sounding of the percussive voices, when a key in the Right Hand (Solo) range is depressed, is accomplished by the application of the positive pulse created by Q116 to the percussive voice diode gate inputs via connector J6-5 and the following circuit paths:

PIANO switch, Connector J6-7, D124, and R450 to PIANO diode gate (anodes of D81 and D82).
GUITAR switch, Connector P6-6, D125, and R456 to GUITAR diode gate (anodes of D84 and D85).
HARPSICHORD switch, Connector P6-8, D127, and R462 to HARPSICHORD diode gate (anodes of D88 and D89).
BANJO switch, Connector J6-9, D126, and R469 to BANJO diode gate (anodes of D94 and D95).

The above voice diode gates will be gated on transiently, thus, the signals supplied via the LADDER FILTER and the active filters will be applied via a common output to the RIGHT HAND OUTPUT AMPLIFIER circuit, Q83 and Q84.

After the trigger voltage is removed, the sustain capacitor of a particular voice diode gate, typically C430 for PIANO, will discharge with a double decay rate: first, through R451, D83, and D115 to a voltage of approximately 9 volts (established by R498 and R499), and then, through a parallel resistor combination such as R447 and R449.

In percussive voice mode of operation, the signal diode gates are placed in a short sustain mode by saturated Q87 in the same manner as previously described.

PERCUSSION PATTERN OPERATION

In the PERCUSSION PATTERN I mode of operation, the STROBE OUTPUT PULSES from the rhythm section are applied to the base of Q117 via connector J6-11, PERCUSSION PATTERN I switch contacts, connector J6-12, R586, and C472. Q117 is turned on by these positive Strobe pulses and provides at its collector a series of negative pulses at the Clock rate, which triggers the one shot (monostable) PERCUSSIVE VOICE TRIGGER circuit.

If a key in the Right Hand (Solo) range is depressed, these pulses will trigger a voice gate at the same frequency as the rhythm clock.

In PERCUSSION PATTERN II mode, the ROM #20 negative pulse is applied to the circuit of Q110 and Q111 via connector J6-14, PERCUSSION PATTERN II switch contacts, connector J6-15, C473, and D136. This provides a series of pulses, corresponding to the internal program of the ROM for the rhythm selected, for percussive voice gate triggering. Also, due to the origin of these triggers, the CLOCK OSCILLATOR must be running.

The triggers supplied through the PERCUSSION PATTERN I and II switches are connected to the base of Q80 and collector of Q81 via J6-12 and R487, or J6-15 and R486.

Normally, when the Real Rhythm circuit is not operating, the collector of Q3 (START/STOP FLIP-FLOP) is at ground potential and is coupled to the base of Q124 via R640. Q124, thus being cut off, allows +27V at its collector to be applied to base of Q81 via R491, driving it into saturation. The trigger voltages at the junction of R486 and R487 will be clamped to ground by saturated transistor Q81, preventing their influence on the state of Q80.

When the Real Rhythm circuit is operating, Q124 will be saturated by the positive voltage now present at the collector of Q3. Thus, saturation voltage for Q81 will be removed, allowing it to cut off and allowing trigger voltages to be applied to Q80. The trigger voltages at R486 and R487 are always at a positive potential (+12V or +27V), therefore Q80 is saturated by way of either PERCUSSION PATTERN switch.

This provides short sustain mode during Percussion Pattern operation by providing an additional path to ground, via Q80 collector to emitter circuit and a diode-resistor series network from the voice diode gate sustain capacitors. This short sustain network consists of D84 and R473 for PIANO, D87 and R473 for GUITAR, R464 and D93 for HARPSICHORD and R471 and D97 for BANJO voice diode gates.

PERCUSSIVE VOICE ASR MODE

When the ASR switch is depressed, the gating of the percussive voice diode gates by the PERCUSSIVE VOICE TRIGGER circuit is defeated. The operation of Q116 is defeated by removing the base and emitter supply voltage normally supplied via the ASR switch contacts, R582, and R583. In addition, PERC. ASR CLAMP transistor Q115 loses its base bias, unsaturates, and allows the pulses from the collector of Q110 to be supplied to the base of PERC. ASR GATE Q114. Normally, when not in the ASR mode, Q114 is cut off, which permits the +27 volt source to be applied by R538 to four (4) ASR trigger gates via R536, R539, R543, and R542, inhibiting their operation by keeping them in an off state. Depending on the rhythm selected (Refer to DIODE MATRIX CHART and F.M. RHYTHM PATTERN & VOICE SELECTION CHART), one or more ASR busses will supply a positive voltage for the emitter and base circuits of Q90, Q91, Q93, or Q92, (e.g., for PIANO ASR TRIGGER Q90, via R537 and R593). When a key in the Right Hand (Solo) range is depressed, the positive pulse created at the collector of Q110, supplied to the base of Q114 via R580, will cause Q114 to produce a negative pulse. This pulse is now applied to the base of the ASR TRIGGER transistors. Any ASR TRIGGER transistor that has its emitter and base voltage supplied by an ASR buss will pass the pulse, thus providing a gating voltage for its voice diode gate.

RIGHT HAND (SOLO) OUTPUT AMPLIFIER

The RIGHT HAND (SOLO) OUTPUT AMPLIFIER, consisting of Q83, Q84, and associated components, couples the voice diode gate output signals to the organ preamplifier circuit via C451, R518, connector J4-1, normally closed contacts of AUTO MUTE switch, connector J4-5, connector P30-6 and R3. The RIGHT HAND (SOLO) OUTPUT AMPLIFIER is also applied to the signal input point of AUTO MUTE circuit via R547 and C459.

The output signals of all Right Hand (Solo) voice gates are added to the D.C. bias current that turns the gates on. This current, injected at the emitter of Q83, tends to change the D.C. level at the output of the amplifier and cause thump. To minimize this effect, typically, R520 for the FLUTE DIODE GATE provides a compensating current at the base of Q83.

AUTO MUTE CIRCUIT

When the AUTO MUTE switch is depressed, the AUTO MUTE circuit output is applied to the organ preamplifier input circuit, while the output from the RIGHT HAND OUTPUT AMPLIFIER is disconnected.

The AUTO MUTE circuit is a filter with a variable bandpass characteristic controlled by the bias current of the voice diode gates, which is applied to the base of emitter follower Q82. The circuit consists of two voltage controlled lo-pass filters (Q96, Q97, Q99, Q100 and Q101, Q102, Q105, Q106) control circuitry for these filters (Q94, Q95, Q103, Q104), and an operational amplifier (IC18).

Signals from the RIGHT HAND OUTPUT AMPLIFIER, via R547 and C459, are supplied to the input of the first filter stage, which consists of two differential amplifier pairs (Q96-Q99 and Q97-Q100) connected in parallel to act as a variable resistance, and, in conjunction with C461 and C462, forms a lo-pass filter. Similarly, the next stage, together with C465 forms a second variable lo-pass filter, with its output applied directly to the operational amplifier integrated circuit of IC18.

A feedback loop, consisting of C465, C462, and R550, feeds the output of each section back to the input of the first stage.

When a key is played, the ACCORDION and TRUMPET trigger voltage is applied via D90 and D91 to the shaping circuit of R504 and C445. This provides a trigger with an attack characteristic for the base of emitter follower Q82. Similarly, the PIANO, GUITAR, HARPSICHORD and BANJO supply a trigger voltage, via D120, D121, D122, and D123, to the base of Q82 by the resistor divider R503 and R502. The FLUTE VOICE DIODE CATE is not connected to the AUTO MUTE TRIGGER, Q82, thus FLUTE and VIBRA HARP voices do not have a muting effect.

Q94, a phase splitter, controls the current supplied to the differential amplifier by Q95, Q104, and Q98, Q103 current sources.

The trigger voltage supplied by continuous voice diode gates and percussive voice diode gates are of different characteristics, so their action and application to the base of Q82, an emitter follower, have to be described separately.

For continuous voices, this trigger is applied via R504 to charge C445, and, then, via D117 to the base of Q82. In this case, the attack will be slow, so that the voltage applied by the emitter of Q82 will slowly rise to maximum. When a key is released, due to the absence of signal from the RIGHT HAND OUTPUT AMPLIFIER, the slow decay of this circuit is of no importance.

For percussive voices, this trigger is divided in half by resistor divider R503 and R502 before it is directly applied to the base of Q82. The attack is fast, while decay will sweep back slowly, causing the emitter voltage of Q82 to rise to maximum value quickly and slowly sweep back. The voltage changes on the emitter of Q82 are applied via R545 to the base of phase splitter Q94.

When the voltage on the base of Q94 is low, Q94 will cut off. Its collector will be highly positive, cutting off Q95 and Q104 so no current will flow to differential amplifiers Q96-Q99 and Q101-Q105, rendering them highly resistive to the incoming signal. Similarly, the emitter of Q94 will be close to ground, cutting off Q98 and D103, the respective current sources for Q97-Q100 and Q102-Q106, so they will also be in a high resistive state with respect to the signal.

With the voltage applied to the base of Q94, it will cause Q94 to conduct, so that its collector will be less positive and its emitter less negative. This will forward bias Q95-Q104-Q98 and Q103, furnishing current to the differential amplifiers, allowing them to be in a low resistance state with respect to the incoming signal.

Summary of the above action on the voices is a slow attack for continuous voices and a slow decay for percussive voices.

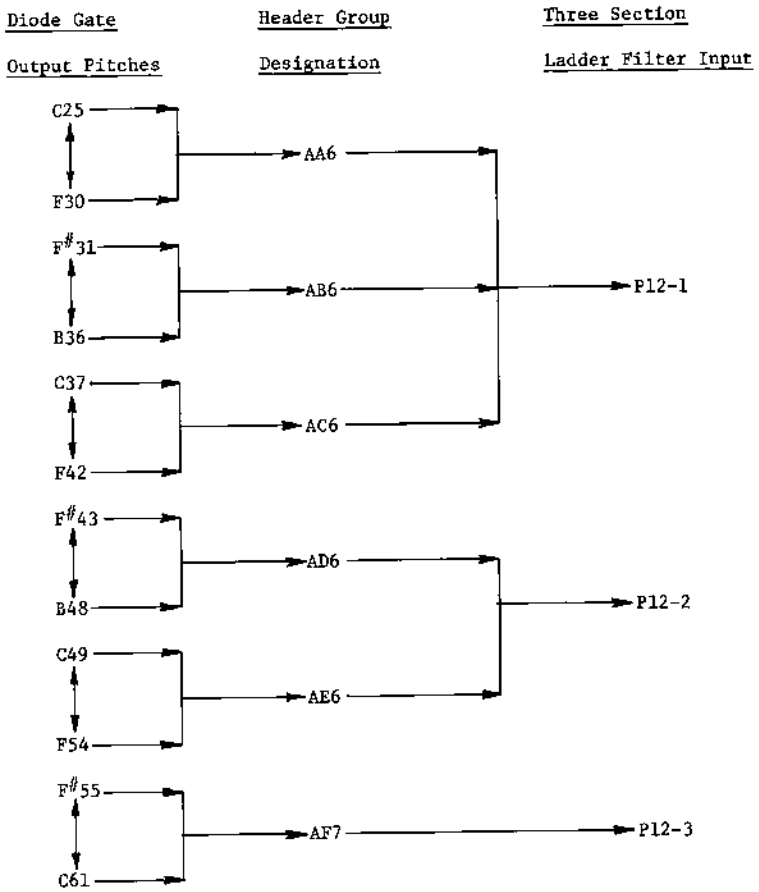
LEFT HAND (ACCOMPANIMENT) CIRCUIT DESCRIPTION

SIGNAL SOURCE

In the same manner as for the RIGHT HAND (SOLO) circuit, the thirty-seven (37) frequencies, C25 through C61, are conducted to thirty-seven (37) individual DIODE GATE circuits located on the GATE AND DIVIDER BOARD ASSEMBLY. The state of these DIODE GATES is controlled by thirty-seven (37) keyswitches in the LEFT HAND (ACCOMPANIMENT) keyboard range.

These diodes are gated by application of +14 volts via R725, R726, and a 680 ohm keyswitch resistor when a key or keys are depressed in the LEFT HAND (ACCOMPANIMENT) keyboard range. The outputs of the DIODE GATE circuits are collected in five (5) header groups of six (6) diode pairs each and one (1) header consisting of seven (7) diode pairs. This header output is further applied to a THREE SECTION LADDER FILTER circuit located on the LEFT HAND (ACCOMPANIMENT) BOARD ASSEMBLY.

The following chart illustrates the signal grouping and distribution:



The THREE SECTION LADDER FILTER contains two (2) outputs: one supplies the FLUTE ACTIVE FILTER circuit of Q122 and Q123; the other, the REED AND STRING FILTER circuit of Q121. The REED AND STRING FILTER circuit is the signal source for all other LEFT HAND (ACCOMPANIMENT) voice active filter circuits, Q119, Q118, and Q120.

The FLUTE FILTER circuit, Q122 and Q123, supplies its output via C638 and R673 to the FLUTE DIODE GATE consisting of D212, D213, and associated components. The REED AND STRING FILTER, Q121, supplies its output via R643 and C626 to REED DIODE GATE D195/D196, via C636 and R665 to STRING DIODE GATE D208/D210, and via C605, C601, and C610 to active filter circuits Q119, Q118, and Q120, respectively.

The GUITAR FILTER, Q119, output is supplied via R613 and C609 to the GUITAR VOICE DIODE GATE, D202/D023. The PIANO FILTER, Q118, output is supplied via C604 and R606 to the PIANO VOICE DIODE GATE, D198/D199. The BANJO FILTER, Q120, output is supplied via C614 to the BANJO VOICE DIODE GATE D206/D025.

When a key or keys in the LEFT HAND (ACCOMPANIMENT) keyboard range are depressed, all of the above voice diode gates are gated on via voice selector switches and continuous or percussive trigger circuits, which will be discussed later.

LEFT HAND (ACCOMPANIMENT) & PEDAL CONTROL CIRCUITS

In FUN MACHINE mode the +5V applied through the Fun Machine push button contacts (FUN MACHINE KEYSWITCH COMMON) saturates LEFT HAND CONTROL transistor Q127. This inhibits the operation of the LEFT HAND (ACCOMPANIMENT) and PEDAL circuits by removing the supply voltage to the CONTINUOUS and PERCUSSIVE VOICE TRIGGER circuits and supplying cut off voltage to the Pedal signal amplifier on the Pedal Sustain board.

The trigger circuit supply voltage for the LEFT HAND (ACCOMPANIMENT) voices is switched by LEFT HAND VOICE INHIBIT circuit, Q138 and Q140. When LEFT HAND CONTROL Q127 is saturated, the junction of R691 and R731 is grounded, removing bias voltage for Q138, which cuts off, allowing Q140 to cut off also. Since Q140 is the only voltage source for VOICE TRIGGER circuit output stages Q141 and Q142, gating of the LEFT HAND (ACCOMPANIMENT) voices is prevented.

The Pedal Latch circuit signal output is inhibited by the action of PEDAL SIGNAL INHIBIT GATE Q129. When Q127 saturates, the current path from +27 volts via R692, R690 and Q127 collector to emitter causes Q129 also to saturate. The +27V is then applied by Q129 collector, R694 and connector P17-15 to Pedal Sustain circuit boards (Refer to C579-372), via P2-15 and D1 to the base of Q4, causing it to be cut off, inhibiting the pedal signal from this source.

In FUN MACHINE mode, the saturation of Q127 removes reverse bias voltage from the base of Q128. Thus, when the positive voltage is applied to the emitter of Q128 by ORGAN RHYTHM PATTERN SWITCH or BASS GUITAR AND BASS DRUM TRIGGER Q18 (See DIODE MATRIX CHART), Q128 will turn on as the result of the voltage developed across R693 by the current path from its emitter to ground via R693, R689 and collector to emitter of Q127. This positive gating voltage is applied by Q128 collector via D216 to gate the BASS GUITAR VOICE circuit. The collector of Q128 also supplies a positive trigger voltage from the ORGAN switch to the preamp muting circuit via D218 and R697. The BASS GUITAR & BASS DRUM trigger voltage is supplied via D219 and R697 to the preamp muting circuit. The preamp muting circuit is discussed in the PREAMP section.

When switching from the FUN MACHINE to normal organ mode, the LEFT HAND CONTROL, Q127, will unsaturate. Its positive collector voltage excursion will be coupled via C641 and R688 to the base of BASS GUITAR DAMPER Q126, which will saturate momentarily, providing an additional discharge path for C229 (Bass Guitar Sustain Capacitor).

PEDAL TRIGGER Q125 is a buffer stage between the pedal gate voltage from the pedal sustain board and the BASS GUITAR TRIGGER AMP Q71. PEDAL TRIGGER Q125 operates in all modes of operation, and also provides the positive trigger voltage for the preamp muting buss. PEDAL SIGNAL BUFFER Q143 is continuously biased by the application of +5V to its base via R754. Q143 acts as the buffer between the signal output from the pedal sustain boards and the DUAL J-K FLIP-FLOP ROOT/FIFTH DIVIDER IC17.

CONTINUOUS & PERCUSSIVE VOICE TRIGGER CIRCUITS

These trigger circuits operate in a manner similar to the corresponding triggers for RIGHT HAND (SOLO) circuits.

The CONTINUOUS VOICE TRIGGER circuit, consisting of Q135, Q134, Q141 and associated components, creates a positive voltage when a key on the LEFT HAND (ACCOMPANIMENT) keyboard is depressed, when not in FUN MACHINE mode. This voltage is supplied via connector P5-4 and D231, D232 and D233 through the FLUTE, REED and STRING selector switches, respectively, to the corresponding voice diode gate circuits.

When a key on the LEFT HAND (ACCOMPANIMENT) keyboard is depressed, a current path is established from the +14 volt source via R725 and R726 through the ACCOMPANIMENT KEYSWITCH COMMON BUSS. A voltage drop across R725, caused by this current, will provide turn on bias for Q135. The +14 volts applied by Q135 emitter to collector circuit via R724 will saturate Q134. When Q134 saturates, a current path is established from +27V via Q140, R738, R723 and collector-emitter circuit of Q134. The voltage drop thus developed across R738 provides turn on bias for Q141. When Q141 saturates, positive supply is available to operate continuous voice diode gates via previously described circuit paths.

Saturation of Q135, when LEFT HAND (ACCOMPANIMENT) key is depressed, also supplies a positive voltage to the preamp muting circuit.

PERCUSSIVE VOICE TRIGGER CIRCUIT

The PERCUSSIVE VOICE TRIGGER circuit, consisting of Q136, Q139, Q142, and associated components, creates a positive trigger voltage transiently, when a key on the LEFT HAND (ACCOMPANIMENT) keyboard is depressed. This trigger pulse is supplied, via percussive voice GUITAR, PIANO, and BANJO selector switches to their voice diode gates. Transistor Q136 is normally turned on by the forward bias supplied to its base from the +27 volt source via R737. When a key in the LEFT HAND (ACCOMPANIMENT) range is depressed, a negative pulse is coupled via R729, C657, and D222 to the base of Q136, causing it to cut off for the duration of the pulse. Ground clamp from the junction of R727 and R730 will be removed, permitting Q139 to be saturated by the application of +14 volts source to its base via saturated Q135. A negative voltage excursion at the collector of Q139, coupled via C660 to the base of Q136 holds Q136 off until C660 recovers from this negative pulse through R737. This 10 ms pulse supplied to the base of Q142 will cause Q142 to saturate, thus, producing a positive 10 ms pulse for the purpose of gating the percussive voice diode gates.

LEFT HAND (ACCOMP.) VOICE DIODE GATES & OUTPUT AMPLIFIER

The CONTINUOUS VOICE DIODE GATES (FLUTE, REED and STRING) and the PERCUSSIVE VOICE DIODE GATES (GUITAR, PIANO and BANJO) consist of similar diode gate circuits, having individual controlled attack and decay characteristics. The description of the FLUTE VOICE DIODE GATE operation will generally apply for the rest of the voice diode gates.

When a key on the Left Hand (Accomp.) keyboard is depressed, a positive voltage from the collector of Q141 is applied via connector P5-4, D231, FLUTE voice switch contacts and connector P5-1 to the FLUTE VOICE DIODE GATE circuit. D212 will be forward biased (gated) by current flow through R678, R676, D212 and R674. Similarly, D213 will be gated by way of R678, R677, D213, and R708. The gating of D212/D213 provides a path for the signal from the FLUTE FILTER CIRCUIT (Q122, Q123) to the LEFT HAND (ACCOMP.) OUTPUT AMPLIFIER (Q130/Q131) by way of C638, R673, D212, C639 and D213.

The LEFT HAND (ACCOMP.) OUTPUT AMPLIFIER, consisting of Q130, Q131, and associated components, couples the voice diode gate output signals to the organ preamplifier circuit via C648, R714 and the PED.-ACC. VOLUME potentiometer.

The output signals of all LEFT HAND (ACCOMP.) voice gates are added to the D.C. bias current that turns the gates on. This current, injected at the emitter of Q130, changes the D.C. level at the output of the amplifier, causing a thump. To minimize this effect, typically, R715 from the FLUTE VOICE DIODE GATE provides compensating current at the base of Q130.

DIODE MATRIX CHART

CONTINUOUS BASS GUITAR & ROOT ONLY INHIBIT

RHYTHM PATTERN SWITCH	DIODE MATRIX	COMPONENTS	
COUNTRY POP ROCK SOUL ROCK BOSA NOVA	D147 D156 D159 D172	R216	To base of Q46
COUNTRY BOSA NOVA OLD TIME WALTZ	D149 D170 D179	R213	
SWING	D140	R212	
HAWAIIAN LATIN III	D162 D165	R214	
FOX TROT POP ROCK RHUMBA POLKA WALTZ	D137 D155 D168 D175 D186	R215	
DIXIELAND RAGTIME HOEDOWN MARCH	D145 D146 D152 D177	D39 & R215	

RHYTHM GUITAR INHIBIT

DIXIELAND RAGTIME HOEDOWN MARCH	D145 D146 D152 D177	R234	To base of Q53

F.M. PIANO (CONTINUOUS)

FOX TROT POP ROCK RHUMBA POLKA WALTZ & ORGAN	D137 D155 D168 D175 D186	D190 ORGAN & R253	To base of Q57
DIXIELAND RAGTIME HOEDOWN MARCH & ORGAN	D145 D146 D152 D177	D191 ORGAN & R253	

F.M. PIANO (TRANSIENT)

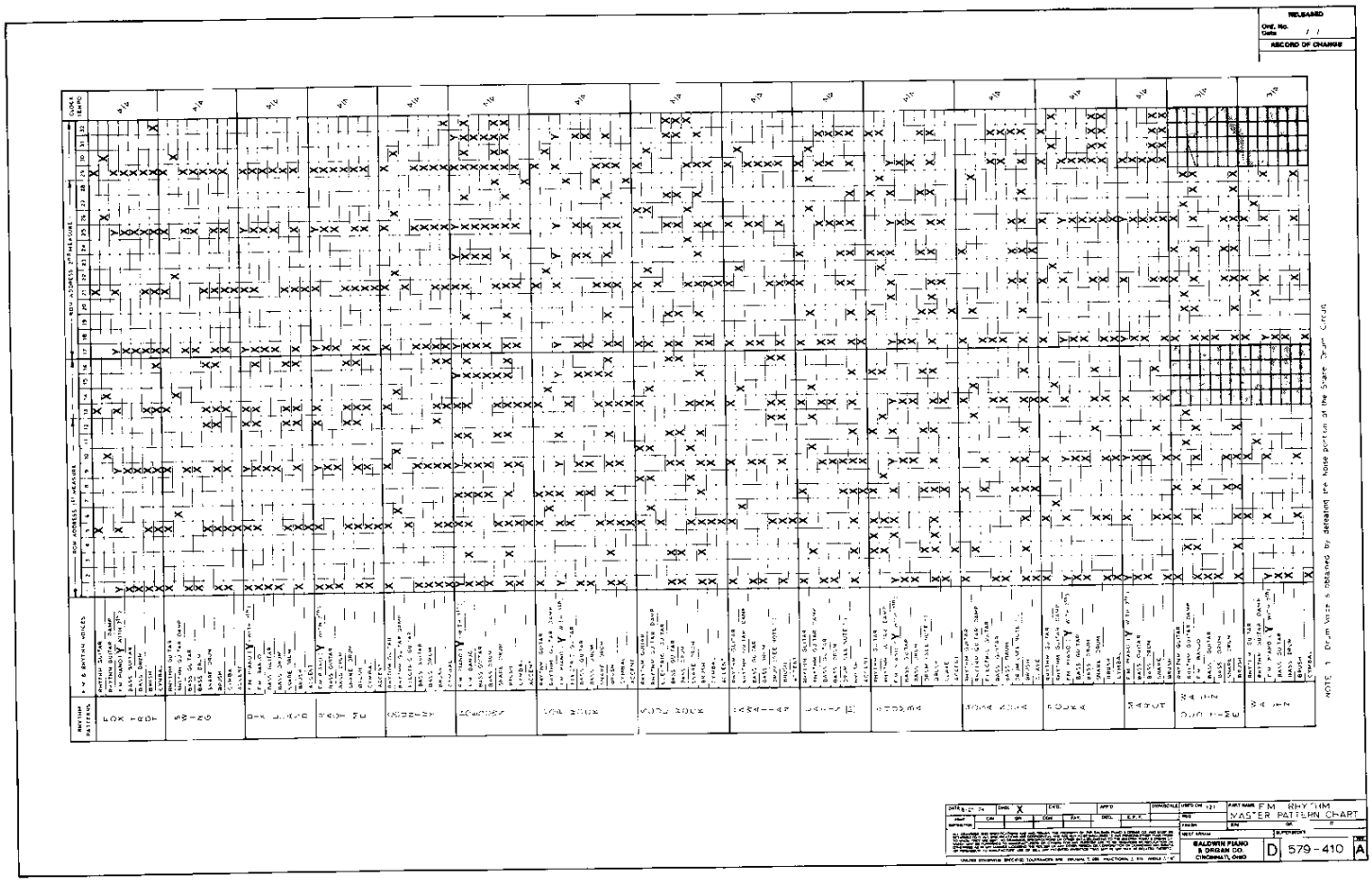
FOX TROT POP ROCK RHUMBA POLKA WALTZ	D137 D155 D168 D175 D186	R251 & R252	To emitter & base of Q58
DIXIELAND RAGTIME HOEDOWN MARCH	D145 D146 D152 D177	D39, R251 &R252	

ELECTRIC GUITAR (TRANSIENT)	DIODE MATRIX	COMPONENTS
COUNTRY	D147	R271 & R272 ——— To emitter & base of Q61
POP ROCK	D156	
SOUL ROCK	D159	
BOSA NOVA	D172	
F.M. BANJO (TRANSIENT)		
DIXIELAND	D144	R286 & R287 ——— To emitter & base of Q63
HOEDOWN	D151	
OLD TIME WALTZ	D180	
SNARE DRUM ADD		
ALL RHYTHMS EXCEPT COUNTRY	———	R33 & R34 ——— To base & emitter of Q9
SNARE (NOISE) & CYMBAL DEFEAT		
HAWAIIAN	D162	R39 ——— To base of Q11
LATIN III	D165	R85 ——— To base of Q23
CLAVE ADD, SNARE (NOISE) & CYMBAL DEFEAT		
RHUMBA	D169	D10, R55 & R56—To base & emitter of Q16
BOSA NOVA	D173	D12 & R39 ———To base of Q11
		D12 & R85 ——— To base of Q23
CYMBAL DEFEAT		
DIXIELAND	R588	——— To base of Q23
MARCH	R589	
OLD TIME WALTZ	D590	
ACCENT DEFEAT		
COUNTRY	D149	D8 ——— To base of Q14
BOSA NOVA	D170	
OLD TIME WALTZ	D179	
VIBRA HARP ASR		
HAWAIIAN	D164	R533 ——— To base of Q88
BOSA NOVA	D174	
WALTZ	D183	
FLUTE ASR		
FOX TROT	D138	R493 ——— To FLUTE DIODE GATE
POP ROCK	D157	
SOUL ROCK	D160	
RHUMBA	D167	
ORGAN	D187	
ACCORDION ASR		
FOX TROT	D139	R495 ——— To ACCORDION DIODE GATE
SOUL ROCK	D161	
POLKA	D176	
ORGAN	D188	
TRUMPET ASR		
DIXIELAND	D142	R497 ——— To TRUMPET DIODE GATE
LATIN III	D166	
MARCH	D178	
ORGAN	D189	
PIANO ASR		
SWING	D141	R593, Q90e-c & R450 ——— To PIANO DIODE GATE
RAGTIME	D148	
POP ROCK	D154	
RHUMBA	D171	
OLD TIME WALTZ	D181	

	DIODE MATRIX		COMPONENTS
GUITAR ASR			
COUNTRY HAWAIIAN	D150 D163	}	R594, Q91e-c & R456 ——— To GUITAR DIODE GATE
HARPSICHORD ASR			
RAGTIME SOUL ROCK WALTZ	D143 D158 D184	}	R595, Q93e-c & R462 ——— To HARPSICHORD DIODE GATE
BANJO ASR			
HOEDOWN	D153	———	R596, Q92e-c & R469 ——— To BANJO DIODE GATE

FUN MACHINE RHYTHM PATTERN & VOICE SELECTION CHART

		FOX TROT	SWING	DIXIELAND	RAGTIME	COUNTRY	HOEDOWN	POP ROCK	SOUL ROCK	HAWAIIAN	LATIN I / III	RHUMBA	BOSA NOVA	POLKA	MARCH	OLD TIME WALTZ	WALTZ	ORGAN
RHYTHM PATTERN	SELECT ROM PIN NO. 2						■	■										
	SELECT ROM PIN NO. 3		■	■	■	■				■								
	SELECT ROM PIN NO. 9															■	■	
	SELECT ROM PIN NO. 10						■							■	■			
	SELECT ROM PIN NO. 11	■				■					■							
	SELECT ROM PIN NO. 12								■									
	SELECT ROM PIN NO. 14										■		■			■		
	SELECT ROM PIN NO. 23											■						
A S R	FLUTE ASR	■						■	■			■						■
	VIBRA HARP ASR									■			■				■	
	ACCORDION ASR	■							■					■				■
	TRUMPET ASR			■							■				■			■
	PIANO ASR		■		■			■				■				■		
	GUITAR ASR					■				■								
	HARPSICHORD ASR				■				■								■	
	BANJO ASR						■											
F. M.	F.M. PIANO ADD	■		■	■		■	■				■		■	■		■	
	F.M. PIANO LONG SUSTAIN	■																
	CONTINUOUS F.M. PIANO (ORGAN SW. ON)	■		■	■		■	■				■		■	■		■	
	CONTINUOUS BASS GUITAR & ROOT ONLY																	■
	CONTINUOUS BASS GUITAR & ROOT ONLY INHIBIT	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	CONTINUOUS RHYTHM GUITAR																	■
	RHYTHM GUITAR DEFEAT			■	■		■								■			
	ELECTRIC GUITAR ADD					■		■	■				■					
	F.M. BANJO ADD			■			■									■		
RHYTHM VOICE	CLAVE ADD											■	■					
	CYMBAL DEFEAT			■						■	■	■	■		■	■		
	ACCENT DEFEAT					■							■			■		
	SNARE DRUM DEFEAT					■												
	SNARE (NOISE) DEFEAT									■	■	■	■					
	3/4-TIME CONTROL BUSS															■	■	


RELEASED
ECN, No.
Date
RECORD OF CHANGE
NOTE 1 Drum voice is obtained by detuning the kick portion of the Snare Drum Circuit.
FM RHYTHM
MASTER PATTERN CHART
BALDWIN PIANO & ORGAN CO.
CINCINNATI, OHIO
D 579-410
A

FUN MACHINE TRANSISTOR

FUNCTION CHART

RHYTHM SECTION VOICE BOARD

Q1 - Q3 . . . . . Start/Stop Flip-Flop. Controls the state of Clock Oscillator and resets the counters.
Stop State: Q1 off, Q3 on. Q3 on via (A), R11, R10A & D3. Start State: Q1 on, Q3 off. Q4 saturates, preventing stop state when F.M. key is released. Q3 also controls the state of Q124.

Q4 . . . . . When key in F.M. is released, Q4 saturates from +27V via R13, R14, Touch Rhythm contacts, D235, Fun Machine contacts, and R9, preventing the Start/Stop Flip-Flop from going into stop mode. In Touch Rhythm mode, Q4 is disabled.

Q5 . . . . . Brush Trigger Gate. Gated by negative pulse from ROM and saturates Q6.

Q6 . . . . . Brush Gate. When gated by Q5, provides ground path for Q7.

Q7 . . . . . Noise Source Buffer. When ground path is provided by Q6, noise is applied to Brush Amplifier Q8.

Q8 . . . . . Brush Buffer Amplifier Stage.

Q9 . . . . . Snare Drum Trigger Gate. When gated by ROM #19, negative pulse saturates Q12 and allows Snare Oscillator Q13 to operate.

Q10 . . . . . Noise Source Buffer. When ground path provided by Q12, noise is applied to Brush Amplifier Q8.

Q11 . . . . . Snare (Noise) Inhibit Gate. Noise portion of Snare Drum is inhibited by Q11 when HAWAIIAN or LATIN III Rhythm patterns are selected.

Q12 . . . . . Snare (Brush) Gate. Gated by Q9, provides ground path for Q10.

Q13 . . . . . Snare Oscillator. Gated by Q9, produces frequency of 238 Hz for duration of 40 ms.

Q14 . . . . . Accent Trigger Gate. Gated on by #22 ROM negative pulse if not defeated in OLD TIME WALTZ, BOSA NOVA or COUNTRY Rhythm pattern modes. Q14 allows Accent Oscillator Q15 to operate.

Q15 . . . . . Accent Oscillator. Gated by Q14, produces frequency of 250 Hz for duration of 30 ms.

Q16 . . . . . Clave Trigger Gate. Gated on by #21 ROM negative pulse in RHYMBA and BOSA NOVA Rhythm pattern modes only. Q16 allows Clave Oscillator Q17 to operate.

Q17 . . . . . Clave Oscillator. Gated by Q16, produces frequency of 2000 Hz for duration of 20 ms.

Q18 . . . . . Bass Guitar and Bass Drum Trigger. Gated by #18 ROM negative pulse. Q18 allows Bass Oscillator Q19 to operate and also triggers Bass Guitar Trigger Amplifier Q71, via D11, R65, D220, Q128 and D216.

Q19 . . . . . Bass Oscillator. Gated by Q18, produces frequency of 111 Hz for duration of 50 ms.

Q20 . . . . . Strike Oscillator Trigger Gate. When gated on by Cymbal Gate Q24, allows Strike Oscillator to operate.

Q21 . . . . . Strike Oscillator. When gated by Cymbal Trigger gates Q22, Q24 and Q20, produces frequency of 5555 Hz for duration of 3.5 ms.

Q22 . . . . . Cymbal Trigger Gate. Gated by #21 ROM negative pulse, Q22 gates on Cymbal gates Q24 and Q28.

Q23 . . . . . Cymbal Inhibit Gate. When gated by +27V via Rhythm Buffer switches in HAWAIIAN, LATIN III, RHYMBA, BOSA NOVA, DIXIELAND, MARCH and OLD TIME WALTZ modes, Q23 disables Cymbal Trigger Gate Q22.

Q24 . . . . . Cymbal Noise and Strike Gate. Gates on Q20 and Q25.

Q25 . . . . . Noise Source Buffer. When gated by Q24, applies noise to Noise Amplifiers Q26 and Q27.

Q26 & Q27 . . . . . High Frequency Noise Amplifier.

Q28 . . . . . Cymbal Noise Gate. Gates on Q29.

Q29 . . . . . Noise Source Buffer. When gated by Q28, applies noise to Noise Amplifiers Q30 and Q31.

Q30 & Q31 . . . . . Lower Frequency Noise Amplifier.

Q32 . . . . . Noise Source.

Q33 thru Q35 . . . . . Noise Source Amplifier. Produces 200 mV P-P noise voltage at the output when mini-pot R129 is set to maximum.

Q36 & Q38 . . . . . Clock Oscillator, operating as free-running multivibrator.

Q37 . . . . . Supplies base current for Q38.

Q39 . . . . . Strobe Output Amplifier. Buffer Amplifier for Clock pulses to ROM via Rhythm Pattern Selector switches and to Percussion Patter I switch.

Q40 . . . . . +12 VDC Supply Source, operating as an Emitter Follower.

Q41 . . . . . Root/Fifth Control Gate. Operates Root/Fifth Gate Q69 when Q70 is in off state.

Q42 & Q43 . . . . . Tempo Light Flasher Circuit.

Q44 & Q45 . . . . . 4/4 - 3/4 Control Gates. In WALTZ and OLD TIME WALTZ Rhythm pattern modes, Q44 is saturated. Q45 produces reset pulse of 2nd, 3rd and 4th Clock Dividers and Clock operates in 3/4 mode.

Fun Machine Transistor
Function Chart (Cont'd.)

FUN MACHINE LOGIC BOARD

Q46 . . . . . Continuous Bass Guitar and Root Only Inhibit Gate. Removes saturation voltage for continuous Bass Guitar Trigger Gate Q71 in all Rhythm Pattern modes. When organ switch is depressed, removes base voltage to Q70 via R308.

Q47 . . . . . One Note Played Detector. When one key in Fun Machine range is depressed, Q47 saturates and supplies ground to Note Played Trigger Buss. In unkeyed state, buss Ⓐ is at +5V level.

Q48 . . . . . Two or more Notes Played Detector. When two or more keys in Fun Machine range are depressed, Q48 saturates and defeats the operation of Q47.

Q49 . . . . . First Stage of Rhythm Guitar Damp Control. Gated on by #15 ROM pulse, turning on Q51.

Q50 . . . . . Rhythm Guitar Trigger Amplifier. When triggered, gates on Rhythm Guitar Diode Gates D40 through D57.

Q51 . . . . . Second Stage of Rhythm Guitar Damp Control. When gated on by Q49, places additional sustain discharge path for C201 by way of R226.

Q52 . . . . . Key Release Damp Control. Saturated by buss Ⓐ voltage when key in Fun Machine range is released, shortening sustain time for Rhythm Guitar voice by placing discharge circuit of R228 and D37 across C201.

Q53 . . . . . Rhythm Guitar Defeat Gate. Defeats the operation of Rhythm Guitar gate Q50 in DIXIELAND, RAGTIME, HOEDOWN and MARCH Rhythm Pattern modes.

Q54 . . . . . Rhythm Guitar Pulse Gate. Operates Rhythm Guitar Trigger Amplifier Q50 when gated by #16 ROM pulse.

Q55 . . . . . Rhythm Guitar Active Filter.

Q56 . . . . . Piano Short Sustain Gate. Fun Machine Piano Trigger circuit in short sustain mode for all Rhythm Patterns except FOX-TROT. Q56 is saturated normally by +27V via FOX-TROT switches.

Q57 . . . . . Fun Machine Trigger Amplifier. When triggered, gates on Fun Machine Piano Diode Gates D52 through D59.

Q58 . . . . . F.M. Piano Pulse Gate. In DIXIELAND, RAGTIME, HOEDOWN, MARCH and WALTZ Rhythm pattern modes Q58 is triggered by #17 ROM pulse and also by #18 ROM pulse when Q59 is unsaturated. Q58 supplies triggering voltage R57.

Q59 . . . . . When signal is present on 7th buss, Q59 is saturated, which allows #18 ROM pulse to operate Q58.

Q60 . . . . . Fun Machine Piano Active Filter.

Q61 . . . . . Electric Guitar Trigger Amplifier. When triggered, gates on Electric Guitar Diode Gates D61 through D68.

Q62 . . . . . Electric Guitar Active Filter.

Q63 . . . . . Fun Machine Banjo Trigger Amplifier. When triggered, gates on Fun Machine Banjo Diode Gates D69 through D76.

Q64 . . . . . Fun Machine Banjo Active Filter.

Q65 . . . . . Seventh Square Wave to pulse wave signal buffer.

Q66 . . . . . Fifth Square Wave to pulse wave signal buffer.

Q67 . . . . . Third Square Wave to pulse wave signal buffer.

Q68 . . . . . Root Square Wave to pulse wave signal buffer.

Q69 . . . . . Root/Fifth Gate. Operated by Q70 in Root Only and Q41 in Root/Fifth mode. Q69 applies its logic output to IC15 and IC16.

Q70 . . . . . Root Only Control. When saturated, defeats the operation of Q69. Q70 is saturated when in ORGAN mode and when key is not depressed in F.M. range.

Q71 . . . . . Bass Guitar Trigger Amplifier. Operates Q72 and Q73 continuously when saturated in ORGAN mode by +27V via R218, D35, Q128 and D216. Q71 also operates transiently via D11, R65, D220, Q128 and D216 when Q18 is triggered on by #18 ROM pulse. Also operated by Pedal Trigger Q125.

Q72 . . . . . 8' Bass Guitar Pulse Shaper. When gated on by Q71, applies 8' signal to Bass Guitar passive filter.

Q73 . . . . . 16' Bass Guitar Pulse Shaper. When gated on by Q71, applies 16' signal to Bass Guitar passive filter.

RIGHT HAND BOARD

Q74 . . . . . Trumpet and Fun Machine Piano Active Header Filter.

Q75 . . . . . Guitar and Harpsichord Active Header Filter.

Q76 . . . . . Fun Machine Banjo Active Header Filter.

Q77 . . . . . Accordion Active Header Filter.

Q78 & Q79 . . . . . Flute Active Header Filter.

Q80 . . . . . Percussion Pattern Short Sustain Control. Q80 is saturated in PERC. PATTERN I or II mode when key in Fun Machine range is depressed. Q80 provides additional discharge path for all percussion voice diode gates, rendering them in short sustain mode.

Q81 . . . . . Percussion Pattern Short Sustain Inhibit. Operated by transistor Q124. When key in Fun Machine range is not depressed, Q81 is saturated via R641 and R491 and inhibits the operation of Q80.

Q82 . . . . . Auto Mute Trigger. Operated by D.C. voltage from diode gates when gated. Q82 provides D.C. control voltage for Auto Mute Circuit.

Q83 & Q84 . . . . . Right Hand Output Amplifier. Amplifies the Right Hand Voice Outputs and applies them to the Auto Mute and Preamplifier circuits.

Fun Machine Transistor
Function Chart (Cont'd.)

RIGHT HAND BOARD

Q87 . . . . . Short/Long Sustain Gate. Unsaturated in VIBRA HARP and ASR VIBRA HARP modes to provide long sustain mode for diode gates on Gate and Divider Boards. Q87 is saturated in all other modes via VIBRA HARP switch from +27V and via ASR switch, R531 and R30, rendering the above diodes in short sustain state.

Q88 . . . . . Vibra Harp ASR Control. Saturated in HAWAIIAN, BOSA NOVA and WALTZ Rhythm patterns, thus removes the bias voltage for Q87 applied from ASR switch.

Q89 . . . . . Vibra Harp ASR Control. Saturated in all modes except ASR. When Q89 is unsaturated, the gate voltage is applied to the Flute Diode Gate via Vibra Harp ASR buss, R535 and D105 in HAWAIIAN, BOSA NOVA and WALTZ rhythm patterns.

Q90 . . . . . Piano ASR Trigger. Q90 bias supply is supplied via Piano ASR buss in SWING, RAGTIME, POP ROCK, RHUMBA, and OLD TIME WALTZ rhythm patterns. If triggered by Q114, it supplies gate voltage for Piano Diode Gate.

Q91 . . . . . Guitar ASR Trigger. Q91 Bias supply is supplied via Guitar ASR buss in COUNTRY and HAWAIIAN rhythm patterns; and if triggered by Q114, it supplies gate voltage for Guitar Diode Gates.

Q92 . . . . . Banjo ASR Trigger. Q92 bias supply is supplied via Banjo ASR Buss in HOEDOWN rhythm pattern; and if triggered by Q114, supplies gate voltage for Banjo Diode Gate.

Q93 . . . . . Harpsichord ASR Trigger. Q93 bias supply is supplied via Harpsichord ASR Buss in RAGTIME, SOUL ROCK and WALTZ rhythm patterns; and if triggered by Q114, supplies gate voltage for Harpsichord Diode Gate.

Q94-95, 98, 103 & 104 Current Sources for Auto Mute differential bandpass amplifiers.

Q96, 97, 99 & 100 . . 1st Auto Mute differential bandpass amplifier.

Q101, 102, 105 & 106 . 2nd Auto Mute differential bandpass amplifier.

Q107 . . . . . Continuous Voice ASR Clamp. Q107 is held in saturation from +27V via ASR normally closed contacts, D428 and R562, disabling continuous voice ASR gating busses to gate continuous voice diode gates. Depressing ASR switch causes Q107 to go out of saturation, permitting specific ASR busses to gate corresponding continuous voice diode gates. Q107 is also saturated by Q109 if ASR switch is depressed.

Q108 . . . . . Part of Continuous Voice Trigger Circuit. When gated on by Q109, causes Q113 to saturate. Also saturates Q107 if ASR switch is depressed, except when a key is played.

Q109 . . . . . First Stage of Continuous Voice Trigger Circuit. Gated on when key in Right Hand is depressed. When Q109 saturates, it provides positive voltage:

a. To saturate Q112 after time constant of C470
b. To delayed vibrato circuit via D129
c. To saturate Q108
d. To saturate Q114, Q115 is cut off

Q110 . . . . . First Stage of Right Hand Percussive Voice Trigger Circuit. When key in Right Hand range is depressed, Q110 unsaturates transiently, removing the ground clamp for Q111, allowing it to saturate.

Q111 . . . . . Part of Right Hand Percussive Voice Trigger Circuit. Gated on when Q110 unsaturates, allowing Q116 to saturate and, via C471, reinforce off state of Q110 to establish pulse width of 10 ms.

Q112 . . . . . Right Hand Vibrato Oscillator Start/Stop Control. Gated on by Q109 via delayed action of C470, removes vibrato oscillator disabling voltage applied from +27V via R576, D113 and D234.

Q113 . . . . . Right Hand Continuous Voice Trigger Circuit Output Stage. When gated on by Q108, provides gating voltage to the continuous voice switches via P5-1.

Q114 . . . . . Percussion ASR Gate. When Q115 is unsaturated, Q114 is gated on by Q109, providing negative pulse which triggers on percussive voice. ASR triggers Q90 through Q93.

Q115 . . . . . Percussion ASR Clamp. Disables input gating voltage to Q114 unless ASR switch is depressed.

Q116 . . . . . Percussive Voice Trigger Circuit Output Stage. When gated on by Q111, provides 10 ms gating pulse to the Percussive voice switches via P5-9.

Q117 . . . . . Percussion Pattern Trigger Amplifier. When pulsed on by Strobe pulses in PERC. PATTERN I mode, Q47 triggers Q116 on.

LEFT HAND BOARD

Q118 . . . . . Piano Active Header Filter.

Q119 . . . . . Guitar Active Header Filter.

Q120 . . . . . Banjo Active Header Filter.

Q121 . . . . . Reed and String Active Header Filter.

Q122 & Q123 . . . . . Flute Active Header Filter.

Q124 . . . . . Percussion Pattern Short Sustain Gate. Operated by the collector voltage of Q3 Start/Stop Flip-Flop stage. When Fun Machine key is depressed, Q124 saturates, removing the saturation voltage for Q81.

Q125 . . . . . Pedal Trigger. Triggered on by positive trigger voltage from 13 Note Pedal Sustain Circuit when pedals are played.

Q126 . . . . . Bass Guitar Damper. Controlled by Q127. Momentarily saturates, discharging Bass Guitar sustain capacitor C229, preventing Bass Guitar operation during the transition from Fun Machine to regular pedals.

Fun Machine Transistor
Function Chart (Cont'd.)

LEFT HAND BOARD

Q127 . . . . . Main Left Hand Control Circuit. Saturated by +5V when FUN MACHINE BUTTON is depressed. When Q127 saturates, its collector at ground potential:

a. Saturates Q129
b. Unsaturates Q138
c. Saturates Q128
d. Momentarily saturates Q126 when FUN MACHINE BUTTON is released (when Q127 goes out of saturation)

Q128 . . . . . Bass Guitar Gate. Controlled by Q127; when saturated, allows the trigger from Q18 or ORGAN switch voltage to be applied to the Bass Guitar Trigger Amplifier, Q71. Q128 also allows above voltages to be applied to the pre-amp muting buss.

Q129 . . . . . Pedal Signal Inhibit Gate. Controlled by Q127; when saturated, it provides positive voltage via R694 for Pedal Clamp on 13 note Pedal Sustain circuit, inhibiting its manual signal operation.

Q130 & Q131 . . . . . Left Hand Output Amplifier. Amplifies the Left Hand Voice Outputs and applies them to the Preamplifier circuit.

Q134 . . . . . Part of Left Hand Continuous Voice Trigger Circuit. When gated on by Q135, causes Q141 to saturate.

Q135 . . . . . First Stage of Left Hand Continuous Voice Trigger Circuit. Gated on when key in Left Hand is depressed. When Q135 saturates, it provides positive voltage:

a. To saturate Q134
b. To saturate Q139
c. For Left Hand Muting Buss

Q136 . . . . . First Stage of Left Hand Percussive Voice Trigger Circuit. When key in Left Hand range is depressed, Q136 unsaturates transiently, removing the ground clamp for Q139, allowing it to saturate.

Q137 . . . . . Left Hand Vibrato Control. When gated on by Q141, Q137, with delayed action (C659), removes vibrato oscillator disabling voltage applied from +27V via R576, D133 and D234.

Q138 . . . . . Left Hand Voice Inhibit Circuit. Operated by Q127; when cut off, causes Q140 to cut off.

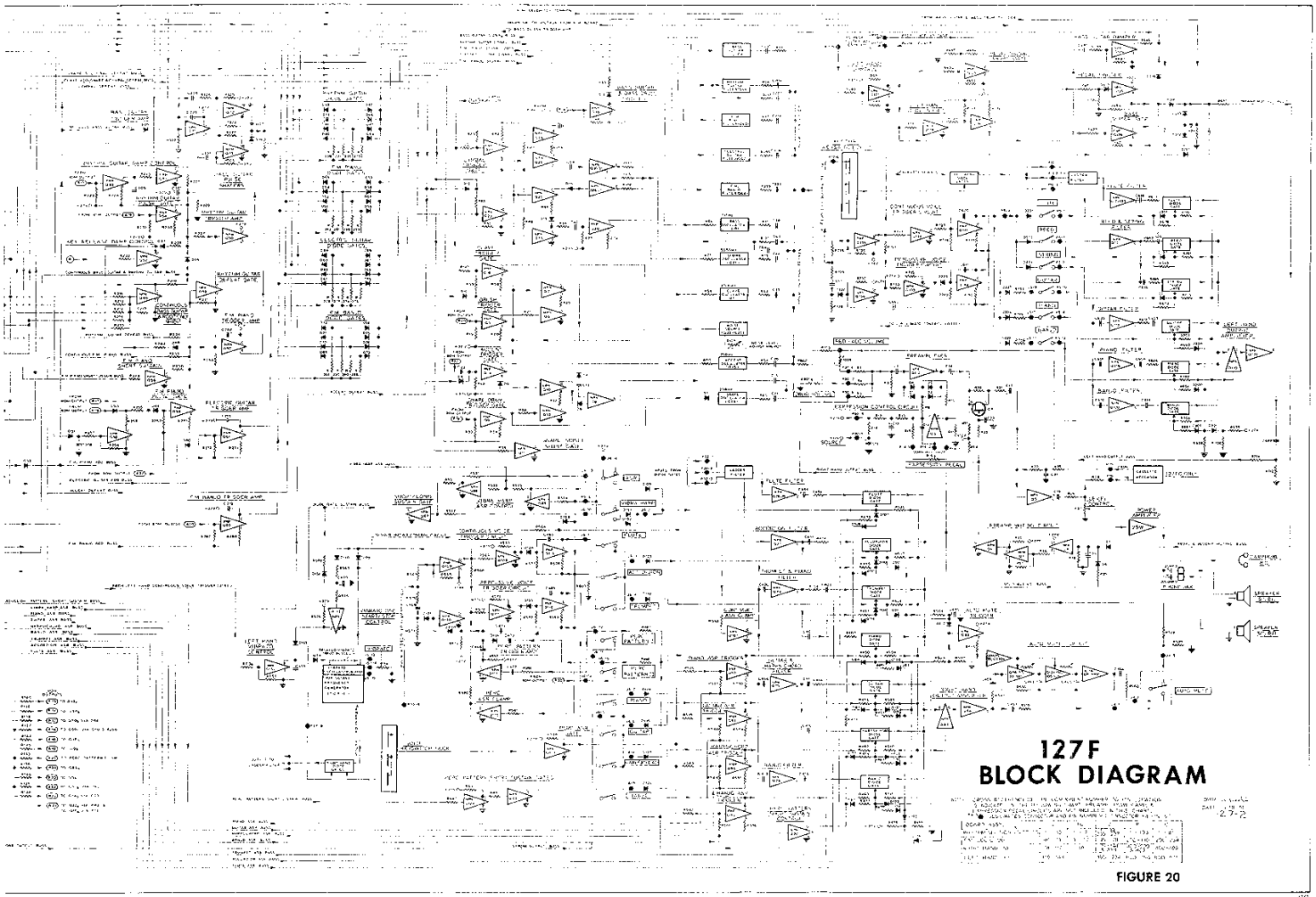
Q139 . . . . . Part of Left Hand Percussive Voice Trigger Circuit. Gated on when Q136 unsaturates, allowing Q142 to saturate and, via C660, reinforce off state of Q136 to establish pulse width of 10 ms.

Q140 . . . . . Left Hand Trigger Circuit Supply Stage. Gated on when Q138 saturates, supplying the necessary +27V source for the operation of Left Hand Continuous and Percussive Trigger Circuit output stages.

Q141 . . . . . Left Hand Continuous Voice Trigger Circuit Output Stage. When gated on by Q134, provides gating voltage to the Left Hand Continuous Voice switches via P5-4.

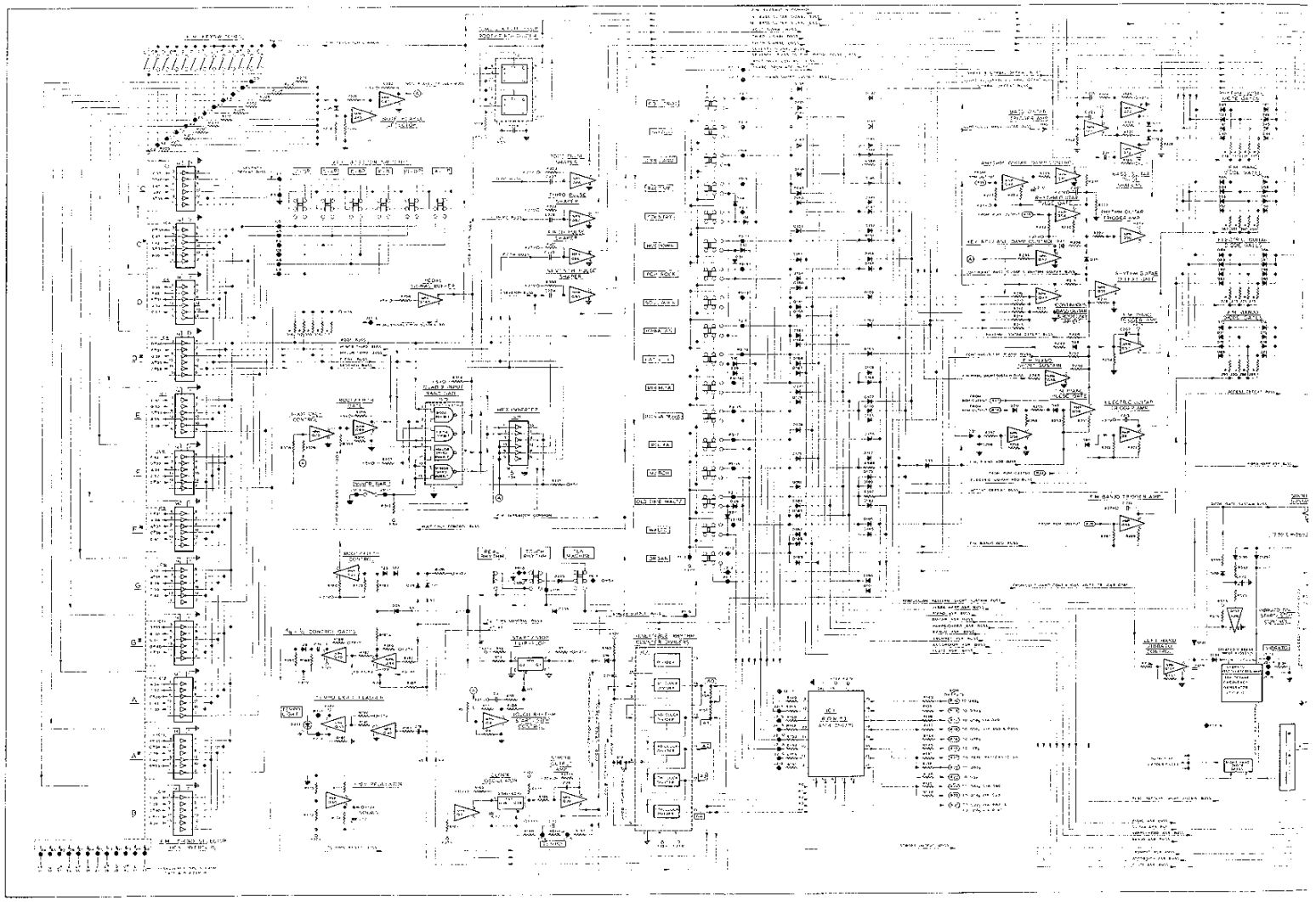
Q142 . . . . . Left Hand Percussive Voice Trigger Circuit Output Stage. When gated on by Q139, provides 10 ms gating pulse to the Percussive Voice switches via D227, D224 and D229.

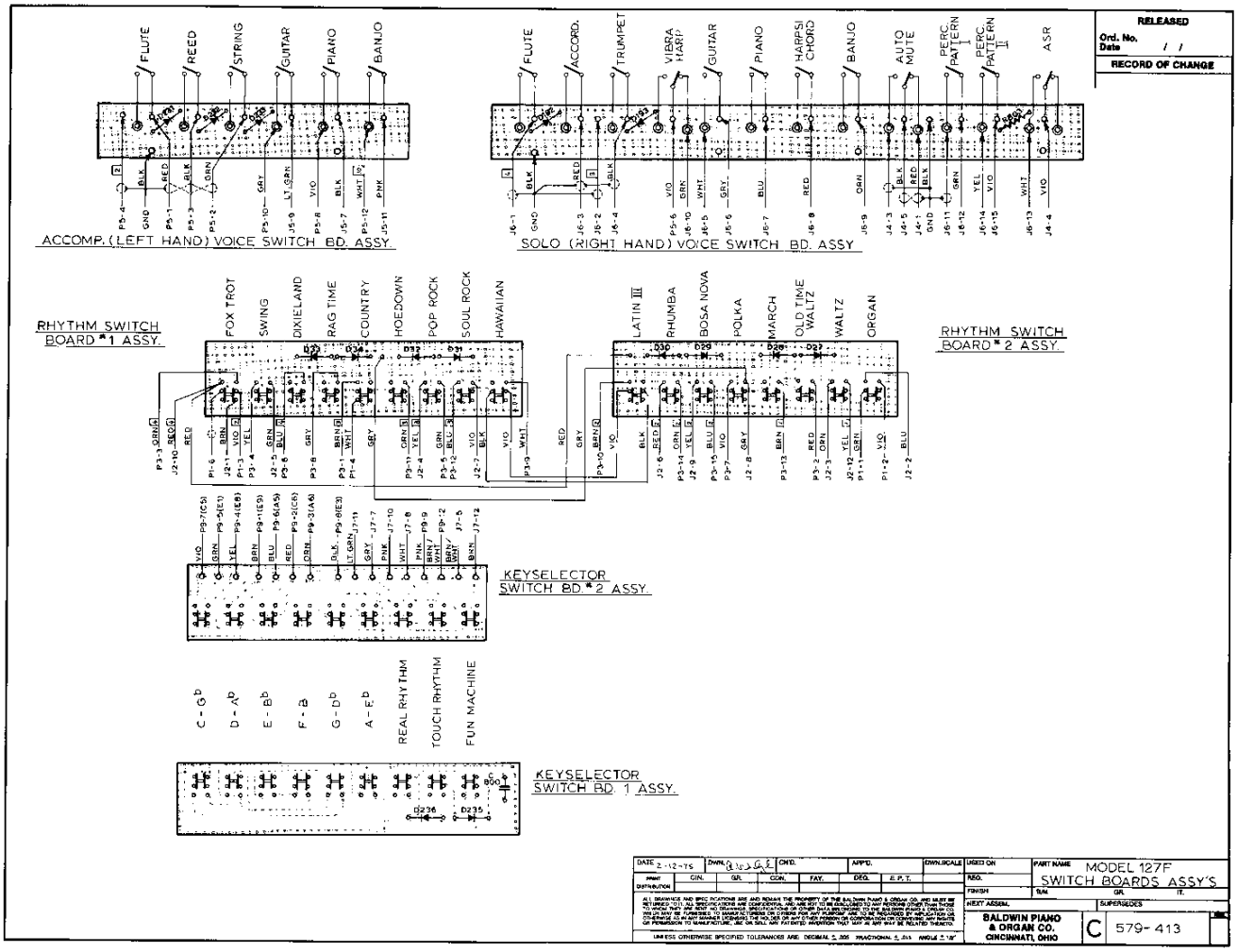
Q143 . . . . . Pedal Signal Buffer Stage. Q143 is turned on continuously by +5V applied via R754 to its base, thus conducting the pedal signals from 13 note pedal sustain circuit to J-K Flip-Flop Root/Fifth Divider IC17 input Pin #9.



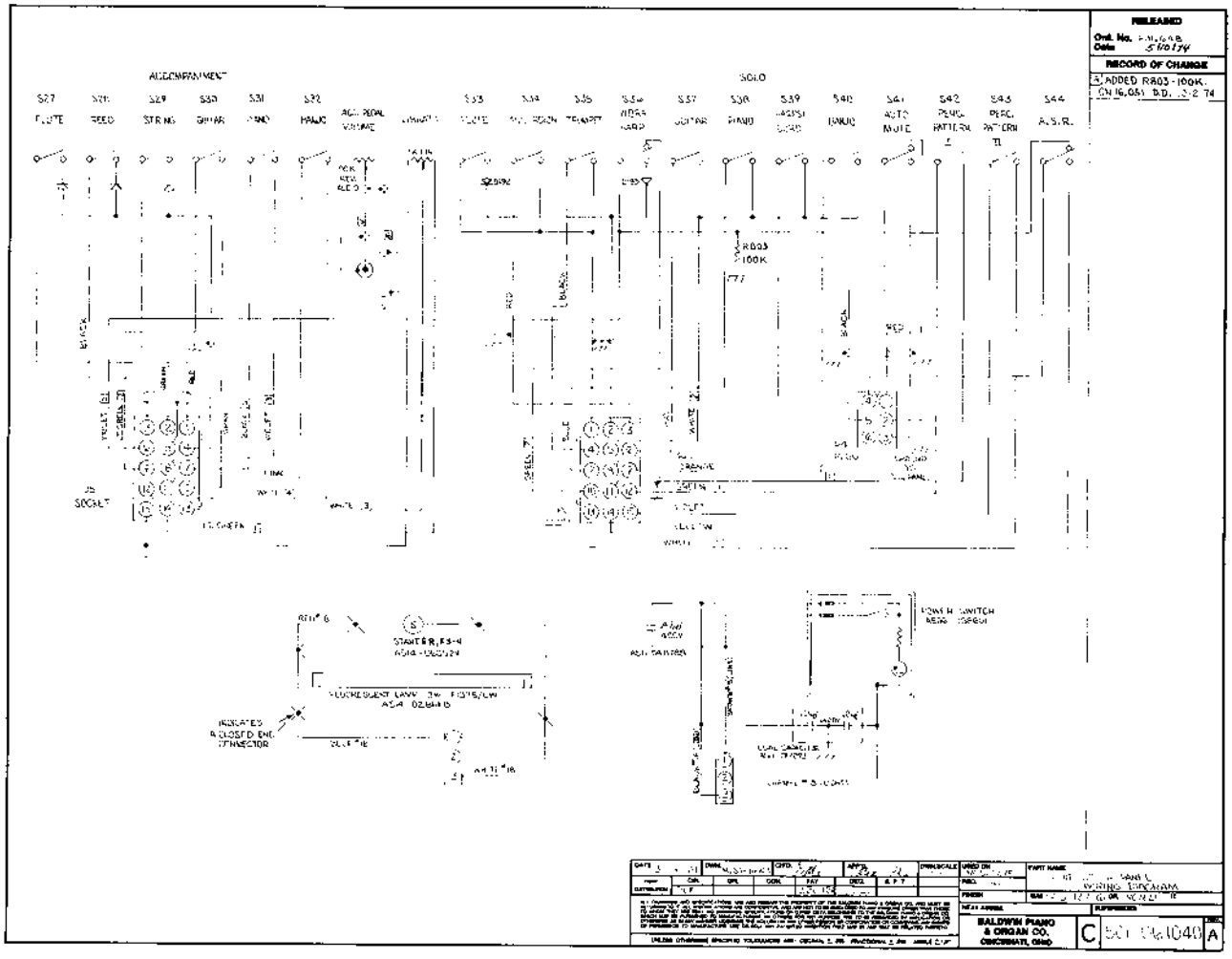
127F
BLOCK DIAGRAM

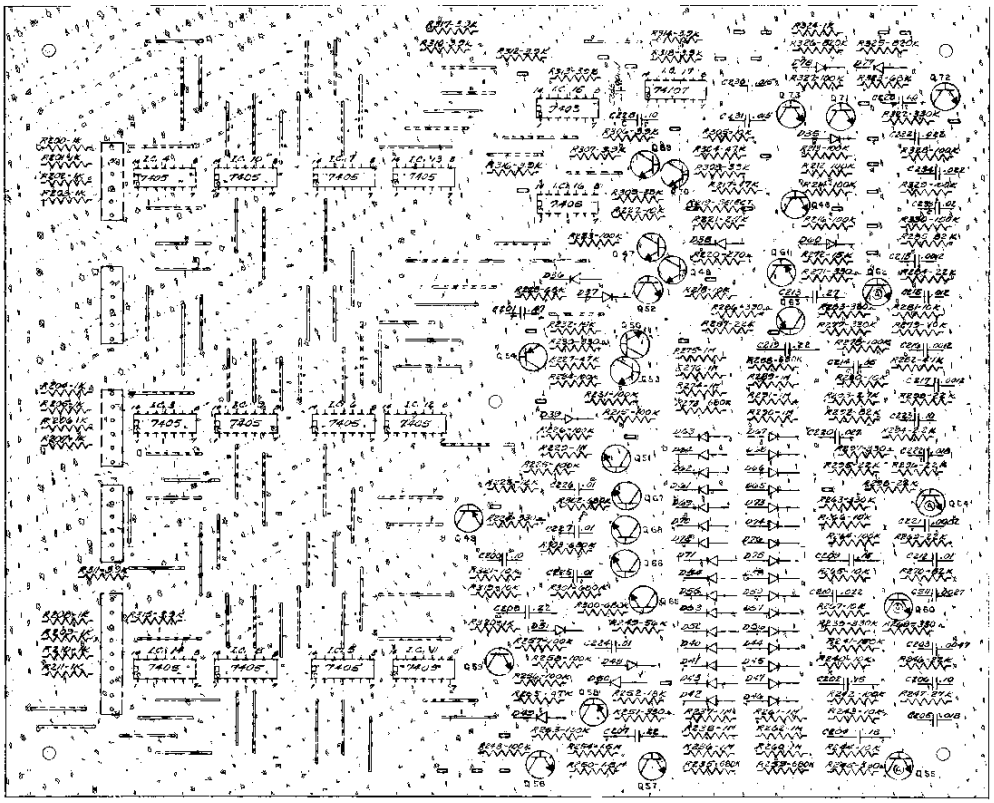
FIGURE 20




RELEASED
Ord. No.
Date / /
RECORD OF CHANGE
FLUTE
REED
STRING
GUITAR
PIANO
BANJO
ACCOMP. (LEFT HAND) VOICE SWITCH BD. ASSY
FLUTE
ACCORD.
TRUMPET
VIBRA HARP
GUITAR
PIANO
HARPSI CHORD
BANJO
AUTO MUTE
PERC. PATTERN I
PERC. PATTERN II
ASR
SOLO (RIGHT HAND) VOICE SWITCH BD. ASSY
RHYTHM SWITCH BOARD #1 ASSY.
FOX TROT
SWING
DIXIELAND
RAG TIME
COUNTRY
HOEDOWN
POP ROCK
SOUL ROCK
HAWAIIAN
LATIN III
RHUMBA
BOSA NOVA
POLKA
MARCH
OLD TIME WALTZ
WALTZ
ORGAN
RHYTHM SWITCH BOARD #2 ASSY
KEYSELECTOR SWITCH BD #2 ASSY.
C - G♭
D - A♭
E - B♭
F - B
G - D♭
A - E♭
REAL RHYTHM
TOUCH RHYTHM
FUN MACHINE
KEYSELECTOR SWITCH BD. 1 ASSY.
DATE 2-12-75
DRWN.
CHKD.
APP'D.
DWN.SCALE
USED ON
PART NAME MODEL 127F SWITCH BOARDS ASSY'S
MATL
DIN.
GR.
CON.
FAY.
DEQ.
E.P.T.
REQ.
FINISH
RUN
GR.
IT.
NEXT ASSEM.
SUPERSEDES
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
C
579-413

70


RELEASED
Ord. No. P.N. 6618
Date 5/10/74
RECORD OF CHANGE
A ADDED R803 - 100K. ON 16,051 D.D. 12-2 74
ACCOMPANIMENT
SOLO
S27 FLUTE
S28 REED
S29 STRINGS
S30 GUITAR
S31 PIANO
S32 HARP
S33 FLUTE
S34 REED
S35 TRUMPET
S36 STRING HARP
S37 GUITAR
S38 PIANO
S39 HARPSI CHORD
S40 BANJO
S41 AUTO MUTE
S42 PERC. PATTERN
S43 PERC. PATTERN
S44 A.S.R.
R803 100K
STARTER, ES-14
INDICATES CLOSED END CONNECTOR
POWER SWITCH
WIRING DIAGRAM
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
C 501 96 1040 A



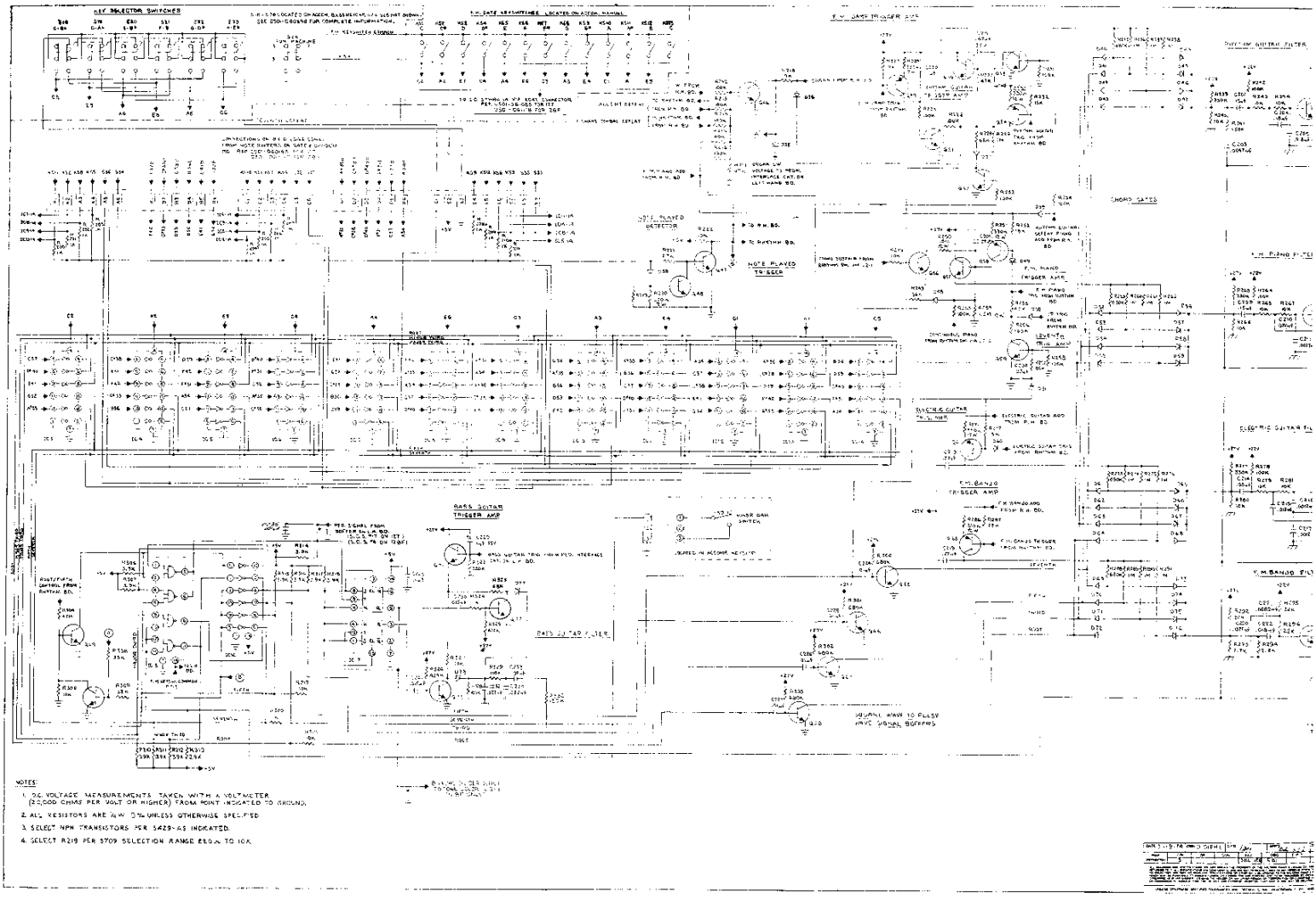
LEGEND:
C DENOTES SCHEMATIC DESIGNATION
PC DENOTES PARTS LIST DESIGNATION

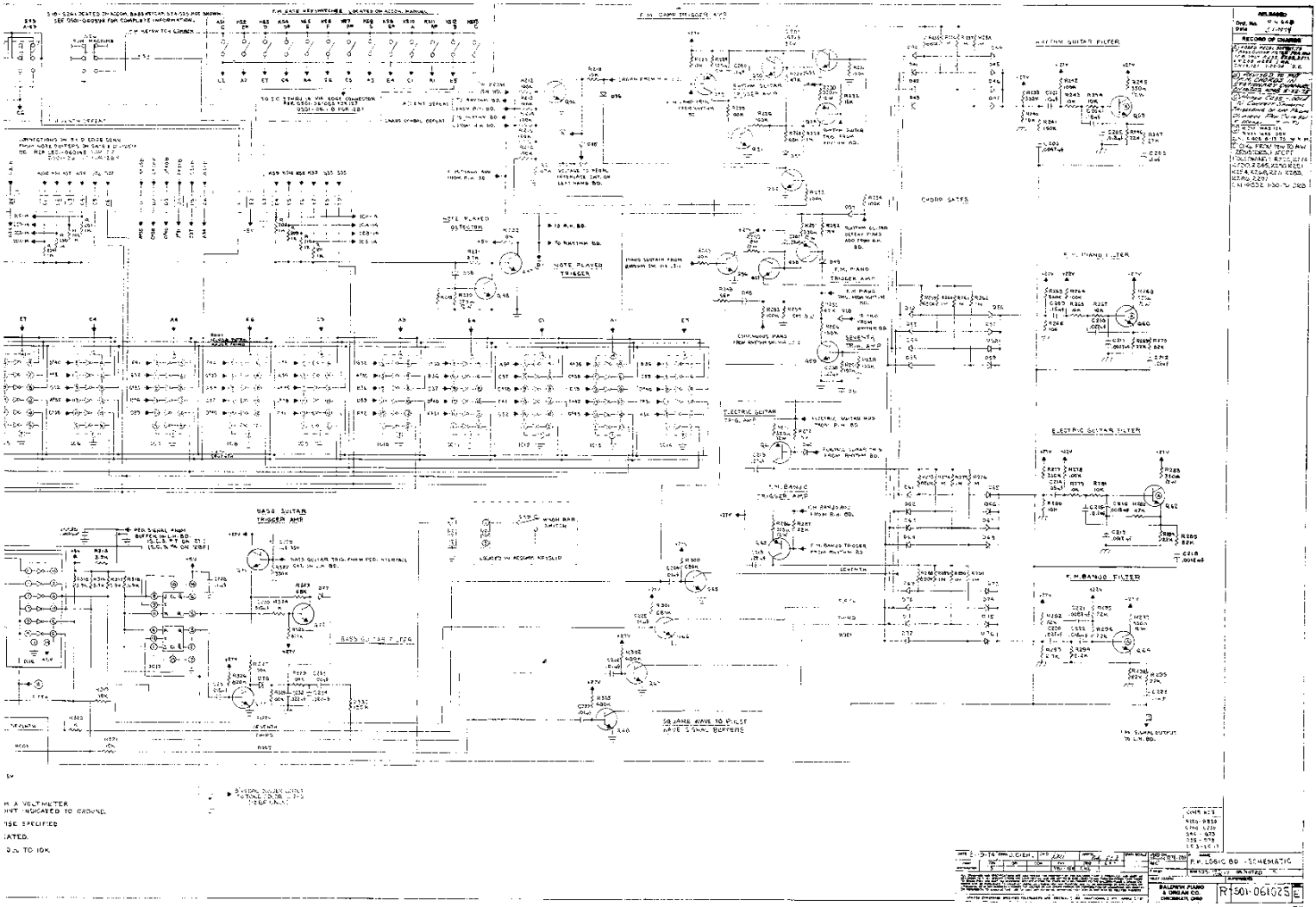
67	1	5213-183	RESISTOR 4 W 1%	BK
61				
60	1	1284-107	CAPACITOR .001 uf CER	
59	X	5134-4	SOLDER (CANADA)	
58	X	5189-5	SOLDER (DIP)	
57	X	5127-4	BARE CHANNEL WIRE	
56	1	HR14-138480	SR FLH FLOP TYPE	HR14-T
55	1	HR14-138468	3-30 SHIFT WING CHAP	HR14
54	1	HR07-100123	MAIN INTERCONNECT	3PIN
53	4	HR07-100125	MAIN INTERCONNECT	6 PIN
52	18	7404 (DUAL)	HEX INVERTER TYPE	7405
51				
50				
49	1	5046-35-105-2	VARIATION TRIMT	1M 35T
48	1	[5146-35-414-1]	TRIMT	5M 35T
47	1	5232-01-274	MYLAR	.27 uf
46	3			.22 uf
45	1			.18 uf
44	2			.15 uf
43	3			.10 uf
42	1			.082 uf
41	3			.056 uf
40	2			.047 uf
39	2			.015 uf
38	1			.012 uf
37	5			.01 uf
36	1	822		.0082 uf
35	1	472		.0047 uf
34	1	273		.0027 uf
33	3	5233-01-102	MYLAR 100 V	.001 uf
32	1	5218-104	CER	.1uf
31	3	5218-503	CER	.05uf
30	1	5203-203	DISC 1045 CER	.02 uf
29	1	5033-1005-10	RESISTOR 1/4 W 10%	1.0M
28	1	1435-165-18	1/4 W 1%	475K
27	3	5531-105	1/4	1M
26	2	824		820 K
25	8	684		680 K
24	4	334		330K
23	2	154		150 K
22	21	104		100 K
21	3	823		82 K
20	2	683		68K
19	1	563		56 K
18	5	473		47K
17	2	333		33K
16	1	273		27K
15	2	223		22K
14	2	183		18K
13	1	123		12 K
12	14	103		10K
11	11	392		3.9K
10	2	272		2.7K
9	1	223		2.2K
8	16	5210-101		5% 100 K
7	9	1435-321		1/4 W 330
6	1	1435-271		1/4 W 270
5	1	5239-XXX-10	RESISTOR 1/4 W	10% SELECT
4	44	HR14-140291	DIODE - MED VOLTAGE	
3	28	HR14-138338	TRANSISTOR - NPN	
2	5	HRN 048310	TRANSISTOR - PNP	
1	1	7805-260478	P.C. LOGIC B'D (RIVETED)	
ITEM NO		PART NO.	PART NAME	

NOTES:
1) SELECT R213 (NOM. 5.11Ω) & 5.11T, SELECTION RANGE 100 Ω TO 10 K.
2) REFERENCE SCHEMATIC 500-060035 (V2); REC1-001205 (-2T, -4T).
3) PIN WIRING DIAGRAM - C60H-660480 (W1, W7) C60H-661373 (-4W).
4) FINAL ASSEMBLY MUST INCLUDE LABEL MARKED 600-660479 D.

RELEASED
Ord. No. 9% 660
Date 7/28/74
RECORD OF CHANGE
(A) MATERIALS TYPES SIZE SHOWN ARE AVG. QUAN.
(F) R235 R239 R279 R289 WERE 1MΩ C-5 15/21-12/79 BC.
(G) R213 1.21Ω 1% 1/4W
(H) R235 WAS 13.7K R239 WAS 100K REVISED NOTE 4 C.N. 15,405 8-15-75 W.R.H. ALSO: REVISED NOTE 1 C.N. 15,405 8-15-75 W.R.H.
(I) ALL R & TYPES 1/4 W 1% C.N. 4732 - 12-19-79 BM.

DATE 7-10-74	DRWN BANDY	CHKD	APPD	DWG SIZE D	SCALE NONE	DES. CTR. 722-01	PART NAME P.C. LOGIC B'D. - ASS'Y.		
FINISH CN	MAT'L	TOL. FRAC.	DEC.	ANG.	DWG NO. 1	REV.			
DISTRIBUTION 2148									
							NEXT ASSY. 500-060030	SUPERSEDES	
							BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO	D	500-060479


KEY SELECTOR SWITCHES
F.M. GATE KEYSWITCHES (LOCATED ON ORGAN MANUAL)
F.M. CHORD GATES
NOTE PLAYED DETECTOR
NOTE PLAYED TRIGGER
F.M. PIANO TRIGGER AMP
F.M. BANJO TRIGGER AMP
ELECTRIC GUITAR TRIG. AMP
BASS GUITAR TRIGGER AMP
BASS GUITAR FILTER
SQUARE WAVE TO FILTER INPUT SIGNAL BUFFERS
NOTES:
1. DC VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHMS PER VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.
2. ALL RESISTORS ARE ¼W 5% UNLESS OTHERWISE SPECIFIED
3. SELECT NPN TRANSISTORS PER 5429-AS INDICATED.
4. SELECT R219 PER 5709 SELECTION RANGE E192 A TO 10K

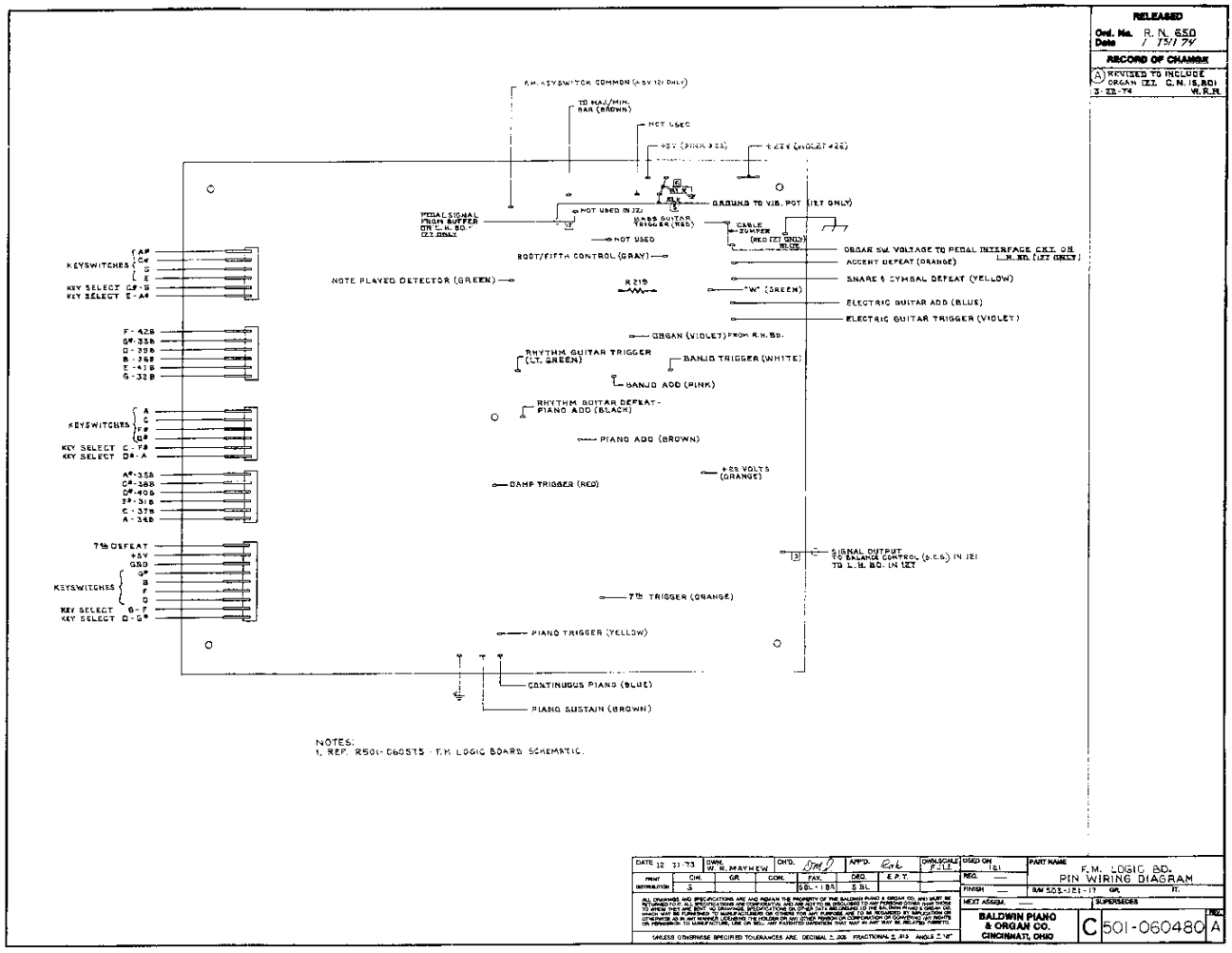


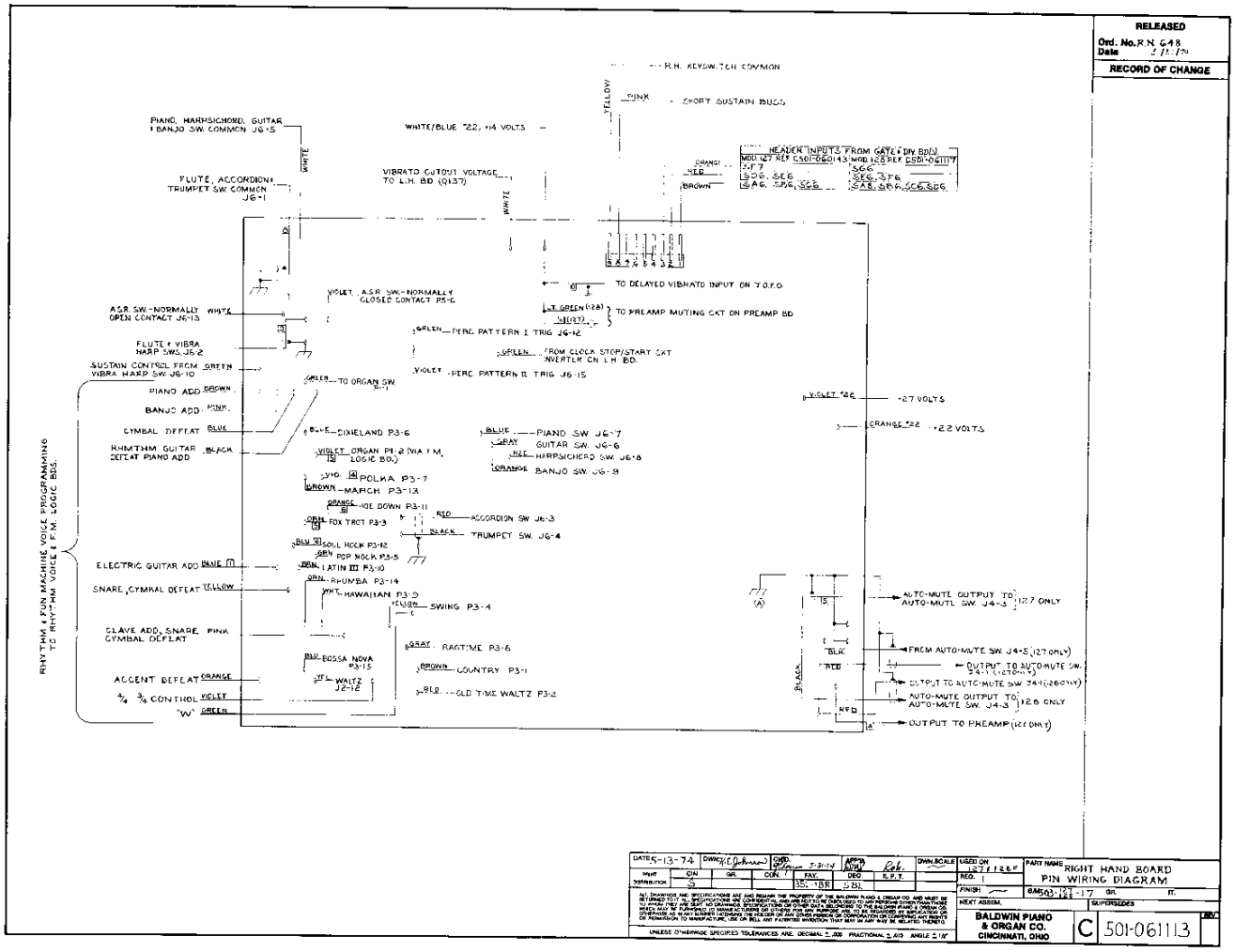
H. A VOLTMETER.
UNIT INDICATED TO GROUND.
ISE SPECIFIED
ATED.
2.2K TO 10K.

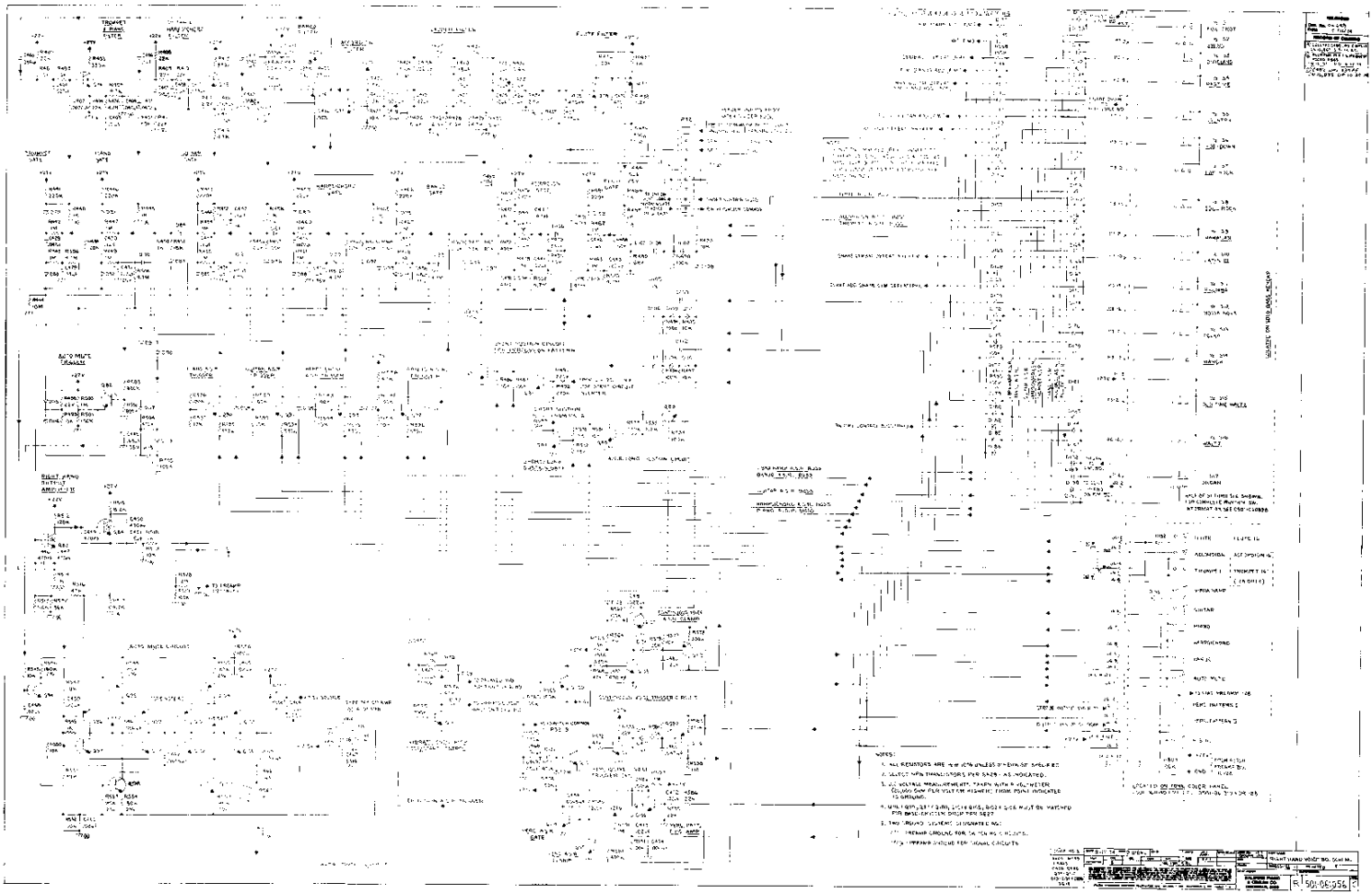
F.M. LOGIC BD. - SCHEMATIC

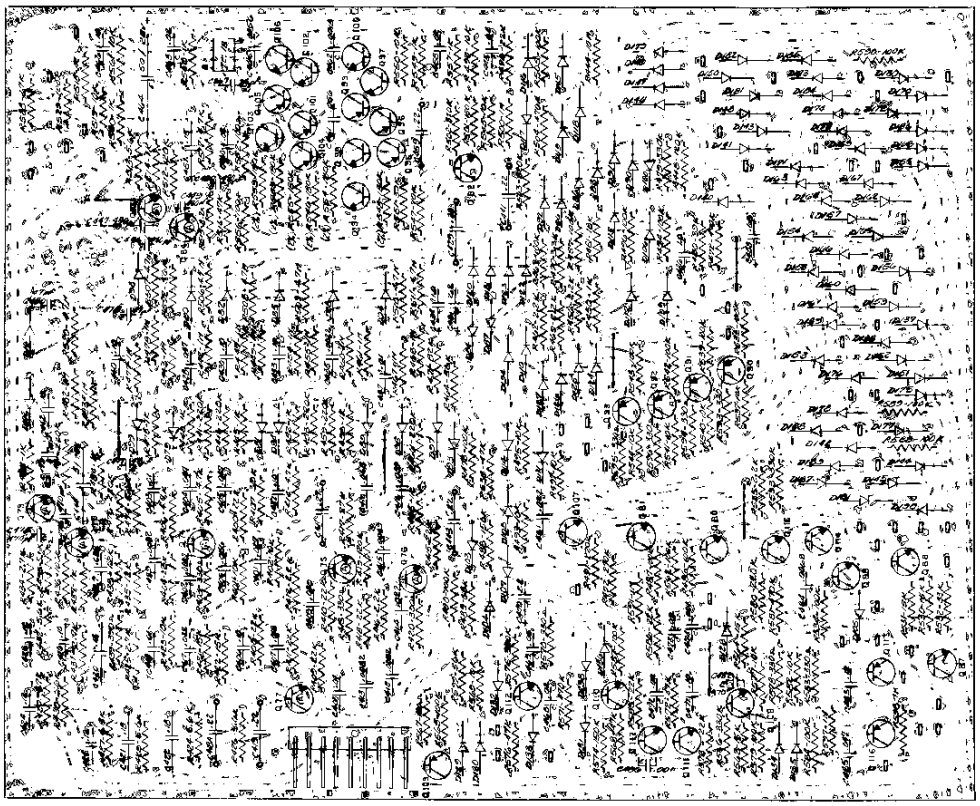
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

R1501-061025


RELEASED
Ord. No. R. N. 650
Date 1/15/74
RECORD OF CHANGE
A REVISED TO INCLUDE ORGAN (ZZ. C. N. 15, BD) 3-22-74 W. R. M.
A.M. KEYSWITCH COMMON (+5V 121 ONLY)
TO MAJ/MIN. BAR (BROWN)
NOT USED
+5V (PINK #22)
+22V (VIOLET #22)
GROUND TO VIB. POT (121 ONLY)
PEDAL SIGNAL FROM BUFFER ON L. H. BD. (ZZ ONLY)
NOT USED IN 121
BASS GUITAR TRIGGER (WHT)
CABLE JUMPER (RED ZZ ONLY)
NOT USED
BOOT/FIFTH CONTROL (GRAY)
ORGAN SW. VOLTAGE TO PEDAL INTERFACE CKT. ON L.H. BD. (121 ONLY)
ACCENT DEFEAT (ORANGE)
SNARE & CYMBAL DEFEAT (YELLOW)
NOTE PLAYED DETECTOR (GREEN)
R 219
"M" (GREEN)
ELECTRIC GUITAR ADD (BLUE)
ELECTRIC GUITAR TRIGGER (VIOLET)
ORGAN (VIOLET) FROM R.H. BD.
RHYTHM GUITAR TRIGGER (LT. GREEN)
BANJO TRIGGER (WHITE)
BANJO ADD (PINK)
RHYTHM GUITAR DEFEAT - PIANO ADD (BLACK)
PIANO ADD (BROWN)
+22 VOLTS (ORANGE)
DAMP TRIGGER (RED)
SIGNAL OUTPUT TO BALANCE CONTROL (B.C.S.) IN 121 TO L.H. BD. IN 121
7th TRIGGER (ORANGE)
PIANO TRIGGER (YELLOW)
CONTINUOUS PIANO (BLUE)
PIANO SUSTAIN (BROWN)
KEYSWITCHES A# C# E
KEY SELECT G#-C5
KEY SELECT E-A4
F-42B
G#-33B
D-39B
B-36B
E-41B
G-32B
KEYSWITCHES A C F# G#
KEY SELECT C-F#
KEY SELECT D#-A
A#-35B
C#-38B
D#-40B
F#-31B
C-37B
A-34B
7th DEFEAT
+5V
GRD
KEYSWITCHES G# B F D
KEY SELECT G-F
KEY SELECT D-G#
NOTES:
1. REF. R501-060STS - F.M. LOGIC BOARD SCHEMATIC.
DATE 12-31-73
DWN. W. R. MAYHEW
CH'D.
APP'D.
DWN. SCALE FULL
USED ON 121
PART NAME F.M. LOGIC BD. PIN WIRING DIAGRAM
REQ.
FINISH
RAW 503-121-17 GR. FI.
NEXT ASSEM.
SUPERSEDES
PRINT DISTRIBUTION CHK. GR. CONT. TAY. DEC. E.P.T.
S 60-118A S BL
ALL DRAWINGS AND SPECIFICATIONS ARE AND REMAIN THE PROPERTY OF THE BALDWIN PIANO & ORGAN CO. AND MUST BE RETURNED UPON REQUEST. ALL SPECIFICATIONS AND CONSTRUCTION ARE AND SHALL REMAIN AT ALL TIMES SUBJECT TO ANY REVISIONS WHICH MAY BE MADE TO OTHERWISE SPECIFICATIONS ON OR AS SUCH MAY BE RECORDED BY THE BALDWIN PIANO & ORGAN CO. WHICH MAY BE FURNISHED TO MANUFACTURERS OR OTHERS FOR ANY PURPOSE, AND TO BE REGARDED BY MANUFACTURERS OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CONCERN TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTIONS THAT MAY BE RELATED THERETO.
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/64 ANGLE ± 1/2°
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
C 501-060480 A


RELEASED
Ord. No. R.N. 648
Date 5/11/74
RECORD OF CHANGE
R.H. KEYSWITCH COMMON
PINK - SHORT SUSTAIN BUSS
YELLOW
WHITE/BLUE *22, +14 VOLTS
PIANO, HARPSICHORD, GUITAR & BANJO SW. COMMON J6-5
WHITE
FLUTE, ACCORDION & TRUMPET SW. COMMON J6-1
VIBRATO CUTOUT VOLTAGE TO L.H. BD (Q137)
WHITE
HEADER INPUTS FROM GATE & DIV BD(S)
ORANGE
RED
BROWN
MOD *27 REF CSO1-0601 & 3
WIRE *28 REF CSO1-0611 & 7
SA6, SD6, SE6
SE6, 3F6
SA8, SB6, SC6, SD6
TO DELAYED VIBRATO INPUT ON T.O.F.G.
VIOLET A.S.R. SW.-NORMALLY CLOSED CONTACT P5-6
A.S.R. SW.-NORMALLY OPEN CONTACT J6-13
WHITE
LT. GREEN (*28) } TO PREAMP MUTING CKT ON PREAMP BD
VIOLET (*27) }
FLUTE & VIBRA HARP SWS. J6-2
GREEN PERC PATTERN I TRIG J6-12
GREEN FROM CLOCK STOP/START CKT INVERTER ON L.H. BD.
SUSTAIN CONTROL FROM VIBRA HARP SW. J6-10
GREEN
VIOLET PERC PATTERN II TRIG J6-15
GREEN TO ORGAN SW.
PIANO ADD BROWN
BANJO ADD PINK
VIOLET *26 -27 VOLTS
ORANGE *22 +22 VOLTS
CYMBAL DEFEAT BLUE
RHYTHM GUITAR DEFEAT PIANO ADD BLACK
BLUE CIXIELAND P3-6
VIOLET ORGAN PL-2 (VIA F.M. LOGIC BD.)
BLUE PIANO SW. J6-7
GRAY GUITAR SW. J6-6
RED HARPSICHORD SW. J6-8
ORANGE BANJO SW. J6-9
VIO POLKA P3-7
BROWN MARCH P3-13
ORANGE WOE DOWN P3-11
ORN FOX TROT P3-3
RED ACCORDION SW J6-3
BLACK TRUMPET SW. J6-4
BLU SOUL ROCK P3-12
GRN POP ROCK P3-5
ELECTRIC GUITAR ADD BLUE
BRN LATIN III P3-10
ORN RHUMBA P3-14
SNARE, CYMBAL DEFEAT YELLOW
WHT HAWAIIAN P3-9
YELLOW SWING P3-4
SLAVE ADD, SNARE, PINK CYMBAL DEFEAT
GRAY RAGTIME P3-6
BRN BOSSA NOVA P3-15
ACCENT DEFEAT ORANGE
YEL WALTZ J2-12
BROWN COUNTRY P3-1
RED OLD TIME WALTZ P3-2
4/4 3/4 CONTROL VIOLET
"W" GREEN
RHYTHM & FUN MACHINE VOICE PROGRAMMING TO RHYTHM VOICE & F.M. LOGIC BDS.
AUTO-MUTE OUTPUT TO AUTO-MUTE SW. J4-3 (127 ONLY)
FROM AUTO-MUTE SW. J4-5 (127 ONLY)
OUTPUT TO AUTO-MUTE SW. J4-1 (+28 VOLTS)
OUTPUT TO AUTO-MUTE SW. J4-1 (+28 VOLTS)
AUTO-MUTE OUTPUT TO AUTO-MUTE SW. J4-3 (+28 ONLY)
OUTPUT TO PREAMP (127 ONLY)
BLACK
RED
DATE 5-13-74
DWN. K.E. Johnson
CHK'D. 5-31-74
APPR'D. Rob.
DWN. SCALE
USED ON 127/128 P
PART NAME RIGHT HAND BOARD PIN WIRING DIAGRAM
REQ.
FINISH
GAUGE 23-17
NEXT ASSEM.
SUPERSEDES
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
C
501-0611.3
REV
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/64 ANGLE ± 1/2°





LEGEND:
"C" DENOTES CERAMIC CAPACITOR
"T" DENOTES TANTALUM CAPACITOR
"E" DENOTES ELECTROLYTIC CAPACITOR

NOTES:
1)
2) ALL DIODES ARE MEDIUM VOLTAGE RECT. CA2701 (IF 74)
3) REFERENCE SCHEMATIC: R501-0606079 (12), R501-0611056 (12.7, 128.5), R501-0611114 (228 M)
4) PIN WIRING DIAGRAM: C501-0606148 (11.21) - C501-0611113 (12.7, 128.5) (501-0611451 (128 K)
5) FINAL ASSY TO INCLUDE PART No. 500-060663 E

RELEASED
Ord. No. R.M. 6.50
Date 1.28.74

RECORD OF CHANGE

(D) REDRAWN 2 TIMES SIZE, NO CHANGE NO CH 9-5-74 KHB

(E) C.A.S.Z. UNIL 330 M SEE OF ITEM 30 UNIL 6 CN 16,092 OF 10-29-74

85					
86					
87	1	5235-002-8	RESISTOR 12W 10% 8.25		
88	1	5084-5	SOLDER (COIL)		
89	x	9-84-4	SOLDER (CHIP)		
90	1	5077-8	WIRE #28 SWG COVERED		
91	1	7614-005374	OPERATIONAL AMPLIFIER		
92	1	4502-0037	CONNECTOR 2 CONT		
93	1	4501-0013558	TRANSISTOR (NPN)		
94	3	R1/4-CARBON	RESISTOR 1/4W, AMB		
95	1	4004-1047-71	DIODE MEDIUM VOLTAGE		
96		CR1-8-503	CAPACITOR CERAMIC 1000		
97	6	5005-103			.01MF
98	1	5005-272			2700PF
99	1	271			270PF
100					
101					
102	6	5005-330			33PF
103	1	5005-330			CERAMIC 33PF
104	1	5311-002-080			ELECT. 50V 80
105	1	5311-002-025			ELECT. 50V 25
106	2	5249-20-2001			TANT. 2.2UF
107	2	1241-35-0012			TANT. 1UF
108	5	5241-35-0011			TANT. .68UF
109	1	8232-0-334			MYLAR .33MF
110					
111	5	502			5K Ω
112	1	102			1K Ω
113	1	154			150K Ω
114	4	104			100K Ω
115	1	684			680K Ω
116	2	913			91K Ω
117	1	273			27K Ω
118	2	103			10K Ω
119	1	223			22K Ω
120	1	123			12K Ω
121	1	183			18K Ω
122	4	103			10K Ω
123	3	152			1.5K Ω
124		682			6.8K Ω
125	1	392			3.9K Ω
126	1	332			3.3K Ω
127	1	272			2.7K Ω
128	1	222			2.2K Ω
129					
130	6	5235-001-10	RESISTOR 12W 10% 10Ω		
131	1	5005-080-062	KIT, HOOK & U RIVETER		
ITEM	QTY	PART NO.	PART NAME		

DATE 9-9-74 DWN. Sandy CHK. KHB APPD. BM SCALE 3/4 SIZE DO NOT SCALE DRAWING
MATERIAL P.C.B. FINISH
NEXT ASSY. USED ON 500-0606-70
PART NAME RIGHT HAND VOICE B'D ASSEMBLY
DWG NO. 605-1611-9 REV. C
SUPERSEDES

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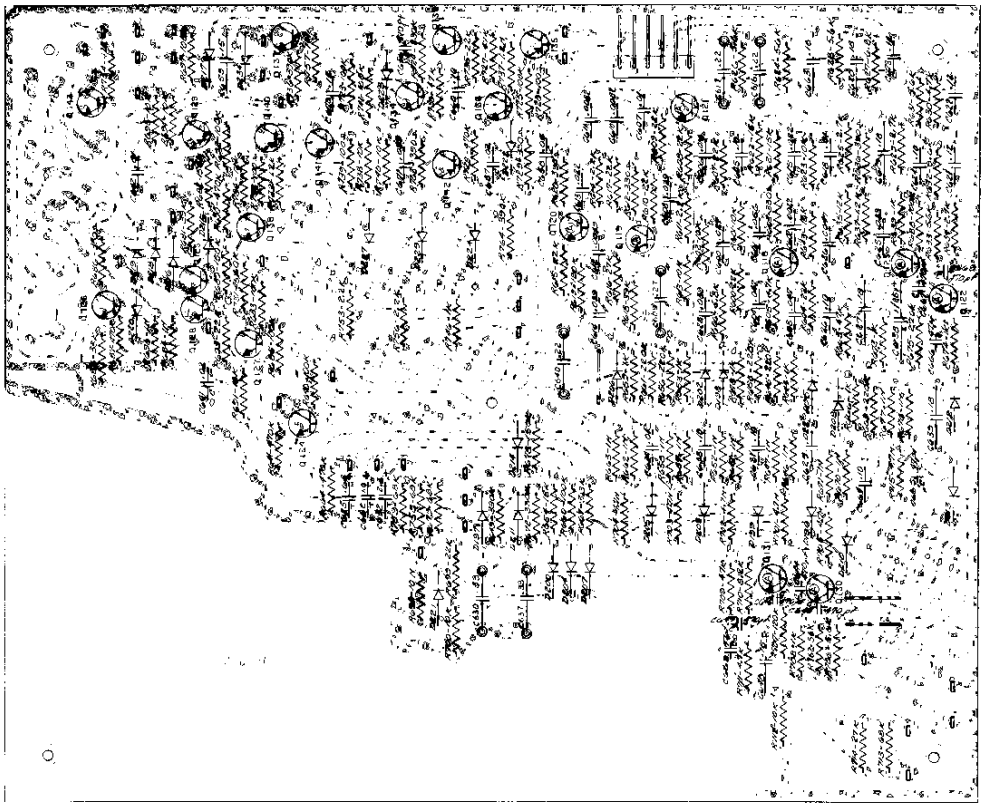
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

D 500-060663 E



NOTES:
1) REF. SCHEMATIC D501-060828.
2) PIN WIRING DIAGRAM C201-060828.
3) FINAL ASSEMBLY MUST INCLUDE PART No. 500-060827C

K-THE NU:
"C" DENOTES CERAMIC CAPACITOR
"T" DENOTES TANTALUM CAPACITOR
"E" DENOTES ELECTROLYTIC CAPACITOR

ITEM	REQ	PART No.	PART NAME
1	1	C505-060826	LEFT HAND VOICE BD. ASS'Y
2	18	RSM-035358	TRANSISTOR NPN
3	6	HDM-CA4546	TRANSISTOR PNP
4	31	RSM-045795	DIODE MEDIUM 100 PIV
5	1	PROTOBOARD	ADVENTION MAKER-S (SOM
6	4	5283-101-10	RESISTOR 100Ω 1/2W 10%
7	5	331	330Ω
8	5	391	390Ω
9	10	102	1K
10	2	122	1.2K
11	4	222	2.2K
12	3	272	2.7K
13	1	332	3.3K
14	8	472	4.7K
15	7	562	5.6K
16	2	682	6.8K
17	11	103	10K
18	2	123	12K
19	2	153	15K
20	2	183	18K
21	11	223	22K
22	2	273	27K
23	1	333	33K
24	2	393	39K
25	4	473	47K
26	4	683	68K
27	5	104	100K
28	2	124	120K
29	3	154	150K
30	6	224	220K
31	3	334	330K
32	2	394	390K
33	5	474	470K
34	1	564	560K
35	15	105	1M
36	2	475	4.7M
37	1	5283-106-10	RESISTOR 10M 1/2W 10%
38	1	5232-01-223	CAPACITOR .0022 μF MYLAR
39	1	392	.0039μF
40	1	472	.0047μF
41	2	852	.0085μF
42	4	103	.01 μF
43	1	123	.012 μF
44	3	153	.015 μF
45	1	223	.022 μF
46	1	273	.027μF
47	4	333	.033 μF
48	2	473	.047μF
49	1	563	.056 μF
50	7	104	.1μF
51	9	154	.15μF
52	2	184	.18μF
53	5	224	.22μF
54	3	274	.27μF
55	1	334	.33μF
56	2	394	.39μF
57	1	5232-01-224	CAPACITOR .22μF MYLAR
58	1	5205-471	470pF
59	7	5209-208	.05μF
60	6	5209-209	.1μF
61	1	5218-503	.05μF CERAMIC
62	1	5211-029-001	1W 5% ELECT.
63	1	5244-35-644-1	.56μF 35v TANT.
64	1	5244-35-105-C	1μF 35v TANT.
65	1	5246-16-166-1	CAPACITOR 16μF 16v TANT.
66	X	5-327-6	BARE COPPER WIRE
67	X	5-184-8	SOLDER DIP
68	X	5-34-4	SOLDER IRON
69	1	5283-125-10	RESISTOR 12M 1/2W 10%
70	1	5283-106-10	RESISTOR 10M 1/2W 10%
71	7	5283-822-10	RESISTOR 8.2K 1/2W 10%
72			
73			
74			
75			

RELEASED
Engr. No. MY 6.45
Date 8/20/74

RECORD OF CHANGE

① REDRAWN AND REVISED TO CONFORM WITH ETCHED PATTERN. CN 16,052 DP 10-29-74 M.S. 5-20-74

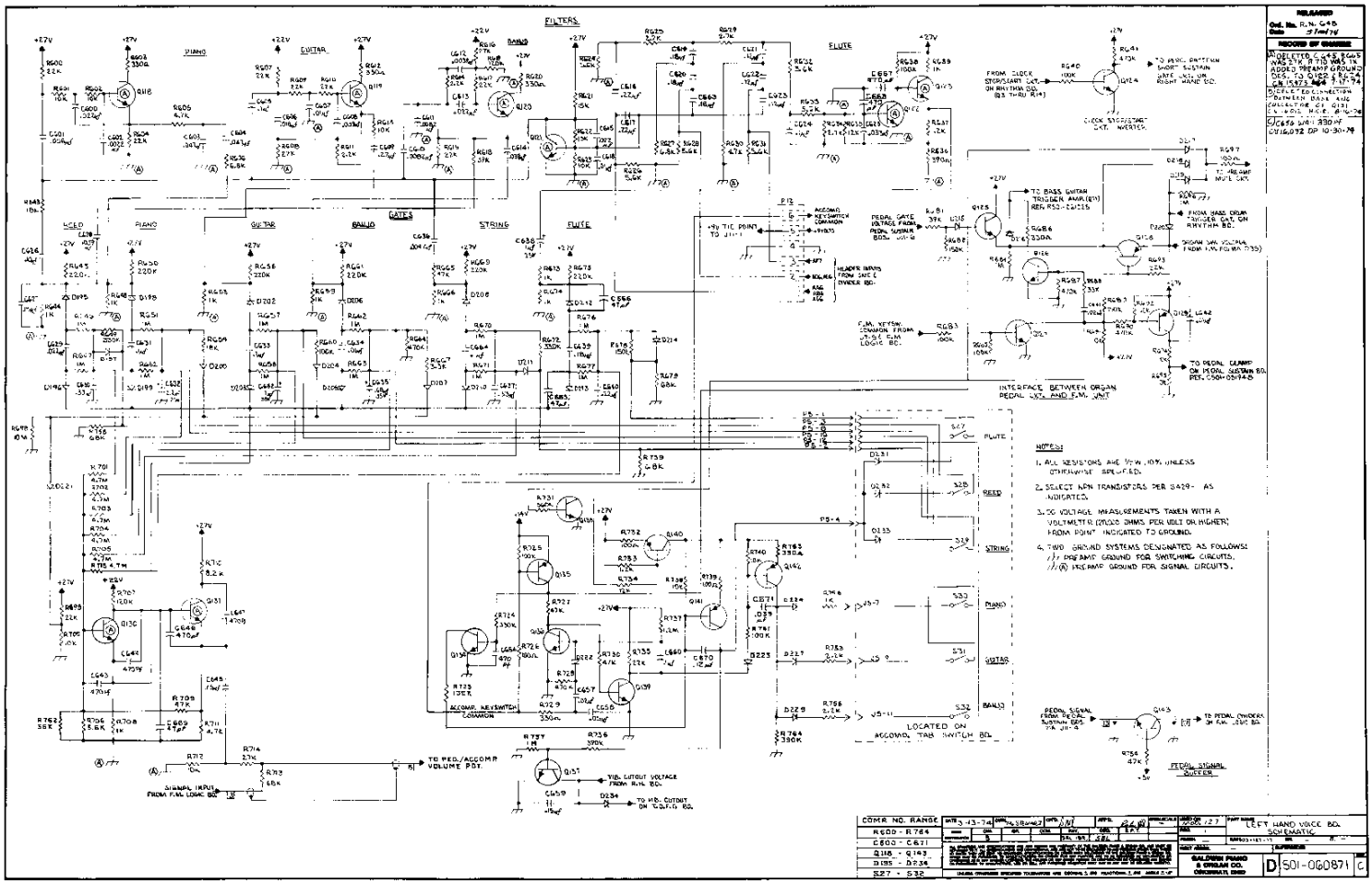
② PC ARTWORK CHANGE, NO CHANGE TO ASSY. M.S. BRADY 3-18-74

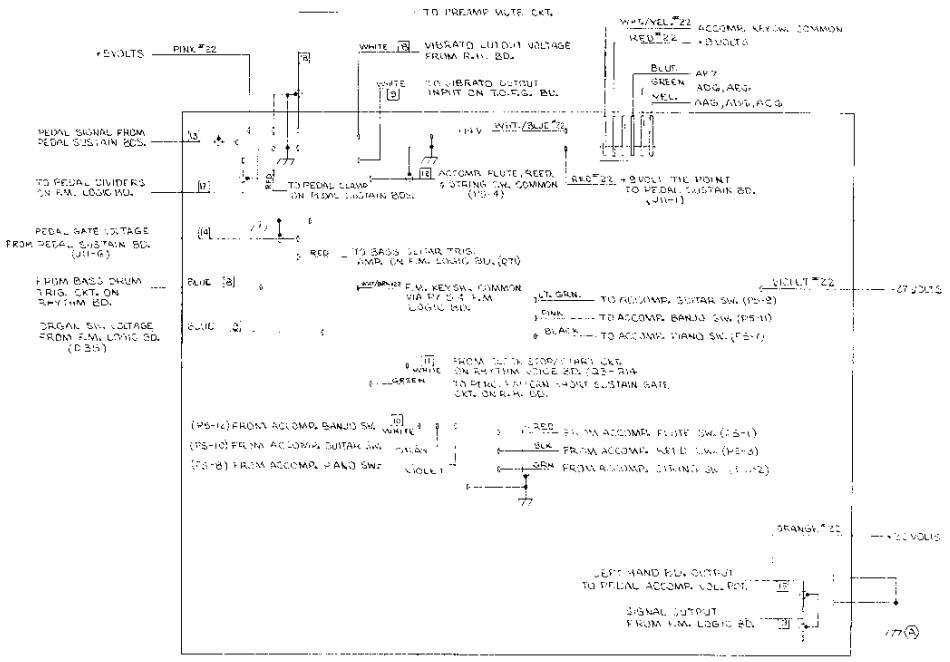
USED ON: SHEET 183
QTY. OF ITEM 59 USED 6
CN 16,052 DP 10-29-74

DATE 3-18-74	DRWN. BRADY
CHK.	
APPROVED	
MATERIAL	
FINISH	
NEXT ASSY.	
DIRECTORY 127	
PART NAME	LEFT HAND VOICE B'D ASS'Y
SUPERSEDES	
SUPERSEDED BY	

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

D 500-060827 C

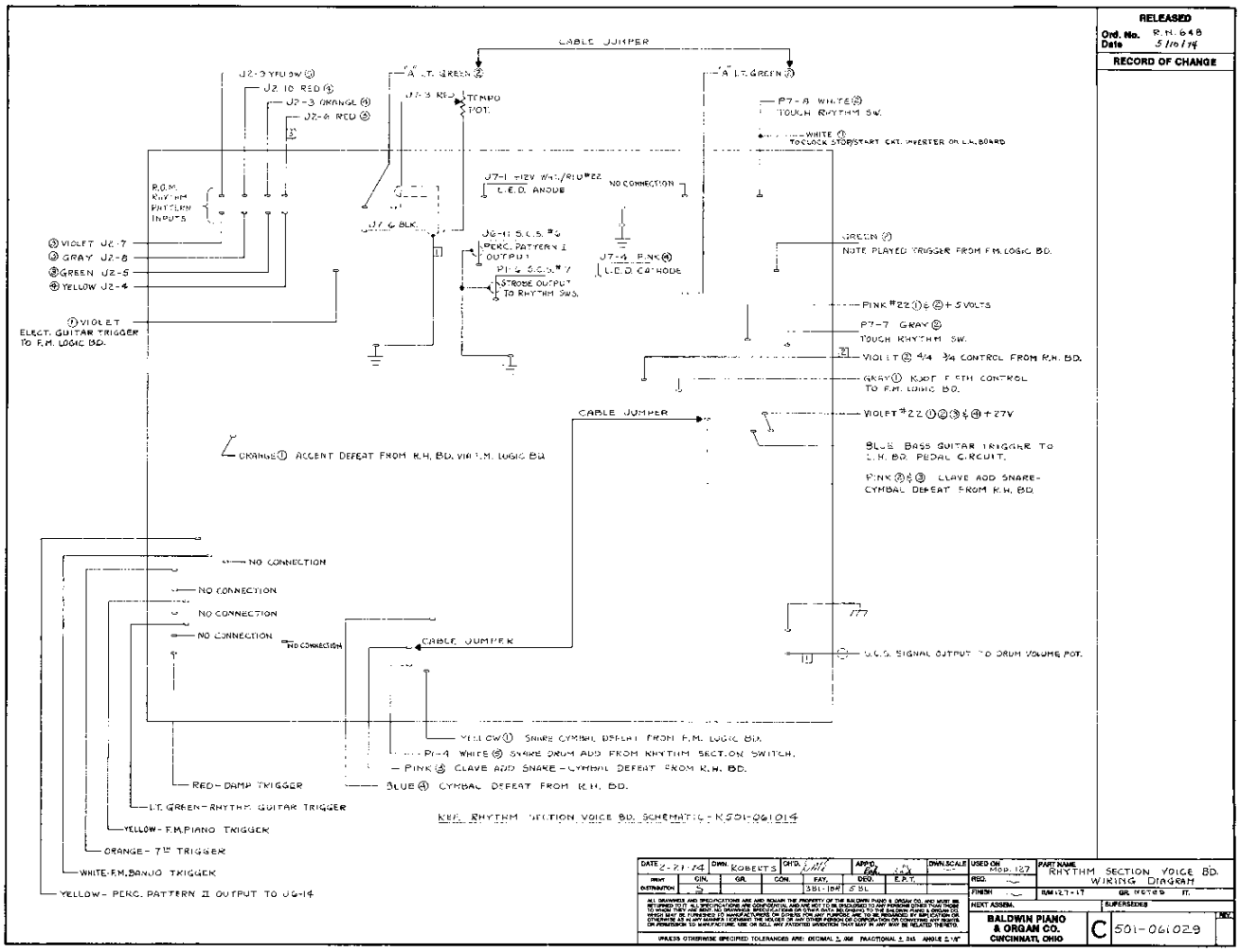

FILTERS
PIANO
GUITAR
BANJO
FLUTE
STRING
GATES
HOLD
NOTES:
1. ALL RESISTORS ARE 1/4W, 10% UNLESS OTHERWISE SPECIFIED.
2. SELECT NPN TRANSISTORS PER SA29- AS INDICATED.
3. DC VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (MORE OHMS PER VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.
4. TWO GROUND SYSTEMS DESIGNATED AS FOLLOWS:
PREAMP GROUND FOR SWITCHING CIRCUITS.
PREAMP GROUND FOR SIGNAL CIRCUITS.
LOCATED ON ACCOMP. TAB SWITCH BD.
INTERFACE BETWEEN ORGAN PEDAL LVT. AND F.M. UNIT
TO PED./ACCOMP VOLUME POT.
TO MID. CUTOUT ON V.C.F.O. BD.
TO PEDAL CLAMP ON PEDAL SUSTAIN BD. PET. 7504-0614-B
TO PEDAL DIVIDER
PEDAL SIGNAL SWEEPER
RELEASED
Ord. No. R.N. 645
Date 17 Feb 74
RECORD OF CHANGE
A) DELETED C 448 & R445 WAS 2.7K R 715 WAS 1K ADDED PREAMP GROUND DES. TO Q 122 & R 454 CR 15473 AC4 5-17-74
B) DELETED CONNECTION BETWEEN D204 AND JUMPER TO C 631 CR 15473 AC4 8-16-74
C) C649 WAS 330 PF CR 16092 DP 10-30-74
CORR. NO. RANGE
R600 - R784
C600 - C671
Q116 - Q143
D195 - D234
S27 - S32
LEFT HAND VOICE BD. SCHEMATIC
D 501-060871 C

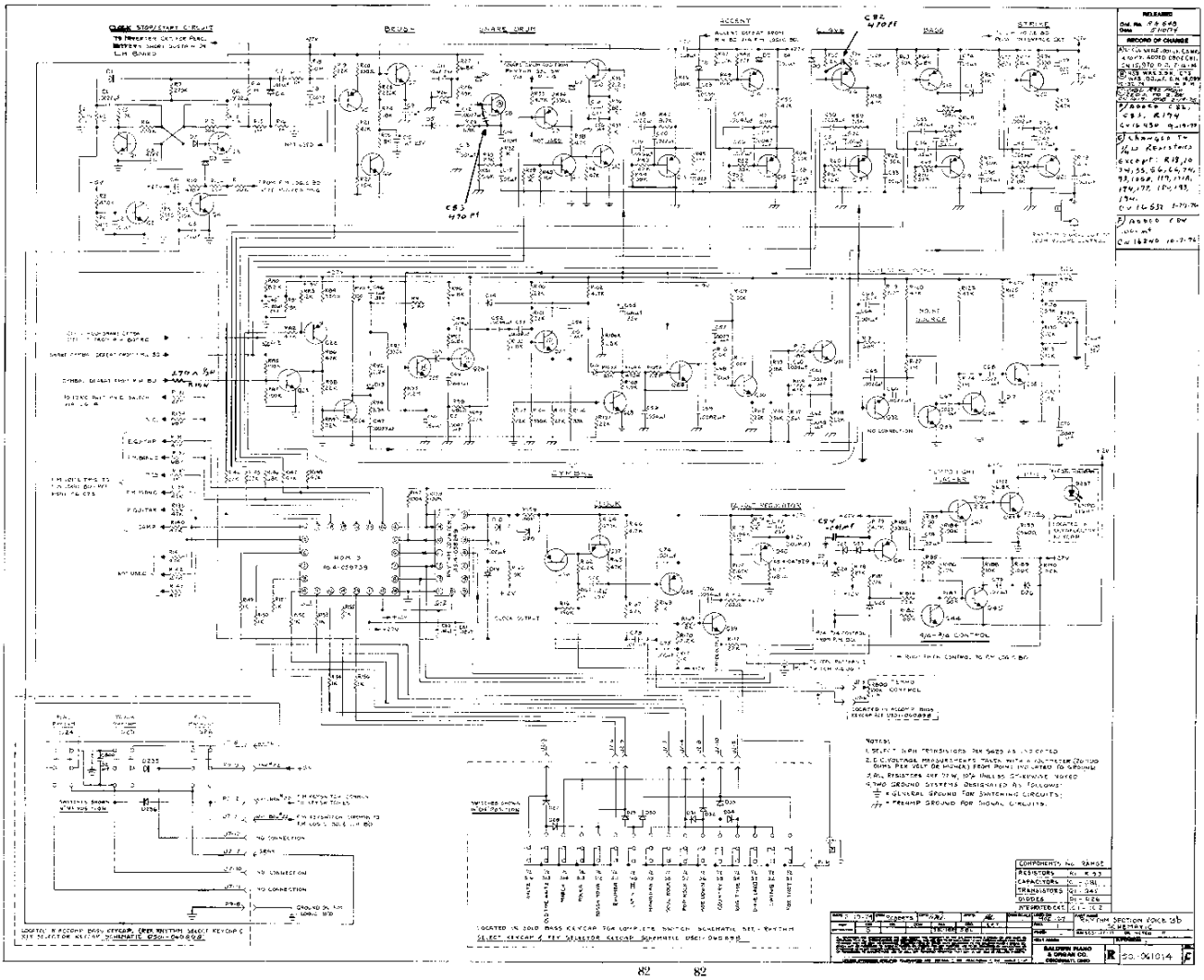


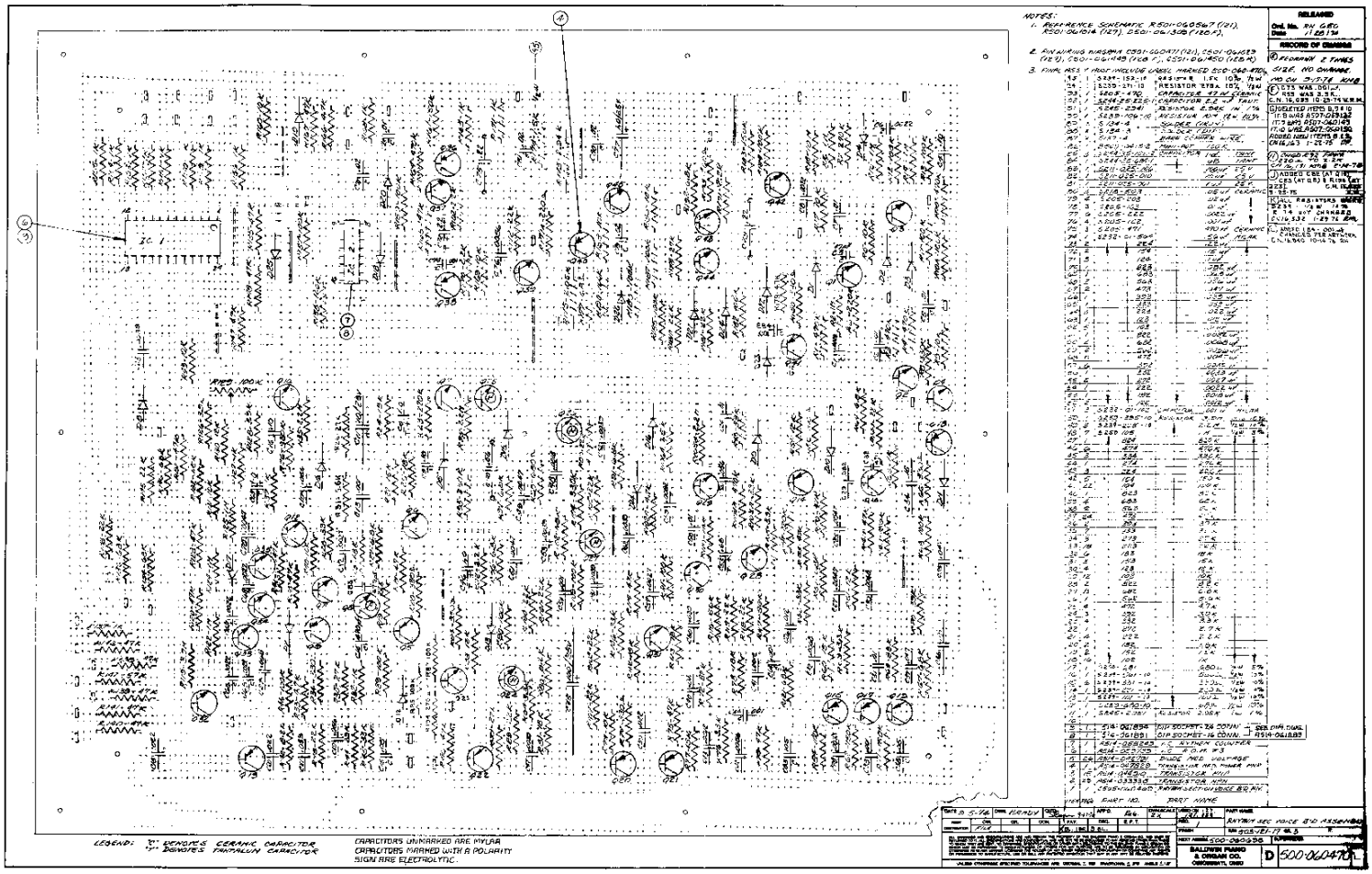
RELEASED
Ord. No. [illegible]
Date 5/31/74

RECORD OF CHANGE

DATE 5-23-74	DWN. M.STEINER	CHK. 5-30-74	APP'D. [illegible]		DWN SCALE —	USED ON M.D.P. 127	PART NAME LEFT HAND VOICE BD. PIN WIRING DIA.				
PRINT DISTRIBUTION	CIN. S	GR.	CON'T	FAY.	DEQ.	E.P.T.		REQ.			
			84, 186	52,				FINISH	GM 503-727-17	GR. M9 F8	IT.
ALL DRAWINGS AND SPECIFICATIONS ARE AND REMAIN THE PROPERTY OF THE BALDWIN PIANO & ORGAN CO. AND MUST BE RETURNED TO IT. ALL SPECIFICATIONS ARE CONFIDENTIAL AND ARE NOT TO BE DISCLOSED TO ANY PERSON OTHER THAN TO WHOM THEY ARE SENT. NO DRAWINGS SPECIFICATIONS OR OTHER DATA DISCLOSED TO THE RECIPIENT HEREOF SHALL BE USED BY HIM IN CONNECTION WITH ANY WORK OTHER THAN THAT FOR WHICH THEY ARE FURNISHED. TO DISCLOSE THEM, OR COPIES OF ANY PORTION THEREOF, TO ANY OTHER PERSON, FIRM OR CORPORATION OR COMPETING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.								NEXT ASSEM.	SUPERSEDES		
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/64 ANGLE 2 1/2°								BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO	C	501-060828	REV.


RELEASED
Ord. No. R.N. 648
Date 5/10/74
RECORD OF CHANGE
CABLE JUMPER
J2-9 YELLOW ⑨
J2-10 RED ⑩
J2-3 ORANGE ③
J2-6 RED ⑥
"A" LT. GREEN ⑤
J7-3 RED
TEMPO POT.
"A" LT. GREEN ⑦
P7-8 WHITE ⑧
TOUCH RHYTHM SW.
WHITE ⑪ TO LOCK STOP/START CKT. INVERTER ON L.K. BOARD
R.O.M. RHYTHM PATTERN INPUTS
J7-1 HI-V WHT/RED #22
L.E.D. ANODE
NO CONNECTION
J7-6 BLK.
J6-11 S.C.S. #9 PERC. PATTERN I OUTPUT
P1-6 S.C.S. #7 STROBE OUTPUT TO RHYTHM SWS.
J7-4 PINK ④
L.E.D. CATHODE
⑤ VIOLET J2-7
② GRAY J2-8
③ GREEN J2-5
④ YELLOW J2-4
① VIOLET ELECT. GUITAR TRIGGER TO F.M. LOGIC BD.
GREEN ⑦ NOTE PLAYED TRIGGER FROM F.M. LOGIC BD.
PINK #22 ① & ⑫ +5 VOLTS
P7-7 GRAY ⑫ TOUCH RHYTHM SW.
VIOLET ⑬ 4/4 3/4 CONTROL FROM R.H. BD.
GRAY ① 5/8 OF 4TH CONTROL TO F.M. LOGIC BD.
CABLE JUMPER
VIOLET #22 ①⑫⑬ & ⑭ +27V
ORANGE ① ACCENT DEFEAT FROM R.H. BD. VIA F.M. LOGIC BD.
BLUE BASS GUITAR TRIGGER TO L.H. BD. PEDAL CIRCUIT.
PINK ⑫ & ⑬ CLAVE ADD SNARE-CYMBAL DEFEAT FROM R.H. BD.
NO CONNECTION
NO CONNECTION
NO CONNECTION
NO CONNECTION
NO CONNECTION
CABLE JUMPER
177
U.C.G. SIGNAL OUTPUT TO DRUM VOLUME POT.
YELLOW ① SNARE CYMBAL DEFEAT FROM F.M. LOGIC BD.
P1-4 WHITE ⑫ SNARE DRUM ADD FROM RHYTHM SECT. ON SWITCH.
PINK ⑬ CLAVE ADD SNARE-CYMBAL DEFEAT FROM R.H. BD.
RED- DAMP TRIGGER
BLUE ④ CYMBAL DEFEAT FROM R.H. BD.
LT. GREEN- RHYTHM GUITAR TRIGGER
YELLOW- F.M. PIANO TRIGGER
ORANGE- 7TH TRIGGER
WHITE- F.M. BANJO TRIGGER
YELLOW- PERC. PATTERN II OUTPUT TO J6-14
KEY RHYTHM SECTION VOICE BD. SCHEMATIC - K501-061014
DATE 2-21-74
DWN. ROBERTS
CHK'D
APP'D
DWN. SCALE
PART NAME RHYTHM SECTION VOICE BD. WIRING DIAGRAM
USED ON MDP-127
REQ.
FINISH
RM127-17
GR. WT'S'D
FT.
NEXT ASSEM.
SUPERSEDES
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
C
501-061029
REV.


CLOCK STOP/START CIRCUIT
BEGIN
CHANGE CIRCUIT
ACCENT
STRIKE
RELEASED
RECORD OF CHANGE
C82 470PF
C83 470 PF
NOT USED
NO CONNECTION
GROUND
SYNTHESIZER SECTION VOICE 38
SCHEMATIC



NOTES:
1. REFERENCE SCHEMATIC R501-0605671 (121), R501-0610141 (127), D501-0613051 (128 F).
2. FOR WIRING DIAGRAM D501-0607471 (121), D501-0614631 (121), D501-0611491 (128 F), D501-0613501 (128 F).
3. FOR PARTS LIST AND/OR CHANGES SEE SCHEMATIC.

LEGEND: "C" DENOTES CERAMIC CAPACITOR
"CP" DENOTES POLYSTYRENE CAPACITOR

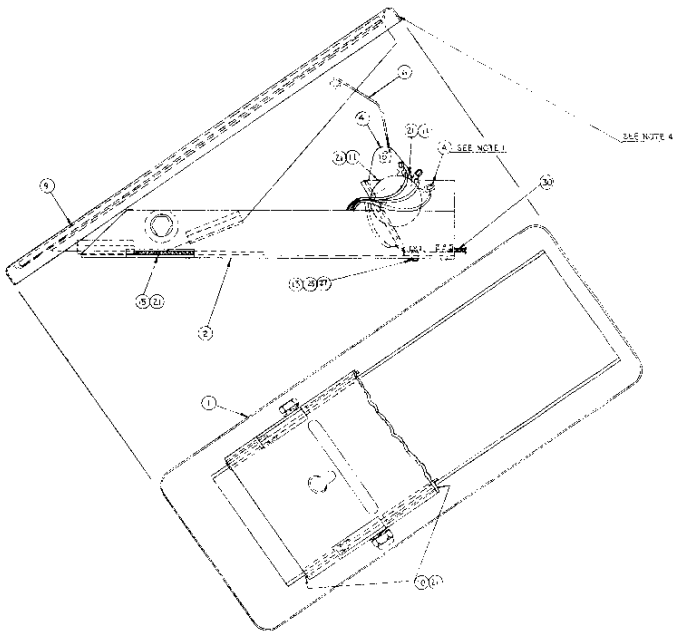
CAPACITORS UNMARKED ARE MYLAR
CAPACITORS MARKED WITH A POLARITY SIGN ARE ELECTROLYTIC.

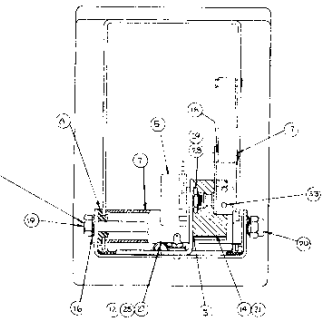
RELEASED
Ord. No. PN GRG
Date 11 26 74
RECORD OF CHANGES
D REDRAWN & TYPES SIZE, NO CHANGE
NO CH. SINCE NOV
E SYS WAS 0611-1
C 113
C.N. 19,693 1-23-74 W.B.M.
G DELETED ITEMS 8, 9 & 10
ITEMS ADDED R501-0613132
ITEM ADDED R501-0601145
ITEM ADDED WIRE PART-0540152
ADDED NEW ITEMS 8 & 9
CN 16,243 1-25-76 DM
H Changed R3 from 2.5K to 2.2K
Ltr 3-11-76 KMB CN 16,732
J ADDED C86 (AT R76)
C85 (AT C83) & R.136 (AT R135)
C.N. 17,282
K 5-25-76
L ALL RESISTORS WERE
5% 1/4W
EXCEPT R 19 NOT CHANGED
CN 16,332 11-23-76 BML

ITEM NO.	PART NO.	PART NAME
8	218-007854	TUBE SOCKET, 24 CONT.
9	214-061885	DIP SOCKET, 16 CONT.
10	464-028245	P.C. RIVETED COUNTER
11	464-027175	P.C. B.O.M. #3
12	464-027629	P.C. BASE REG. VOLTAGE
13	464-047828	TRANSISTOR NPN, POWER PNP
14	464-047829	TRANSISTOR NPN
15	464-133316	TRANSISTOR NPN
16	150-011403	RAYTHEON SECTION-VOICE B.O.M.

DRAWN F.T.P. 5-1-74
CHK.
ENGR.
SCALE
DATE
MFG.
TEST
ENGR.
APPD.
DRAWING NO. 500-0604706
PART NAME RAYTHEON SEC VOICE B.O. ASSEMBLY
MFR. 605-121-77 SK. 3
PART NUMBER 500-0604706
SUPERSEDES
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
D 500-0604706

RELEASED
Ord. No. E N 5 9 7
Date 8-5-71





ITEM	REQ	PART NO	PART NAME	NOT SHOWN
33	1	G2105-93-5	SET SCREW, #8-32 .312 LG	
32	X	9134-4	SOLDER	
31	X	5E2294-1/16	TAPE, BLACK PAPER .125 W	
30	1	9598-553444	EXP PED CABLE, EXP PED END	
29	1	A247-016139	NUT, #8-32 HEX	
28	1	G125-10 SCPL	LOCKWASHER, #8 - T	
27	2	G2022-356PL	FLAT WASHER #8	
26				
25		S2093-438-450PL	SCREW, 8-32 PAN HD, SEMS, 1/4 LG	
24	X	A569-080881	AMPHENOL GREASE 53, 3OT	
23	X	A249-012.84	VULCALOCK	
22	X	A249-080109	PL-BOND #30	
21	X	A249-027137	CEMENT-BLACK	
20	1	A247-022975	PLASTIC STOP NUT	
19		A247-015223	SCREW, 4-28 H.H. SPECIAL 5/8 LG	
18	2	A244-006416	NYLON SHIM	
17	1	A547-031746	5/8" RING	
16	4	A247-040149	SPRING WASHER	
15	EPSS	A344-000055	BUSHING CLOTH #88 3/8 X 1" LG	
14	EPC	A344-000055	BUSHING CLOTH #88 3/8 X 1" LG	
13	1	M546-00001	SOLDER LUG	
12	1	A537-100516-1	CABLE CLAMP	
11	AR	A244-018648	RUBBER CHANNEL (EPDS .4" LG)	
10	5"	A325-034649	VINYL EXTRUSION .4 PER IN LG	
9	1	C844-027515	PAD, EXPRESSION PEDAL	
8	1	A244-026136	BUSHING	
7	1	A537-035321	EXPRESSION PEDAL SPACER	
6	1	A524-075988	DRIVE SPRING	
5	1	S534-048890	POTENTIOMETER 50 K "B" LIN. TAPER	
4	1	A500-044740	POT LEVER RIVETED ASSY	
3	1	A528-044743	POT SUPPORT BRKT	
2	1	C523-043944	EXP PED CHANNEL	
1	1	S500-044637	PEDAL R/V ASSY	

RECORD OF CHANGE

EXP PEDAL ASSY
ORGAN MOD 124A

D. H. BALDWIN CO.
CINCINNATI, OHIO

D 500-053250 A

NOTES
1. ADJUSTMENT SPECIFICATIONS - ADJUST THE POSITION OF POT SUPPORT BRKT (IT 3) SO THAT THE POT LEVER (IT 4) STOPS ON THE BUSHING CLOTH (IT 14) IN BOTH EXTREMES OF TRAVEL WITH THE SHOE FULLY UP, ROTATE THE POT SHAFT SO THAT 50 TO 100 OHMS RESISTANCE IS MEASURED BETWEEN THE CENTER TERMINAL AND TERMINAL "A". RESISTANCE SHOULD BEGIN TO INCREASE IMMEDIATELY WITH ANY DOWNWARD MOTION OF THE SHOE. TIGHTEN THE SET SCREWS (IT 33).
2. APPLY VULCALOCK (IT 23) TO PAD (IT 9) AND LET DRY 30 MIN. TO 24 HRS. PRIOR TO CEMENTING TO PEDAL WITH BLACK ADHESIVE (IT 21) OR PLOBOARD (IT 22).
3. EXPRESSION PEDAL BUSHINGS (IT 8) ARE TO BE COVERED WITH AMPHENOL GREASE (IT 24) ON ALL BEARING SURFACES PRIOR TO ASSEMBLY.
4. ADJUST FOR DOWN PRESSURE OF 400 GRAMS

PREAMPLIFIER AND EXPRESSION CONTROL

Reference: Preamplifier Schematic - C501-061070

The Model 127 organ employs one preamplifier circuit, consisting of three (3) NPN transistors.

Signal input to the preamplifier is applied through C1 to the base of Q1 transistor, which operates as a voltage amplifier stage. The D.C. condition of the first stage (Ic = 50 uA) is set by its base current supplied from the Q2 emitter through R18, R17 and R5 resistors. The collector of the Q1 transistor is directly (D.C.) coupled to the base of the second stage Q2 transistor so that the R6 resistor supplies current for the Q1 collector and Q2 base. The second stage (Q2), operating as an emitter follower, has collector current of about 1.3 mA. A portion of the emitter (A.C.) output, determined by R18 and R19 divider resistors and a variable feedback circuit (D1 and D2 in parallel to D4 and D5), is applied back to the base of Q1 as negative feedback to control the gain of the preamplifier.

The emitter of Q2 is A.C. coupled via C16 capacitor and via R20 and Q4 muting FET to the base of the last stage, Q5, operating as a voltage amplifier. Base current for Q4 is supplied by resistor R23, which sets the collector current to about 2.5 mA.

Using VTVM or voltmeter (20,000 Ohms/Volts), D.C. voltages given in the following chart should be measured with respect to ground.

	EMITTER	BASE	COLLECTOR
Q1	0V	+0.6V	+ 2.8V
Q2	+2.2V	+2.8V	+12 V
Q5	0V	+0.6V	+11.8V

Supply voltages are +27V for 3rd (Q5) stage and +22V for 1st and 2nd (Q1 and Q2) stages.

EXPRESSION CONTROL CIRCUIT

Referring to Preamplifier Schematic C501-061070, the Expression Pedal circuit consists of a controlling element, Q3, and a double feedback loop around the first two stages of the preamplifier.

When the expression pedal potentiometer is fully open (up), it back biases transistor Q3 (base at emitter potential). This causes the collector of Q3 to be highly positive with respect to the emitter potential.

Referring to the preamplifier feedback circuitry, when Q3 collector is highly positive with respect to Q3 emitter, current will flow through R8, D1 and D2 (common anode connection), D4 and D5 (common cathode connection), through R10 to the emitter.

Both pairs of feedback diodes will be forward biased, thus lowering the gain of the preamplifier.

When the expression pedal is fully depressed (down), positive potential is applied to the base of Q3, which will saturate. This causes the collector and the emitter to be at approximately the same potential, causing the feedback diodes to be non-conductive, rendering the preamplifiers in the high gain state.

PREAMPLIFIER MUTING CIRCUIT

The muting circuit, consisting of Q4, Q6, Q7 and Q8 stages, reduces the gain of the preamplifier circuit until such time as a Solo, Accompaniment, or Pedal key is depressed. This prevents undesirable circuit noise from appearing in the output circuitry when the keys on the organ are not being played.

The low gain of the preamplifier circuit is accomplished by insertion of a high resistance, R20 (39k), between the output of the second and the input of the third stage of the preamplifier. Resistor R20 is shunted by Q4, an FET, which is kept cut off by the application of +12V to its drain via R31 and by the ground application to its gate via R33 and saturated Q6 transistor.

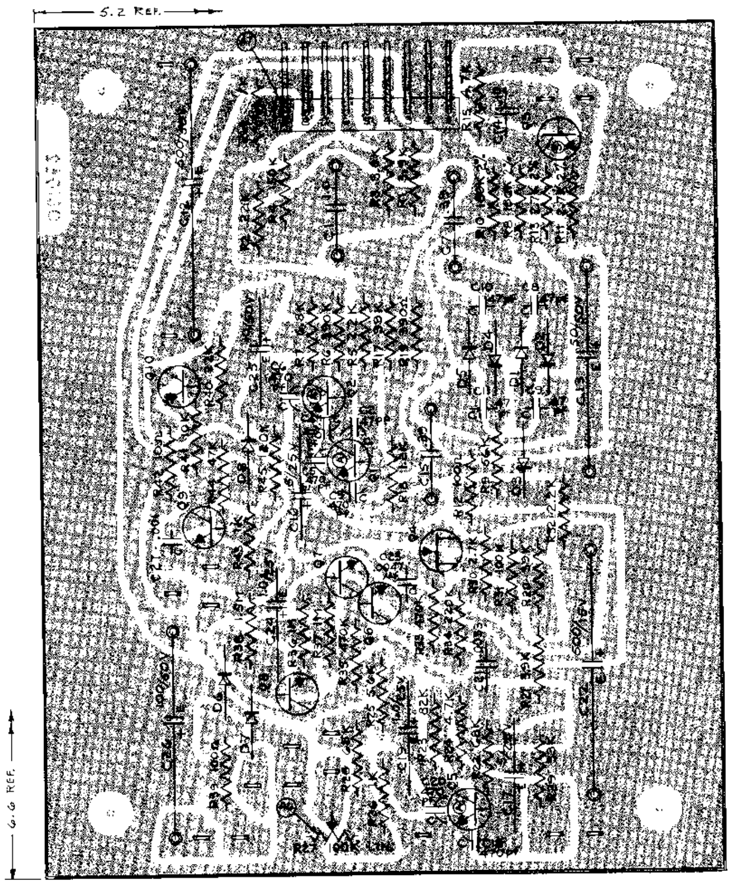
When any key is played, Right Hand, Left Hand, or Pedal, a positive voltage is applied to the base of Q8, which will saturate. Q7 will also saturate, providing the ground to the junction of Q6 base and R35, thus, unsaturating Q6. When Q6 unsaturates, +12V is applied to the gate of Q4 FET, via R34 and R33. Q4 provides a low impedance, effectively shorting out the resistance of R20, thus rendering the preamplifier in the normal gain state. Capacitor C24 allows the muting circuit to have delayed muting action of 3 to 6 seconds after a key is released.

The Right Hand Continuous Voice Trigger Gate Q109 applies a positive voltage via D129, R39 and D6 to the base of Q8 for Solo muting; Left Hand Continuous Voice Trigger Gate Q135 applies a positive voltage via D217, R697 and D7 for Accompaniment muting; Pedal Trigger Gate Q125 supplies a positive voltage via D218, R697 and D7 for Pedal muting.

NOISE ELIMINATOR CIRCUIT

The Noise Eliminator circuit (Q9 and Q10), located on the Preamplifier Board assembly, initially defeats operation of the first stage of the Power Amplifier (Q1 on Schematic C501-051929) to prevent switch on transient noises from being heard until the Power Supply circuits have stabilized. Otherwise, the Rhythm circuits that could be gated by voltage transients created when the organ is turned on might be heard.

When the organ is first turned on Q9 transistor will be turned on by the charging action of C25 capacitor. As capacitor C25 charges, base bias is available for Q9 transistor. At the same time, Q10, a PNP transistor, will be saturated, providing +27V bias via its collector circuit and R42 to saturate Q1 transistor in the Power Amplifier circuit. When C25 fully charges, Q9 and Q10 cut off, permitting the organ signals to be fed to the Power Amplifier circuit. Capacitor C26 (together with R1 and R26 located on the Power Amplifier circuit) delays the application of +53 V.D.C. supply to the Power Amplifier driver stage (Q3) when the organ is just turned on, thus preventing additional audible transients.



LEGEND:
E - DENOTES ELECTROLYTIC CAPACITOR.
C - DENOTES CERAMIC CAPACITOR.

RELEASED
Ord. No. RN 648
Date 3/22/74

RECORD OF CHANGE

- (A) CORRECTED PART NO. OF IT. 50 C.N. 15807 M.S. 4-12-74
- (B) REDRAWN. CHANGED FROM B SIZE TO C SIZE & FROM FULL SCALE TO 2X SIZE. No C.N. 9-20-74 H.C.R.
- (C) R14 WAS 2.7K C.N. 17118 2-4-77 R.H.

ITEM	REQ'D.	PART No	PART NAME
55			
54			
53	X	S184-3	SOLDER DIP
52	1	S239-682-10	RESISTOR ½W 10% 6.8K
51	X	S134-4	SOLDER IRON
50	1	A514-040296	TRANSISTOR F.E.T. (N CHANNEL)
49	1	A514-044910	TRANSISTOR PNP
48	8	A514-033338	TRANSISTOR NPN
47	1	A507-059127	KONEKTCON CONN. 9 PIN
46	1	3509-041912	MINI POT. 100K LINEAR
45	8	A514-042791	DIODE MED. VOLTAGE
44	1	S211-050-500	CAPACITOR ELECT. 500µf 50V
43	1	015-500	500µf 15V
42	1	050-100	100µf 50V
41	1	050-050	50µf 50V
40	1	050-010	10µf 50V
39	2	025-005	5µf 25V
38	2	S211-025-001	ELECT. 1µf 25V
37	1	S232-01-105	MYLAR 1.0µf
36	2	S232-01-394	MYLAR .39µf
35	1	S232-01-104	MYLAR .10µf
34	1	S232-01-332	MYLAR .0033µf
33	1	S205-472	CER. .0047µf
32	1	S205-102	CER. .001µf
31	6	S205-471	CER. 470pf
30	5	S205-470	CAPACITOR CER. 47pf
29	1	S239-155-10	RESISTOR ½W 10% 1.5M
28	2	105	1M
27	2	474	470K
26	1	394	390K
25	1	224	220K
24	1	154	150K
23	1	124	120K
22	1	104	100K
21	1	823	82K
20	2	683	68K
19	1	563	56K
18	1	473	47K
17	2	393	39K
16	1	333	33K
15	2	223	22K
14	1	103	10K
13	1	562	5.6K
12	2	472	4.7K
11	3	392	3.9K
10	1	272	2.7K
9	2	222	2.2K
8	1	122	1.2K
7	3	102	1K
6	1	391	390Ω
5	2	101	100Ω
4	1	S239-100-10	10% 10Ω
3	2	S243-2701	2% 2.7K
2	2	S243-1803	RESISTOR ½W 2% 180K
1	1	B505-061063	PREAMP B'D. RIVETED

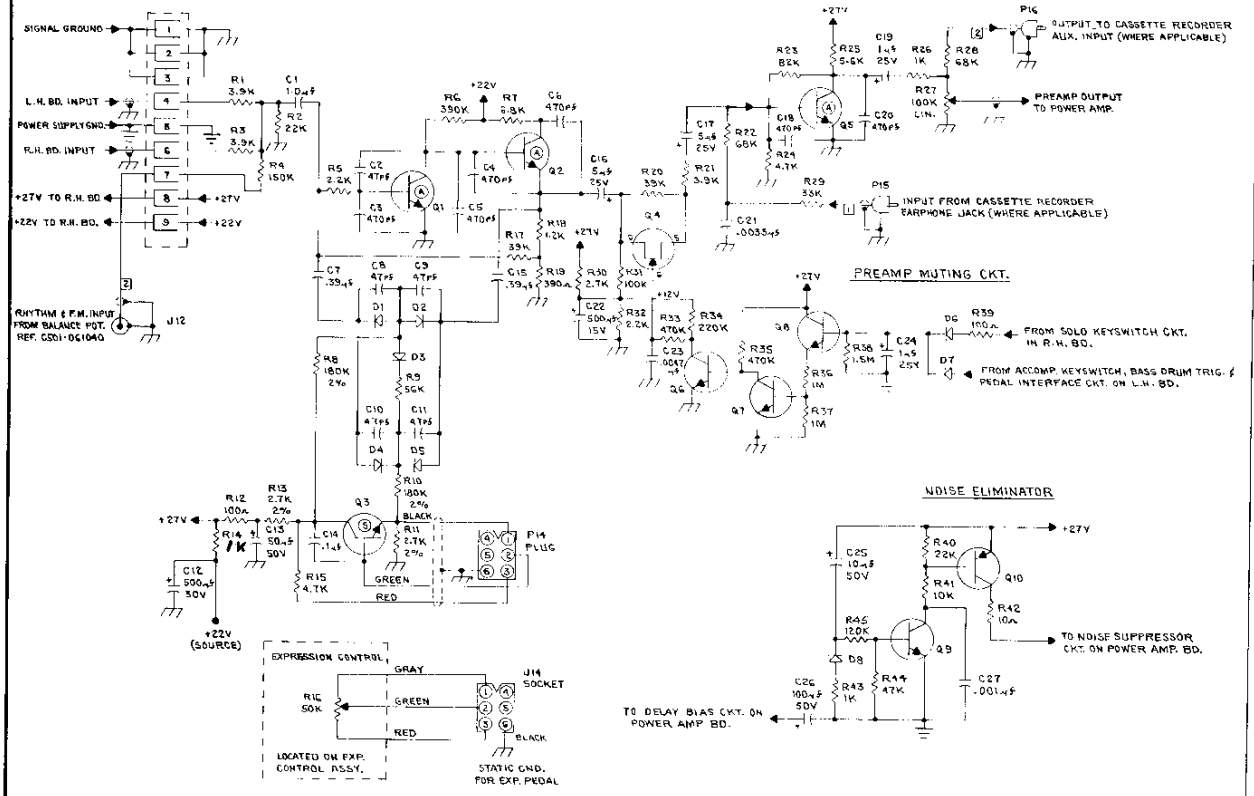
NOTES:
1. REFERENCE PIN WIRING DIA. B501-061065.
2. REFERENCE SCHEMATIC C501-061070
3. SELECT DIODES D1, D2, D4, & D5 PER S440-1.
4. TRANSISTORS ARE: Q1, Q2, Q3, Q5, Q6, Q7, Q8, & Q9 NPN WITH Q1, Q2 & Q5 SELECTED PER S429-7; Q3 PER S429-2. Q4 - F.E.T. (N CHANNEL); Q10 - PNP.
5. FINAL ASSEMBLY MUST INCLUDE PART NUMBER 500-061064.

DATE 9-20-74	DWN. ROBERTS	CHK'D. 10-8-74	APP'D.	DWN. SCALE 2X	USED ON MOD. 127 F	PART NAME PREAMP BOARD ASSEMBLY
PRINT DISTRIBUTION	CIN. FILE	GR.	CON.	FAY. 3BL-18R	DEQ. 3BL	E.F.T.
					REQ. 1	BM 506-127-10 GR. 9 IT.
					FINISH ~	
					NEXT ASSEM.	SUPERSEDES

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .008 FRACTIONAL ± .016 ANGLE ± 1/2°

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

C 500-061064 REV. C



RELEASED
Ord. No. 21648
Date 5/10/74

RECORD OF CHANGE
A ADDED R45 (12.0K) AT BASE OF Q9.
C.N. 16,912 H.C.R. 8-15-74
B R14 WAS 2.7K
CN 17118 2-4-77
RH

NOTES:

1. SELECT NPN TRANSISTORS PER S429- AS INDICATED.
2. BRIDGE DIODES D1 & D2, D4 & D5 PER S440-1.
3. ALL RESISTORS ARE ½W 10% UNLESS OTHERWISE SPECIFIED.
4. D.C. VOLTAGE MEASURMENTS TAKEN WITH A VOLTMETER (20,000 OHM PER VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.

LAST USED
R45
C27
D8
Q10

DATE 3-7-74 | DWN. D.DIEHL | CHK'D. RJH | APP'D. [illegible] | DWN. SCALE

DIST.	CIN.	GR.	CON.	FAY.	DEQ.	E.K.T.
	S			38L-1256	58L	

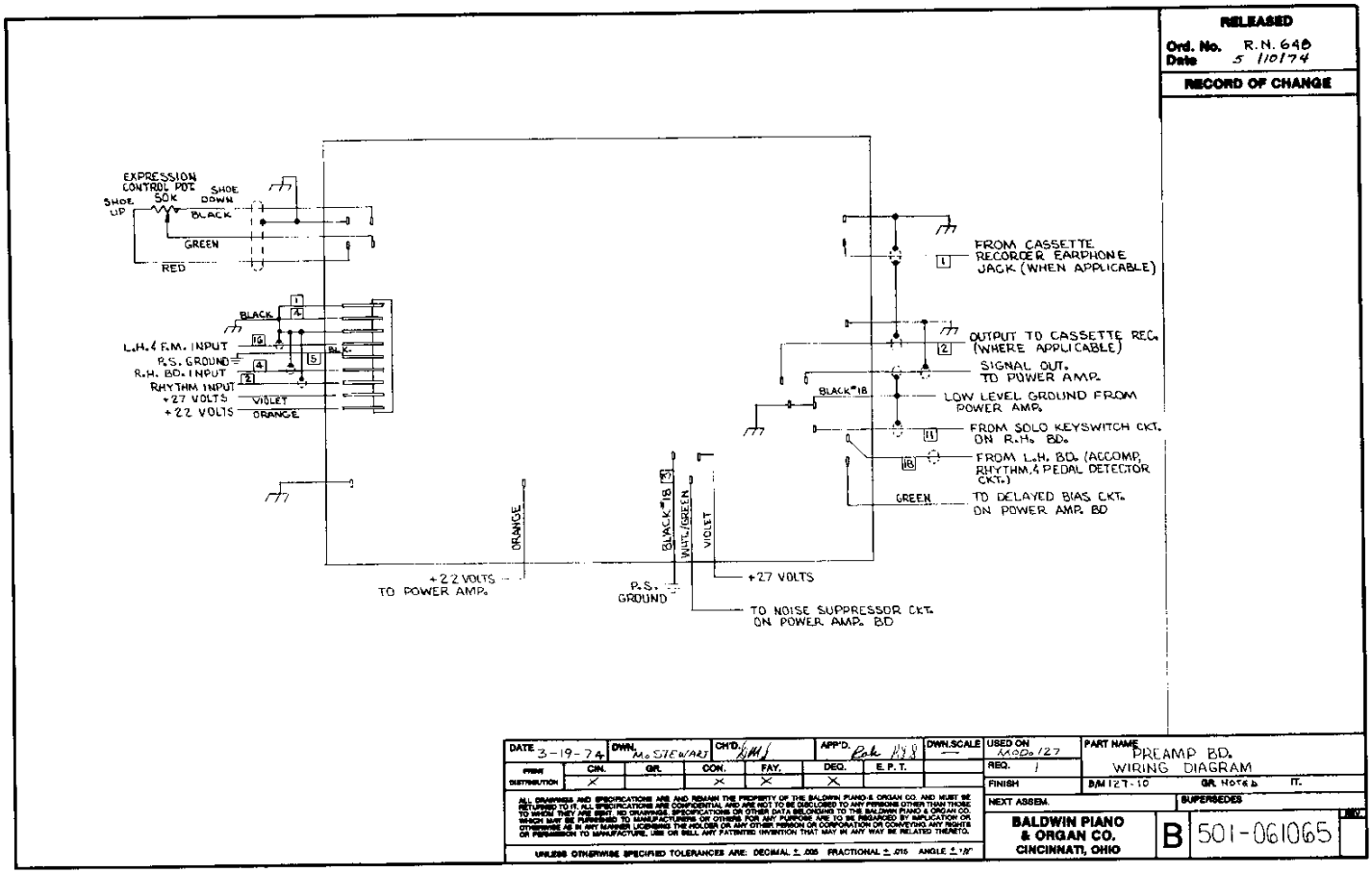
USED ON ORGAN 127
FIND. —
FINISH
NEXT ASSEM.

PART NAME: PREAMP SCHEMATIC
BAI 503-127-10 OR NOTED
SUPERSEDES

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

C 501-061070 B

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/64 ANGLE ± 1/2°


RELEASED
Ord. No. R.N. 648
Date 5/10/74
RECORD OF CHANGE
EXPRESSION CONTROL POT
SHOE UP
50K
SHOE DOWN
BLACK
GREEN
RED
BLACK
L.H. & F.M. INPUT
P.S. GROUND
R.H. BD. INPUT
RHYTHM INPUT
+27 VOLTS
+22 VOLTS
VIOLET
ORANGE
FROM CASSETTE RECORDER EARPHONE JACK (WHEN APPLICABLE)
OUTPUT TO CASSETTE REC. (WHERE APPLICABLE)
SIGNAL OUT. TO POWER AMP.
BLACK #18
LOW LEVEL GROUND FROM POWER AMP.
FROM SOLO KEYSWITCH CKT. ON R.H. BD.
FROM L.H. BD. (ACCOMP. RHYTHM, & PEDAL DETECTOR CKT.)
GREEN
TO DELAYED BIAS CKT. ON POWER AMP. BD
ORANGE
+22 VOLTS TO POWER AMP.
BLACK #18
WHITE/GREEN
VIOLET
P.S. GROUND
+27 VOLTS
TO NOISE SUPPRESSOR CKT. ON POWER AMP. BD
DATE 3-19-74
DWN. M. STEWART
CH'D.
APP'D. Rob
DWN. SCALE —
USED ON M880/127
REQ. 1
FINISH
PART NAME PREAMP BD. WIRING DIAGRAM
BM 127-10
GR. NOTED
NEXT ASSEM.
SUPERSEDES
PRINT DISTRIBUTION
CIN. GR. CON. FAY. DEQ. E.P.T.
X X X X
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UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± .015 ANGLE ± 1/2°
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
B
501-061065
REV

POWER SUPPLY DESCRIPTION

Reference: Power Supply Schematic - D501-060598
Power Supply, Amp., AC & D. C. Wiring Diagram - D501-061101
Figures - 4 & 16

The Model 127 series organs utilize one Power Supply, producing all the necessary operating voltage for the organ circuitry. The Power Supply is protected against overload by a 2 ampere, slo-blo fuse in the primary of the power transformer.

The center-tapped secondary winding of the power transformer (yellow-red/yellow-yellow) is rectified by a pair of diodes, D1 and D2, and filtered by capacitor C1, providing the -18 volt supply. This supply is dropped and filtered further by R1, C2 and R2 to provide the -9.0 V.D.C. source supply for the tone generator assembly.

The same winding is also rectified by diodes D5 and D6 and filtered by capacitor C3 to provide the positive +18V source supply, which is used as the primary voltage for +9V and +5V regulated supply circuits.

The red-red/yellow-red winding is rectified by D3 and D4 and filtered by capacitor C8 to provide +53 V.D.C. source supply, which is used as the primary voltage for +27V and +14V regulated supply circuits and as the supply source for the power amplifier output stage. C8 capacitor is located on the treble end of the console near the power transformer.

A series regulated circuit is used to provide the +9 V.D.C. source for the tone generator circuits. The output voltage (+9 V.D.C.) is sensed by R7 and applied to Q3, a reference amplifier. The emitter voltage of Q3 is set by D8, an 8.2V zener diode, and remains constant. The voltage across R9 will remain constant due to zener action of emitter-base junction of Q3 and will be set to about 8.2V + 0.6V = 8.8V. Therefore, any voltage change of the +9V supply will be sensed by R7 which will cause Q3 to draw more or less current, varying the conduction of Q2 and Q1, the series regulating element.

For example, if the output current increases, the output voltage will drop, causing less voltage across R7 with a corresponding decrease in the current through Q3. R8 provides the collector current for Q3 and the base current for Q2. Due to the decrease in the conduction of Q3, more current will be supplied to Q2, which will now conduct harder, and then cause Q1 to also conduct harder. Saturation resistance of Q1 will be lowered so that the +9V will come up to its nominal regulated voltage value.

Q1 transistor operates as a variable resistor (rheostat), Q3 transistor senses the current requirement for the output circuit and with the aid of Q2 current, the amplifier changes the setting to the rheostat (Q1 transistor).

To assure that the power supply provides good regulation, the +9V source lead and the reference lead on the board assembly are separately brought out and connected together closer to the load.

Diode D7, connected from the +27V regulated supply output, assures that the +9V regulator circuit will not fail to start operating, because of the constant load of tone generator circuit, when the console power is switched on.

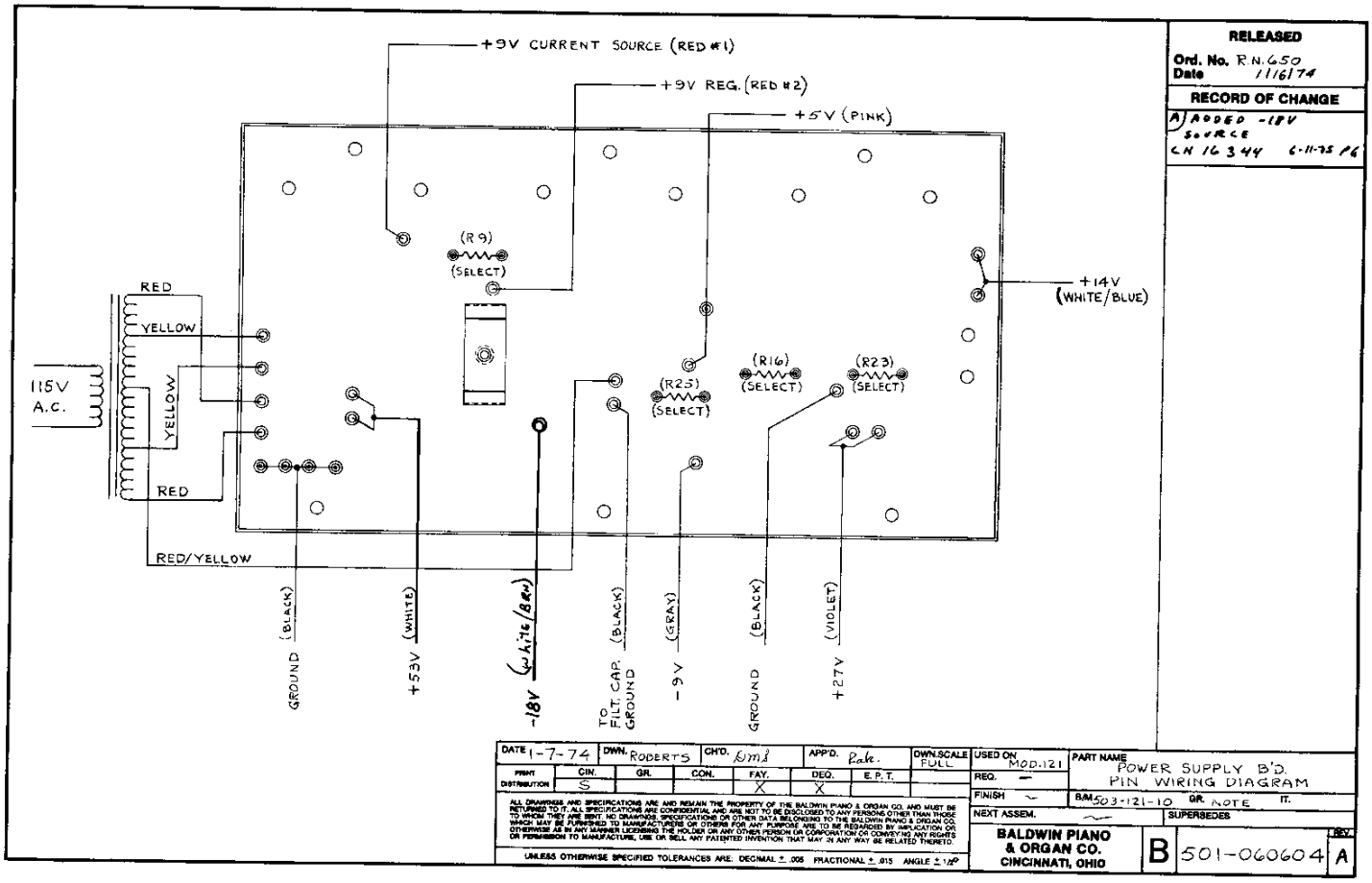
Resistors R3 and R4 are the current limiters (protectors) for the series regulator transistors Q1 and Q2. The resistors, at the same high current (well above normal), take voltage away from the series transistors to prevent excessive thermal dissipation. The regulator is "short proof" and will deliver the same maximum current at zero volts output.

The operation of +27 volts regulated supply is identical to that of the +9 V.D.C. regulated supply and consists of Q4 (series regulator), Q5 (driver), and Q6 (reference D.C. amplifier). The reference voltage for this regulator is the +9 V.D.C. regulated source, applied to the emitter of Q6 transistor via blocking diode D9. Output voltage of this regulator is factory preadjusted by selection of the R16 resistor.

On the preamplifier board assembly the +27 V.D.C. source is stepped down and filtered by R14 and C12 to +22 V.D.C. for the various organ circuits.

The regulator circuit for +5 V.D.C. is basically the same as previously described circuit for +9 V.D.C. with the exception that the reference circuit for this supply uses differential amplifier configuration of Q8 and Q9, operating from the +9 V.D.C. supply.

The +14 V.D.C. source is derived from the +53 V.D.C. and +27 V.D.C. regulated supply. The +53 V.D.C. provides the current for the load via R20, R21 and Q7 and is additionally filtered by C13. The +27 V.D.C. regulated source via resistor divider R19, R22 and R23 is used as the voltage reference for the base circuit of Q7. Resistor R23 is factory selected to obtain +14 V.D.C. source.



RELEASED
Ord. No. R.N. 650
Date 1/16/74

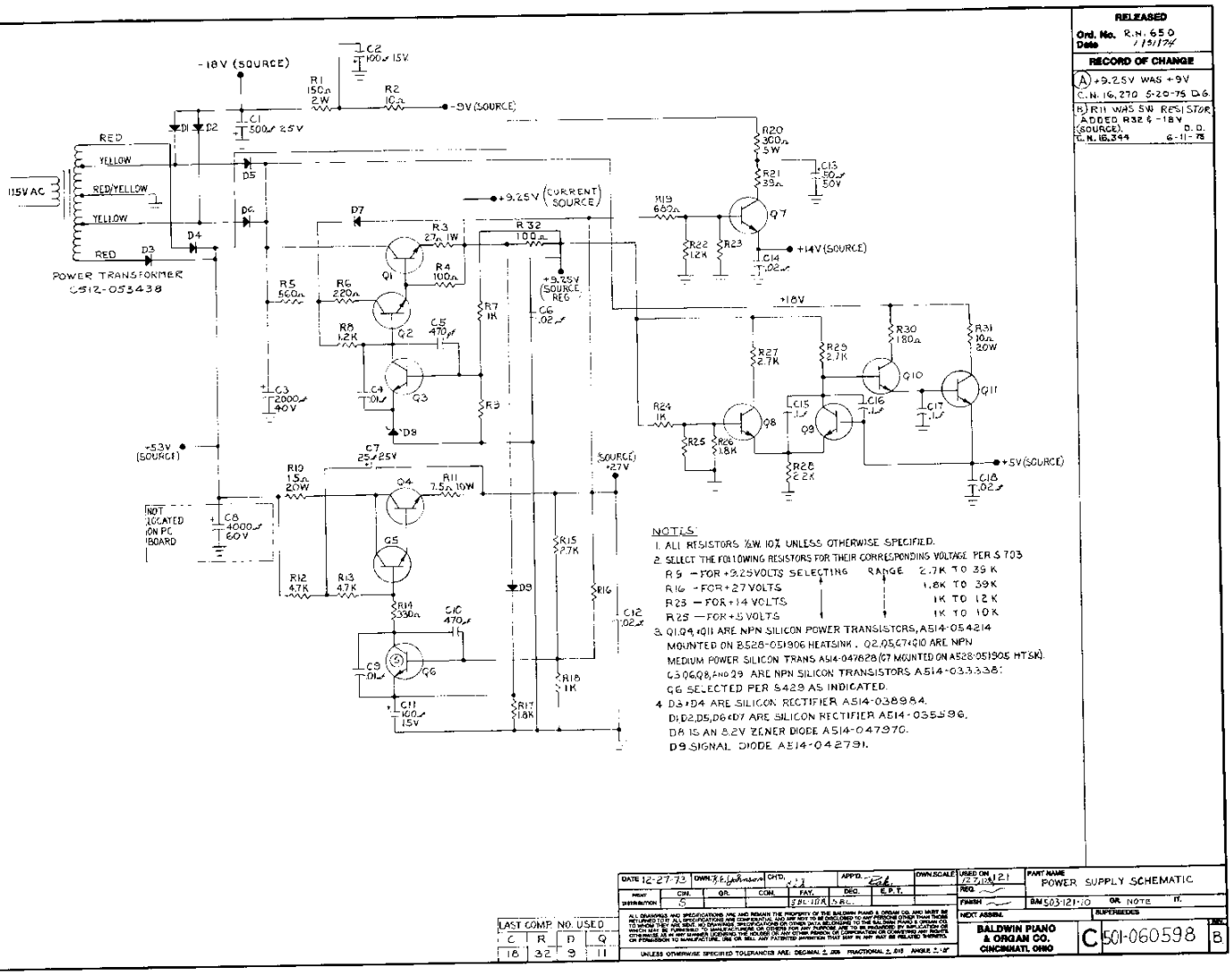
RECORD OF CHANGE
A) ADDED -18V SOURCE
CN 16344 6-11-75 PG

DATE 1-7-74	DWN. ROBERTS	CH'D. WMS	APP'D. Bak.	DWN. SCALE FULL	USED ON MOD-121	PART NAME POWER SUPPLY B'D. PIN. WIRING DIAGRAM		
PRINT DISTRIBUTION	CIN. S	GR.	CON.	FAY. X	DEQ. X	E.P.T.	REQ. —	
							FINISH ~	B.M. 503-121-10 GR. NOTE IT.
							NEXT ASSEM. ~	SUPERSEDES

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± .015 ANGLE ± 1/2°

BALDWIN PIANO & ORGAN CO.
CINCINNATI, OHIO

B 501-060604 REV. A



NOTES:

1. ALL RESISTORS ½W. 10% UNLESS OTHERWISE SPECIFIED.
2. SELECT THE FOLLOWING RESISTORS FOR THEIR CORRESPONDING VOLTAGE PER S 703

		RANGE
R9	— FOR +9.25 VOLTS SELECTING	2.7K TO 39K
R16	— FOR +27 VOLTS	1.8K TO 39K
R23	— FOR +14 VOLTS	1K TO 12K
R25	— FOR +5 VOLTS	1K TO 10K

3. Q1,Q4,Q11 ARE NPN SILICON POWER TRANSISTORS, A514-054214 MOUNTED ON B528-051906 HEATSINK. Q2,Q5,Q7,Q10 ARE NPN MEDIUM POWER SILICON TRANS A514-047628 (Q7 MOUNTED ON A528-051905 HTSK). Q3,Q6,Q8, AND Q9 ARE NPN SILICON TRANSISTORS A514-033338; Q6 SELECTED PER S429 AS INDICATED.
4. D3 & D4 ARE SILICON RECTIFIER A514-038984. D1,D2,D5,D6 & D7 ARE SILICON RECTIFIER A514-035596. D8 IS AN 8.2V ZENER DIODE A514-047970. D9 SIGNAL DIODE A514-042791.

RELEASED
Ord. No. R.N. 650
Date 1/15/74

RECORD OF CHANGE

(A) +9.25V WAS +9V
C.N. 16,270 5-20-75 D.G.

(B) R11 WAS 5W RES | STOR ADDED R32 & -18V (SOURCE). D.D.
C.N. 16,344 6-11-75

LAST COMP. NO. USED			
C	R	D	Q
18	32	9	11

DATE 12-27-73 | DWN. R.E. Johnson | CH'D. | APP'D. Rob. | OWN. SCALE | USED ON 121 | PART NAME POWER SUPPLY SCHEMATIC

PRINT DISTRIBUTION: CIN. | QR. | CON. | FAY. | DEC. | E.P.T.

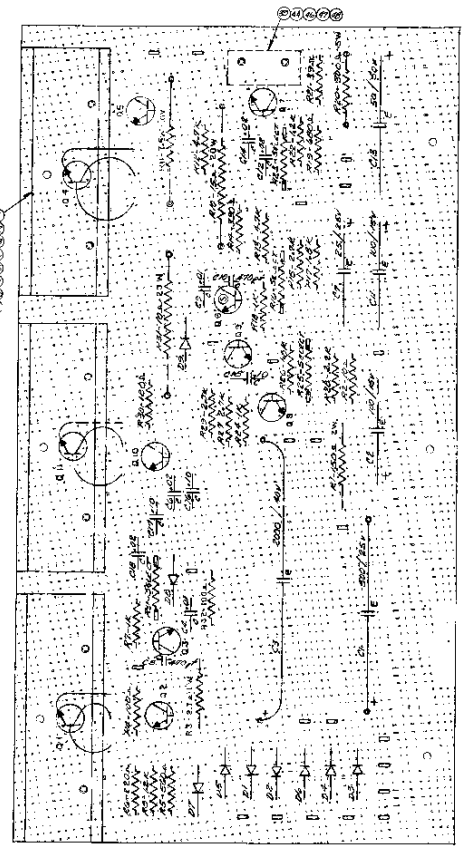
REQ. | FINISH | BM 503-121-10 | QR. NOTE | IT.

NEXT ASSEM. | SUPERSEDES

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/64 ANGLE ± 1/2°

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

C 501-060598 B



(LEGEND:
"C" DENOTES CERAMIC CAPACITOR
"E" DENOTES ELECTROLYTIC CAPACITOR

NOT. 2:

1) TRANSISTORS Q1, Q11 & Q8 ARE NPN SILICON POWER TRANSISTORS ASM-0E828-A (IT. 34) MOUNTED ON HEATSINK 8520-051306 (IT. 4). TRANSISTORS Q2, Q6, Q9 & Q7 ARE NPN SILICON POWER SILICON TRANSISTORS ASM-047982A (IT. 33) WITH Q7 MOUNTED ON HEATSINK 8520-051305 (IT. 3). TRANSISTORS Q3, Q4, Q5 & Q10 ARE NPN SILICON TRANSISTORS ASM-033338 (IT. 32), WITH Q6 SELECTED PER 5427-2.

2) THESE RESISTORS TO BE SELECTED TO PROVIDE: R20 FOR 19.0 VOLTS (RANGE 2.0 VOLTS (P 29C) R19 FOR +27 VOLTS (RANGE FOR +0.39 K) R23 FOR +18 VOLTS (RANGE 1K TO 1.2 K) R25 FOR +5 VOLTS (RANGE 1K TO 1K)

3) D1, D2, D5, D6 & D7 ARE SILICON RECTIFIERS ASM-038336 (IT. 31). D3 & D8 ARE SILICON RECTIFIERS ASM-038304 (IT. 30). D9 IS A ZENER 8.2V DIODE ASM-047930 (IT. 22). D4 IS A MEDIUM VOLTAGE, SIGNAL DIODE ASM-047979 (IT. 36).

4) REFERENCE SCHEMATIC 8501-660603, REFERENCE PRINTWIRING DIAGRAM 8501-660604.

5) FINAL ASSEMBLY MUST INCLUDE LABEL MARKED 500-060603 1

RELEASED
Engl. No. R.N. 650
Date 1/16/74

RECORD OF CHANGES

(A) 11-22-1973
5240-250-20, 25Ω
2 W RESISTOR
CH 13716 ACR. D-4178

(B) ELEMENT NO. CH 9.
APP. 3-29-74

(C) ELEMENT 2 X SIZE
NO CHANGE, NO CH.
APP. 5-16-74

(D) +31.5V WAS +9V
CH 15,270 9-30-75 DG

(E) IT. 11 WAS SW. REVISION
RELOCATED DS.
CH 16,284 D.D. 6-11-76

(F) ADDED ITEM 53
CH 16,694 11-21-76 DG

53	K	A749-100021	GLUE, HOT MELT		
52	K	5184-3	SOLDER - DIP		
51	X	5184-4	SOLDER - PROV.		
50	X	5224	ALLOY 388 SOLID		
49	X	AMPD-016897	SILICON COMPOUND		
48	1	522821-304	NUTTAL AC RELAYS		
47	1	3540H-403-5W	50K Ω 10 TH. 1406L		5W LOG
46	0	3223Y4-B.S.A.	50K Ω AX TYPE 71		1/2 W
45	0	3223Y6-B3CA	1CW Ω AX TYPE 71		1/2 W
44	1	A266-047702	SWITCH		
43	3	A534-033365	INSULATOR MICA		
42	3	A547-033823	TRANSISTOR SOCKET		
41	0	A266-047704	SWITCH ASSY #9		
40	2	8528-061304	HEATSINK		
39	1	A528-051305	HEATSINK		
38	2	A534-038364	INSULATOR SILICON		
37	2	-1A3274	RECTIFIER SILICON		
36	1	-1A2791	DIODE CURVE 1N2 VOLTAGE		
35	1	-1A1770	DIODE ZENER 8.2 V		
34	3	-038424	TRANSISTOR NPN SILICON POWER		
33	4	-047982B	TRANSISTOR NPN MEDIUM POWER		
32	4	ASM-033338	TRANSISTOR NPN SILICON		
31	1	1N914-E6192	CHARACTOR ELECT. DIODE		
30	1	5211-065-100	ELECT. 100μF 15V		
29	2	5211-065-200	ELECT. 200μF 15V		
28	1	5211-065-1000	ELECT. 1000μF 10V		
27	1	5211-065-000	ELECT. 500μF 15V		
26	3	5218-104	CER. 1μF		
25	4	5208-503	CER. .02μF		
24	2	5200-105	CER. .01μF		
23	2	5205-471	CAPACITOR CER. 470μF		
22	1	5240-150-20	RESISTOR 20W		15Ω
21	1	5240-100-10	10W		10Ω
20	1	5240-901-05	5W		390Ω
19	1	5240-795-10	10W		75Ω
18	1	5181-18	2W		180Ω
17	1	5177-64	1W		27Ω
16	2	5239-472	2W	10%	47K
15	5	270			27K
14	1	220			22K
13	2	180			18K
12	2	120			12K
11	3	100			10K
10	1	681			680Ω
9	1	561			560Ω
8	1	331			330Ω
7	1	221			220Ω
6	1	181			180Ω
5	2	121			120Ω
4	1	350			33Ω
3	1	100			10Ω
2	4	5239-561-R5	RESISTOR 2W	10%	560Ω
1	1	8505-060602	POWER SUPPLY BD ASSY		
ITEM NO.		QUAN.	PART NAME		

DATE 9-16-74 | DRWN. Beady | CHK. | APP'D. | DWG. SCALE

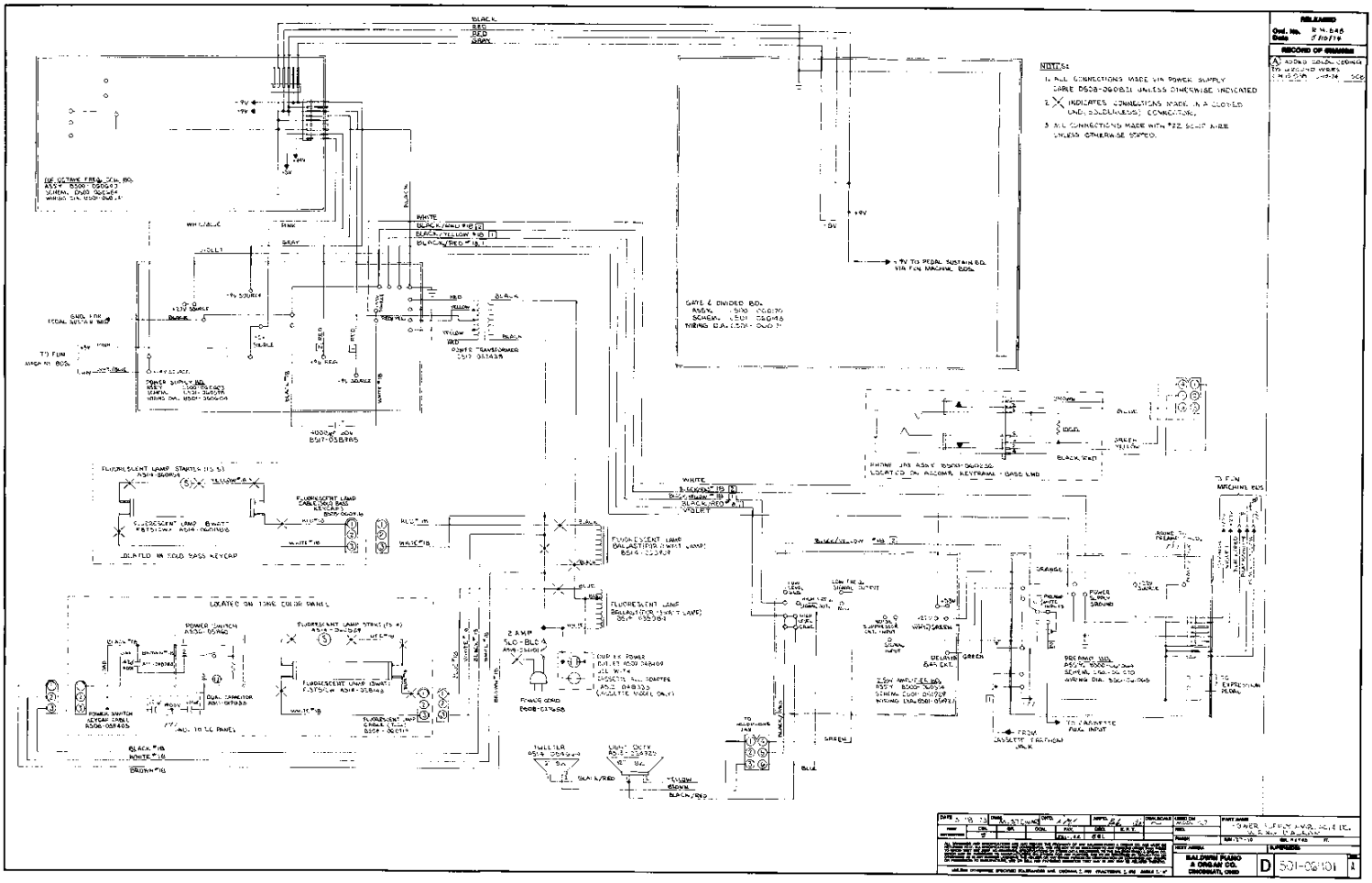
PART NAME: POWER SUPPLY BD ASSEN

DWG. 8503-121-10M, 7

NEXT ASSEM. 8503-060681 | SUPERSEDES 8500-060602

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

D 500-060603 F


NOTES:
1. ALL CONNECTIONS MADE VIA POWER SUPPLY CABLE D508-060B31 UNLESS OTHERWISE INDICATED
2. X INDICATES CONNECTIONS MADE IN A CLOSED (NO SOLDERLESS) CONNECTOR.
3. ALL CONNECTIONS MADE WITH #22 SCHP WIRE UNLESS OTHERWISE STATED.
RELEASED
RECORD OF CHANGES
GATE & DIVIDED BD.
+9V TO PEDAL SUSTAIN BD. VIA FUN MACHINE BDS.
LOCATED ON TONE COLOR PANEL
LOCATED IN SOLID BASS KEYCAP
TO FUN MACHINE BDS
TO EXPRESSION PEDAL
TO CASSETTE PWR. INPUT
FROM CASSETTE FUNCTION
BALDWIN PIANO & ORGAN CO.
CINCINNATI, OHIO
D
501-06101

POWER AMPLIFIER THEORY

Reference: Schematics - C501-051929
Figures - 4, 17 & 21

The Model 127 series organs contain one (1) 25W amplifier located on the front panel of the console to the bass side of the Expression Pedal housing.

The power amplifier circuit, including heat sinks, is contained on a single printed circuit board assembly and is fastened to the console by four (4) screws.

The circuit is a Quasi-Complementary silicon power amplifier type. The output stage employs two (2) silicon NPN power transistors, each mounted on a separate heat sink. The driver circuit contains a complementary pair of silicon NPN-PNP medium power transistors. The predrivers, or voltage amplifier circuits, consist of silicon PNP and NPN transistors operating as Class A amplifiers. Two (2) NPN transistors are used as current limiters for amplifier overload protection.

Referring to the 25W Amplifier Schematic, C501-051929, the base of the first voltage amplifier stage (Transistor Q1) is biased from +22V supply via R7 and R11 resistors so that, in conjunction with the D.C. feedback through R12, it sets the D.C. operating point at the junction of Q5 emitter and Q6 collector to about one-half the supply voltage.

The input signal applied from the amplifier level set minipot (located on the preamplifier board assembly) is amplified by voltage amplifiers Q1 and Q2 to a sufficient level to drive the output stages. The amplified signal from the collector of Q2 is applied to both bases of the complementary drivers, Q3 and Q4. Transistors Q3 and Q5, operating as two emitter followers (Darlington connection), provide a current to the load without phase inversion. Transistor Q4 operates as a common emitter amplifier and its collector supplies signal 180° out of phase to the output stage Q6, which is also a common emitter amplifier. Q6 will invert the signal again and will provide the current for the load. Transistors Q3 and Q4 are slightly forward biased by diodes D1, D2, and resistor R25 to assure the proper switching point and minimize crossover distortion. Resistors R5 and R20, due to the conduction of Q3 and Q4, develop a voltage drop which forward biases the output transistors, Q5 and Q6. Current flowing through output transistors, under no signal condition (idling current), is in the order of a few tenths of a milli-ampere so that the amplifier is operating in Class AB mode.

Resistors R1, R2, and capacitor C1 provide a bootstrapping action to assure sufficient drive to Q3 transistor when the output signal goes positive. The positive output voltage is coupled via C1 capacitor to the junction of R1 and R2, boosting the voltage to allow sufficient current to drive Q5 output transistor.

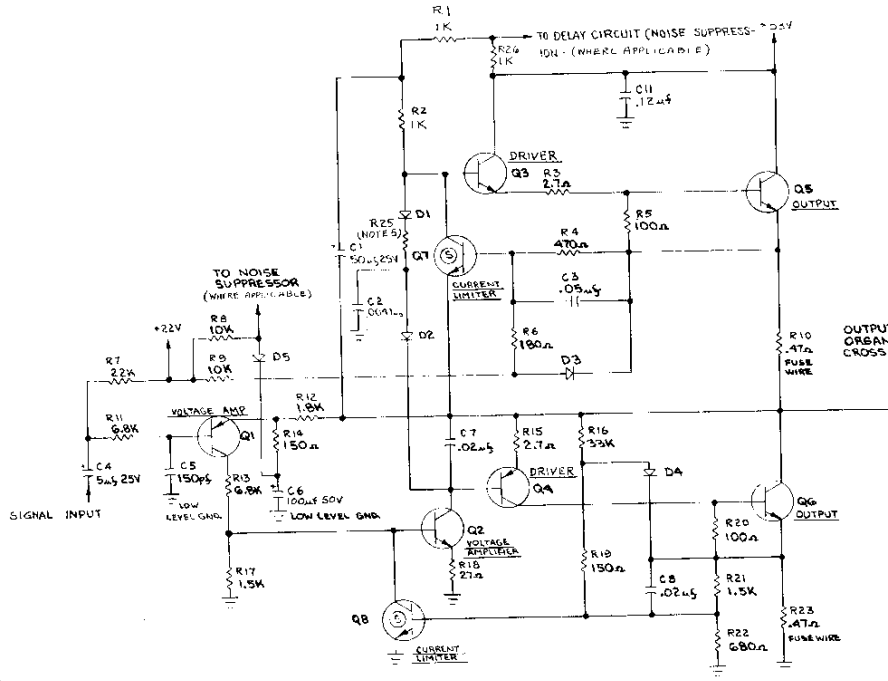
Output transistor emitter resistors R10 and R23 are fusing type resistors, which will open the circuit under high currents and prevent any further damage to the output power transistors.

Additional short circuit protection is provided by the current limiting transistors Q7 and Q8. Under high current condition, voltage drop on fuse link resistors R10 and R23 will be high enough to forward bias transistors Q7 and Q8, which will saturate and limit the drive to the driver transistors.

Components R6, R9, and D3, and R16, R19, and D4 reduce the limiting action of Q7 and Q8, respectively, when an output signal is present (not shorted), permitting the amplifier to be driven to full output.

Capacitor C9 provides a high frequency limit for the amplifier.

The noise suppressor circuit consists of diode D5 and capacitor C6 and an external circuit (its operation is described under Preamplifier Theory), which, when the organ power is switched on, keeps the outputs of the amplifiers near ground until all supply voltages are stabilized, thus preventing any audible transients. When the organ is turned on, diode D5 is forward biased and rapidly charges capacitor C6, temporarily saturating Q1. After stability is achieved, diode D5 cuts off, permitting the normal operation of the amplifier. An additional delay circuit incorporated on 127 models is located on the preamp board assembly and consists of R1, R26 and C26, a 100 mfd electrolytic capacitor. This circuit delays the application of +53 V.D.C. supply to the driver stage (Q3) when the organ is first turned on, thus preventing audible transients.



NOTES:
1. ALL RESISTORS ARE ½w 10% UNLESS OTHERWISE SPECIFIED.
2. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHM PER VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.
3. ALL GROUNDS ARE HIGH LEVEL AMPLIFIER GROUNDS UNLESS OTHERWISE SPECIFIED.
4. Q1 - PNP SILICON TRANSISTOR (A514-044910)
   Q2 & Q3 - NPN MEDIUM POWER SILICON TRANSISTOR (A514-047828)
   Q4 - PNP MEDIUM POWER SILICON TRANSISTOR (A514-047829)
   Q5 & Q6 - NPN SILICON POWER TRANSISTOR (A514-054214)
   Q7 & Q8 - NPN SILICON TRANSISTOR (A514-033338) SELECTED PER S429-2
   D1, D2, D3, D4 & D5 - MEDIUM VOLTAGE DIODE (A514-042791)
5. SELECT R25 TO OBTAIN 400 mv ± 50 mv AT BASE OF Q6 (REF. S607).
   CAUTION: AMPLIFIER MUST BE COLD WHEN SELECTING THIS VOLTAGE.

RELEASED
Ord. No. RH 592
Date 3-4-71

A ADDED R25 C.N. 14,433 5-21-71 W.R.M.
B R23 WAS 33Ω C.N. 15,728 11-11-71 W.R.M.
C C5 WAS WERE A514-047830 CHANGED C6 2/23/72
D C6 WAS 100μf @ 25V. CHANGED TO 100μf @ 50V C.N. 14907 H.G.R. 5-11-72
E C11 WAS .02μf, C9 WAS .1μf ADDED NOTE 5 ETC. C.N. 14,974 D.D. 7-31-72
F ADDED INFORMATION FOR TECHNICAL SERVICE DEPT. C.N. 15077 H.G.R. 9-28-72
G REVISED NOTES 5 & 6 C.N. 15,303 D.L.L. 4-4-73
H R1 WAS 1.5K, R2 WAS 1.5K, R23 WAS 33Ω, ADDED R24. REVISED NOTE 5. DELETED NOTE 6. DELETED "R25 TO 1400" NOTES 4 ADDED "WHERE APPLICABLE". LAST R № WAS 25. C.N. 15404 H.G.R. 5-17-73
J REVISED TO PROVIDE HIGH FREQ. SIGNAL OUTPUT (WHEN APPLICABLE) C.N. 15,602 M.S. 12-4-73

LAST COMP № USED			
A	C	Q	D
26	12	8	5

RECORD OF CHANGE

PRINT DISTRIBUTION

B.V.		BOND		B.S.L.	
CTR.	QR.	COR.	RAY	E.E.I.	CAR.
S			48-125		

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UNLESS OTHERWISE SPECIFIED TOLERANCE ARE: DECIMAL ± .005 FRACTIONAL ± 1/16 ANGLE ± 1/2°

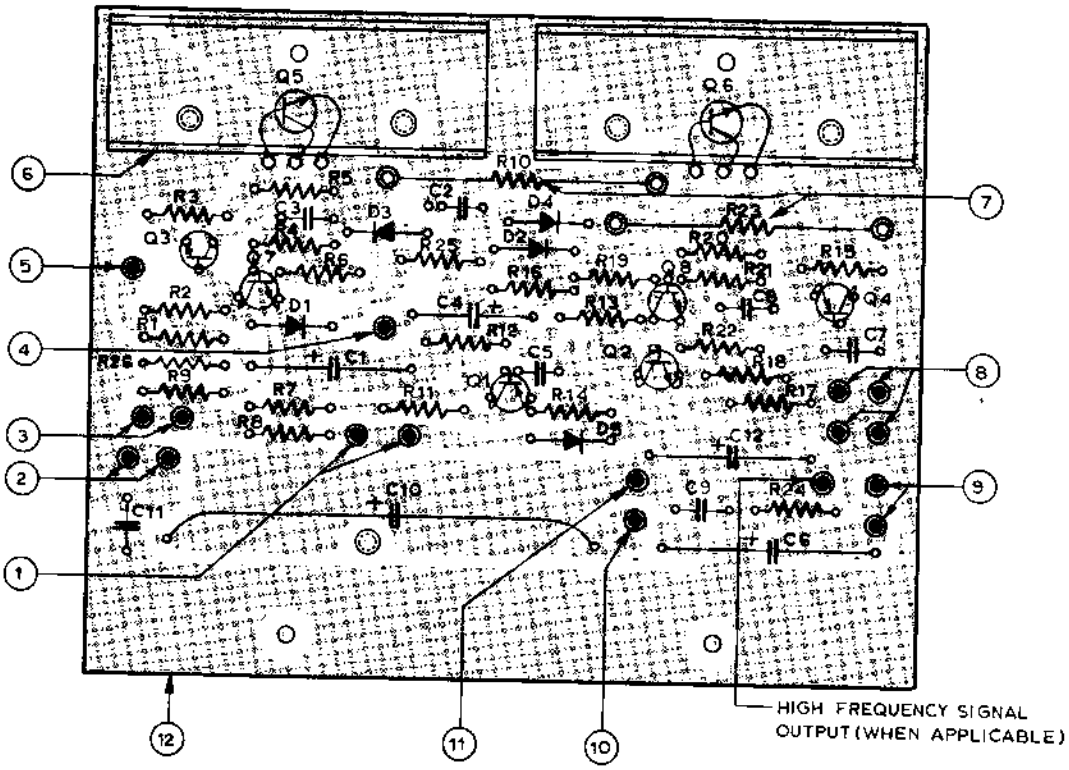
DWN. C. [illegible]	PART NAME 25W AMPLIFIER SCHEMATIC
DATE 1-21-71	
CHK'D 3-2-71	B/P 503-130-10 M.
APP'D [illegible]	USED ON C6 & [illegible]
APP'D [illegible]	DWN. SIZE NEXT ASSY.
FINISH	REL. SUPERSEDES

D. H. BALDWIN CO.
CINCINNATI, OHIO

C 501-051929 REV. J

25W POWER AMPLIFIER BOARD ASSEMBLY

SCHEMATIC No. C501-051929



ITEM	DESCRIPTION	WIRE COLOR/PART NO.
1	TO NOISE SUPPRESSOR CIRCUIT (WHEN APPLICABLE)	RED #2
2	+53VDC SUPPLY INPUT	WHITE
3	+22VDC SUPPLY INPUT	ORANGE
4	SIGNAL INPUT	SNGL. COND. SH. #4
5	TO DELAY CIRCUIT (WHEN APPLICABLE)	
6	HEATSINK	B528-051906
	TRANSISTOR SOCKET	B507-033322
	TRANSISTOR MICA INSULATOR	A514-033359
	SILICON COMPOUND	A249-016587
7	FUSING WIRE	A514-033375
8	HIGH LEVEL GROUND	BLACK #18 AWG
9	LOW LEVEL GROUND	BLACK #18 AWG
10	SIGNAL OUTPUT	BROWN #18 AWG
11	CROSSOVER SIGNAL OUTPUT (WHEN APPLICABLE)	VIOLET
12	25W POWER AMPLIFIER BOARD ASSEMBLY	B500-060514

FIGURE 21

MODEL 127FC - GENERAL INFORMATION

The Model 127FC organ is the basic Model 127F with a cassette recorder attached.

> When a cassette is factory installed, the letter C is added to the model number, i.e., Model 127F becomes Model 127FC.

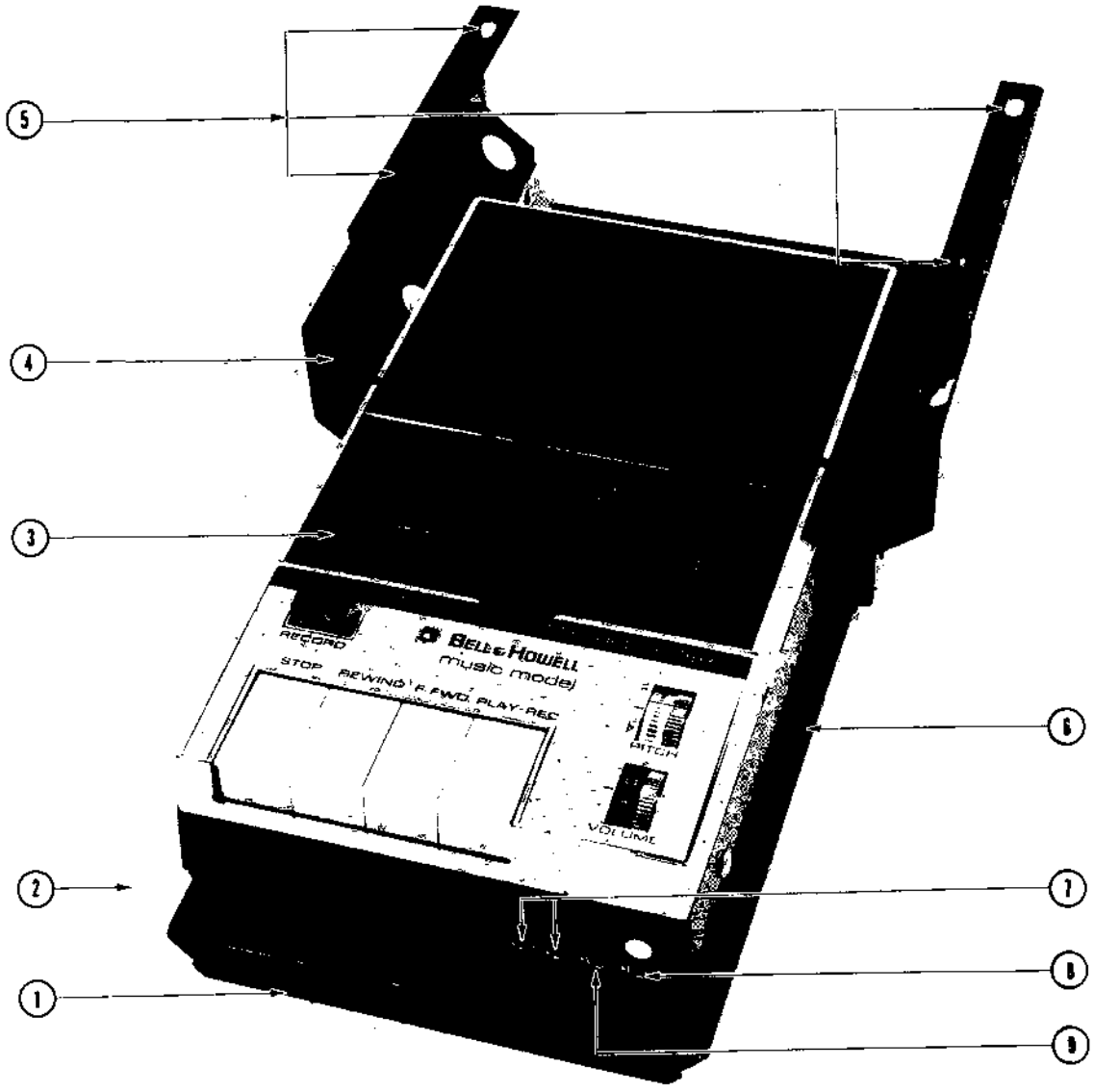


FIG. 22 - CASSETTE DRAWER FINAL ASSEMBLY

ITEM	DESCRIPTION	PART NUMBER
1.	VINYL EXTRUSION	A525-034469
2.	CASSETTE DRAWER FINAL ASSEMBLY	C500-053460
3.	CASSETTE RECORDER (REWORK)	B500-053627
4.	RECORDER DRAWER SLING	C500-052519
5	CASSETTE DRAWER MOUNTING SLOTS	
6.	RECORDER DRAWER SLIDE	C528-053457
7.	MICROPHONE INPUT SOCKETS	
8.	ORGAN INPUT TO RECORDER	
9.	RECORDER OUTPUT TO ORGAN	

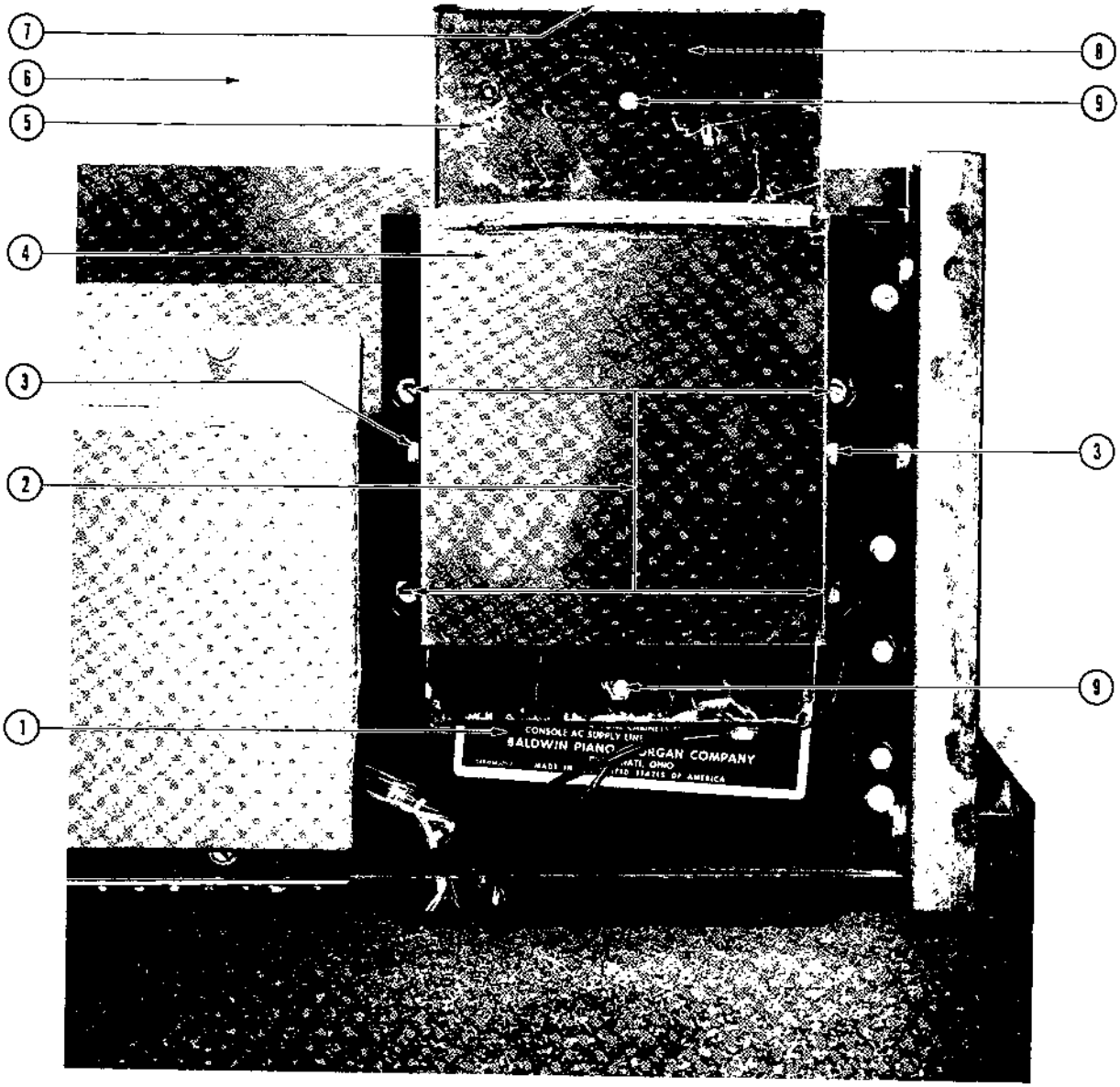


FIG. 23 - CASSETTE DRAWER ASSEMBLY

ITEM	DESCRIPTION	PART NUMBER
1.	MODEL & SERIAL NUMBER NAMEPLATE	
2.	FOUR (4) SCREWS SECURING CASSETTE DRAWER TO THE CONSOLE	
3.	SLIDE TRAVEL LIMITING SCREWS	
4.	RECORDER DRAWER SLING	C500-052519
5.	RECORDER DRAWER SLIDE	C528-053457
6.	CASSETTE DRAWER FINAL ASSEMBLY	C500-053460
7.	VINYL EXTRUSION	A525-034469
8.	CASSETTE RECORDER (REWORK)	B500-053627
9.	TWO (2) SCREWS SECURING THE CASSETTE RECORDER TO DRAWER	

127W GENERAL INFORMATION

The Model 127W is essentially the same as the Model 127F. For 127W information not contained in this supplement, refer to the previous section.

BE SURE TO USE PART NUMBERS AVAILABLE IN THIS SUPPLEMENT WHEN ORDERING 127W PARTS.

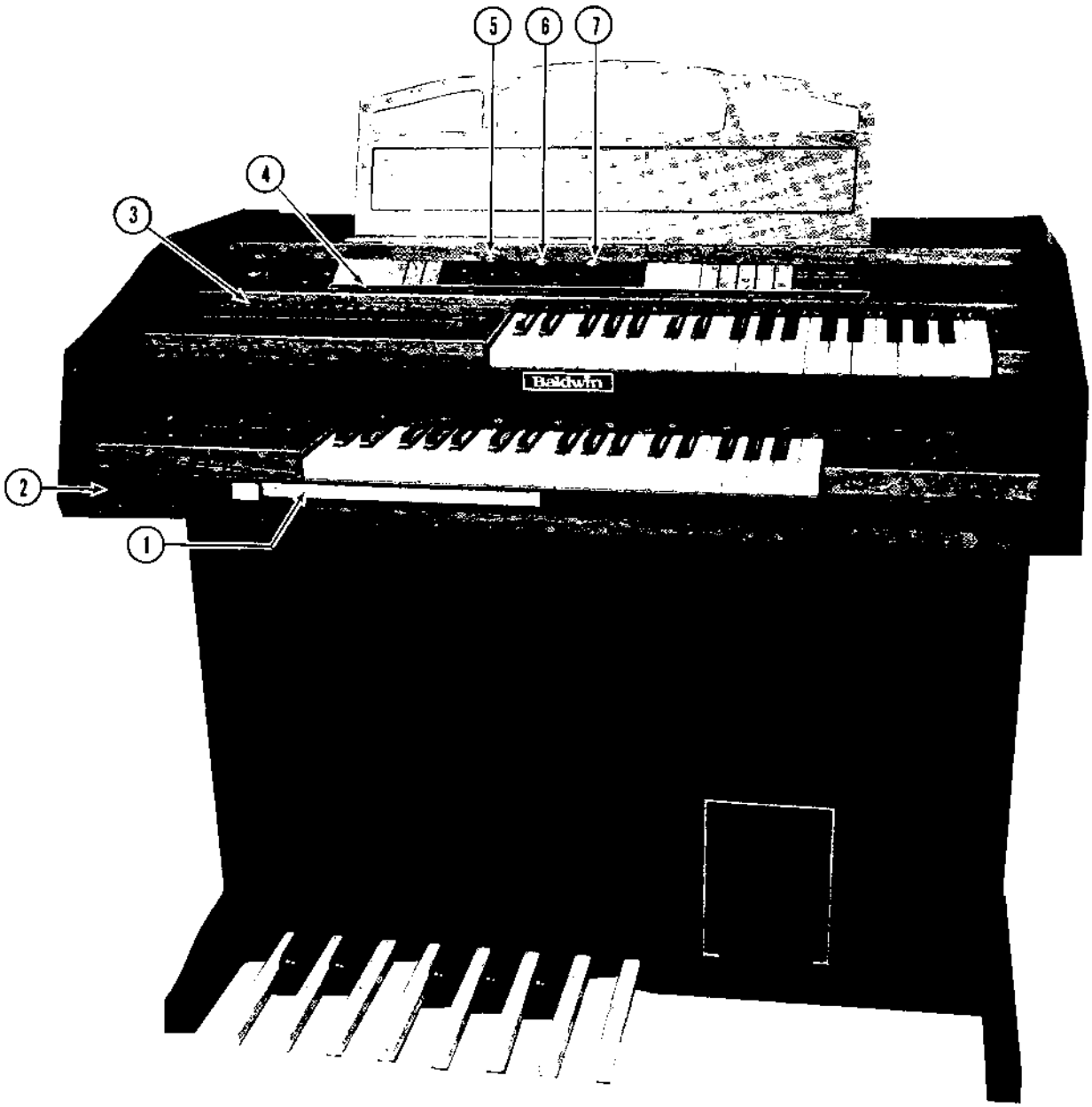


FIG. 24 - MODEL 127W

1.	Touch Strip Assembly	0500-100690
2.	Accompaniment Keyslip Assembly	0500-101015
3.	Push Button - Insert Type	0250-054568
	Push Button Insert - Dotted	0247-100811
4.	Nameplate - Tone Color Panel	0249-061023
5.	Fun Bass - Pull Cancel (Pedal Volume) Control	
	Knob	0247-047794
	Knob Insert	0249-100763
	Knob Assembly	0247-101114
	100k Rev. Audio Pot. with switch	0509-052398
6.	Accompaniment Volume Control	
	Knob Insert	0249-058377
7.	Vibrato Control	
8.	Grille Cloth	0244-100886

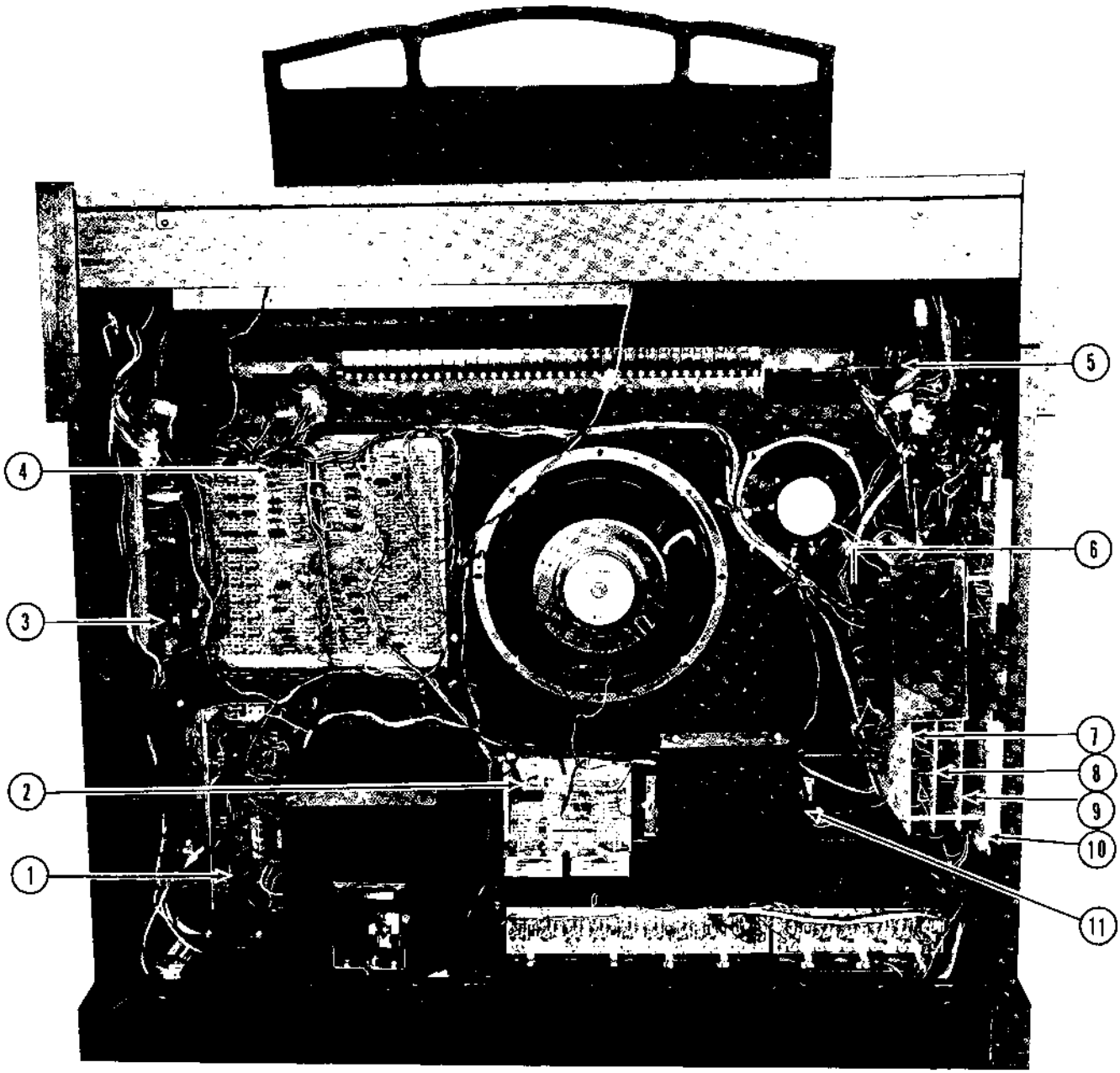
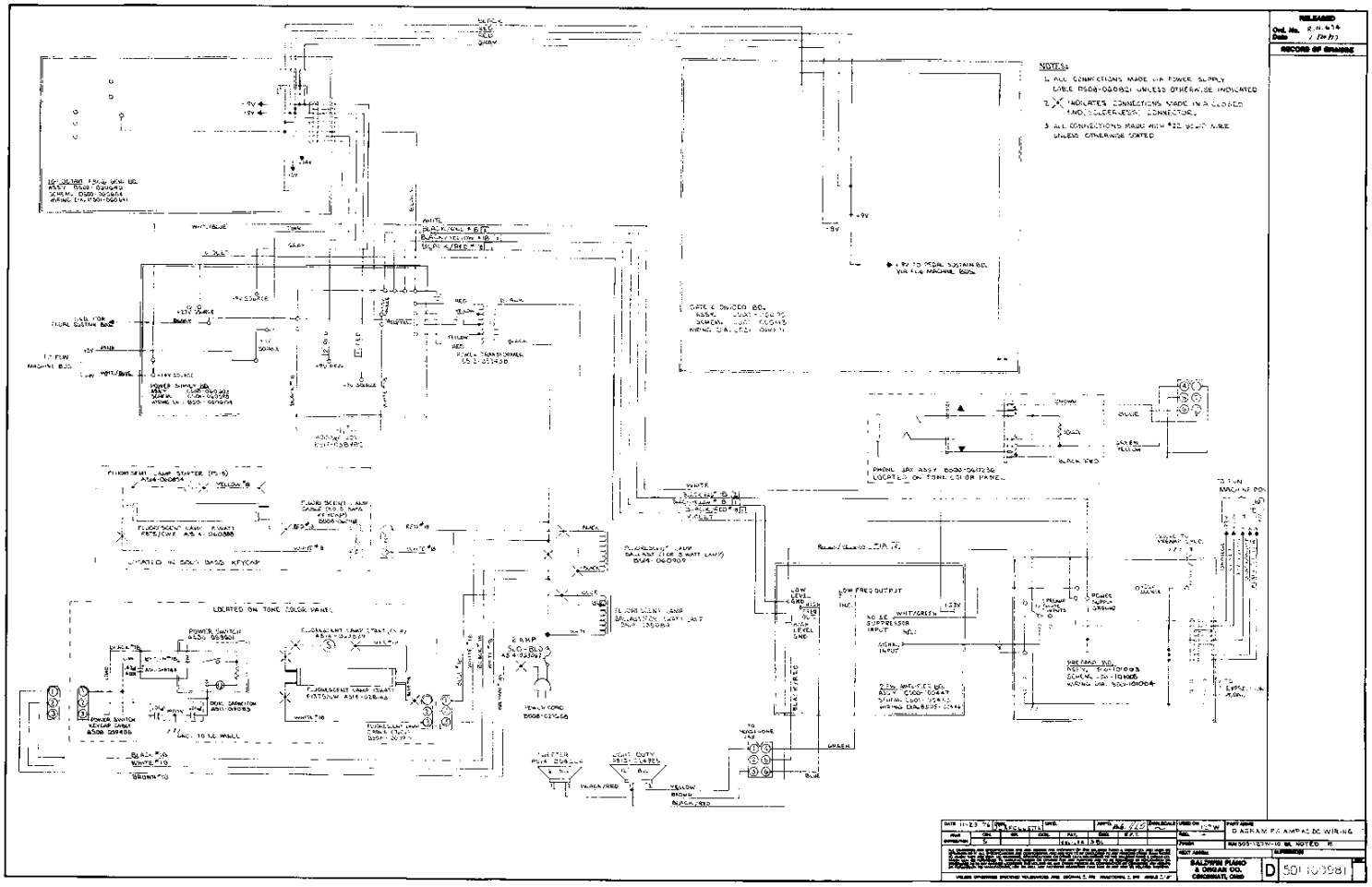
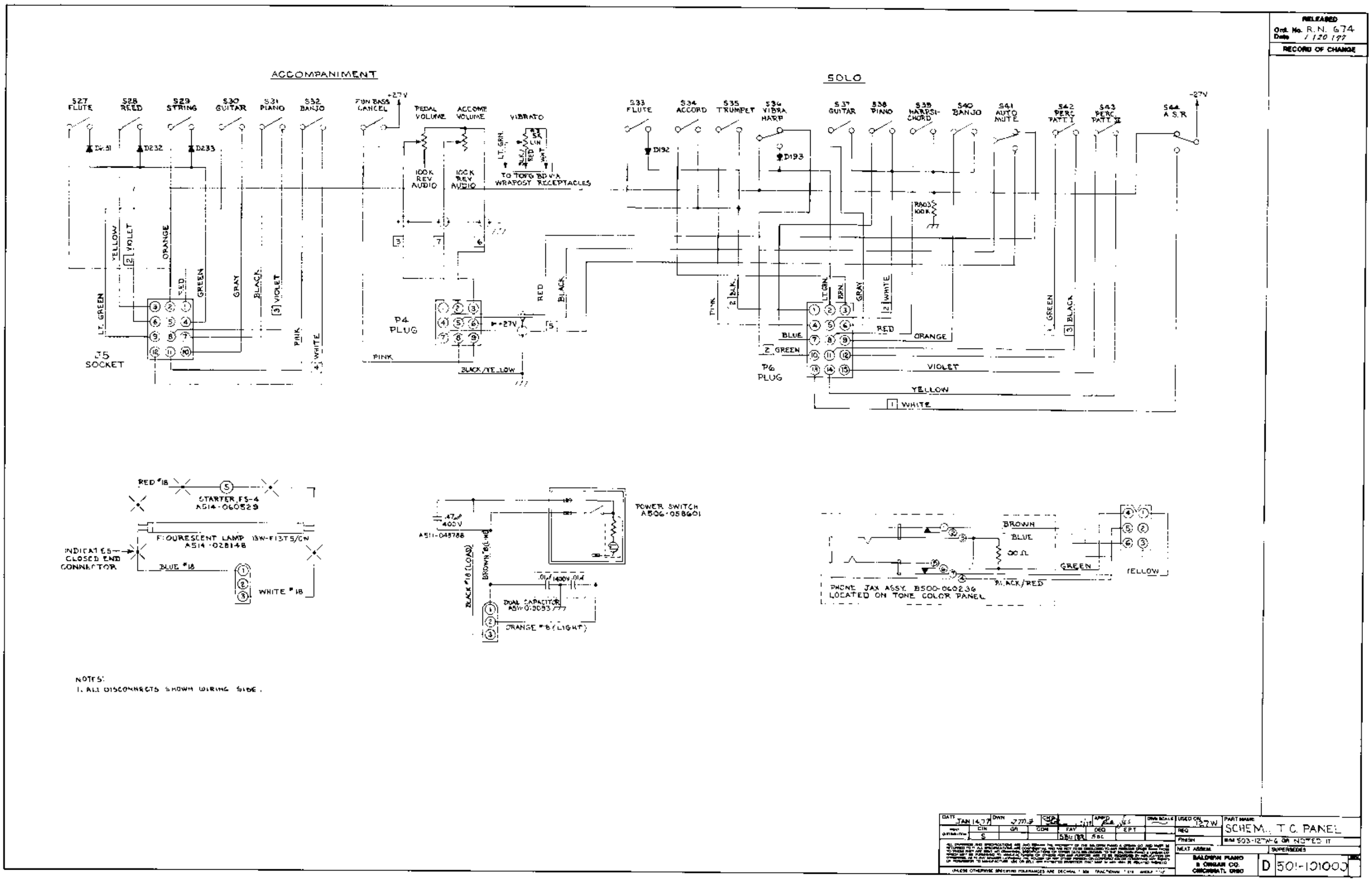


FIG. 25 - 127W REAR

1.	Power Supply Board Assembly	0500-060603
2.	25 Watt Amplifier Board Assembly	0500-100447
3.	TOFG Board Assembly	0500-060640
4.	Gate & Divider Board Assembly	0500-060170
5.	Touch Strip Interface Board Assembly	0500-100615
6.	Fun Machine Boards Assembly	0500-101006
7.	Fun Machine Logic Board Assembly	0500-101002
8.	Fun Machine Rhythm Voice Board Assembly	0500-100231
9.	Fun Machine Right Hand Voice Board Assembly	0500-060663
10.	Fun Machine Left Hand Voice Board Assembly	0500-060827
11.	Preamp Board Assembly	0500-101003


NOTES:
1. ALL CONNECTIONS MADE VIA POWER SUPPLY CABLE D508-060801 UNLESS OTHERWISE INDICATED
2. X INDICATES CONNECTIONS MADE IN A CLOSED END, SOLDERLESS CONNECTOR.
3. ALL CONNECTIONS MADE WITH #22 GAUGE WIRE UNLESS OTHERWISE STATED
RELEASED
RECORD OF CHANGE
LOCATED ON TONE COLOR PANEL
LOCATED IN SOLID BASS KEYCAP
PHONE JAK ASSY D508-060236
LOCATED ON TONE COLOR PANEL
D AGRAM FOR AMPLAC DC WIRING
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
D 501 100981


ACCOMPANIMENT
SOLO
S27 FLUTE
S28 REED
S29 STRING
S30 GUITAR
S31 PIANO
S32 BANJO
FUN BASS CANCEL
+27V
PEDAL VOLUME
ACCOMP VOLUME
VIBRATO
100K REV AUDIO
TO TOFO BD VIA WRAPOST RECEPTACLES
S33 FLUTE
S34 ACCORD
S35 TRUMPET
S36 VIBRA HARP
S37 GUITAR
S38 PIANO
S39 HARPSI-CHORD
S40 BANJO
S41 AUTO MUTE
S42 PERC PATT I
S43 PERC PATT II
S44 A.S.R.
-27V
D232
D233
D192
D193
J5 SOCKET
P4 PLUG
P6 PLUG
LT. GREEN
YELLOW
VIOLET
ORANGE
RED
GREEN
GRAY
BLACK
PINK
WHITE
BLUE
BLACK/YELLOW
RED #18
STARTER FS-4 A514-060529
FLOURESCENT LAMP 13W-F13T5/CW A514-028148
INDICATES CLOSED END CONNECTOR
BLUE #18
WHITE #18
.47µf 400V
POWER SWITCH A506-058601
BROWN #18 (LINE)
BLACK #18 (LOAD)
DUAL CAPACITOR
ORANGE #18 (LIGHT)
BROWN
BLUE
GREEN
YELLOW
BLACK/RED
PHONE JAX ASSY. B500-060236 LOCATED ON TONE COLOR PANEL
NOTES:
1. ALL DISCONNECTS SHOWN WIRING SIDE.
RELEASED
RECORD OF CHANGE
SCHEM., T.C. PANEL
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
D 501-101000

FUN BASS THEORY

Fun Bass is a new feature which has been added to the Fun Machine automatic chord system. Fun Bass circuitry increases the capability of the bass section of the system so that in addition to the usual root and fifth bass pitches, the third, sixth, and seventh pitches are also made available and are included in the bass line of several rhythms. Fun Bass may be cancelled by pulling up on the Fun Bass Cancel switch, returning the bass portion of the rhythm pattern to a normal root/fifth.

Listed are the seven rhythm patterns that can include Fun Bass:

Swing	Hawaiian
Dixieland	Rhumba
Country	Polka
Pop Rock	

A black dot in the center of a rhythm select push button switch indicates that Fun Bass is available in that rhythm pattern.

Fun Bass pedal rhythm patterns are shown in chart form below:

	1st Measure																2nd Measure													
COUNT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
SWING	R				3				5				6				7				6				5				3			
DIXIELAND	R				R				5				5				7				6				5				3			
COUNTRY	R								5								R								5				3			
POP ROCK	R						R		5						5		R						R		5						3	
HAWIIAN	R								5								R								5				3			
RHUMBA	R								5				5				R								5				3			
POLKA	R								5								R								5				3			

R = ROOT 3 = THIRD 5 = FIFTH 6 = SIXTH 7 = SEVENTH — BASS PITCHES

FUN BASS TECHNICAL DESCRIPTION

The Fun Bass circuit is located on the Fun Machine logic board assembly, which is the bottom board in the Fun Machine Boards Assembly on all instruments with Fun Bass, 121W, 123W, 127W, and 128W.

The following technical description is supplemental to previously published Fun Machine theory. Fun Bass circuits have been added to the basic Fun Machine circuit resulting in alteration of automatic chording, key selector, and bass frequency control logic.

FUN MACHINE CHORD LOGIC

On Fun Bass organs, an additional generator frequency, the sixth for each of the twelve chords, has been added. Thus, the chord selector hex inverters (IC3-14) can supply all the pitches required by the Fun Bass logic circuit in addition to the normal inputs required for manual chords. This additional chord frequency necessitates the addition of a six transistor array (IC20) in the key selector circuit.

KEY SELECTOR

The resulting key selector function is unchanged. For instance, when the C - C^d key selector switch is depressed, four keys in the Fun Machine range will play a triad chord. Those chords are C, F, F#, and B, all other keys play a seventh chord. For example, when C is played and the C - G^d key selector switch is closed, +5V from the keyswitch is applied both to pin 14 of IC3 and via R865 to pin 10 of IC20. IC20 pin 10 is the base of an array transistor, the collector of which is connected to the seventh defeat bus (IC21 pin 8) via key selector switch S32. Playing C in the Fun Machine range then, in addition to gating the required pitches for the C chord, saturates the array transistor, which grounds the seventh bus. For this example, if C# is played, the array transistor saturated by the keyswitching voltage is not connected to the seventh defeat bus via the key selector switches, and therefore, the seventh is heard in the C# chord.

FUN BASS

During Fun Machine operation, Fun Bass circuitry must supply the bass divider with the correct signal frequencies in several modes of operation: In Fun Machine organ mode, the chord root frequency only is supplied to the divider. In non-Fun Bass rhythm modes of operation, root and fifth frequencies only are made available to the bass divider, and in Fun Bass mode, five of the chord frequencies are available to be gated to the bass divider input (IC17 pin 9). Of course, the divider must never receive two pitches at the same time.

FUN BASS THEORY (Cont'd.)
FUN BASS (Cont'd.)

Bass divider, IC17, is also used as the pedal divider on Model 127W and Model 128W organs. The Fun Machine push button switch, by switching +5V, accomplishes the changeover as follows: when switching to normal organ mode, +5V is removed from a bus which supplies: 1) the base of Q179; 2) power to part of the pedal logic circuit; and 3) Fun Machine keyswitch common voltage. As a result, Q179 now unclamps the pedal latch output and signal is applied to the pedal divider via level shifter Q180. Pedal logic open collector output stages IC25 and 26, now without power, are effectively non-existent, and Fun Machine keyswitch common voltage, also now missing, assures that all other Fun Machine circuits are inactive.

Generator signals gated by the Fun Machine chord selector IC's (IC3 thru IC14) are collected on common buses; root, major third, minor third, fifth, sixth, and seventh. The major and minor third signals are controlled by minor touch circuitry (to be discussed later) so that one or the other of these third signals will make up an output bus known as the "third bus". The chord output thus derived is controlled by normal Fun Machine circuits (See Fun Machine Theory in Technical Manual). These outputs are also supplied to the Fun Bass logic circuit.

The Fun Bass logic circuit contains two triple three input NAND gates with open collector outputs (type 7412). One input on each of five individual three input NAND gates receives signal from a chord selector output bus. (ie., root, third, etc.) Root signal is applied to pin 2 of IC26; third signal is applied to pin 4 of IC25; fifth signal is applied to pin 10 of IC26; sixth signal is applied to pin 1 of IC25; and seventh signal is applied to pin 4 of IC26. The outputs of these five three input NAND gates are connected together to form the output of the Fun Bass logic circuit. This output bus is connected to pin 9 (the clock input) of bass divider, IC17.

In order for the signal frequency to be gated by a typical three input NAND gate, it is necessary for the signal (square wave, 0, +5V) to be applied to one input and a high logic level (+5V) to the two other inputs. For instance, in root only mode of operation, pin 1 and pin 13 of IC26 must both be high. With these conditions met, the root signal (applied to pin 2) will be inverted by IC26 and appear at the output. It is also a circuit requirement that the other four available bass pitches be defeated. Any signal applied to a three input NAND gate input, along with a low logic level at, at least one other input, is inhibited. These conditions are met by the logic circuitry preceding the output stage of the Fun Bass logic circuit.

ROOT ONLY

Root only operation occurs only when ORGAN is selected alone. The Organ Switch supplies saturation voltage to the base of Q70. Q70 grounds the base of Q69, assuring that its collector can be pulled up to +5V, the high logic level. This high logic level is applied to pin 5 of two input NOR gate IC23 along with a wired low at the other input, pin 6. The combination of high and low at the input of the NOR gate results in a low output at pin 4. IC23 pin 4 is connected to IC26, pin 9, causing the fifth signal to be inhibited. This same low logic level is also applied to pin 11 of two input NOR gate IC23. Pin 12 of IC23 is also at the low logic level through a portion of the circuit yet to be described. NOR gate IC23 having both inputs at the low logic level supplies, at its output, a high logic level to pin 13 of IC26; which is part of the information necessary to gate the root signal.

Also necessary is the circuit path from the high logic level present at the collector of Q172. The collector of Q172 is high because no forward bias voltage, from a rhythm pattern switch, is present at its base. (Bias for Q172 is available only when a rhythm pattern with Fun Bass is selected.) The high collector of Q172 supplies the other necessary high logic level to pin 1 of IC26, allowing the root frequency to be gated. +5V at the collector of Q172 is also connected to pin 2 of IC23 along with the wired low logic level at pin 3. The output at pin 1 of IC23 is therefore low and is connected to IC26 pin 5, inhibiting the seventh.

The collector of Q178 is high (+5V) also, because no Fun Bass rhythm select switch is on. Inputs to NOR gate IC23 are therefore +5 at pin 8 (from Q178 collector) and a wired low at pin 9 causing the output to be low. The low logic level at IC23 pin 10 inhibits the sixth and the third by supplying a low logic level to IC25 pin 3 and 13. IC23 pin 12 also receives the low logic level from IC23 pin 10 and along with the previously discussed low input at pin 11 causes a high logic level to be at its output, pin 13. The high logic level from pin 13 is connected to IC26 pin 13 completing the logic requirements for gating the root of the chord.

NOTE: Portions of the circuit that are irrelevant to Root Only operations have not been discussed.

ROOT/FIFTH

Root/fifth is the normal Fun Machine bass pattern. That is, a root bass frequency may be triggered one or more times in the first half of each measure, and a fifth bass frequency in the second half of each measure. The timing of the pulses, which sound the bass notes, is determined by the rhythm pattern selected. Rhythms to which Fun Bass can be added play a root/fifth pedal pattern when Fun Bass is cancelled.

In any rhythm mode, outputs from the Rhythm Voice board initiate the switching of the bass logic circuits that determine which of the five available frequencies are supplied to the bass divider. In the case of any root/fifth mode of operation, a single input from the Rhythm Voice board determines whether a root or a fifth will be the bass frequency. In all 4/4 rhythms, counter output A3 (IC2 pin 12) supplies information the pedal logic circuit that determines when the circuit output switches between root and fifth. In Waltz mode, A4 (IC2 pin 13) supplies this information. During the first half of each measure, A3 is at the high logic level. This voltage causes Q41 to be cut-off and, therefore, supplies no voltage to the base of Q69 on the Fun Machine logic board. When Q69 is in the cut-off state, the Fun Bass logic circuit supplies a root frequency to the pedal divider as previously discussed under Organ Mode. In the second half measure, counter output A3 is at the low logic level, forcing Q41 to saturate and supply +27V to Q69. The collector of the now saturated Q69 supplies a low logic level, resulting in the following action: Pin 5 of NOR gate IC23 is now low along with the wired low at pin 6, resulting in a change from low to high logic level at output pin 4. This change in logic level affects two other points: The high logic level at pin 11 of IC23 causes the output of this NOR gate, at pin 13, to switch, going from high to low, and because of its connection to pin 13 of IC26, the root frequency is now defeated. And at the same time, the high logic level from pin 4 of IC23 is applied to pin 9 of IC26, completing the necessary input logic level requirements needed to gate the fifth signal to the pedal divider.

When a 3/4 time rhythm pattern has been selected, Q41 is controlled by counter output A4 which switches only at the end of each measure. As a result, 3/4 time rhythm patterns play root base frequencies in the first measure and fifth bass frequencies in the second measure, etc.

Rhythm patterns with Fun Bass capability are identified by a black dot on the associated push button switch. The Fun Bass switch controls the bases of three PNP transistors, Q185, Q186, and Q173. When Fun Bass is cancelled, these transistor bases are held at +27V and cannot respond to any input. When Fun Bass is desired, clamping voltage is removed by the switch and the transistors are then able to respond to control voltage.

Typical Fun Bass circuit operation: Swing

The Swing push button switch contacts simultaneously supply strobe pulses to pin 3 of the ROM and +27V to the Fun Bass logic circuit. (Rhythm circuit theory is covered in all Fun Machine manuals.) +27V supplied by the Swing switch is connected to the emitters of Q185 and Q186, providing the voltage which will be applied to the Fun Bass logic circuit when the associated rhythm counter output is at its low logic level (+12V). The switched +27V also saturates Q175 and Q174. Q175 then supplies a low at IC22 pin 13 and Q174 causes Q173 to be forward biased so that the Cymbal trigger will also trigger the Bass Guitar.

At the beginning of a measure, all counter outputs are set high and the Swing rhythm pattern memory information supplies a Bass Guitar trigger. At the 1st count of the measure, the Fun Bass logic circuit is supplying the root frequency to the bass divider. (Same circuit configuration as previously explained in the ROOT ONLY SECTION.) As the measure progresses, during the 2nd, 3rd, and 4th counts, no ROM trigger output is programmed for the Bass Guitar or Cymbal circuits and the counter outputs A2, A3, and A4, which control the Fun Bass logic, do not change. At count 5, the A2 counter output changes to the low logic level. (See Real Rhythm logic waveform chart.) When A2 goes low, Q186 is switched on (saturated) supplying saturation bias for Q178. Saturation of Q178 now supplies a low to NOR gate IC23 pin 8 which along with the wired low at pin 9, causes a high to be applied from output pin 10 to IC23 pin 12. NOR gate IC23 pins 12 and 11, now has a high and a low at its input terminals and the resulting low output at pin 13 defeats the root by supplying a low to NAND gate IC26 pin 13. The high from IC23 pin 10 also supplies part of the necessary logic needed to gate the 3rd by its connection to IC25 pins 3 and 13 (the 3rd must be gated at count #5). In order to gate the 3rd signal, one additional high must be applied to IC25 pin 5. Since pin 5 is supplied by the output of an inverter stage (IC25 pin 8), it is necessary that the input to the inverter (IC25 pins 9, 10, and 11) be low and referring to the Fun Machine chord logic schematic it can be seen that this necessary low logic level also defeats the 6th by its connection to IC25 pin 2. This required low logic level is supplied by NAND gate output IC24 pin 6. Pins 4 and 5 of IC24 must now be high. The necessary high logic levels for IC24 pins 4 and 5 come from two additional NAND gates in IC24 with outputs at pins 3 and 8. Inputs controlling pins 3 and 8 (NAND gate outputs) are the previously explained low logic levels from IC23 pins 1 and 4 which are connected to IC24 pins 2 and 9 respectively, assuring the necessary highs at pins 3 and 8 of IC24.

The preceding establishes that the 3rd signal is now being applied to the bass divider. In order to sound this frequency, a trigger from the Cymbal circuit is conducted via D262 & Q173 to Bass Guitar trigger transistor Q71. The Cymbal trigger is utilized at this count because the Swing ROM program does not include a Bass Guitar trigger at this point in the measure.

As the measure continues through count 6, 7 and 8, the 3rd continues to be applied to the bass divider but no additional Bass Guitar or Cymbal trigger comes from the ROM and so during this time, no bass note is heard. At count 9, both A2 and A3 counter outputs change state and set up the circuit for gating the 5th as previously discussed under Root/Fifth. The Bass Guitar is now triggered by both sources - Bass trigger and Cymbal trigger.

FUN BASS THEORY (Cont'd.)
ROOT/FIFTH (Cont'd.)

Continuing through the measure, no Bass or Cymbal ROM output is programmed until count 13. At count 13, counter output A2 switches low and causes voltage to be applied to the base of Q178, the resulting level change at the collector causes the associated logic circuitry to apply the 6th to the bass divider and the Cymbal trigger will sound this bass note.

Each succeeding change in the 3 counter outputs connected to the bass logic circuit cause one of the five available bass frequencies to be applied to the pedal divider at the time required by the rhythm pattern selected.

Swing and Dixieland have similar "walking bass" patterns when in Fun Bass mode. The other five Fun Bass patterns: Country, Pop Rock, Hawaiian, Rhumba, and Polka add a "3rd" to the normal root/fifth pedal patterns. Control voltage (+27V) from the rhythm pattern switches is applied, as in Swing and Dixieland, to Q185 and Q186 emitters, and to the base of Q176 which cuts off Q177. The collector of Q177 now switches to the high logic level and allows NAND gate IC22 pins 4, 5, and 6 to become active. Thus, when A3 is high the operation of Q172 in response to A4 is inhibited by the low at IC22 pin 6. The result of this action is that a normal root/fifth pattern is heard during the first measure of these rhythms and an extra bass note (3rd) is added to the second measure.

MINOR TOUCH THEORY

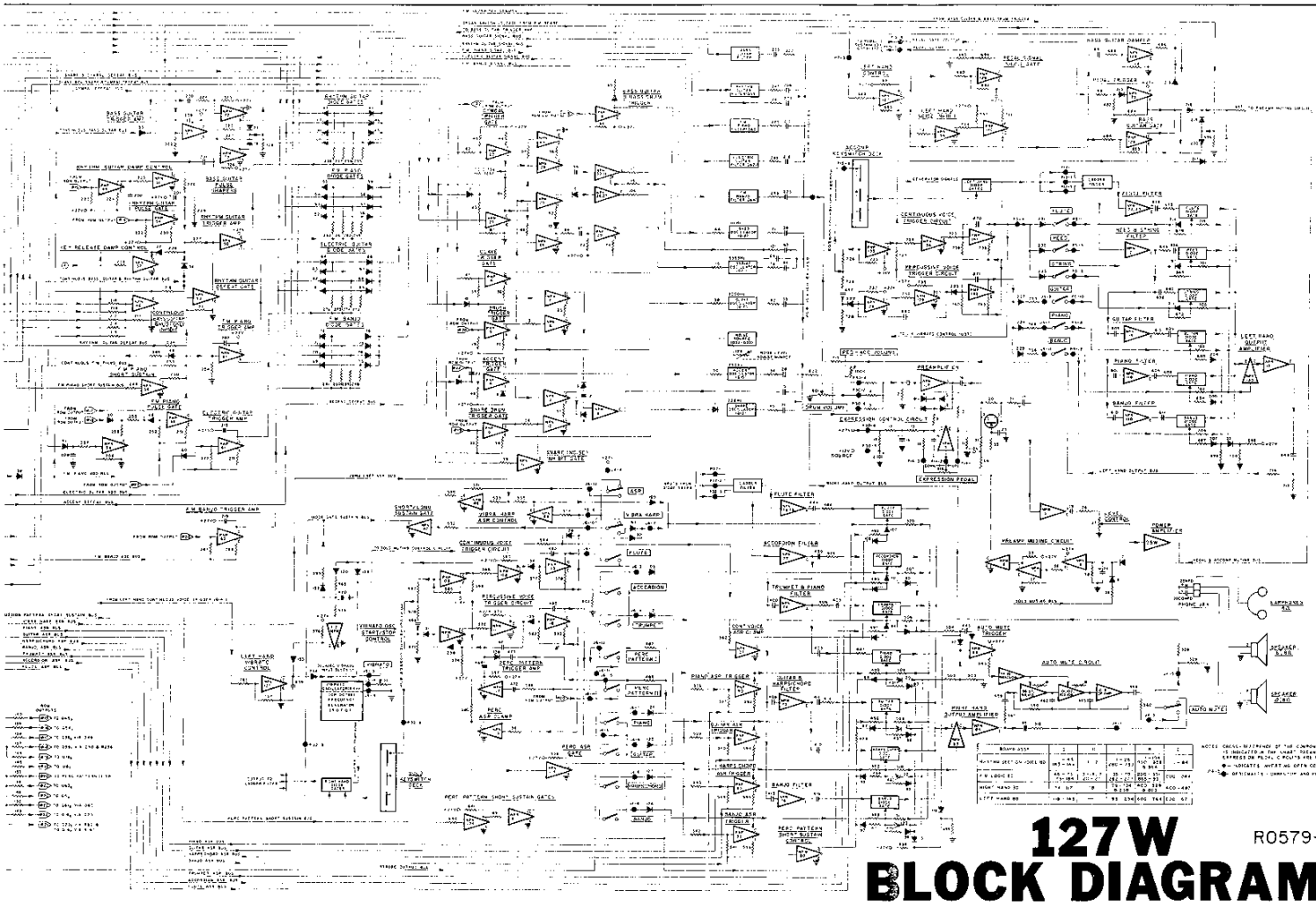
In all W series organs, 121W, 123W, 127W, and 128W, the mechanical switch operated minor bar has been replaced with a body capacity operated "touch strip". The minor touch action is identical to the previous system (changes the major 3rd in the chord to a minor 3rd), but is accomplished through different means.

Both the major and minor 3rd pitches are always gated by the action of chord selector logic. Normally, the major 3rd is included in the chord and the minor 3rd is inhibited. When the touch strip is activated, the major 3rd is inhibited and the minor 3rd is included in the chord. A single bus, known as the 3rd bus, carries the output signal.

Minor touch circuitry consists of a capacity touch strip on the accompaniment manual keyslip connected to the minor touch strip interface circuit assembly located on a small P.C. board mounted on the accompaniment keyframe directly behind the accompaniment bass keycap. A single shielded line from the P.C. board provides control for major - minor 3rd logic circuit on the Fun Machine logic board.

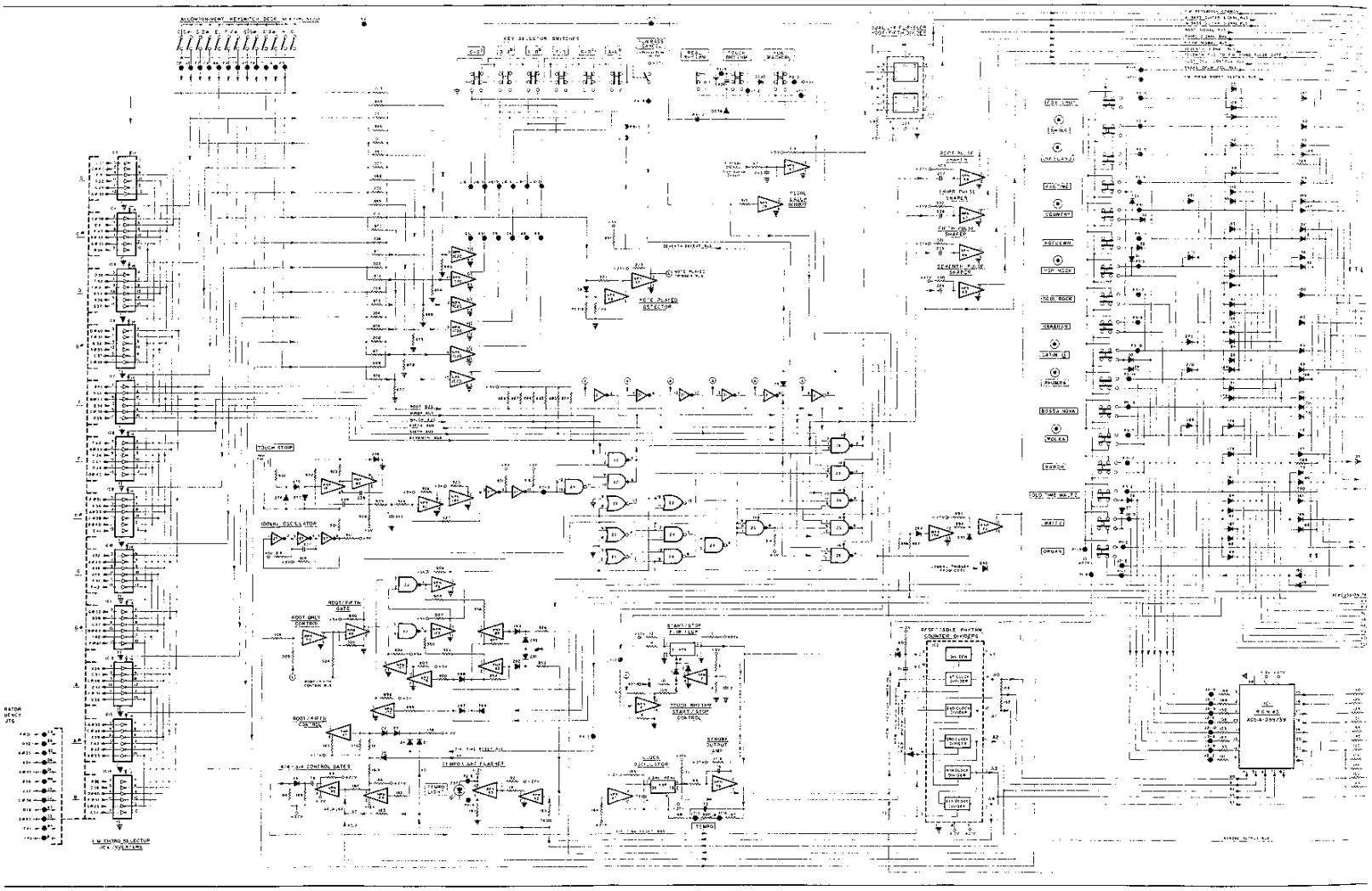
Control of the 3rd bus is accomplished by two 2 input NAND gates in IC22 (see Fun Machine logic schematic) and an additional NAND gate wired to function as an inverter. Major 3rd signal is connected to IC22-1 and the mionr 3rd signal is connected to IC22-9. The major 3rd signal (0, +5V square wave) and the minor touch control bus form the input to a NAND gate. When the control bus is high, the minor 3rd signal is inverted by the NAND gate and appears on the 3rd bus. The high minor touch control bus is also inverted and applied to the NAND gate controlling the minor 3rd, this now inhibits the minor 3rd. When the minor touch strip is activated, the control bus switches low to defeat the major 3rd, and is inverted by IC24 pin 12, 13, and 11, to gate the minor 3rd.

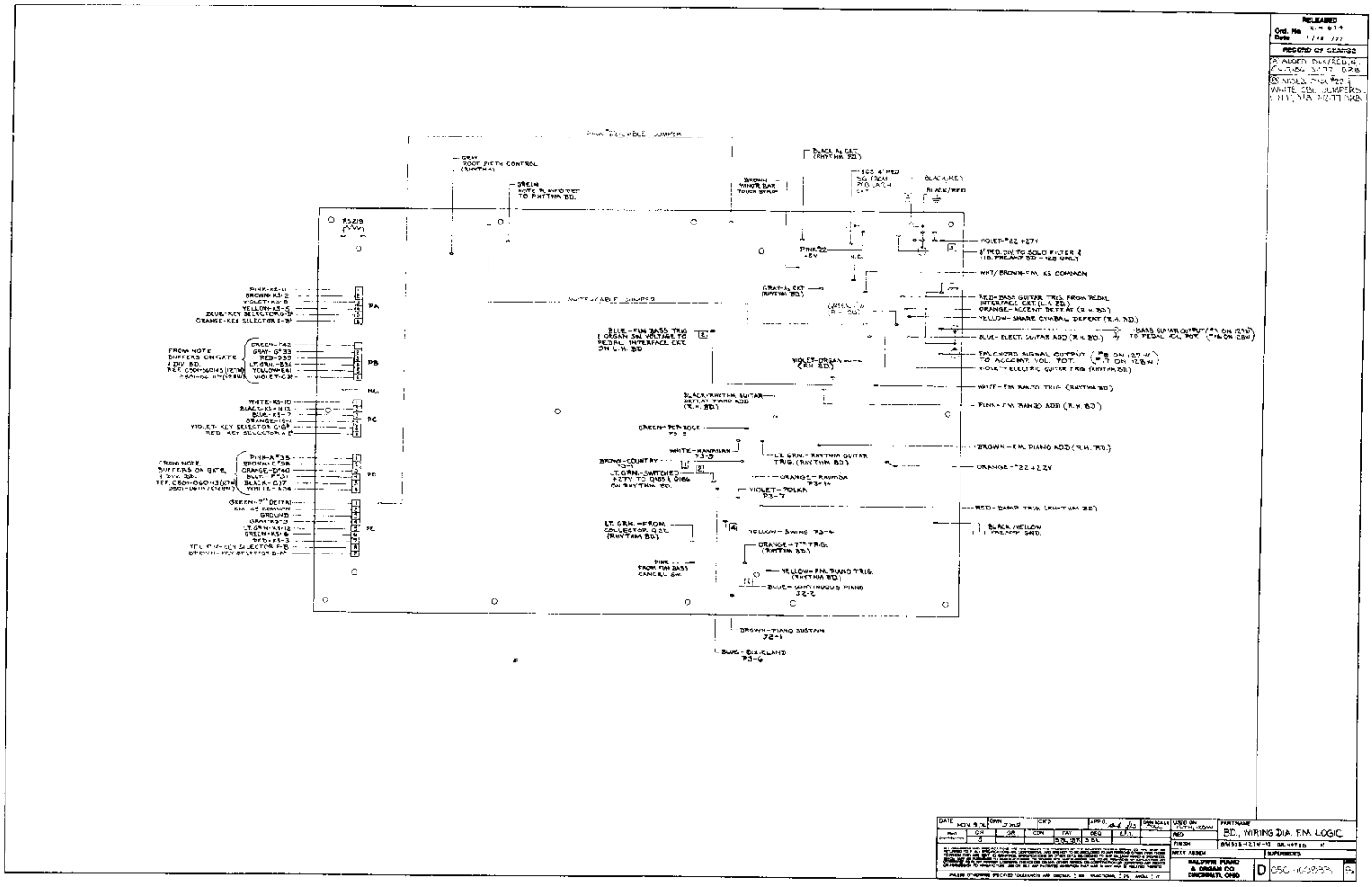
The Minor Touch Strip Interface circuit includes a 100kHz oscillator, the output of which is connected to the inner foil of the Touch Strip and the emitter of Q181. The base of Q181 is also connected to the oscillator output by two series diodes, D274 and D275. The junction of the two diodes is connected to the outer foil of the touch strip. When the strip is touched, capacity to ground is added to the circuit. The capacity to ground at the junction of D274 and D275 allows this point to become positive enough to cut off Q181, which allows Q182 to saturate. The collector of Q182 now drops to approximately .7V, resulting in the cut off of previously saturated Q183. The collector of Q183 now allows Q184 to be saturated via R923. The low collector of Q184 now, through two inverter stages in IC27, supplies a low on the minor touch control bus, resulting in a minor 3rd being substituted in the chord being played.

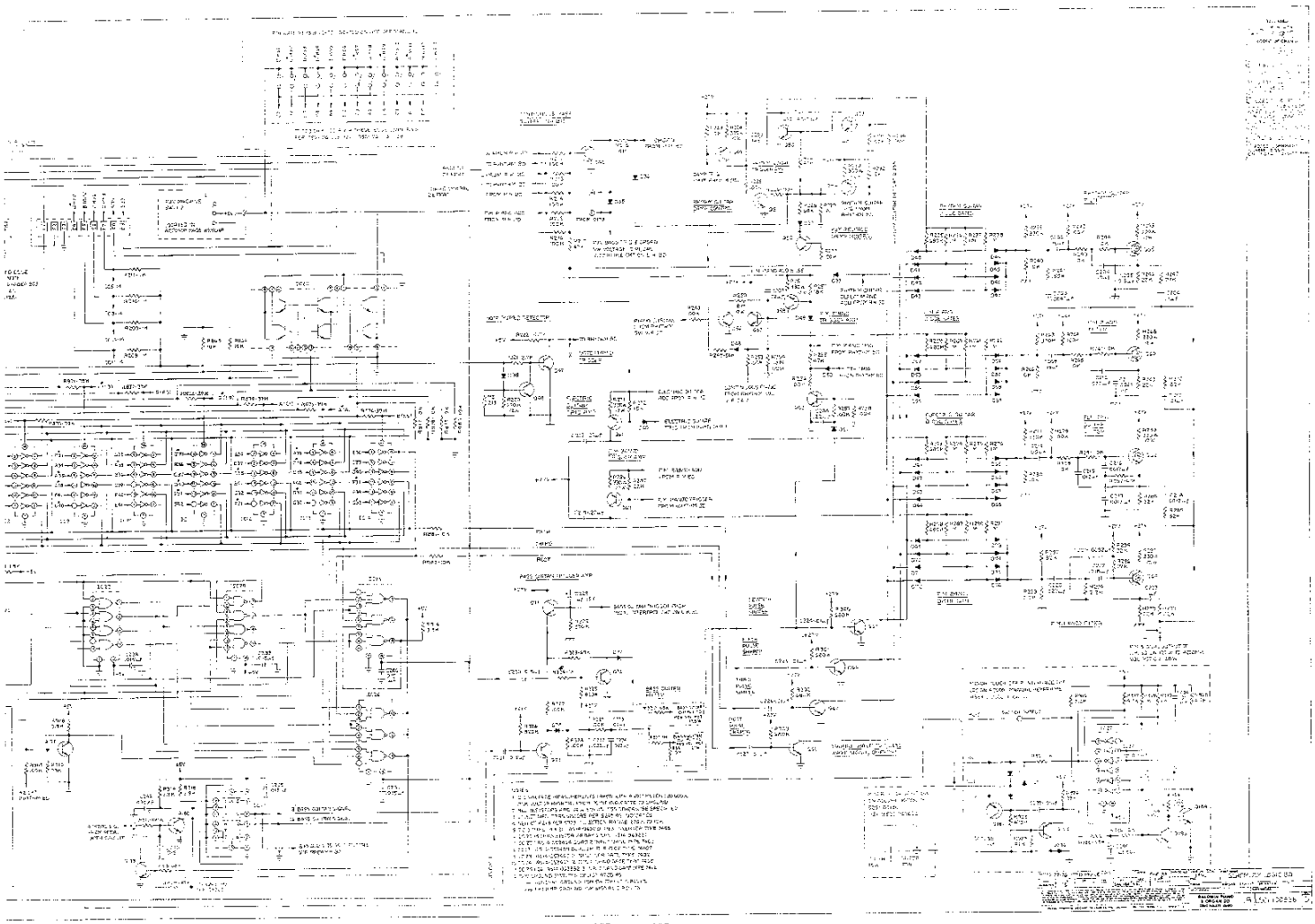


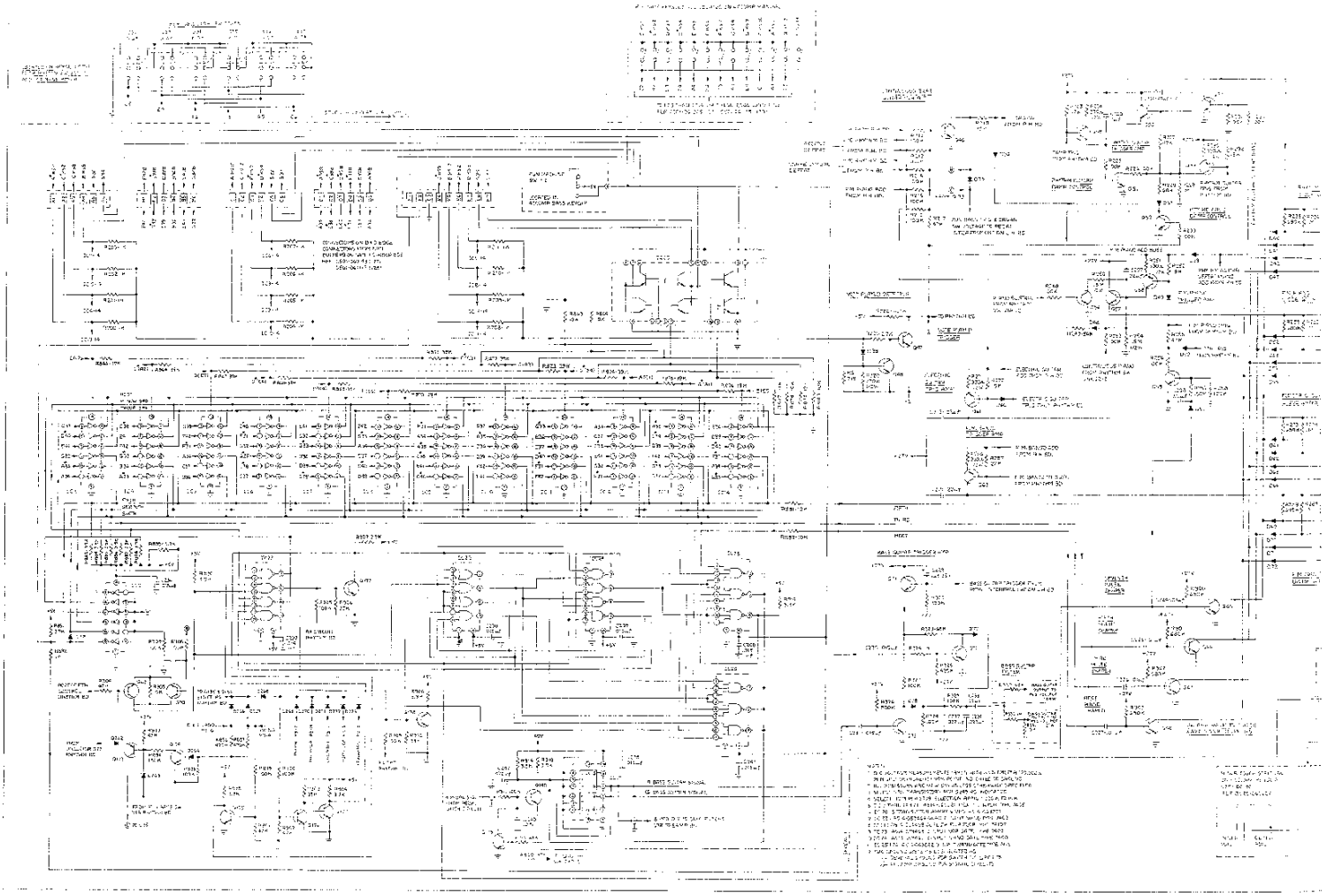
127W BLOCK DIAGRAM

R0579-100009




RELEASED
Ord. No. S.N. 674
Date 1/18/72
RECORD OF CHANGES
ADDED BLK/RED W.
CHANGE 3.77 .025
ADDED 7 PIN "P5"
WHITE TAIL JUMPERS
BD., WIRING DIA. F.M. LOGIC
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
D
050-100935





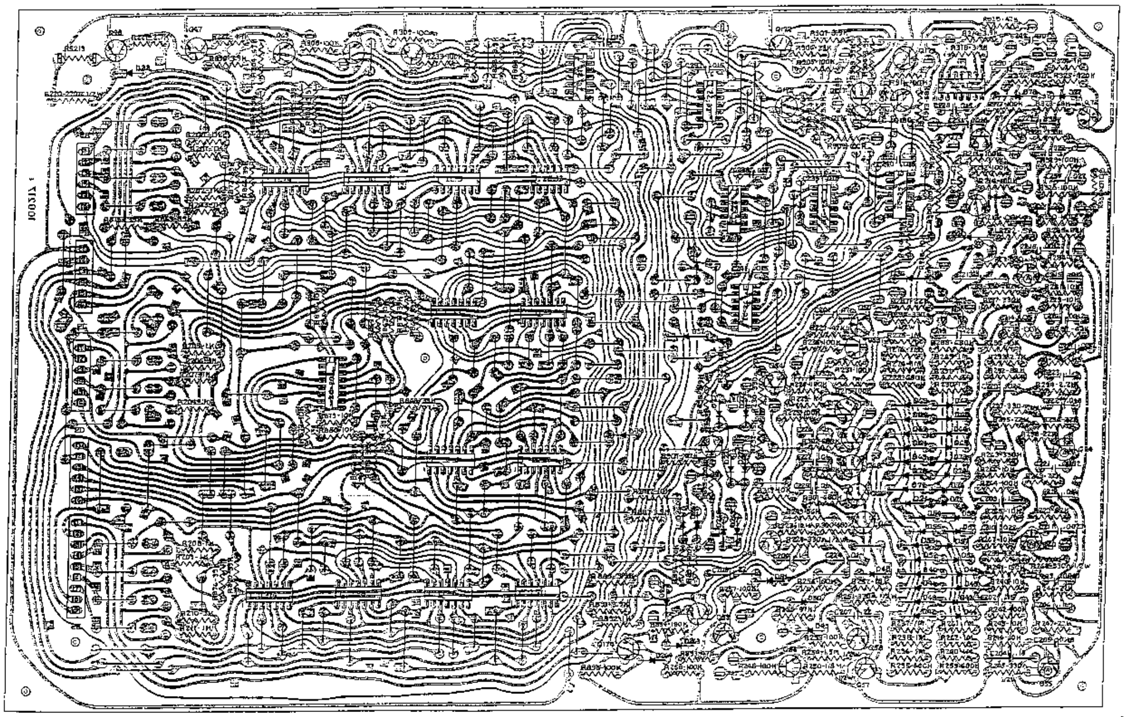
NOTES
1 REFERENCE SCHEMATIC 2050-100356
2 ALL RESISTORS ARE 1/4 W 5%, UNLESS OTHERWISE SPECIFIED.
3 ALL CAPACITORS ARE IN MICROFARAD UNLESS OTHERWISE SPECIFIED.
4 I.C. 3 THRU 14 & 21 ARE A514-056021 (7405)
I.C. 20 IS A514-063227 (5 TRANSISTOR ARRAY)
I.C. 22 IS A514-059464 (7403)
I.C. 17 IS A514-054489 (74107)
I.C. 23 IS A514-059465 (7402)
I.C. 24 IS A514-059463 (7400)
I.C. 25 & 26 ARE A514-063892 (74-21)
5 SELECTED TRANSISTORS ARE Q55, Q60, Q62 & Q64
6 SELECT R219 PER 5709, SELECTION RANGE 220Ω TO 10K
7 FINAL ASSY MUST INCLUDE PART NO. 0500-101002 (127) & 0500-101055 (128).
8 CAPACITORS MARKED C ARE CERAMIC
CAPACITORS MARKED WITH POLARITY ARE TANTALUM
CAPACITORS UNMARKED ARE MYLAR

9.

R NO.	VALUE	MODEL
R330	1M	127W
	68K	128W
R331	15K	127W
	NOT USED	128W

RELEASED
Ord. No. E.R. 674
Date 1/18/77

RECORD OF CHANGES
(A) ADDED R219 ... C.N. 17186 2-28-77 ...
REISSUED 3-6-7...
(B) ...
(C) RELOCATED R3... C.N. 17312 4-22-77 ...
(D) REVISED TO SEPARATE 360 FRO... C218. ADDED D75 ... DELETED D76 ... R222 WAS 4.7K. R308 & R309 WERE 33K. C245 WAS ... C.N. 17578 6-23-77 ...
(E) REMOVED JUMPE... C.N. 17546 9-2-77 ...



0500-10155 (18)	ITEM	QTY	PART NO.	PART NAME
X	72	X	5184-3	SOLDER-DIP
X	71	X	53134-6	SOLDER-IRON
X	70	X	5137-4	WIRE #22 BARE CU
	69			
	68			
1	67	1	5206-503	CAPACITOR CERAMIC .05µF
1	66	1	5209-203	" " .02µF
8	65	8	5205-153	" " .015µF
1	64	1	5205-471	" " 470pF
1	63	1	5248-35-105-2	CAPACITOR TANT 35V 20% 1µF
1	62	1	5249-35-475-1	" " 35V 10% 4.7µF
1	61	1	5232-01-274	CAPACITOR MYLAR .27µF
3	60	3	5232-01-224	" " .22µF
1	59	1	5232-01-184	" " .18µF
2	58	2	5232-01-154	" " .15µF
9	57	9	5232-01-104	" " .1µF
1	56	1	5232-01-273	" " .027µF
3	55	3	5232-01-223	" " .022µF
2	54	2	5232-01-183	" " .018µF
2	53	2	5232-01-153	" " .015µF
1	52	1	5232-01-123	" " .012µF
5	51	5	5232-01-103	" " .01µF
1	50	1	5232-01-822	" " .0082µF
1	49	1	5232-01-472	" " .0047µF
1	48	1	5232-01-272	" " .0027µF
3	47	3	5232-01-222	" " .0022µF
	46			
1	45	1	5255-225-10	RESISTOR 1/2 W 10% 2.2M
1	44	1	5255-155-10	" " " " 1.5M
3	43	3	5255-331-10	" " " " 330Ω
1	42	1	5255-271-10	" " " " 270Ω
1	41	1	5250-000-10	RESISTOR 1/4W 5% 4.7K
1	40	1	5250-XXX	RESISTOR 1/4 W 5% SELECT
13	39	13	5250-105	" " " 1M
2	38	2	5250-824	" " " 820K
8	37	8	5250-684	" " " 680K
2	36	2	5250-474	" " " 470K
4	35	4	5250-334	" " " 330K
1	34	1	5250-184	" " " 180K
3	33	3	5250-154	" " " 150K
31	32	31	5250-104	" " " 100K
3	31	3	5250-823	" " " 82K
4	30	4	5250-683	" " " 68K
1	29	1	5250-563	" " " 56K
8	28	8	5250-473	" " " 47K
13	27	13	5250-393	" " " 39K
2	26	2	5250-333	" " " 33K
1	25	1	5250-273	" " " 27K
8	24	8	5250-223	" " " 22K
1	23	1	5250-183	" " " 18K
2	22	2	5250-153	" " " 15K
1	21	1	5250-123	" " " 12K
19	20	19	5250-103	" " " 10K
1	19	1	5250-682	" " " 6.8K
16	18	16	5250-392	" " " 3.9K
2	17	2	5250-272	" " " 2.7K
1	16	1	5250-222	" " " 2.2K
34	15	34	5250-102	" " " 1K
	14			
1	13	1	A507-053127	CONNECTOR WAFER RT. ANGLE 7
4	12	4	A507-053125	CONNECTOR WAFER RT. ANGLE 5
2	11	2	A514-063892	I.C. 2 INPUT NAND GATE
1	10	1	A514-059463	I.C. 2 INPUT NAND GATE
1	9	1	A514-059465	I.C. 2 INPUT NOR GATE
1	8	1	A514-054489	I.C. DUAL JK FLIP FLOP
1	7	1	A514-059464	I.C. QUAD 2 INPUT NAND GATE
1	6	1	A514-063227	I.C. TRANSISTOR ARRAY 5 NPN
13	5	13	A514-056021	I.C. HEX INVERTER
6	4	6	A514-044910	TRANSISTOR PNP SM. SIGNAL
31	3	31	A514-033338	TRANSISTOR NPN SM. SIGNAL
58	2	58	A519-042751	DIODE MEDIUM VOLTAGE
1	1	1	C505-100218	BD. FM LOGIC RIVETED
QTY	ITEM	QTY	PART NO.	PART NAME

12-9-76 D. PEALE
PART NAME: BD. ASSY. F.M. LOGIC
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
F0500-101002 E

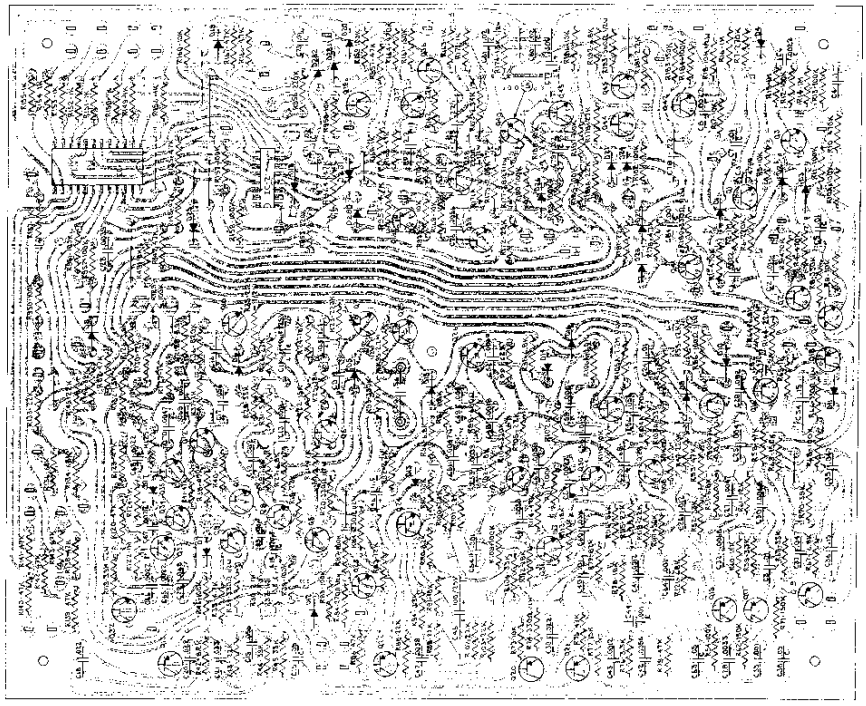
NOTES:

1. REF. SCHEMATIC 8501-100233, WIRING DIAGRAM C501-100761 (2) - 8501-100461, 2501-100946 (2) - 8501-100946, 2501-100982
2. ALL RESISTORS ARE 1/4W 5% UNLESS OTHERWISE SPECIFIED.
3. ALL CAPACITOR VALUES ARE IN MFD. UNLESS OTHERWISE SPECIFIED
   CAPACITORS MARKED 'C' ARE CERAMIC - MARKED 'A' ARE TANTALUM - MARKED 'S' ARE ELECTROLYTICS -
   UNMARKED ARE MYLARS.
4. IC (1) A514-058739 MOUNTED ON SOCKET (IT 8).
   IC (2) A514-058248 MOUNTED ON SOCKET (IT 8).
5. FINAL ASSY MUST INCLUDE PART No. 300-100631.
6. SF 321 (26, 324, 325, 326, 327 99% SLDR.

RELEASED
Ord No. XP-1412
Date 6/16/76

RECORD OF CHANGE

(A) REVISED PER ANT
Initial Assembly Run
(B) ADDED A 33 K RES
ON (1) 9th 77



93	1	3344-252X5-1	CAP. TANT. 2.2 μF	10%
92	3	3344-35105-2	CAP. TANT. 1μF	20%
91	1	3344-35689-1	CAP. TANT. 68μF	10%
90	1	5311-055-100	CAP. ELECTROLYTIC 100μF	25V
89		5311-065-610	CAP. ELECTROLYTIC 610μF	25V
88	1	5311-050-001	CAP. ELECTROLYTIC 1μF	50V
87	3	5198-508	CAP. CERAMIC	.01μF
86	4	5198-508		.01μF
85	9	104		.01μF
84	4	103		.001μF
83	6	333		.0033μF
82	3	471		470pF
81	1	3309-470	CAP. CERAMIC	47pF
80	3	5230-01-104	CAP. MYLAR	.1μF
79	1	564		.56μF
78	2	334		.33μF
77	1	154		.15μF
76	3	103		.010μF
75	1	913		.0091μF
74	1	683		.0068μF
73	3	563		.0056μF
72	1	473		.047μF
71	1	393		.033μF
70	1	303		.033μF
69	3	223		.022μF
68	3	123		.012μF
67	1	102		.0020μF
66	1	872		.0087μF
65	2	682		.0068μF
64	5	562		.0056μF
63	5	472		.0047μF
62	6	392		.0039μF
61	1	332		.0033μF
60	2	272		.0027μF
59	1	332		.0033μF
58	1	182		.0018μF
57	7	5230-01-101	CAP. MYLAR	.0010μF

ITEM	REQ.	PART NUMBER	PART NAME

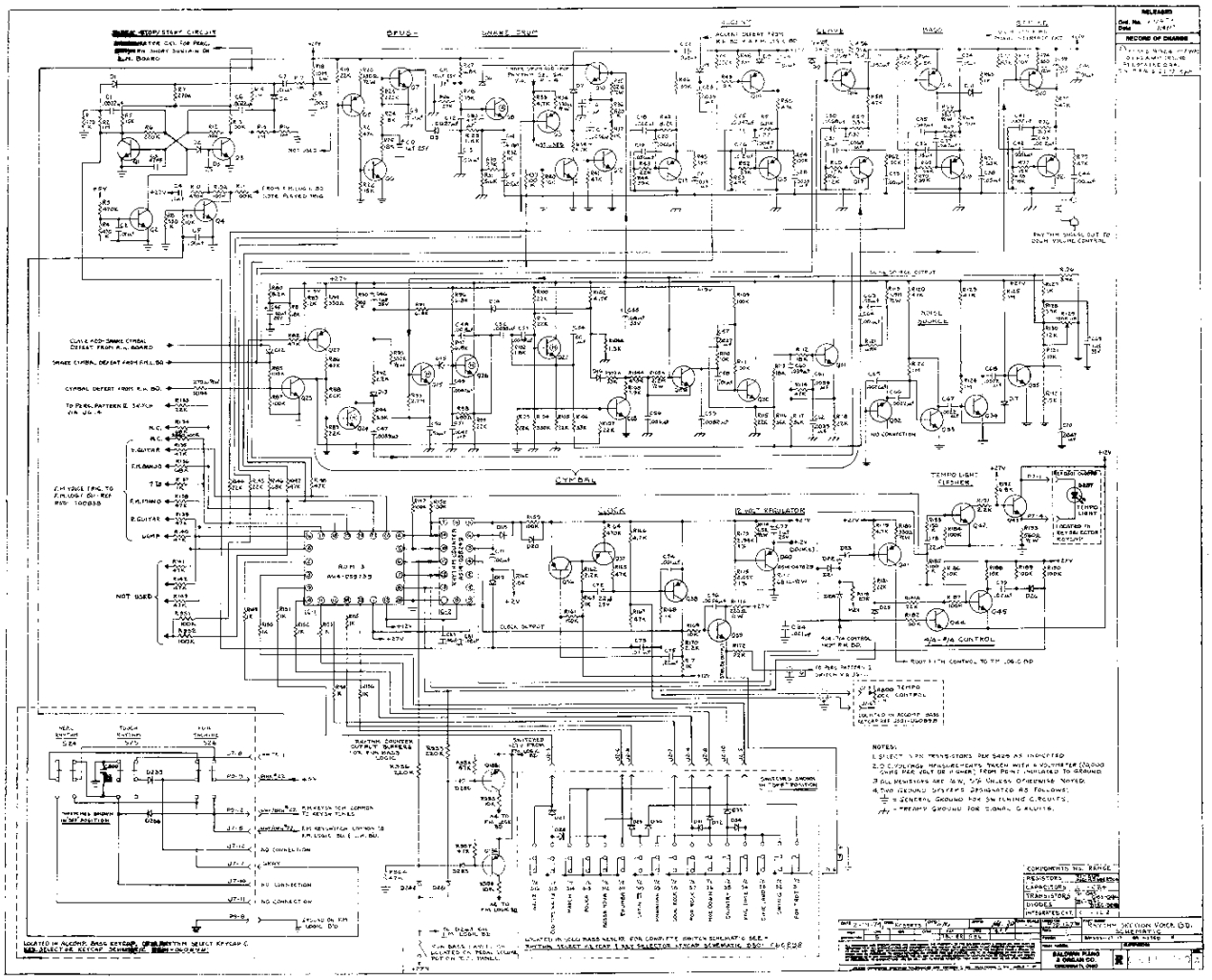
54	X	W84-3	SOLDER (DIP)	
53	A	53134-6	SOLDER (WORK)	
52	X	5137-4	WIRE #22, BARE CU.	
51		A505-041910	TFNH-707, 100K, 1%	
50	1	53232-0052941	RES. 1W 1%	2.94K
49	1	53232-0032057	RES. 1W 1%	2.05K
48		12.35-106-10	RESISTOR 1/2W 10%	10M
47	1	395		3.9M
46	3	225		2.2M
45	1	152		1.5K
44	1	561		560Ω
43	6	331		330Ω
42	1	271		270Ω
41	1	221		220Ω
40	1	101		100Ω
39	3	5229-685-10	RESISTOR 1/2W 10%	68Ω
38	9	5250-105	RESISTOR 1/4W 5%	1M
37	1	854		850K
36	6	474		470K
35	3	394		390K
34	2	334		330K
33	1	274		270K
32	6	224		220K
31	8	154		150K
30	19	104		100K
29	1	823		82K
28	4	683		68K
27	2	563		56K
26	17	473		47K
25	5	393		39K
24	3	333		33K
23	10	273		27K
22	6	223		22K
21	6	183		18K
20	3	153		15K
19	4	123		12K
18	14	103		10K
17	7	822		8.2K
16	8	682		6.8K
15	1	562		5.6K
14	5	472		4.7K
13	3	392		3.9K
12	3	332		3.3K
11	4	272		2.7K
10	2	182		1.8K
9	3	152		1.5K
8	1	102		1K
7	1	5250-681	RESISTOR 1/4W 5%	680Ω
6	1	6514-36/804	I.C. SOCKET 14 PIN	
5	1	2546-041851	I.C. SOCKET 16 PIN	
4	1	A514-058739	I.C. RHYTHM PATTERN GEN.	
3	1	A514-058249	I.C. RHYTHM COUNTER	
2	1	A514-047975	TRANSISTOR PNP MED PWR.	
1	17	1504-544810	TRANSISTOR PNP GP SIGNAL	
3	30	A514-053358	TRANSISTOR NPN SM SIGNAL	
2	130	A514-041791	DIODE, HEL VOLTAGE	
1	1	2505-102300	SD RHYTHM VOICE PWB	

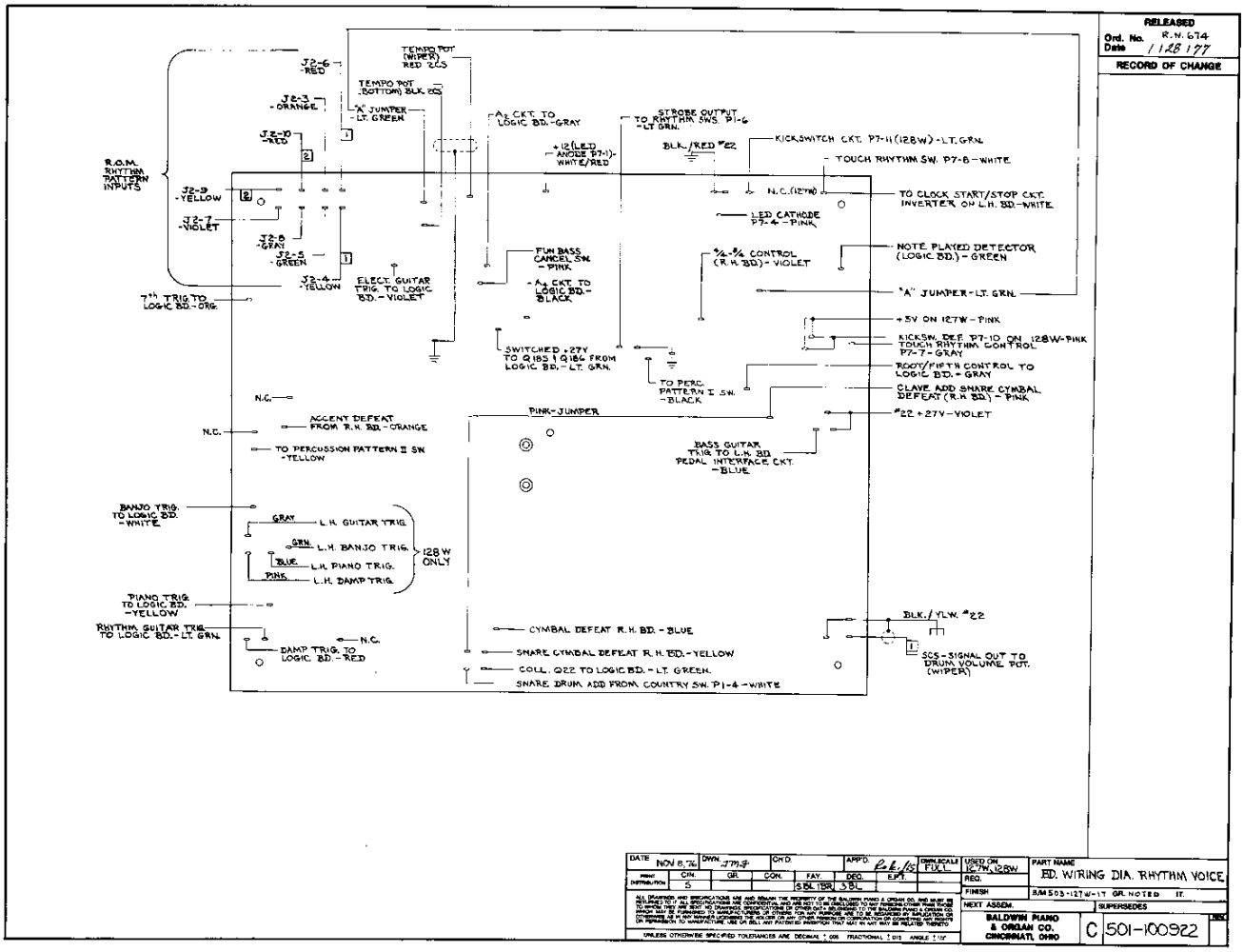
ITEM	REQ.	PART NUMBER	PART NAME

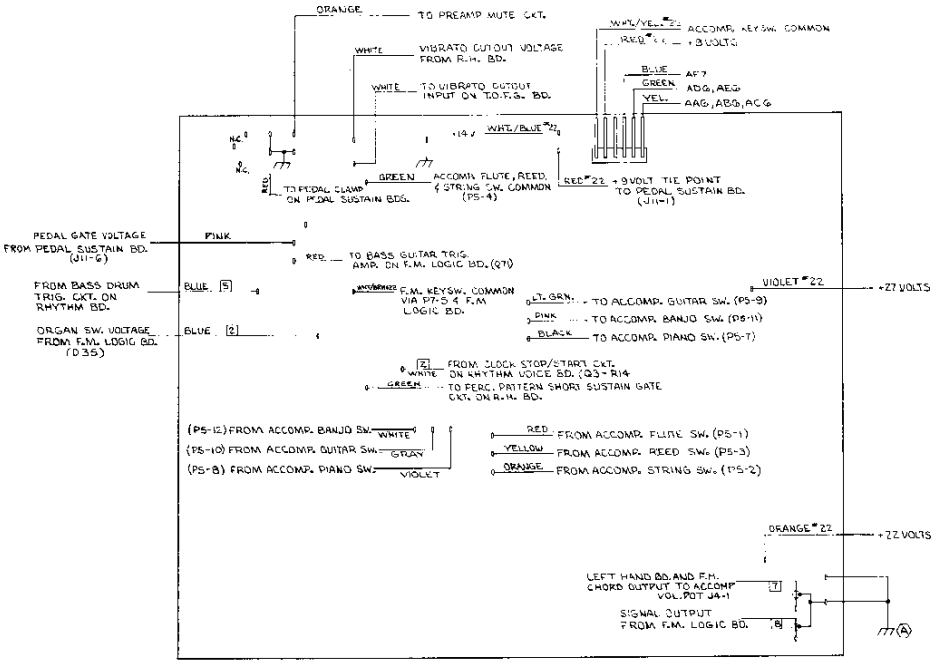
ASSY RHYTHM VOICE SD

THE BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

R 8590-100231 B




R.O.M. RHYTHM PATTERN INPUTS
J2-9 -YELLOW
J2-7 -VIOLET
J2-8 -GRN.
J2-5 -GREEN
J2-4 -YELLOW
J2-6 -RED
J2-3 -ORANGE
J2-10 -RED
TEMPO POT (WIPER) RED #25
TEMPO POT (BOTTOM) BLK. #25
"A" JUMPER - LT. GREEN
7th TRIG TO LOGIC BD. - ORG.
ELECT. GUITAR TRIG. TO LOGIC BD. - VIOLET
A1 CKT. TO LOGIC BD. - GRAY
STROBE OUTPUT TO RHYTHM SWS. P1-6 - LT GRN.
+12 (LED ANODE P7-1) - WHITE/RED
BLK./RED #22
KICKSWITCH CKT. P7-11 (128W) - LT. GRN.
TOUCH RHYTHM SW. P7-8 - WHITE
N.C. (127W)
TO CLOCK START/STOP CKT. INVERTER ON L.H. BD. - WHITE
LED CATHODE P7-4 - PINK
FUN BASS CANCEL SW. - PINK
A4 CKT. TO LOGIC BD. - BLACK
¾-¾ CONTROL (R.H. BD.) - VIOLET
NOTE PLAYED DETECTOR (LOGIC BD.) - GREEN
"A" JUMPER - LT. GRN.
+5V ON 127W - PINK
KICKSW. DEF. P7-10 ON 128W - PINK
TOUCH RHYTHM CONTROL P7-7 - GRAY
ROOT/FIFTH CONTROL TO LOGIC BD. - GRAY
CLAVE ADD SNARE CYMBAL DEFEAT (R.H BD.) - PINK
#22 +27V - VIOLET
SWITCHED +27V TO Q185 & Q186 FROM LOGIC BD. - LT. GRN.
TO PERC. PATTERN I SW. - BLACK
PINK - JUMPER
BASS GUITAR TRIG TO L.H. BD PEDAL INTERFACE CKT. - BLUE
N.C.
ACCENT DEFEAT FROM R.H. BD. - ORANGE
TO PERCUSSION PATTERN II SW. - YELLOW
BANJO TRIG. TO LOGIC BD. - WHITE
GRAY - L.H. GUITAR TRIG.
GRN. - L.H. BANJO TRIG.
BLUE - L.H. PIANO TRIG.
PINK - L.H. DAMP TRIG.
128 W ONLY
PIANO TRIG. TO LOGIC BD. - YELLOW
RHYTHM GUITAR TRIG. TO LOGIC BD. - LT. GRN.
DAMP TRIG. TO LOGIC BD. - RED
N.C.
CYMBAL DEFEAT R.H. BD. - BLUE
SNARE CYMBAL DEFEAT R.H. BD. - YELLOW
COLL. Q22 TO LOGIC BD. - LT. GREEN.
SNARE DRUM ADD FROM COUNTRY SW. P1-4 - WHITE
BLK./YLW. #22
SCS - SIGNAL OUT TO DRUM VOLUME POT. (WIPER)
RELEASED
Ord. No. R.N. 674
Date 1/28/77
RECORD OF CHANGE
DATE NOV 8,'76
DWN. JMH
CH'D.
APP'D. R.K. 1/5
DIMENSIONS FULL
USED ON 127W, 128W
PART NAME ED. WIRING DIA. RHYTHM VOICE
PRINT DISTRIBUTION CIN. 5 GR. CON. FAY DEG. EPT. 5 BAL. 1SR. 3 BAL.
REQ.
FINISH BM 503-127W-17 GR. NOTED IT.
NEXT ASSEM. SUPERSEDES
ALL DRAWINGS AND SPECIFICATIONS ARE AND REMAIN THE PROPERTY OF THE BALDWIN PIANO & ORGAN CO. AND MUST BE RETURNED TO IT ON REQUEST. ALL SPECIFICATIONS ARE CONFIDENTIAL AND ARE NOT TO BE DISCLOSED TO ANY PERSONS OTHER THAN THOSE TO WHOM THEY ARE ORIGINALLY ISSUED. NO MANUFACTURE OF OTHER CONSTRUCTION PLANS ARE TO BE MADE FROM THESE DRAWINGS WITHOUT THE WRITTEN CONSENT OF THE BALDWIN PIANO & ORGAN CO. OTHERWISE AS IN ANY MANNER LICENSING THE BUILDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHT OR EXPRESSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE DECIMAL ± .005 FRACTIONAL ± 1/32 ANGLE ± 1/2°
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
C 501-100922
REV.



RELEASED
Ord. No. R.N. 614
Date 1/28/77

RECORD OF CHANGE

(A) REVISED TO CONFORM WITH CBL. CONNECTIONS. C.N. 13,118 2-11-77 RN

DATE 12-6-76 DWK. 1774-3 CHK'D. APP'D. DWG. SCALE

FIRST	CHK.	QR.	CON.	FAY.	DEG.	E.P.T.
DISTRIBUTION	G			SBL 1SR	3 SL	

USED ON MODEL 127N REQ. —

PART NAME DIAGRAM, L.H. VOICE BD. PIN WIR

FINISH BAM 508-1276-17 SPC 748-158 FT.

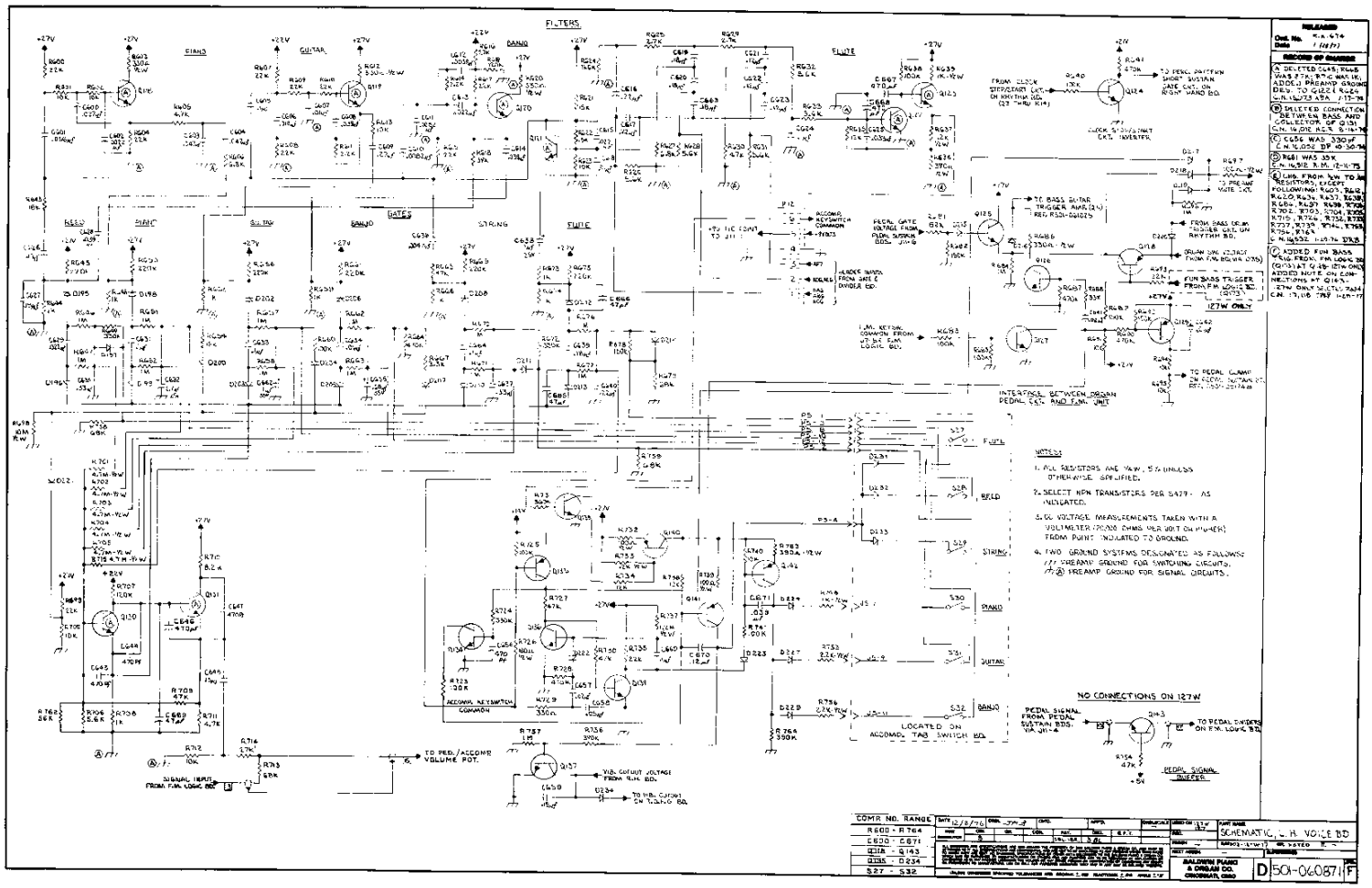
NEXT ASSBL. SUPERSEDES

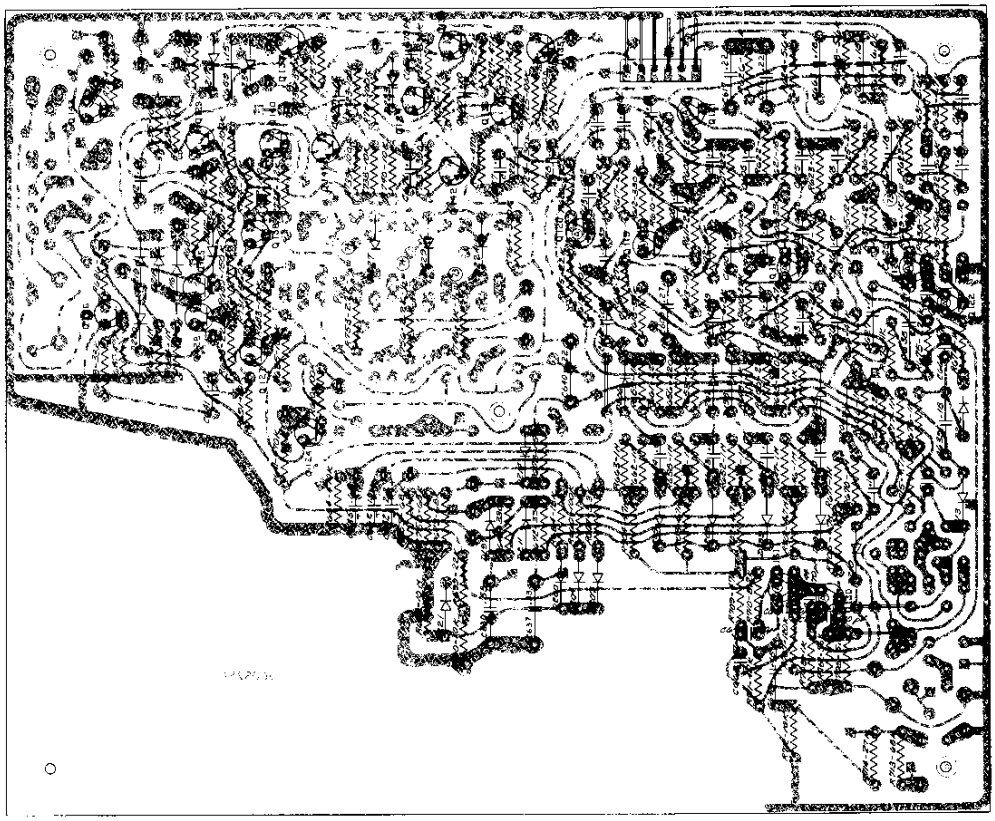
ALL DRAWINGS AND SPECIFICATIONS ARE AND REMAIN THE PROPERTY OF THE BALDWIN PIANO & ORGAN CO. AND MUST BE RETURNED TO IT UPON REQUEST. ALL SUCH DRAWINGS AND SPECIFICATIONS ARE LOANED SUBJECT TO AGREEMENT THAT THEY ARE NOT TO BE DISCLOSED TO ANY PERSONS OTHER THAN THOSE TO WHOM SUCH DISCLOSURE IS NECESSARY FOR THE PURPOSE FOR WHICH THEY ARE LOANED, NOR COPIED NOR USED AS A BASIS FOR, NOR IN THE PREPARATION OF, ANY OTHER DRAWINGS OR SPECIFICATIONS, EXPRESS OR IMPLIED, TO MANUFACTURERS OR OTHERS FOR ANY PURPOSE AND TO BE SURRENDERED ON DEMAND OR OTHERWISE AS IN ANY EVENT, EXPRESSED THE LOANEE OR ANY OTHER PERSON OR CORPORATION OR COMPANY FOR WHOM OR FOR WHOSE BENEFIT THE LOANEE MAY ACT, MAY MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY BE AND MAY BE RELATED THERETO.

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/64 ANGLE ± 1/2°

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

C 501-100996 A


FILTERS
PIANO
GUITAR
BANJO
FLUTE
STRING
GATES
REED
PIANO
GUITAR
BANJO
STRING
FLUTE
FLUTE
REED
PIANO
STRING
GUITAR
BANJO
S27
S28
S29
S30
S31
S32
LOCATED ON ACCOMP. TAB SWITCH BD.
INTERFACE BETWEEN ORGAN PEDAL CKT. AND TAB. UNIT
127W ONLY
NO CONNECTIONS ON 127W
PEDAL SIGNAL FROM PEDAL SUSTAIN BDS. VIA J11-4
PEDAL SIGNAL BUFFER
TO PEDAL DIVIDER ON FIN. LOGIC BD.
TO PEDAL CLNAR ON PEDAL GUITAR VT. BD. (127-2217-B)
TO PED./ACCOMP. VOLUME POT.
SIGNAL INPUT FROM FIN. LOGIC BD.
ACCOMP. KEYSWITCH COMMON
TO TAB. CIRCUITS ON TGEN/O BD.
VIB. OUTPUT VOLTAGE FROM FIN. BD.
TO BASS GUITAR TRIGGER AMP. (12-REF. 1531-0402)
FROM BASS DRUM TRIGGER CKT. ON RHYTHM BD.
FUN BASS TRIGGER FROM FIN. LOGIC BD.
PEDAL GATE VOLTAGE FROM FIN. LOGIC BDS.
+5V VIC CONT TO J11
FROM CLOCK STEP/START CKT. ON RHYTHM BD. (J3 -THRU- K14)
CLOCK STOP/START CKT. INVERTER
TO PERC. PATTERN SHORT SUSTAIN GATE CKT. ON RHYTHM BD.
FROM KEYING COMMON FROM 12 V.C. CAM LOGIC BD.
LADDER INPUTS FROM GATE & DIVIDER BD.
RELEASED
Cust. No. 127-2214
Date 1/19/77
RECORD OF CHANGES
A DELETED C645, R646 WAS 8.2K, R710 WAS 1K, ADDED PREAMP GROUND DES. TO Q122 & Q124 C.N. 16,623 ADA. 7-17-76
B DELETED CONNECTION BETWEEN BASS AND COLLECTOR OF Q131 C.N. 16,012 ALS. 8-16-76
C C656 WAS 330 pF C.N. 16,006 BY 10-30-76
D R681 WAS 33K C.N. 16,912 R.M. 12-16-76
E C616 FROM 33K TO 36K RESISTORS, EXCEPT FOLLOWING: R603, R612, R620, R634, R637, R638, R686, R687, R698, R702, R703, R704, R705, R715, R724, R731, R732, R737, R739, R740, R754, R764 C.N. 16,932 1-19-77 BWB
F ADDED FUN BASS C50 FROM FIN LOGIC BD. (Q113) AT Q48 (127W ONLY) ADDED NOTE ON CONNECTIONS AT Q124. -27V ONLY SCTN. 7434 C.N. 17,108 2-8-77 HEN-77
NOTES:
1. ALL RESISTORS ARE ¼W, 5% UNLESS OTHERWISE SPECIFIED.
2. SELECT NPN TRANSISTORS PER SA27- AS INDICATED.
3. DC VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHMS PER VOLT ON HIGHEST) FROM POINT INDICATED TO GROUND.
4. TWO GROUND SYSTEMS DESIGNATED AS FOLLOWS:
PREAMP GROUND FOR SWITCHING CIRCUITS.
SIGNAL GROUND FOR SIGNAL CIRCUITS.
COMP. NO. RANGE
R600 - R764
C600 - C671
Q114 - Q143
D195 - D234
S27 - S32
SCHEMATIC, L.H. VOICE BD
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
D 50-06087 1 F



75				
74	2	5239-224-10	RESISTOR 220K 1/4W 10%	
73	2	5239-182-10	RESISTOR 1K 1/4W 10%	
72	1	5120-823	RESISTOR 82K 1/4W 5%	
71	1	5120-822	RESISTOR 8.2K 1/4W 5%	
70	1	5239-563	RESISTOR 56K 1/4W 5%	
69	1	5239-125-10	RESISTOR 1.2M 1/4W 10%	
68	X	5134-4	SOLDER IRON	
67	X	5164-8	SOLDER DIP	
66	X	5187-6	BARE SOLDER WIRE	
65	1	5046-15-205-1	SHUNT FOR 2.5A KEY-TAPE	
64	1	5244-35-106-2	1uF 50V - TANT	
63	1	5244-35-684-1	.68uF 35V - TANT	
62	1	5311-025-001	1uF 25V ELECT	
61	1	5310-503	.05uF CERAMIC	
60	5	5218-203	.02 MY	
59	7	5605-471	470pF	
58				
57	3	5206-470	47pF CERAMIC	
56	5	5232-01-334	.33uF MYLAR	
55	1	274	.27 uF	
54	3	224	.22uF	
53	5	184	.18uF	
52	2	154	.15uF	
51	4	124	.12uF	
50	7	104	.10uF	
49	1	563	.056uF	
48	2	473	.047uF	
47	4	393	.039uF	
46	1	333	.033uF	
45	1	273	.027uF	
44	3	223	.022uF	
43	1	183	.018uF	
42	4	103	.01uF	
41	2	682	.0068uF	
40	1	472	.0047uF	
39	1	392	.0039uF	
38	1	5232-01-222	CAPACITOR, .0022uF MYLAR	
37	1	5233-106-10	RESISTOR 10M 1/2W 10%	
36	6	5231-475-10	4.7M 1/2W 10%	
35	18	5239-105	1M 1/4W 5%	
34	1	564	560K	
33	5	474	470K	
32	2	394	390K	
31	3	334	330K	
30	6	224	220K	
29	3	154	150K	
28	2	124	120K	
27	3	104	100K	
26	4	683	68K	
25	5	473	47K	
24	1	393	39K	
23	1	333	33K	
22	2	273	27K	
21	11	223	22K	
20	2	183	18K	
19	2	163	16K	
18	2	123	12K	
17	11	103	10K	
16	2	682	6.8K	
15	7	562	5.6K	
14	3	472	4.7K	
13	1	332	3.3K	
12	2	272	2.7K	
11	2	5235-222	2.2K 1/4W 5%	
10	2	5239-122-10	1.2K 1/4W 10%	
9	8	5150-102	1K 1/4W 5%	
8	2	5239-391-10	390 Ω 1/4W 10%	
7	5	5235-331-10	330Ω 1/4W 10%	
6	4	5235-101-10	PRECISION 100Ω 1/2W 10%	
5	1	A107-059136	KONTAKTOR MAKER-6 COMP	
4	21	A64-042701	DIODE-MEDIUM VOLTAGE	
3	6	A64-046510	TRANSISTOR PNP	
2	18	A64-05338A	TRANSISTOR NPN	
1	1	C505-060828	LEFT HAND VOICE BD. ASS'Y	
QTY/ASSY		PART NO.	PART NAME	

RELEASED
CHG. No. RM 6-49
Date 8/30/74

RECORD OF CHANGES

A) REDRAWN AFTER USED TO COMPARE WITH ETCHED PATTERN. CN 12,301 M.S. 5-20-74

B) RELEASED AS SCR. NO CHANGE, NO CN M.K. JOHNSON 8-16-74

C) ADDED W#3 & W#4 QTY. OF ITEM 53 WAS 6 CN 16,032 DP 10-29-74

D) CHANGED PART NUMBER OF ITEM 59 FROM 5605-472 TO 5605-471 CN 16,368 DP 12-17-74 a. Samuel

E) R60 WAS 1M CN 16,476 RM 2-13-75

F) ALL RESISTORS WERE 5239-182 1K R73 & R156 WERE NOT CHANGED CN 16,532 DP 3-19-75 EM

G) DELETED R434 CN 17,118 2-27-75 RM

NOTES:
1) REF SCHEMATIC D501-060871 (27W-D501-00395)
2) PIN WIRING DIAGRAM C501-060828 (16TW-C501-100836)
3) FINAL ASSEMBLY MUST INCLUDE PART No. 500-060827

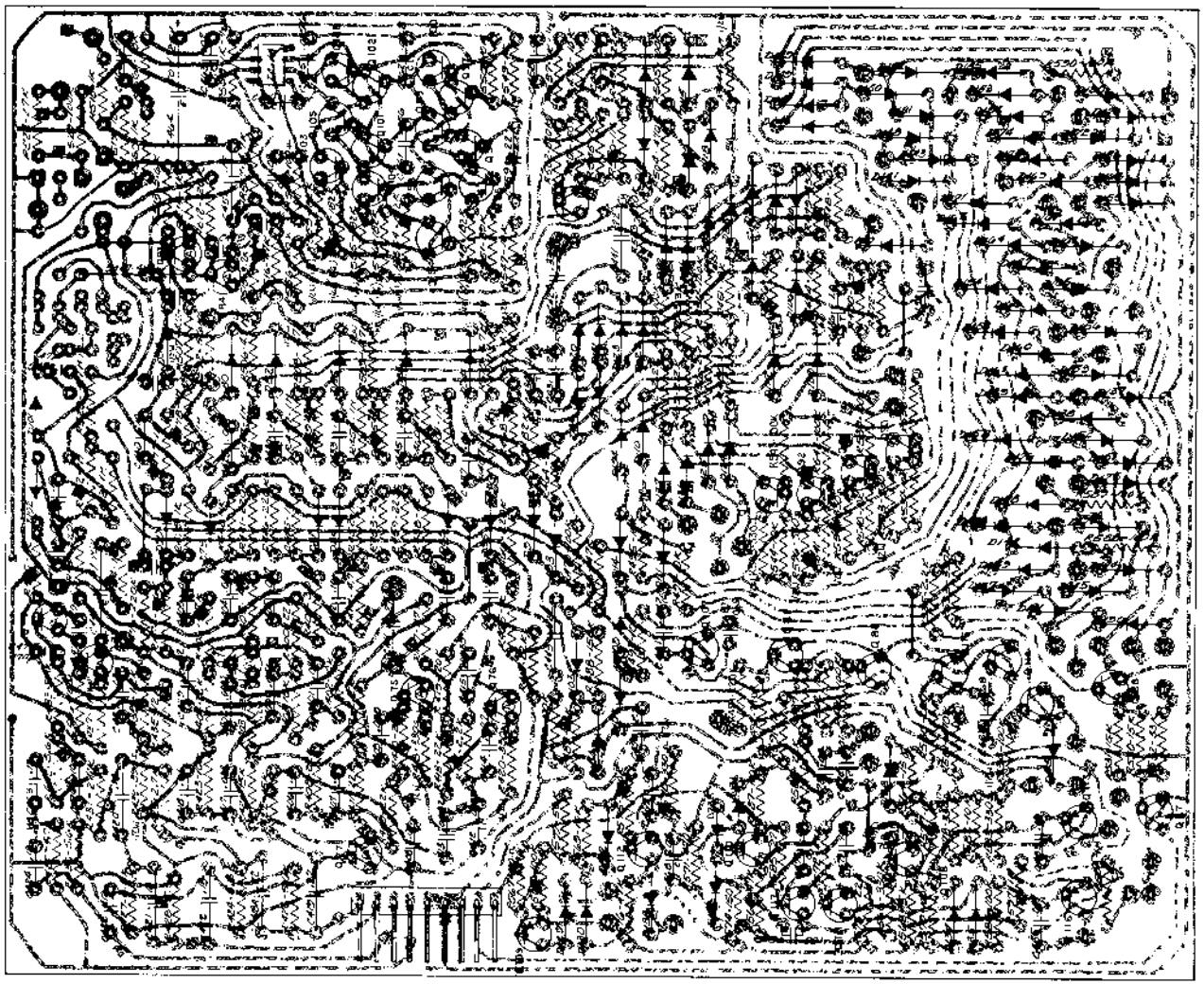
LEGEND:
"T" DENOTES TANTALUM CAPACITOR
"E" DENOTES ELECTROLYTIC CAPACITOR

DATE 7-18-74 | DWN. JOHNSON | TRACED | APPD. | MFG. | SPEC. SCALE FULL | DWG. No. C505-060828 | PART NAME LEFT HAND VOICE BD ASS'Y

MAT'L SPEC. 5A | DRL. E.T. | REV. | SHEET NUMBER 1 OF 1

THE BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

D 500-060827 G



LEGEND:
'C' DENOTES CERAMIC CAPACITOR
'T' DENOTES TANTALUM CAPACITOR
'E' DENOTES ELECTROLYTIC CAPACITOR

63	13	3250-102	RESISTOR 1/4W 5% 1K	
64	1	3283-8232-10	RESISTOR 82K 1/2W 1%	
65	1	3284-3	SOLDER (LUG)	
66	2	3183-4	SOCKET (TERM)	
67	X	3137-A	WIRE PER BASE DRAWING	
68		4514-0332N	OPERATIONAL AMPLIFIER	
69	1	4607-053-1	CONNECTOR (3 CONN.)	
70	10	4041-035558	TRANSISTOR, NPN	
71	12	4514-0A8910	TRANSISTOR, PNP	
72	1/16	4514-0A8791	DIODE, MEDIUM VOLTAGE	
73	1	3282-3108	CAPACITOR CERAMIC .05	
74	16	3285-308	.33	
75	2	102	.001	
76	8	471	470	
77				
78				
79	4	470	47	
80	1	3285-330	CERAMIC 33	
81	1	3211-052-050	ELECT 50V MV	
82	1	3211-015-025	ELECT 25V	
83	2	3288-25-2251	TANT 2.2	
84	2	3244-45-104-2	TANT 1.0	
85	12	3248-35-684	TANT .68	
86	1	3232-01-334	MYLAR .33	
87	1	274	270	
88	6	224	220	
89	3	184	180	
90	1	164	160	
91	4	154	150	
92	7	124	120	
93	1	648	680	
94	2	563	560	
95	4	473	470	
96	1	393	390	
97	1	333	330	
98	1	273	270	
99	2	223	220	
100	3	183	180	
101	1	153	150	
102	1	123	120	
103	4	103	100	
104	3	682	6800	
105	1	472	4700	
106	1	392	3900	
107	1	332	3300	
108	2	222	2200	
109		3282-331-88	CAPACITOR, CERAM 330	
110	6	3315-002-153	RESISTOR 1/2W 1% 15K	
111	1	3280-100-10	RESISTOR 1/2W 10% 10M	
112	7	3239-475-1	1/4W 1% 4.75K	
113	18	3250-105	1/4W 5% 1M	
114	2	825	820K	
115	4	475	470K	
116	1	394	390K	
117	3	334	330K	
118	1	274	270K	
119	3	224	220K	
120	1	184	180K	
121	3	154	150K	
122	1	124	120K	
123	1	104	100K	
124	1	823	82K	
125	1	683	68K	
126	2	563	56K	
127	2	473	47K	
128	2	393	39K	
129	1	333	33K	
130	1	273	27K	
131	12	223	22K	
132	1	183	18K	
133	6	153	15K	
134	1	123	12K	
135	13	103	10K	
136	1	682	6.8K	
137	5	562	5.6K	
138	1	472	4.7K	
139	1	392	3.9K	
140	1	332	3.3K	
141	1	272	2.7K	
142	6	3239-222	1/4W 5% 2.2K	
143	1	3239-182-10	1/4W 1% 1.82K	
144	3	102	1K	
145	1	391	390	
146	10	331	330	
147	3	3135-101-10	RESISTOR 1/4W 10% 100	
148	1	0500-0600662	P.W. BOARD RIGHT	
ITEM	QTY	PART NO.	PART NAME	

NOTES:
1) SELECT NPN TRANSISTORS Q74, Q75, Q76, Q77, Q78, Q79, Q83, Q84, PER 5425-A
Q90 & Q99 - Q97 & Q102 - Q91 & Q105 - Q106 & Q102 ARE MATCHED FOR BASE EMITTER DROP PER 5627
2) ALL DIODES ARE MEDIUM VOLTAGE 4514-0A2791 (1N 914)
3) REFERENCE SCHEMATIC - R501-060690 (1/2W) R500-061054 (1.27K/1/2W) R501-061414 (220R)
4) PWB WIRING DIAGRAM - 0501-180392 (12W) 0501-061113 (12.7K/1/2W) 0501-061451 (1.62K R)
5) FINAL ASSY TO INCLUDE PART No 500-060663 J

RELEASED
Ord. No. FA 650
Date 1/28/74

RECORD OF CHANGE

A REDRAWN 2 TIMES 3/25, NO CHANGE 110 ON 3-5-74 KNS

B C 482 WAS 330 PF QTY OF ITEM 70 WAS 6 CN 16,032 DP 10-29-74

F ADDED NOTE 1 CN 16,543 DRB 1-14-76

G ALL RESISTORS WERE 5239 1/4W 1% R987, R989 WERE NOT CHANGED CN 16,836 1-30-76 BRL

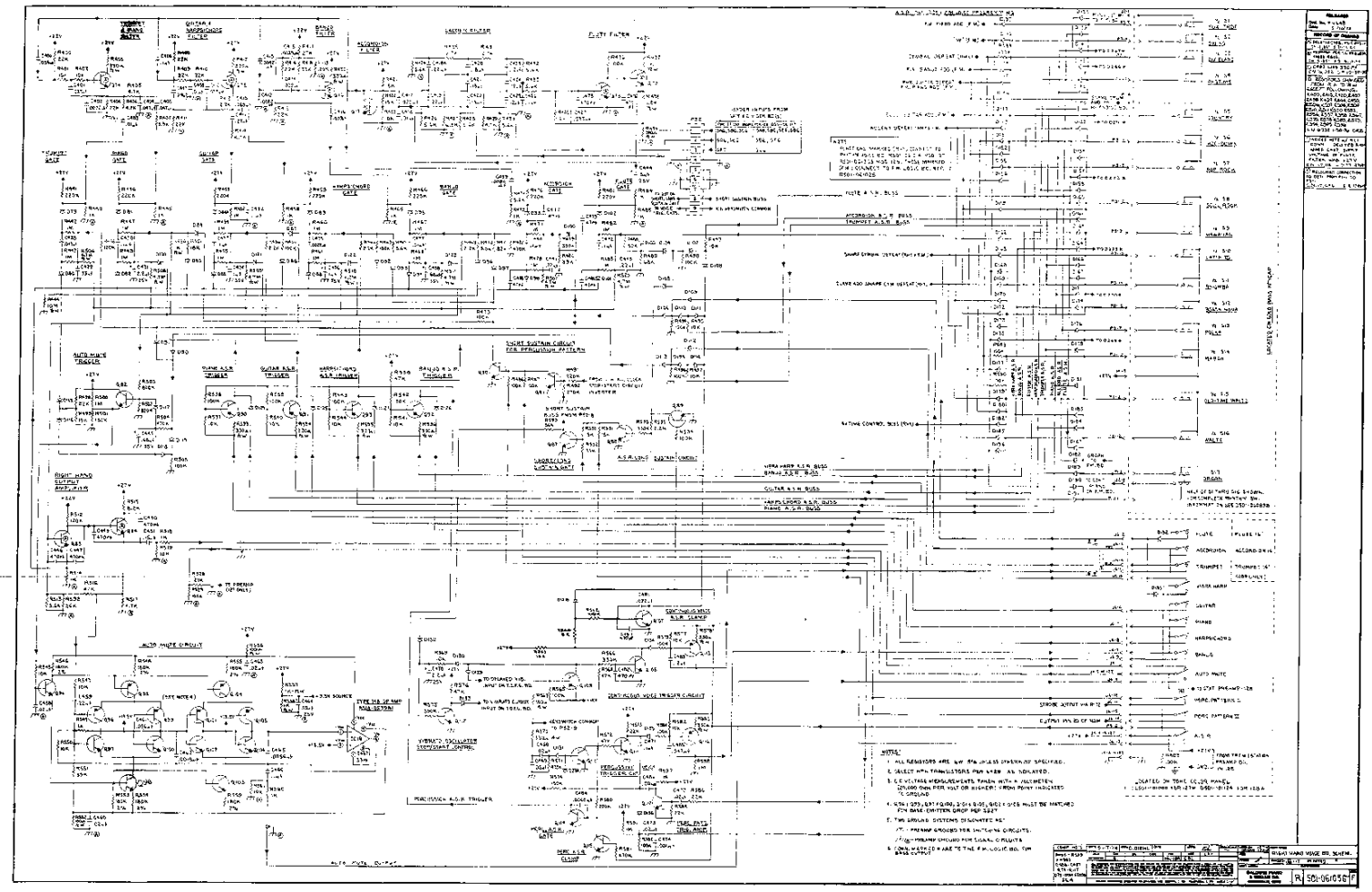
H ITEM 36 PART No. WAS 5249-193 CN 16,978 3-1-76

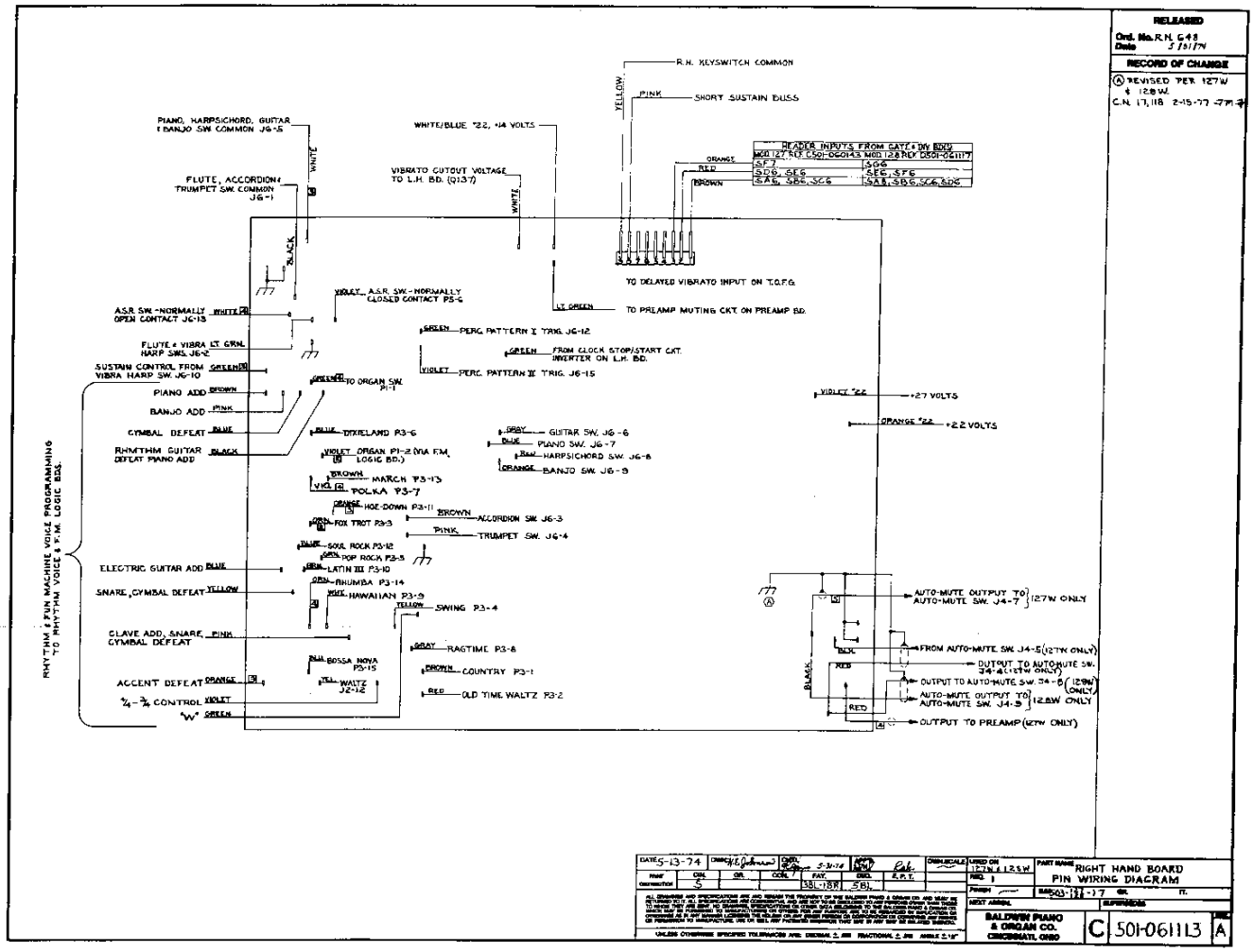
I DELETED 2434, 2003 C487 CN 17,118 2-1-77 RW

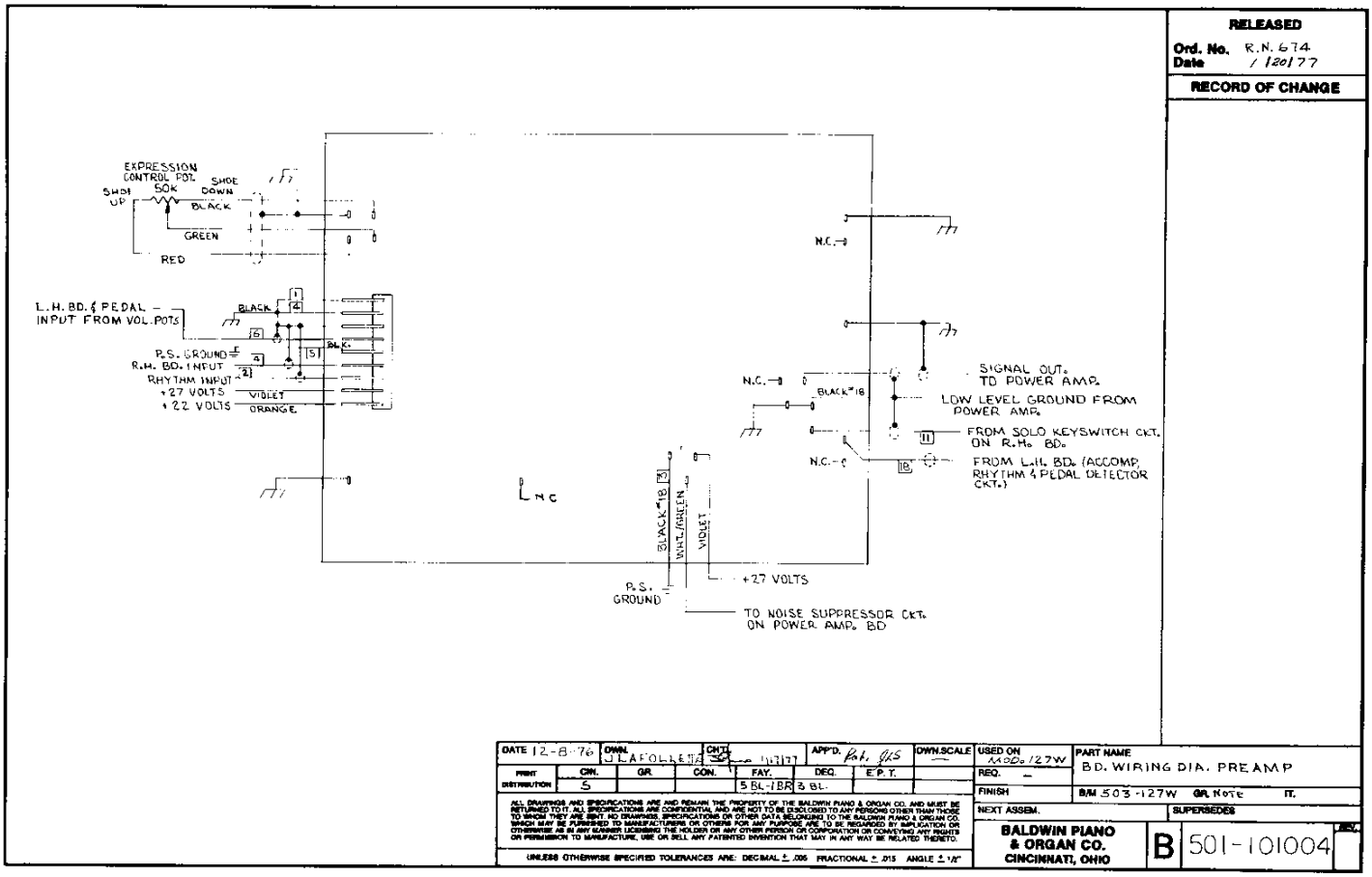
DATE 2-7-74	DRAWN Arnold	APPD. Bal.	TOLERANCES ± X	PART NAME RIGHT HAND VOICE B'D ASSEMBLY
				SIZE D
				NEXT HIGHER ASSY 500-100750

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

D 500-060663 J




RELEASED
Ord. No. R.N. 649
Date 5/31/74
RECORD OF CHANGE
A REVISED PER 127W & 128W. C.N. 17,118 2-15-77
R.H. KEYSWITCH COMMON
YELLOW
PINK
SHORT SUSTAIN BUSS
PIANO, HARPSICHORD, GUITAR & BANJO SW. COMMON J6-5
WHITE/BLUE +22, +14 VOLTS
VIBRATO CUTOUT VOLTAGE TO L.H. BD. (Q137)
FLUTE, ACCORDION & TRUMPET SW. COMMON J6-1
WHITE
BLACK
ORANGE
RED
BROWN
HEADER INPUTS FROM GATE & DIV BOWS
MOD 127, REF C501-060143 MOD 128 REF D501-061117
SF7 SG6
SD5, SE6 SE6, SF6
SA5, SB6, SC6 SA5, SB6, SC6, SD5
TO DELAYED VIBRATO INPUT ON T.O.F.G.
TO PREAMP MUTING CKT. ON PREAMP BD.
LT. GREEN
VIOLET A.S.R. SW.-NORMALLY CLOSED CONTACT P5-6
A.S.R. SW.-NORMALLY OPEN CONTACT J6-13
FLUTE & VIBRA HARP SWS. J6-2
SUSTAIN CONTROL FROM VIBRA HARP SW. J6-10
PIANO ADD
BANJO ADD
CYMBAL DEFEAT
RHYTHM GUITAR DEFEAT PIANO ADD
GREEN PERC. PATTERN I TRIG. J6-12
GREEN FROM CLOCK STOP/START CKT. INVERTER ON L.H. BD.
VIOLET PERC. PATTERN II TRIG. J6-15
TO ORGAN SW. P1-1
VIOLET +27 VOLTS
ORANGE +22 VOLTS
BLUE DIXIELAND P3-6
VIOLET ORGAN P1-2 (VIA F.M. LOGIC BD.)
GRAY GUITAR SW. J6-6
BLUE PIANO SW. J6-7
BLACK HARPSICHORD SW. J6-8
ORANGE BANJO SW. J6-9
BROWN MARCH P3-13
VIOLET POLKA P3-7
ORANGE HOE-DOWN P3-11
BROWN ACCORDION SW. J6-3
FOX TROT P3-3
PINK TRUMPET SW. J6-4
SOUL ROCK P3-12
POP ROCK P3-5
LATIN III P3-10
ELECTRIC GUITAR ADD BLUE
SNARE, CYMBAL DEFEAT YELLOW
RHUMBA P3-14
HAWAIIAN P3-9
YELLOW SWING P3-4
CLAVE ADD, SNARE, CYMBAL DEFEAT PINK
GRAY RAGTIME P3-8
BROWN COUNTRY P3-1
BLUE BOSSA NOVA P3-15
YELLOW WALTZ J2-12
RED OLD TIME WALTZ P3-2
ACCENT DEFEAT ORANGE
¾-⅔ CONTROL VIOLET
"W" GREEN
RHYTHM & FUN MACHINE VOICE PROGRAMMING TO RHYTHM VOICE & F.M. LOGIC BDS.
AUTO-MUTE OUTPUT TO AUTO-MUTE SW. J4-7 (127W ONLY)
FROM AUTO-MUTE SW. J4-5 (127W ONLY)
OUTPUT TO AUTO-MUTE SW. J4-6 (127W ONLY)
OUTPUT TO AUTO-MUTE SW. J4-8 (128W ONLY)
AUTO-MUTE OUTPUT TO AUTO-MUTE SW. J4-9 (128W ONLY)
OUTPUT TO PREAMP (127W ONLY)
BLACK
RED
DATE 5-13-74
DRAWN H.E. Gutmann
CHKD. 5-31-74
APPD. Cole
FINISH
DIM. SCALE
USED ON 127W & 128W
PART NAME RIGHT HAND BOARD PIN WIRING DIAGRAM
REQ. 1
MATL
SIZE 503-132-17
DR.
IT.
NEXT ASSBL.
SUPERSEDES
BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO
C 501-061113
REV. A
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/64 ANGLE ± 1°



RELEASED
Ord. No. R.N. 674
Date 1/20/77

RECORD OF CHANGE

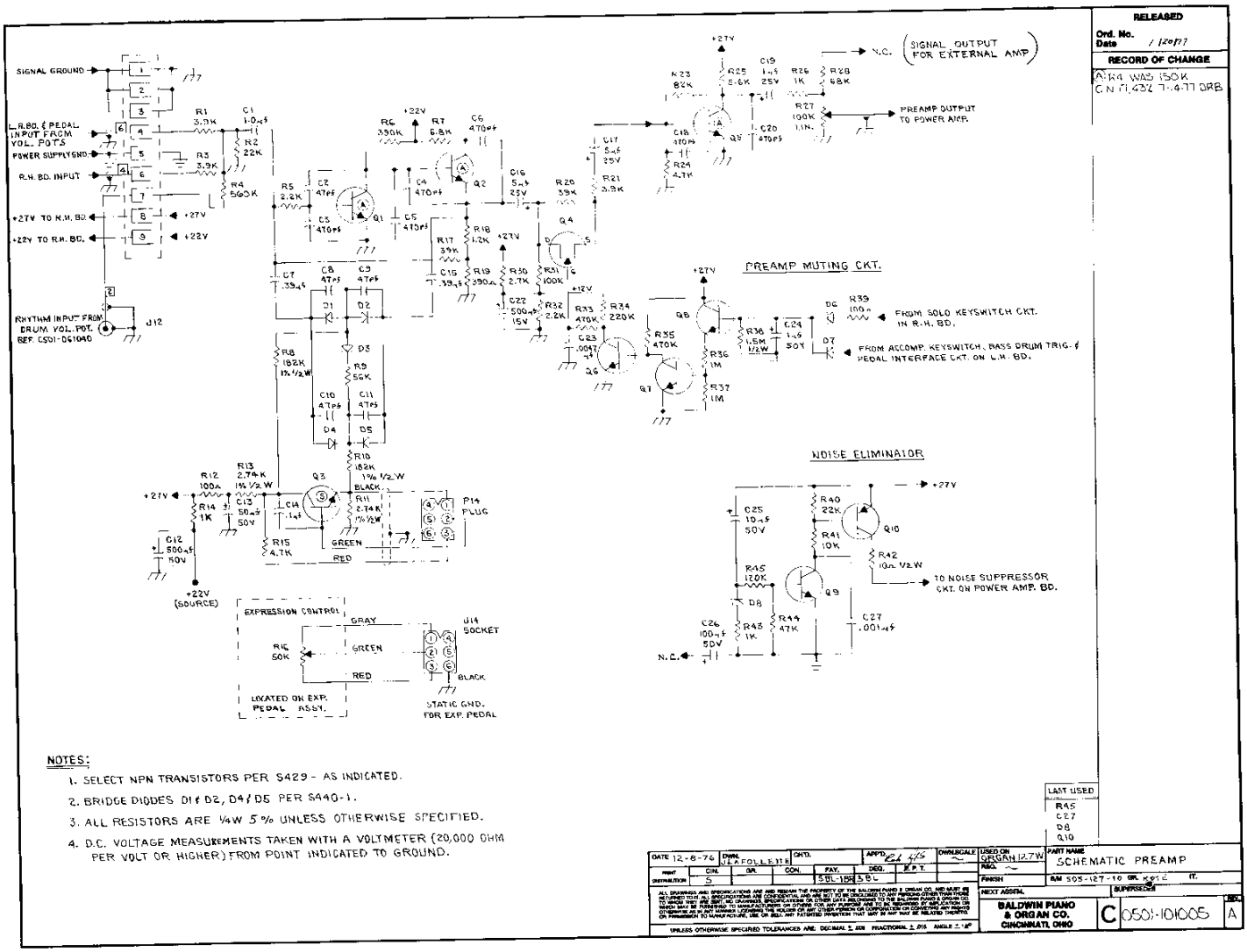
DATE 12-8-76	DWN. J. LAFOLLETTE	CHK'D. 1/3/77	APP'D. Pat. Fitz	DWN. SCALE —	USED ON MODEL 127W	PART NAME BD. WIRING DIA. PREAMP		
PRINT DISTRIBUTION	CIN. 5	GR.	CON.	FAY. 5 BL-1 BR 3 BL.	DEG.	E.P.T.	REQ. —	
							FINISH	B/M .503-127W GR. Note IT.
							NEXT ASSEM.	SUPERSEDES

ALL DRAWINGS AND SPECIFICATIONS ARE AND REMAIN THE PROPERTY OF THE BALDWIN PIANO & ORGAN CO. AND MUST BE RETURNED TO IT. ALL SPECIFICATIONS ARE CONFIDENTIAL AND ARE NOT TO BE DISCLOSED TO ANY PERSONS OTHER THAN THOSE TO WHOM THEY ARE SENT. NO DRAWINGS, SPECIFICATIONS OR OTHER DATA BELONGING TO THE BALDWIN PIANO & ORGAN CO. WHICH MAY BE FURNISHED TO MANUFACTURERS OR OTHERS FOR ANY PURPOSE ARE TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± .015 ANGLE ± 1/2°

BALDWIN PIANO & ORGAN CO.
CINCINNATI, OHIO

B | 501-101004 | REV.



NOTES:

1. SELECT NPN TRANSISTORS PER S429 - AS INDICATED.
2. BRIDGE DIODES D1 & D2, D4 & D5 PER S440-1.
3. ALL RESISTORS ARE ¼W 5% UNLESS OTHERWISE SPECIFIED.
4. D.C. VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHM PER VOLT OR HIGHER) FROM POINT INDICATED TO GROUND.

RELEASED
Ord. No.
Date 1/20/77

RECORD OF CHANGE
A R4 WAS 150K
C.N. 71,434 7-4-77 DRB

LAST USED
R45
C27
D8
Q10

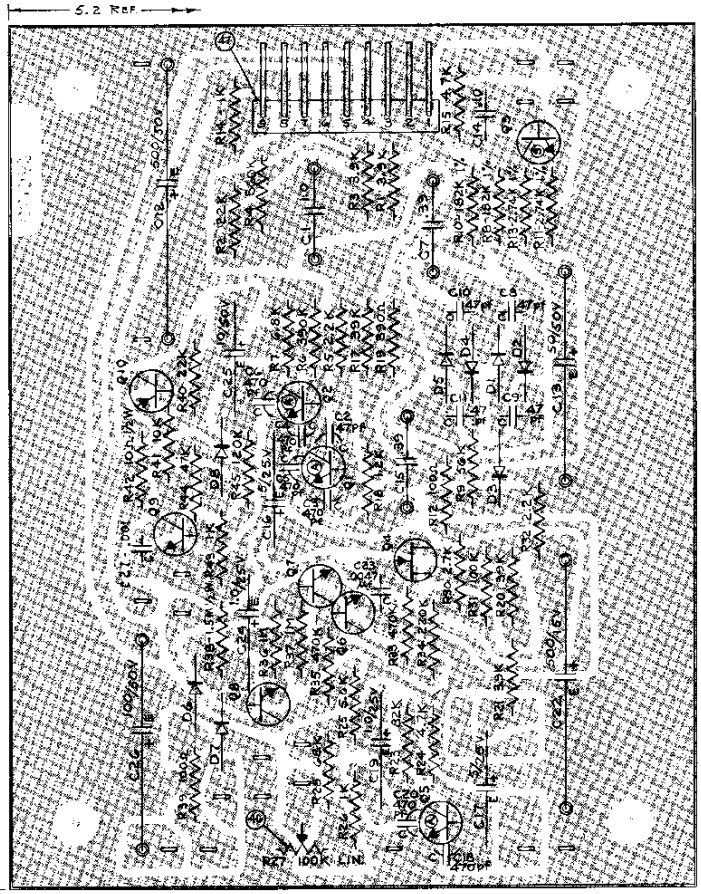
DATE 12-8-76	DWN. J.A. FOLLETT	CHK'D.	APP'D.		OVERLOAD	USED ON ORGAN 12.7W	PART NAME SCHEMATIC PREAMP		
PRINT DISTRIBUTION	CIN. 5	GR.	CON.	FAY. SBL-188	DEG. 3.6	E.P.T.	REQ. —		
							FINISH	BM 505-127-10 GR. K-P-E	IT.
							NEXT ASSEM.	SUPERSEDES	

ALL DRAWINGS AND SPECIFICATIONS ARE AND REMAIN THE PROPERTY OF THE BALDWIN PIANO & ORGAN CO. AND ARE NOT TO BE LOANED (EXCEPT TO A BALDWIN VENDOR FOR BIDDING OR MANUFACTURING PURPOSES) COPIED OR REPRODUCED IN ANY MANNER WHATSOEVER NOR USED FOR ANY PURPOSE EXCEPT IN CONNECTION WITH THE PRODUCTION OF BALDWIN PIANO & ORGAN CO. ALL SPECIFICATIONS ARE CONFIDENTIAL AND ARE NOT TO BE DISCLOSED TO ANY PERSON OTHER THAN THOSE TO WHOM THEY ARE SENT. NO DRAWINGS, SPECIFICATIONS OR OTHER DATA RELATING TO THE BUILDING OF BALDWIN EQUIPMENT WHICH MAY BE FURNISHED TO MANUFACTURERS OR OTHERS BY THE BALDWIN PIANO & ORGAN CO. SHALL BE CONSTRUED AS GRANTING BY IMPLICATION OR OTHERWISE ANY LICENSE TO MANUFACTURE, USE OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO, OR PERMISSION TO HUMP IN FUR.

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .XX FRACTIONAL ± 1/16 ANGLE ± 1°

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

C 0501-101005 A



LEGEND:
E - DENOTES ELECTROLYTIC CAPACITOR.
C - DENOTES CERAMIC CAPACITOR.

ITEM	REQ'D.	PART Nº	PART NAME
55			
54	1	52250-000564	RES. 1/4W 5% 560K
53	X	S184-3	SOLDER DIP
52	1	5239-687-10	RESISTOR 1/2W 10% 6.8K
51	X	S134-4	SOLDER IRON
50	1	A514-040296	TRANSISTOR F.E.T. (N CHANNEL)
49	1	A514-044910	TRANSISTOR PNP
48	8	A514-033336	TRANSISTOR NPN
47	1	A507-059127	KONEKTRON CONN. 9 PIN
46	1	B509-041912	MINI POT. 100K LINEAR
45	8	A514-042791	DIODE MED. VOLTAGE
44	1	S211-050-500	CAPACITOR ELECT. 500µF 50V
43	1	015-500	500µF 15V
42	1	050-100	100µF 50V
41	1	050-050	50µF 50V
40	1	050-010	10µF 50V
39	2	025-005	5µF 25V
38	2	S211-025-001	ELECT. 1µF 25V
37	1	S232-01-105	MYLAR 1.0 µF
36	2	S232-01-394	MYLAR .39 µF
35	1	S232-01-104	MYLAR .10 µF
34			
33	1	S205-472	CER. .0047 µF
32	1	S205-102	CER. .001 µF
31	6	S205-471	CER. 470 PF
30	5	S205-470	CAPACITOR CER. 47 PF
29	1	5239-155-10	RESISTOR 1/2W 10% 1.5M
28	2	S250 105	1/4W 5% 1M
27	2	474	470K
26	1	394	390K
25	1	224	220K
24			
23	1	124	120K
22	1	104	100K
21	1	823	82K
20	1	683	68K
19	1	563	56K
18	1	473	47K
17	2	393	39K
16			
15	2	223	22K
14	1	103	10K
13	1	562	5.6K
12	2	472	4.7K
11	3	392	3.9K
10	1	272	2.7K
9	2	222	2.2K
8	1	122	1.2K
7	3	102	1K
6	1	391	390Ω
5	2	S250-101	1/4W 5% 100Ω
4	1	5239-100-10	1/2W 10% 10Ω
3	2	S3252-002741	1/2W 1% 2.74K
2	2	S3252-001823	RESISTOR 1/2W 1% 182K
1	1	B505-061063	PREAMP B'D. RIVETED

NOTES:
1. REFERENCE PIN WIRING DIA. B501-101004.
2. REFERENCE SCHEMATIC C0501-101005.
3. SELECT DIODES D1, D2, D4, & D5 PER S440-1.
4. TRANSISTORS ARE: Q1, Q2, Q3, Q5, Q6, Q7, Q8, & Q9 NPN WITH Q1, Q2 & Q5 SELECTED PER S429-7; Q3 PER S429-2.
   Q4 - F.E.T. (N CHANNEL); Q10 - PNP.
5. FINAL ASSEMBLY MUST INCLUDE PART NUMBER 0500-101003.

RELEASED
Ord. No. R.N. 674
Date 11 Aug 77

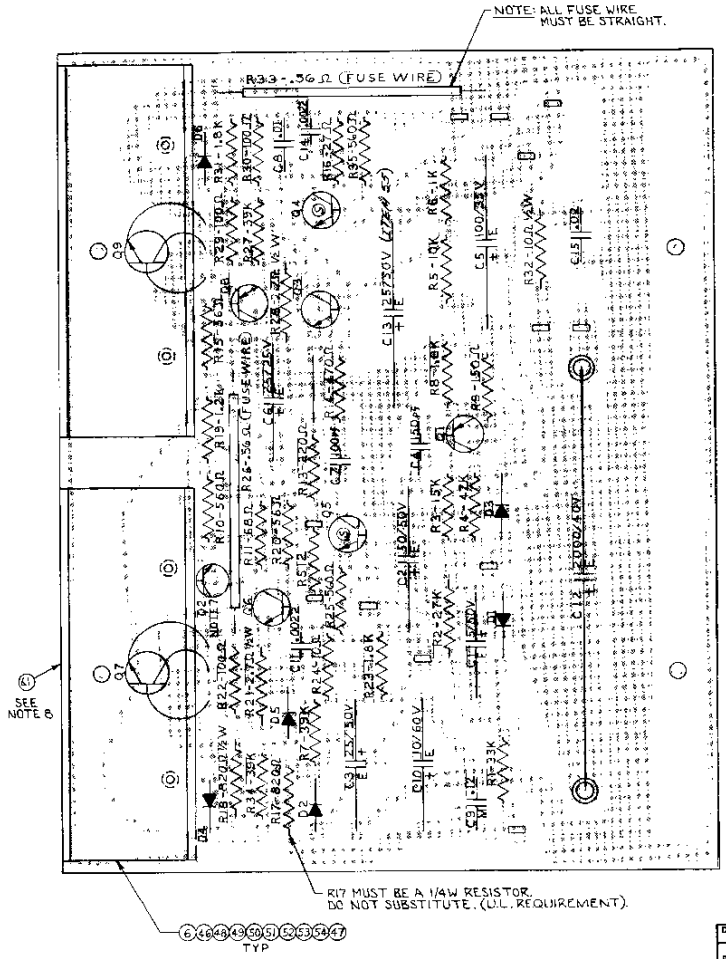
RECORD OF CHANGE
(A) R4 WAS 150 K
C.N. 17,432 7-14-77 DRB

DATE 12-8-76 | DWN. N. HAFOLETTE | CHK'D | APP'D. | DWN. SCALE GA | USED ON MOD-127W | PART NAME BD ASSY PREAMP
PRINT DISTRIBUTION: CIN. OR. CON. FAY. DEO. E.F.T. PYLE | 481-10R 3BL | REQ. SEE B/M | FINISH — | B/M 503-127W-100A 3 IT.
NEXT ASSEM. | SUPERSEDES

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/16 ANGLE ± 1/2°

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

C | 0500-101003 | A



NOTES:

1. FOR CALIBRATION PROCEDURE REF. C 501-100455.
2. REFERENCE SCHEMATIC C501-100455.
3. SELECT NPN TRANSISTORS PER 5429- AS INDICATED.
4. Q7 & Q9 ARE ITEM 6. Q3 & Q6 ARE ITEM 5. Q8 IS ITEM 4. Q2, Q4 & Q5 ARE ITEM 3. Q1 IS ITEM 2.
5. CAPACITORS MARKED WITH "E" POLARITY SIGN ARE ELECTROLYTIC CAPACITORS MARKED WITH "M" ARE MYLAR. ALL CAPACITOR VALUES ARE IN MICROFARAD UNLESS NOTED OTHERWISE.
6. FINAL ASSY. TO INCLUDE PART NO. 500-100447A
7. Q2 IS MOUNTED BETWEEN HEAT SINKS (ITEMS 46 & 47). CENTER TRANSISTOR SO AS TO PREVENT THE TRANSISTOR CASE FROM RESTING ON EITHER ONE OF THE HEAT SINK SURFACES.
8. ITEM 61 MUST BE ATTACHED TO THE COPPER SIDE OF THE BOARD, FLUSH WITH THE INDICATED BOARD EDGE.

RELEASED
Ord. No. R.N. 670
Date 8/13/76

RECORD OF CHANGE

(A) ADDED IT. 60 C.N. 16,876 9-14-76 JTW

(B) ADDED ITEM 61. & NOTE 8 ADDED NOTES FOR FUSE WIRE AND R17. C.N. 17,152 2-3-77 RH

(C) R23 & R31 WERE 1.5K, R25 & R35 WERE 680Ω, R26 & R33 WERE .47Ω C.N. 17,714 2-1-78 JTW

AI	L*	PART NO.	PART NAME	
60	X	A249-010295	TAPE 3/4" SCOTCH ELECTRICAL	
		A249-10002.1	GLUE, HOT MELT X-39	
59	X	33134-6	SOLDER (RON)	
58	X	5184-3	SOLDER (DIP)	
57	X	S 36-4	SLEEVING	
56	X	A513-033375	FUSE WIRE	
55	1	A517-033352	CAPACITOR ELECT 25μF@50V	
54	X	5234-	WIRE #22 SOLID	
53	X	A249-016587	SILICON COMPOUND	
52	4	52227-6-8 SCPL	SCR #6 RH TYPE A 1/2" LG	
51	4	A244-047994	SHOULDER WASHER	
50	2	A514-033359	TRANSISTOR MICA WASHER	
49	2	8507-033322	TRANSISTOR SOCKET	
48	5	52267-6-4 BLOX	SCR #6 RH TYPE 17 1/4" LG	
47	1	A528-100225	HEAT SINK	
46	2	8528-051906	HEAT SINK	
45	1	5205-203	CAPACITOR CERAMIC	.02μF
44	1	5205-103		.01μF
43	2	5205-222		.0022μF
42	1	5205-151		150 PF
41	1	5235-101	CERAMIC	100 PF
40	1	5232-01-124	MYLAR	.12μF
39	1	A517-051652	ELECT.	2000@40V
38	1	5211-035-100		100@35V
37	1	5211-050-080		80@50V
36	1	5211-050-025		25@50V
35	1	5211-025-025		25@25V
34	1	5211-060-010		10@60V
33	1	5211-050-005	CAPACITOR ELECT.	5@50V
32	1	5239-821-10	RESISTOR 1/2W 10%	820Ω
31	1	5239-100-10	1/2 W 10%	10Ω
30	2	5239-2R7-10	1/2 W 10%	2.7Ω
29	1	5250-XXX	1/4 W 5%	SELECTED
28	1	5250-473		47K
27	3	5250-393		39K
26	1	5250-333		33K
25	1	5250-273		27K
24	1	5250-153		15K
23	1	5250-103		10K
22	3	5250-182		1.8K
21				
20	1	5250-122		1.2K
19	1	5250-102		1K
18	1	5250-821		820Ω
17				
16	3	5250-561		560Ω
15	1	5250-471		470Ω
14	1	5250-221		220Ω
13	1	5250-151		150Ω
12	3	5250-101		100Ω
11	1	5250-680		68Ω
10	2	5250-560		56Ω
9	1	5250-270		27Ω
8	1	5250-100	RESISTOR 1/4 W 5%	10Ω
7	6	A514-042791	DIODE MEDIUM VOLTAGE	
6	2	A514-054214	TRANSISTOR NPN POWER	
5	2	A514-047828	" NPN MEDIUM POWER	
4	1	A514-047829	" PNP MEDIUM POWER	
3	3	A514-033336	" NPN SMALL SIGNAL	
2	1	A514-044910	" PNP SMALL SIGNAL	
1	1	B505-100446	BD. 2.5 WATT AMPLIFIER - RIV	

ITEM	REQ	PART NO.	PART NAME

DATE 7-12-76 DWN. J.LAFOLLETTE CH'D APP'D DWG. SCALE 2X USED ON 133 PART NAME BD. 2.5 WATT AMPLIFIER- ASSY

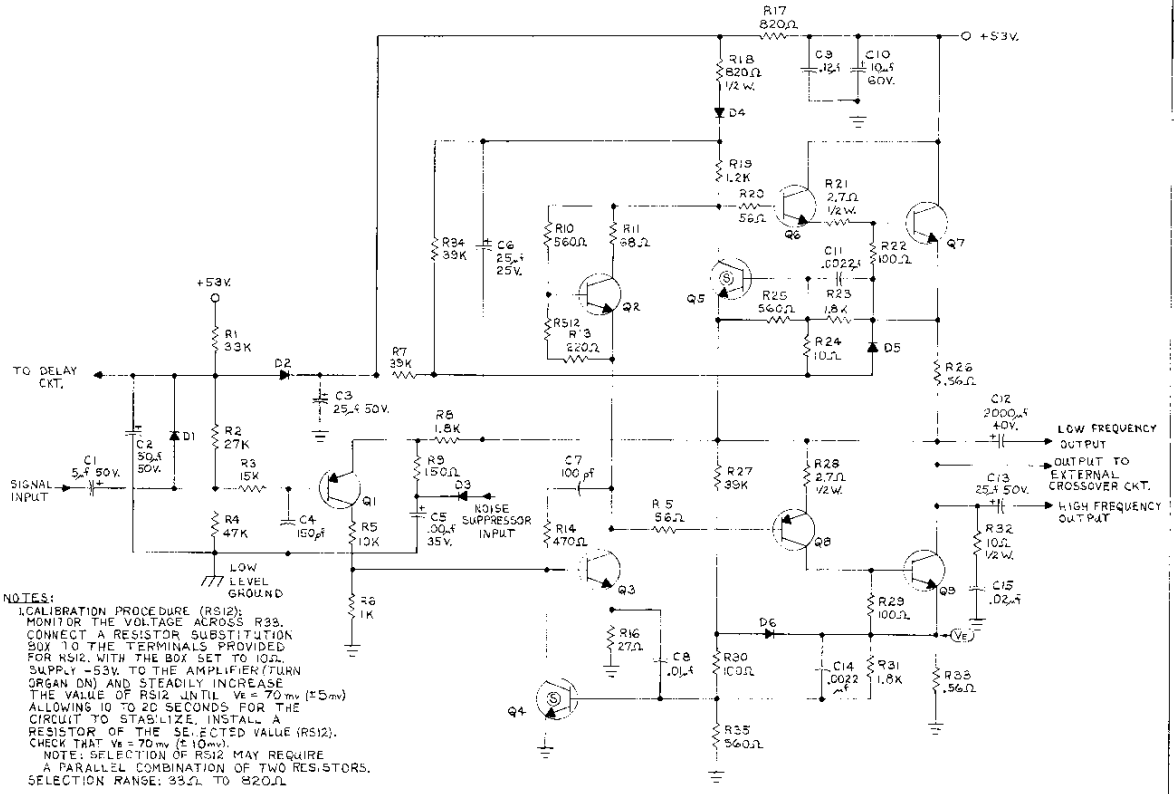
PRINT DISTRIBUTION: CIN. | GR. | CON. | TRAY. | DEQ. | E.P.T. | FILE | 481-188 | 582 | REQ. SEE B/M | FINISH | B/M 503-133-10 GR. 3 IT.

NEXT ASSEM. | SUPERSEDES

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/16 ANGLE ± 1/2°

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

C 0500-100447 C



NOTES:

1. CALIBRATION PROCEDURE (RS12): MONITOR THE VOLTAGE ACROSS R33. CONNECT A RESISTOR SUBSTITUTION BOX TO THE TERMINALS PROVIDED FOR RS12. WITH THE BOX SET TO 10Ω, SUPPLY −53V. TO THE AMPLIFIER (TURN ORGAN ON) AND STEADILY INCREASE THE VALUE OF RS12 UNTIL Ve = 70 mv (±5mv) ALLOWING 10 TO 20 SECONDS FOR THE CIRCUIT TO STABILIZE. INSTALL A RESISTOR OF THE SELECTED VALUE (RS12). CHECK THAT Ve = 70 mv (± 10mv).
   NOTE: SELECTION OF RS12 MAY REQUIRE A PARALLEL COMBINATION OF TWO RESISTORS. SELECTION RANGE: 33Ω TO 820Ω.
2. CALIBRATION MUST BE CHECKED, AND ADJUSTED IF NECESSARY, WHENEVER ANY TRANSISTOR IS REPLACED.
3. ALL RESISTORS ARE 1/4 WATT, 5% UNLESS OTHERWISE SPECIFIED.
4. SELECT NPN TRANSISTORS Q4 & Q5 PER S429-2
5. DC VOLTAGE MEASUREMENTS TAKEN WITH A VOLTMETER (20,000 OHMS PER VOLT OR HIGHER) FROM POINT INDICATED, TO GROUND.
6. ALL GROUNDS ARE HIGH LEVEL GROUNDS UNLESS OTHERWISE INDICATED.
7. TRANSISTORS:
   PNP SMALL SIGNAL (A514-044310) - Q1
   PNP MEDIUM POWER (A514-047829) - Q6
   NPN SMALL SIGNAL (A514-043338) - Q2, Q4, Q5
   NPN MEDIUM POWER (A514-047828) - Q3, Q6
   NPN POWER (A5.4-054214) - Q7, Q9 WITH HEAT SINKS
8. REF ASSY C0500-100447

RELEASED
Ord. No. R.N. 670
Date 8/13/76

RECORD OF CHANGE

(A) REVISED NOTE 1: 70mv (± 5mv) WAS 50mv (± 15mv) AND 70mv (± 10mv) WAS 50mv (± 20mv). ADDED NOTE 8. C.N. 17,555 10-31-77 JTH

(B) R33 & R31 WERE 1.5K, R25 & R35 WERE 680Ω, R24 & R33 WERE 47Ω. (FUSE WIRE) C.N. 17,714 2-6-78 JTH

DATE 4-15-76	DWN. D. STEVENSON	CHK'D. [illegible]	APP'D. [illegible]	DWN. SCALE —	USED ON ORGANS	PART NAME SCHEM 25 WATT AMPLIFIER	
PRINT DISTRIBUTION: 5	ORIGINAL	GR.	CON.	FAY. 28L 18R	DEO. 38L	E.P.T.	REQ. —
							FINISH B/M 303-138-10 GR. NOTE IT
							NEXT ASSEM. SUPERSEDES

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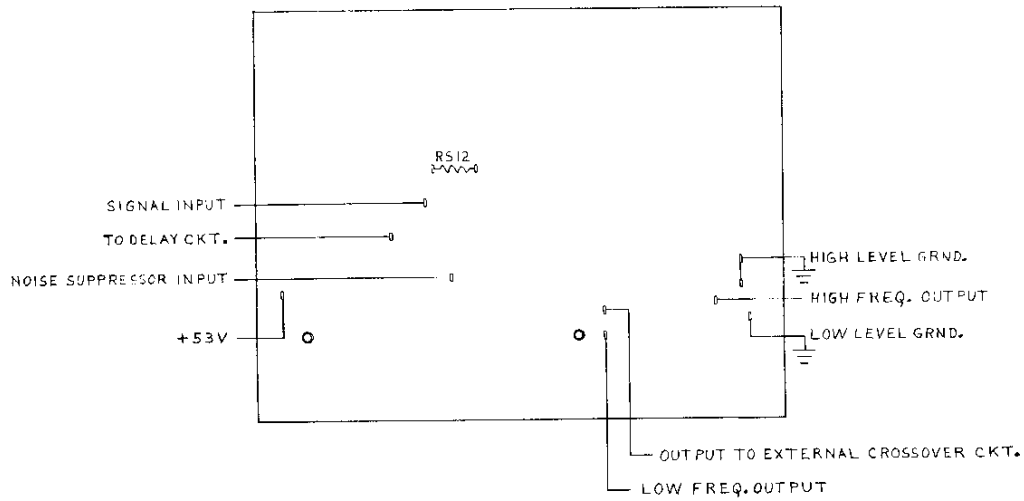
UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/64 ANGLE ± 1/2°

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

C 0501-100455 B

RELEASED
Ord. No. R.N. 670
Date 8/27/76

RECORD OF CHANGE



ITEM	REQ	PART NO.	PART NAME
3	2	A516-019255	EYEL. .089 X 1/8
2	12	A516-061235	WIRE WRAP POST
1	1	A575-100445	BD. AMPL. 25W D.E.M.

DATE 7-27-76	OWN. J.A. FOLLETTE	CH'D.	APP'D. Bak	DWN. SCALE FULL	USED ON 133	PART NAME BD. 25W AMPLIFIER - RIV.			
PRINT DISTRIBUTION	CIN. FILE	GR.	CON.	FAY. 4BC-1BR	DEQ.	E.P.T.	REQ. SEE B/M		
							FINISH ~	B/M 503-133-20 GR. 2	IT.
							NEXT ASSEM. C 500-100446	SUPERSEDES	

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: DECIMAL ± .005 FRACTIONAL ± 1/16 ANGLE ± 1/2°

BALDWIN PIANO & ORGAN CO. CINCINNATI, OHIO

B 505-100446 REV.

M O D E L 127

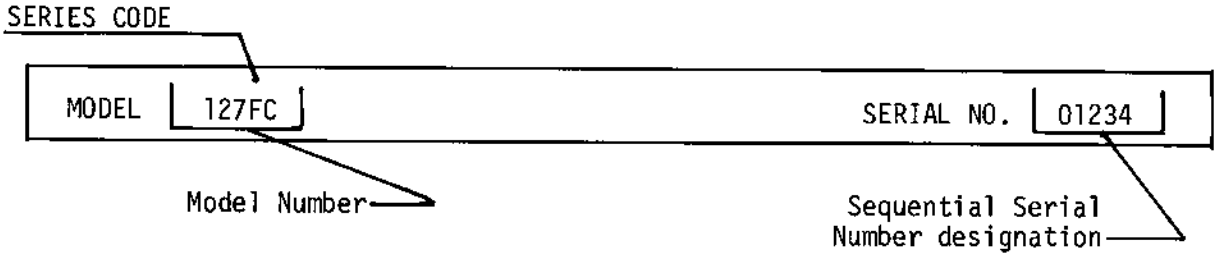
P A R T S L I S T

For the Model and Serial Number Nameplate location, refer to Fig. 23.

Information pertaining to the case finish and factory installed accessories is coded into the model and serial number. For this reason, and because of possible changes in sub-assemblies during the normal production life of an instrument, the complete model and serial number must be supplied when ordering replacment parts for a particular instrument.

MODEL AND SERIAL NUMBER CODE

FOR THE 127 SERIES ORGAN



SERIES CODE

C Note	WITH CASSETTE TAPE PLAYER/RECORDER

NOTE: Cassette factory installation only.

MODEL 127 PARTS LIST

GENERATOR ASSEMBLIES

ITEM NO.	PART NUMBER	DESCRIPTION
469- 1	C-500-060170	Gate & Divider Board Assembly
469- 2	B-500-060640	Top Octave Frequency Generator Board Assembly
469- 3	A-514-033338	Transistor - NPN
469- 4	A-514-044910	Transistor - PNP
469- 5	A-514-033903	Diode - 100V
469- 6	A-514-042791	Diode - Medium Voltage
469- 7	A-514-060590	Top Octave Frequency Generator (Motorola)
469- 8	A-514-060260	Top Octave Frequency Generator (Mostek)
469- 9	A-514-047801	Frequency Divider (7 Stage IC)
469-10	B-512-060328	Coil Assembly - Vertical Mounting
469-11	A-507-060591	I.C. Nest - 11 Connector
469-12	A-507-060150	I.C. Nest - 8 Connector
469-13	A-507-059132	I.C. Socket
469-14	A-507-059125	Interconnect - 6 Connector
469-15	A-507-059127	Interconnect - 9 Connector
469-16	S-211-015500	Capacitor, Electrolytic 500 mfd @ 15V
469-17	S-211-025050	Capacitor, Electrolytic 50 mfd @ 25V
469-18	S-411-001102	Capacitor, Polymylar .001 mf
469-19	S-244-252251	Capacitor, Tantalum 2.2 mf
469-20	S-244-204752	Capacitor, Tantalum 4.7 mf
469-21	S-244-353941	Capacitor, Tantalum .39 mf
469-22	S-232-001102	Capacitor, Mylar .0010 mf
469-23	S-232-001122	Capacitor, Mylar .0012 mf
469-24	S-232-001152	Capacitor, Mylar .0015 mf
469-25	S-232-001182	Capacitor, Mylar .0018 mf
469-26	S-232-001222	Capacitor, Mylar .0022 mf
469-27	S-232-001272	Capacitor, Mylar .0027 mf
469-28	S-232-001332	Capacitor, Mylar .0033 mf
469-29	S-232-001392	Capacitor, Mylar .0039 mf
469-30	S-232-001472	Capacitor, Mylar .0047 mf
469-31	S-232-001562	Capacitor, Mylar .0056 mf
469-32	S-232-001682	Capacitor, Mylar .0068 mf
469-33	S-232-001822	Capacitor, Mylar .0082 mf
469-34	S-232-001103	Capacitor, Mylar .010 mf
469-35	S-232-001123	Capacitor, Mylar .012 mf
469-36	S-232-001153	Capacitor, Mylar .015 mf
469-37	S-232-001183	Capacitor, Mylar .018 mf
469-38	S-232-001223	Capacitor, Mylar .022 mf
469-39	S-232-001333	Capacitor, Mylar .033 mf
469-40	S-232-001393	Capacitor, Mylar .039 mf
469-41	S-232-001473	Capacitor, Mylar .047 mf
469-42	S-232-001563	Capacitor, Mylar .056 mf
469-43	S-232-001683	Capacitor, Mylar .068 mf
469-44	S-232-001823	Capacitor, Mylar .082 mf
469-45	S-232-001273	Capacitor, Mylar .027 mf
469-46	S-232-001104	Capacitor, Mylar .10 mf
469-47	S-232-001124	Capacitor, Mylar .12 mf
469-48	S-232-001154	Capacitor, Mylar .15 mf
469-49	S-232-001184	Capacitor, Mylar .18 mf
469-50	S-232-001224	Capacitor, Mylar .22 mf
469-51	S-232-001274	Capacitor, Mylar .27 mf
469-52	S-232-001334	Capacitor, Mylar .33 mf
469-53	S-232-001394	Capacitor, Mylar .39 mf
469-54	S-232-001474	Capacitor, Mylar .47 mf
469-55	S-232-001564	Capacitor, Mylar .56 mf
469-56	S-232-001684	Capacitor, Mylar .68 mf
469-57	S-232-001824	Capacitor, Mylar .82 mf
469-58	S-232-001105	Capacitor, Mylar 1.0 mf
469-59	S-205-000102	Capacitor, Ceramic .001 mf
469-60	S-205-000103	Capacitor, Ceramic .01 mf
469-61	S-205-000203	Capacitor, Ceramic .02 mf
469-62	S-218-000104	Capacitor, Ceramic .1 mf

MODEL 127 PARTS LIST

POWER SUPPLY, AMPLIFIER & PREAMPLIFIER

ITEM NO.	PART NUMBER	DESCRIPTION
470- 1	C-500-060603	Power Supply Board Assembly
470- 2	B-500-060514	25 Watt Amplifier Board Assembly
470- 3	B-500-061064	Preamplifier Board Assembly
470- 4	A-517-051652	Capacitor, Electrolytic 2000 uf @ 40V
470- 5	S-211-025500	Capacitor, Electrolytic 500 uf @ 25V
470- 6	S-211-075250	Capacitor, Electrolytic 250 uf @ 75V
470- 7	S-211-050100	Capacitor, Electrolytic 100 uf @ 50V
470- 8	S-211-025100	Capacitor, Electrolytic 100 uf @ 25V
470- 9	S-211-015100	Capacitor, Electrolytic 100 uf @ 15V
470-10	S-211-050050	Capacitor, Electrolytic 50 uf @ 50V
470-11	S-211-025050	Capacitor, Electrolytic 50 uf @ 25V
470-12	S-211-025025	Capacitor, Electrolytic 25 uf @ 25V
470-13	S-211-025005	Capacitor, Electrolytic 5 uf @ 25V
470-14	S-211-050500	Capacitor, Electrolytic 500 uf @ 50V
470-15	S-211-050010	Capacitor, Electrolytic 10 uf @ 50V
470-16	S-211-025001	Capacitor, Electrolytic 1 uf @ 25V
470-17	S-211-015500	Capacitor, Electrolytic 500 uf @ 15V
470-18	A-517-039382	Capacitor, Electrolytic 25 mfd @ 50V
470-19	A-514-040296	F.E.T. - N Channel
470-20	A-514-054214	Transistor - NPN - Power
470-21	A-514-047828	Transistor - NPN - Medium Power
470-22	A-514-047829	Transistor - PNP - Medium Power
470-23	A-514-033338	Transistor - NPN - Silicon
470-24	A-514-044910	Transistor - PNP - Silicon
470-25	A-514-038984	Rectifier - Silicon - 3 Amp IN4141
470-26	A-514-035596	Rectifier - Silicon - 1N4003
470-27	A-514-047970	Diode - Zener - 8.2V
470-28	A-514-042791	Diode - Signal - Medium Voltage - 1N251
470-29	B-528-051906	Heat Sink
470-30	A-528-051905	Heat Sink
470-31	A-507-059127	Konektcon - 9 Connector
470-32	B-509-041912	Minipot - 100K - Linear
470-33	S-232-001105	Capacitor, Mylar 1.0 uf
470-34	S-232-001394	Capacitor, Mylar .39 uf
470-35	S-232-001104	Capacitor, Mylar .1 uf
470-36	S-232-001332	Capacitor, Mylar .0033 uf
470-37	S-218-000104	Capacitor, Ceramic .1 uf
470-38	S-218-000503	Capacitor, Ceramic .05 uf
470-39	S-205-000203	Capacitor, Ceramic .02 uf
470-40	S-205-000103	Capacitor, Ceramic .01 uf
470-41	S-205-000102	Capacitor, Ceramic .001 uf
470-42	S-205-000472	Capacitor, Ceramic .0047 uf
470-43	S-205-000471	Capacitor, Ceramic 470 pf
470-44	S-205-000151	Capacitor, Ceramic 150 pf
470-45	A-244-047994	Shoulder Washer
470-46	B-507-033322	Transistor Socket
470-47	A-514-033359	Insulator - Mica
470-48	A-244-047992	Spacer
470-49	A-514-033375	Fuse Wire

TONE COLOR ASSEMBLY

471- 1	X-500-060792	Tone Color Panel Assembly
471- 2	C-500-060783	Accompaniment Tone Color Tab & Switch Assembly
471- 3	C-500-060779	Solo Tone Color Tab & Switch Assembly
471- 4	A-506-060652	Accompaniment Tone Color Switch Assembly
471- 5	B-506-060627	Solo Tone Color Switch Assembly
471- 6	B-250-060791	Stop Tablet Set
471- 7	A-511-048788	Capacitor Assembly - .47 mfd @ 400V
471- 8	A-514-042791	Diode - Medium Voltage - 1N251
471- 9	A-506-058601	Power Switch - Rocker Type
471-10	A-237-037146	Detent Spring
471-11	A-237-037993	Tab Spring Retainer
471-12	A-250-037943	Tab Insert
471-13	A-244-026947	Felt - 1/2" X 1/8"
471-14	A-528-059872	Tone Color Hold Down
471-15	B-509-039731	Potentiometer - 100K - Rev. Audio
471-16	B-509-047956	Potentiometer - 5K - Linear
471-17	A-528-060052	Potentiometer Mounting Bracket

MODEL 127 PARTS LIST

TONE COLOR ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION
471-18	A-247-015157	3/8" Lock Washer (Bl. Ox.)
471-19	S-125-000010	3/8" Lock Washer
471-20	A-247-015158	3/8" Hex Nut
471-21	A-247-021846	3/8" Hex Nut (Bl. Ox.)
471-22	A-247-052042	Knob
471-23	B-528-060620	Lamp Holder Bracket
471-24	A-514-035044	Bi-Pin Lamp Holder
471-25	A-514-028148	Fluorescent Lamp - 13W
471-26	A-507-060524	Starter Base - Socket
471-27	A-507-060529	Lamp Starter
471-28	B-502-061037	Tone Color Shield
471-29	A-247-024947	Speed Clip
471-30	A-507-035085	Closed End Connector
471-31	A-506-033399	Spring Contact
471-32	A-506-037787	Contact Wire

STOP TABLETS

471-43	B-250-060791	Stop Tab Set	
471-44	X-250-038730	Flute	
471-45	X-250-060785	Reed	ACCOMPANIMENT SECTION
471-46	X-250-047898	String	
471-47	X-250-054776	Guitar	
471-48	X-250-054774	Piano	
471-49	X-250-054777	Banjo	
471-50	X-250-038730	Flute	
471-51	X-250-060786	Accordion	
471-52	X-250-038732	Trumpet	
471-53	X-250-044171	Vibra Harp	
471-54	X-250-054776	Guitar	SOLO SECTION
471-55	X-250-054774	Piano	
471-56	X-250-054778	Harpsichord	
471-57	X-250-054777	Banjo	
471-58	X-250-060787	Auto Mute	
471-59	X-250-060788	Perc. Pattern I	
471-60	X-250-060789	Perc. Pattern II	
471-61	X-250-060790	A.S.R.	

KEYCAP ASSEMBLIES

472- 1	X-500-060937	Accompaniment Bass Keycap Assembly
472- 2	X-500-060938	Solo Bass Keycap Assembly - With Lamp Assembly
472- 3	X-500-052471	Accompaniment Treble Keycap Assembly
472- 4	X-500-052474	Solo Treble Keycap Assembly
472- 5	B-500-061812	Solo Bass Keycap Assembly - Without Lamp Assembly
472- 6	X-500-060878	Push Button Switch Assembly - 8 Station - Latin II ----
472- 7	X-500-060881	Push Button Switch Assembly - 9 Station - Fox Trot ----
472- 8	A-505-061462	Keyselector Switch Board #2 - Riveted
472- 9	X-500-061465	Keyselector Switch - Final Assembly
472-10	B-506-060718	Push Button Switch - 8 Station - Latin II ----
472-11	B-506-047925	Push Button Switch - 9 Station - Fox Trot ----
472-12	B-506-060717	Push Button Switch - 9 Station - Key Selector
472-13	A-514-058969	L.E.D. Assembly
472-14	A-514-059254	Light Emitting Diode
472-15	A-514-059256	Mounting Ring
472-16	A-514-059255	Mounting Clip
472-17	B-528-060710	Lamp Holder Channel
472-18	A-514-035044	Bi-Pin Lamp Holder
472-19	A-514-060888	Fluorescent Lamp - 12" - 8W
472-20	A-514-060854	Starter - 8W - Lamp
472-21	A-507-060524	Starter Base - Socket
472-22	A-237-061345	Compression Ring
472-23	A-247-052812	Spacer
472-24	A-514-042791	Diode - Medium Voltage

MODEL 127 PARTS LIST

KEYCAP ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION
472-25	B-509-040783	Potentiometer - 100K - Linear
472-26	A-247-060913	Knob Assembly - "Drum Vol."
472-27	A-247-058982	Knob Assembly - "Tempo"
472-28	A-250-054568	Knob - Push Button
472-29	A-247-054869	Push Button Insert - Clear
472-30	A-247-054868	Push Button Insert - Red
472-31	A-247-054867	Push Button Insert - Blue

KEYSWITCH ASSEMBLIES

472-45	X-500-060830	Solo Switch Assembly
472-46	X-500-060831	Accompaniment Switch Assembly
472-47	B-506-060139	13 Note Switch Board Assembly - 680 Ohms
472-48	B-506-060141	12 Note Switch Board Assembly - 680 Ohms
472-49	B-506-060140	13 Note Switch Board Assembly - Fun Machine
472-50	B-506-060816	13 Note Switch Board Assembly - 3.3K
472-51	B-506-060822	12 Note Switch Board Assembly - 3.3K
472-52	B-500-031585	13 Note Plunger Guide Assembly
472-53	B-500-031584	12 Note Plunger Guide Assembly
472-54	B-528-022466	Upstop Bar - C-E
472-55	B-528-023045	Upstop Bar - F-C
472-56	B-528-022465	Upstop Bar - F-E
472-57	A-506-060151	Switch Plunger - 1 Slot
472-58	B-506-031977	Switch Plunger - 2 Slot
472-59	A-528-060593	Clamp - Switch Cover
472-60	D-502-060577	Manual Switch Cover
472-61	A-506-031576	Spacer - .125
472-62	A-506-024323	Spacer - .187
472-63	A-244-019857	Neoprene Washer
472-64	S2022-4 SCPL	Flat Washer
472-65	A-247-053665	Switch Post Washer
472-66	A-506-027595	Contact Wire

MANUAL ASSEMBLIES

473- 1	X-500-060835	Solo Manual Assembly With Switches
473- 2	X-500-060834	Accompaniment Manual Assembly With Switches
473- 3	C-500-060833	Accompaniment Keyslip Assembly
473- 4	B-500-052666	Actuator Bar Assembly
473- 5	B-500-060236	Phone Jax Assembly
473- 6	B-250-054321	Key Channel Assembly
473- 7	B-250-060054	Natural Key Assembly - C
473- 8	B-250-060055	Natural Key Assembly - D
473- 9	B-250-060056	Natural Key Assembly - E
473-10	B-250-060057	Natural Key Assembly - F
473-11	B-250-060058	Natural Key Assembly - G
473-12	B-250-060059	Natural Key Assembly - A
473-13	B-250-060060	Natural Key Assembly - B
473-14	B-250-060061	Natural Key Assembly - Wide C
473-15	B-250-060062	Sharp Key Assembly
473-16	C-250-025895	Plastic Keycap - Sharp
473-17	C-250-041051	Plastic Natural Keycap - Wide C
473-18	X-250-041050	Plastic Natural Keycap - B
473-19	X-250-041049	Plastic Natural Keycap - A
473-20	X-250-041048	Plastic Natural Keycap - G

MODEL 127 PARTS LIST

MANUAL ASSEMBLIES

ITEM NO.	PART NUMBER	DESCRIPTION
473-21	X-250-041047	Plastic Natural Keycap - F
473-22	X-250-041046	Plastic Natural Keycap - E
473-23	X-250-041045	Plastic Natural Keycap - D
473-24	X-250-041044	Plastic Natural Keycap - C
473-25	A-244-023942	Key Upstop Bumper
473-26	A-244-040842	Rubber Bumper
473-27	A-506-052616	Micro Switch
473-28	A-237-052680	Actuator Detent
473-29	A-247-052681	Speed Nut
473-30	A-247-028484	Nut - Nylok - #6-32
473-31	A-244-045932	Nylon Washer
473-32	A-244-052672	Gasket - Felt
473-33	A-244-024941	Felt - Maroon - .240/.260 X 5/16 X 1/2"
473-34	A-244-006211	Felt - Maroon - .035/.050 X 1/4"
473-35	A-249-022737	Black Cement
473-36	A-508-060401	Minor Bar Cable
473-37	A-244-010008	Felt - Brown - 1/8" X 1/2"
473-38	C-528-060536	Fulcrum Rail
473-39	C-528-060548	Keyslip - Solo
473-40	C-528-060622	Keyslip Extension
473-41	A-244-029612	Upstop Felt
473-42	A-244-028487	Felt - .160/.180 X 3/8"
473-43	A-244-006328	Key Cloth
473-44	A-249-032351	Wax
473-45	A-244-054730	Keyslip Felt
473-46	A-244-024941	Keyslip Felt

PEDAL ASSEMBLY

474- 1	D-500-059863	13 Note Pedal Assembly
474- 2	C-506-048860	5 Note Pedal Sustain Board Assembly
474- 3	C-506-048866	8 Note Pedal Sustain Board Assembly
474- 4	A-500-035728	Spring Contact Assembly
474- 5	C-250-032686	Sharp Pedal Assembly
474- 6	C-250-047968	Natural Pedal Assembly
474- 7	B-250-015033	Sharp Pedal Block
474- 8	A-237-032651	Pedal Spring
474- 9	A-237-039159	Actuator
474-10	A-514-033338	Transistor - NPN
474-11	A-514-044910	Transistor - PNP
474-12	A-514-042791	Diode - Medium Voltage - 1N251
474-13	S-211-006050	Capacitor, Electrolytic 50 mf @ 6V
474-14	S-205-000203	Capacitor, Ceramic .02 mf
474-15	S-205-000472	Capacitor, Ceramic 4700 pf
474-16	A-247-035735	Rivet - Iron - 1/4"
474-17	A-247-006163	Rubber Head Nail
474-18	A-244-005855	Felt
474-19	A-244-028821	Felt
474-20	A-506-035033	Contact Wire - Stationary
474-21	S-247-000002	Shrink Tubing

EXPRESSION PEDAL ASSEMBLY

474-31	D-500-053250	Expression Pedal Assembly
474-32	A-500-044740	Potentiometer Lever Assembly
474-33	A-506-044842	Bushing
474-34	A-237-036413	Drive Spring Pin
474-35	B-509-048890	Potentiometer - 50K
474-36	A-526-035985	Drive Spring
474-37	A-237-033321	Expression Pedal Spacer
474-38	A-244-026736	Bushing
474-39	A-244-022513	Pad
474-40	A-525-034469	Vinyl Extrusion - 5" Required
474-41	A-247-040149	Spring Washer
474-42	A-244-028468	Rubber Channel
474-43	A-244-036416	Nylon Shim
474-44	A-247-031746	E Ring
474-45	A-247-022975	Elastic Stop Nut

MODEL 127 PARTS LIST

FUN MACHINE BOARD ASSEMBLIES

ITEM NO.	PART NUMBER	DESCRIPTION
475- 1	X-500-060865	Fun Machine Boards Assembly
475- 2	D-500-060470	Rhythm Section Voice Board Assembly
475- 3	D-500-060479	Fun Machine Logic Board Assembly
475- 4	D-500-060663	Right Hand Board Assembly
475- 5	D-500-060827	Left Hand Board Assembly
475- 6	A-514-033338	Transistor - NPN
475- 7	A-514-044910	Transistor - PNP
475- 8	A-514-047829	Transistor - Medium Power - PNP
475- 9	A-514-042791	Diode - Medium Voltage - 1N251
475-10	B-509-041912	Mini-Pot - 100K
475-11	A-507-059132	IC Socket
475-12	A-507-060150	IC Socket Nest - 8 Connector
475-13	A-507-060149	IC Socket Nest - 12 Connector
475-14	A-514-053981	IC Operational Amp.
475-15	A-514-059739	IC ROM #3
475-16	A-514-058249	IC Rhythm Counter
475-17	A-514-060021	IC - Type 7405 - Hex Inverter
475-18	A-514-059464	IC - Type 7403 - Quad 2 Input Nand Gate
475-19	A-514-054489	IC - Type 74107 - Dual J-K Flip-Flop
475-20	S-211-025001	Capacitor 1 uf @ 25V
475-21	S-211-025005	Capacitor 5 uf @ 25V
475-22	S-211-025010	Capacitor 10 uf @ 25V
475-23	S-211-025050	Capacitor 50 uf @ 25V
475-24	S-211-025100	Capacitor 100 uf @ 25V
475-25	S-205-000330	Capacitor, Ceramic 33 pf
475-26	S-205-000101	Capacitor, Ceramic 100 pf
475-27	S-205-000471	Capacitor, Ceramic 470 pf
475-28	S-205-000102	Capacitor, Ceramic .001 uf
475-29	S-205-000222	Capacitor, Ceramic .0022 uf
475-30	S-205-000103	Capacitor, Ceramic .01 uf
475-31	S-205-000203	Capacitor, Ceramic .02 uf
475-32	S-218-000503	Capacitor, Ceramic .05 uf
475-33	S-218-000104	Capacitor, Ceramic .1 uf
475-34	S-205-000470	Capacitor, Ceramic 47 pf
475-35	S-244-354741	Capacitor, Tantalum .47 uf
475-36	S-244-356841	Capacitor, Tantalum .68 uf
475-37	S-244-252251	Capacitor, Tantalum 2.2 uf
475-38	S-244-351052	Capacitor, Tantalum 1 uf
475-39	S-232-001102	Capacitor, Mylar .0010 uf
475-40	S-232-001122	Capacitor, Mylar .0012 uf
475-41	S-232-001152	Capacitor, Mylar .0015 uf
475-42	S-232-001182	Capacitor, Mylar .0018 uf
475-43	S-232-001222	Capacitor, Mylar .0022 uf
475-44	S-232-001272	Capacitor, Mylar .0027 uf
475-45	S-232-001332	Capacitor, Mylar .0033 uf
475-46	S-232-001392	Capacitor, Mylar .0039 uf
475-47	S-232-001472	Capacitor, Mylar .0047 uf
475-48	S-232-001562	Capacitor, Mylar .0056 uf
475-49	S-232-001682	Capacitor, Mylar .0068 uf
475-50	S-232-001822	Capacitor, Mylar .0082 uf
475-51	S-232-001103	Capacitor, Mylar .010 uf
475-52	S-232-001123	Capacitor, Mylar .012 uf
475-53	S-232-001153	Capacitor, Mylar .015 uf
475-54	S-232-001183	Capacitor, Mylar .018 uf
475-55	S-232-001223	Capacitor, Mylar .022 uf
475-56	S-232-001273	Capacitor, Mylar .027 uf
475-57	S-232-001333	Capacitor, Mylar .033 uf
475-58	S-232-001393	Capacitor, Mylar .039 uf
475-59	S-232-001473	Capacitor, Mylar .047 uf
475-60	S-232-001563	Capacitor, Mylar .056 uf
475-61	S-232-001683	Capacitor, Mylar .068 uf
475-62	S-232-001823	Capacitor, Mylar .082 uf
475-63	S-232-001104	Capacitor, Mylar .10 uf
475-64	S-232-001124	Capacitor, Mylar .12 uf
475-65	S-232-001154	Capacitor, Mylar .15 uf
475-66	S-232-001184	Capacitor, Mylar .18 uf
475-67	S-232-001224	Capacitor, Mylar .22 uf
475-68	S-232-001274	Capacitor, Mylar .27 uf
475-69	S-232-001334	Capacitor, Mylar .33 uf
475-70	S-232-001394	Capacitor, Mylar .39 uf
475-71	S-232-001474	Capacitor, Mylar .47 uf
475-72	S-232-001564	Capacitor, Mylar .56 uf
475-73	S-232-001684	Capacitor, Mylar .68 uf
475-74	S-232-001824	Capacitor, Mylar .82 uf
475-75	S-232-001105	Capacitor, Mylar 1.0 uf
475-76	A-507-059127	Interconnect Wafer - 9 Pin
475-77	A-507-059125	Interconnect Wafer - 6 Pin

MODEL 127 PARTS LIST

MISCELLANEOUS

ITEM NO.	PART NUMBER	DESCRIPTION
476- 1	B-500-053627	Cassette Recorder
476- 2	C-500-052519	Cassette Recorder Drawer Sling
476- 3	C-105-053450	Plexiglas Music Desk
476- 4	D-175-060936	Back Panel
476- 5	A-518-052823	Expression Pedal Trim Moulding
476- 6	A-249-037744	Nameplate - Baldwin
476- 7	A-249-061841	Nameplate - Interlude
476- 8	B-249-061022	Nameplate - Rhythm
476- 9	A-249-061020	Nameplate - Key Selector
476-10	A-249-061019	Nameplate - Solo
476-11	A-249-061018	Nameplate - Accomp.
476-12	C-249-061023	Nameplate - T.C. Panel
476-13	A-249-061015	Nameplate - Ped. Accom. Volume
476-14	A-249-061017	Nameplate - Vibrato
476-15	A-249-061021	Nameplate - Minor Bar
476-16	A-513-054664	Speaker - 6"
476-17	A-513-024925	Speaker - 12"
476-18	C-512-053438	Transformer
476-19	B-514-035094	Ballast - Fluorescent Lamp
476-20	B-514-060909	Ballast - Fluorescent Lamp
476-21	B-517-038985	Capacitor - 4000 mf @ 60V
476-22	A-514-032101	Slow Blow Fusetron - 2 Amp
476-23	A-514-059976	Fuse Holder
476-24	A-237-019612	Mounting Clip
476-25	A-507-059124	Harness Connector - Konektcon - 6 Conn.
476-26	A-507-059126	Harness Connector - Konektcon - 9 Conn.
476-27	A-516-059123	Terminal - Konektcon - Crimp Style
476-28	A-507-014682	Phono Plug
476-29	A-507-060473	Extension Jax
476-30	A-244-033683	Color Dot - Red
476-31	A-244-033682	Color Dot - White
476-32	A-508-048246	Tini Plug Cable Assembly
476-33	A-507-044885	Socket - Molex - 3 Pin
476-34	A-507-044886	Plug - Molex - 3 Pin
476-35	A-507-044897	Socket - Molex - 6 Pin
476-36	A-507-044898	Plug - Molex - 6 Pin
476-37	A-507-044874	Socket - Molex - 9 Pin
476-38	A-507-044875	Plug - Molex - 9 Pin
476-39	A-507-044876	Socket - Molex - 12 Pin
476-40	A-507-044877	Plug - Molex - 12 Pin
476-41	A-507-042637	Socket - Molex - 15 Pin
476-42	A-507-042705	Plug - Molex - 15 Pin
476-43	A-516-046569	Terminal - Female - Small
476-44	A-516-042630	Terminal - Female - Large
476-45	A-516-046572	Terminal - Male - Small
476-46	A-516-042635	Terminal - Male - Large
476-47	A-507-027654	Solderless Connector - Single
476-48	A-507-028288	Solderless Connector - Double
476-49	A-507-035841	Solderless Connector - Speaker
476-50	A-244-005321	Felt - Maroon - .050/.035 X 1/2"
476-51	A-244-026947	Felt - Maroon - .115/.135 - 1" X 1/2" - 2 Pieces
476-52	A-514-061030	Insulator - Mylar
476-53	A-507-027654	Solderless Disc - Single
476-54	A-507-028288	Solderless Disc - Double
476-55	A-516-000011	Locking Terminal
476-56	C-502-060715	Expression Pedal Cover
476-57	B-502-060895	Preamp Shield
476-58	B-508-027658	Power Cord
476-59	A-507-048409	Duplex Power Outlet
476-60	A-512-048333	A.C. Adaptor
476-61	A-506-058921	Power Switch - Rocker Type - Red
476-62	C-512-054035	Power Transformer - 120/240V @ 50-60 Hz
476-63	C-512-059907	Power Transformer - 100V PRI
476-64	B-514-059756	Ballast - Fluorescent Lamp - 13W - 118V - 50 Hz