Film-Tech

The information contained in this Adobe Acrobat pdf file is provided at your own risk and good judgment.

These manuals are designed to facilitate the exchange of information related to cinema projection and film handling, with no warranties nor obligations from the authors, for qualified field service engineers.

If you are not a qualified technician, please make no adjustments to anything you may read about in these Adobe manual downloads.

www.film-tech.com

INTRODUCTION

This manual has been prepared especially for the Bell & Howell Service Stations. It is assumed that the repair man performing repairs has a thorough knowledge of sound amplifiers and the operation of all Filmosounds. If the repair man is not familar with Filmosound operation, reference should be made to the Instruction Book and Manual of Operation which accompanies each machine.

Missing pages:

E27: amplifier # 12634 for 138 Commercial, Utility, & Academy

H9: amplifier # 13817 for 156-V

H20: amplifier # 05311 for 185

H21: amplifier # 05973 for 185

H22: amplifier # 05973 new for 185

K1: information about amplifier # 07001 for 202 (page 1)

K2: information about amplifier # 07001 for 202 (page 2)

K5: monitor mixer # 25996

L1-B: projector electrical diagram for 285

L3: amplifier # 07138-J for late 285 projectors

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SECTION A

GENERAL INFORMATION

AMPLIFIERS.

Amplifier circuits are all conventional or adaptations of conventional tube circuits. An oscillating vacuum tube supplies energy for the exciter lamp. Frequencies range from 22KC to 100KC, depending on the model. Volume is usually controlled at two places: first, by varying the voltage on the oscillator tube causing a change of oscillation intensity, and second, by varying the voltage to the photocell. On older models this is accomplished by one control which is placed in the cathode circuit of the oscillator tube. A lead from the cathode side of this control connects to one side of the photocell and the voltage drop is used to neutralize the voltage on the opposite side of the photocell when the control is in the minimum position. Therefore, if the two voltages are not equal the volume will not shut off completely. Another method is used on the later Design 130, Model R and Design 156, Model A and D amplifiers. This consists of a dual control, one section of which varies the voltage on the photocell, and the other changes the degree of feedback in the oscillator tube.

EXCITER LAMP VOLTAGE.

Exciter lamp voltage or current cannot be measured with any meter other than a vacuum tube voltmeter or a radio frequency ammeter. Many modern testing units are not vacuum tube voltmeters on the A.C. scales.

SPEAKERS.

Speakers have specially designed cones whose frequency characteristics blend in with those of the associated amplifier; therefore, do not have damaged cones replaced by any company other than Bell & Howell.

PARTS.

Parts should always be ordered by the "A" number and description. If the number is unknown give the projector serial number and a brief description of the part.

TUBES.

Tubes used must be very low in microphonic qualities, otherwise vibration of the running motor will be reproduced in the speaker.

MODEL DESIGNATION.

On all old model Filmosounds the model designation appears on the projector name plate. On late model Filmosounds the amplifier part number appears on an individual plate attached to the amplifier. Be sure to give the serial number of the projector and, when possible, the part number of the amplifier in correspondence concerning an amplifier.

On models manufactured since 1943 the design number and model designation appear on the name plates of projector and speaker case.

RESISTOR COLOR CODE.

The following resistor color code is given as means of determining the resistance values of the resistors.

Color	(A) Body	(B) Tip	(C) Dot
Black	0	0	---
Brown	1	1	0---
Red	2	2	00---
Orange	3	3	000---
Yellow	4	4	0000---
Green	5	5	00000---
Blue	6	6	000000---
Violet	7	7	
Grey	8	8	
White	9	9	

EXAMPLE: _____ Red Body (A)
_____ Green Tip (B)
_____ Yellow Dot (C)

The resistance value of this resistor would be:

Red Body, Green Tip, Yellow Dot

---2---5---0000---

which is 250,000 ohms.

Later resistors are marked with 3 consecutive bands. A fourth band is used for tolerance percentage. A gold band indicates a 5% tolerance and a silver band indicates a 10% tolerance. Absence of a fourth band indicates a 20% tolerance. The bands are read 1 - 2 - 3 toward the percentage band.

SECTION B

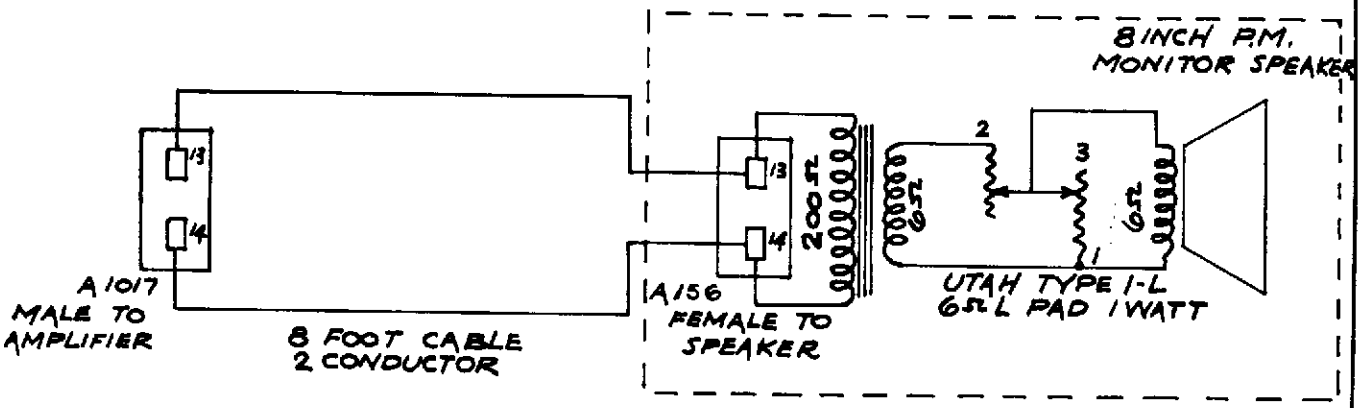
FILMOSOUND MONITOR SPEAKER

The Filmosound monitor speaker is supplied with a monitor volume control. Permanently attached to this box is a short cord which should be plugged into the amplifier receptacle to which the speaker cable is ordinarily connected.

Connect the speaker cable to the receptacle provided in the monitor speaker case.

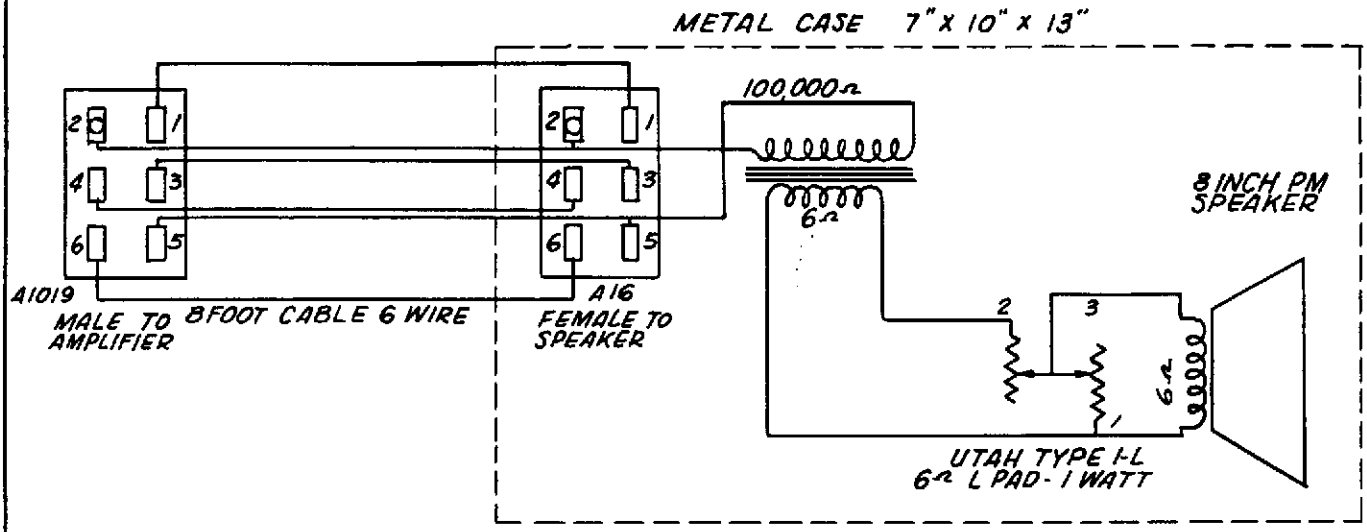
The volume of the monitor speaker will always be proportional to the volume of the stage speaker, and experimentation will quickly indicate the correct position of the monitor volume control to provide the proper volume of sound in the projection booth when the stage speaker is delivering the desired output in the auditorium.

Do not connect or disconnect the monitor speaker until the Filmosound amplifier has been turned off.



MODELS 130G, GB, E, EB, - 140 A, E, G, H, AB, EB, GB, HB, 142 B, BB, C, CB, 120 J-K

SERVICE DATA	
MONITOR SPEAKER	
	DATE 9-8-45



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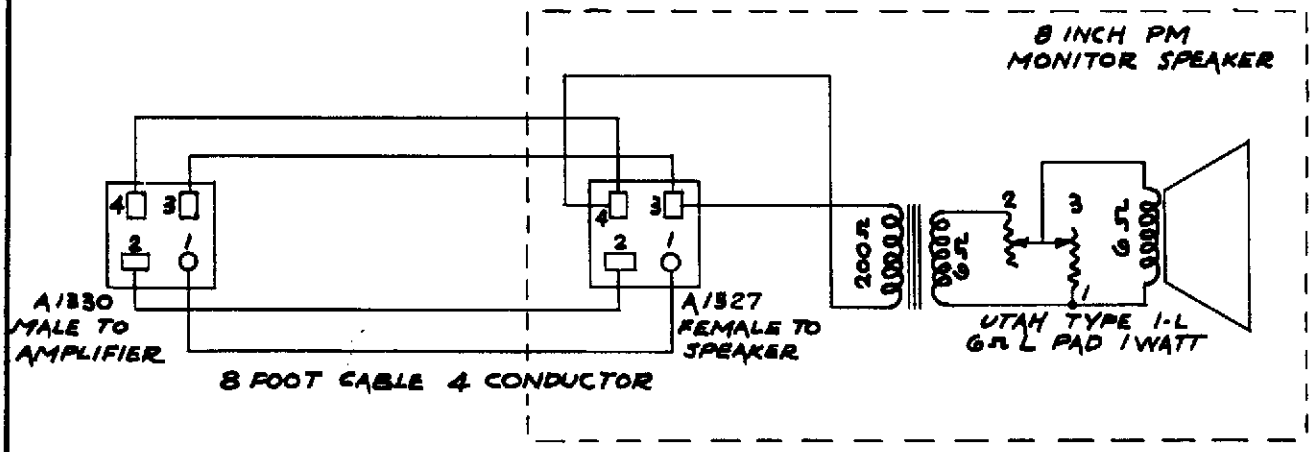
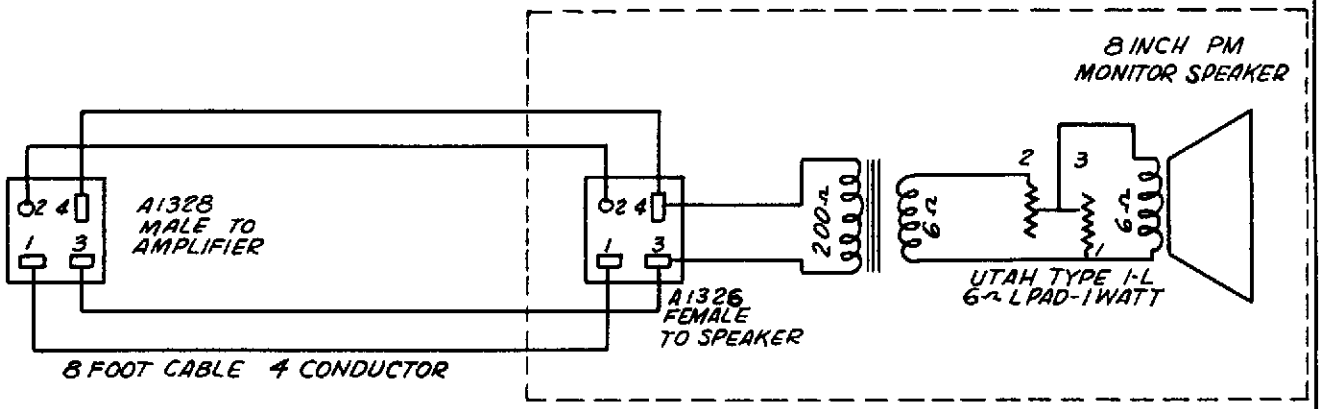
MONITOR SPEAKER	
MONITOR SPEAKER MODELS 138Q,70Z	
	DATE



SERVICE DATA
MONITOR SPEAKER
MODELS 142 D & DB
DATE 9-8-45



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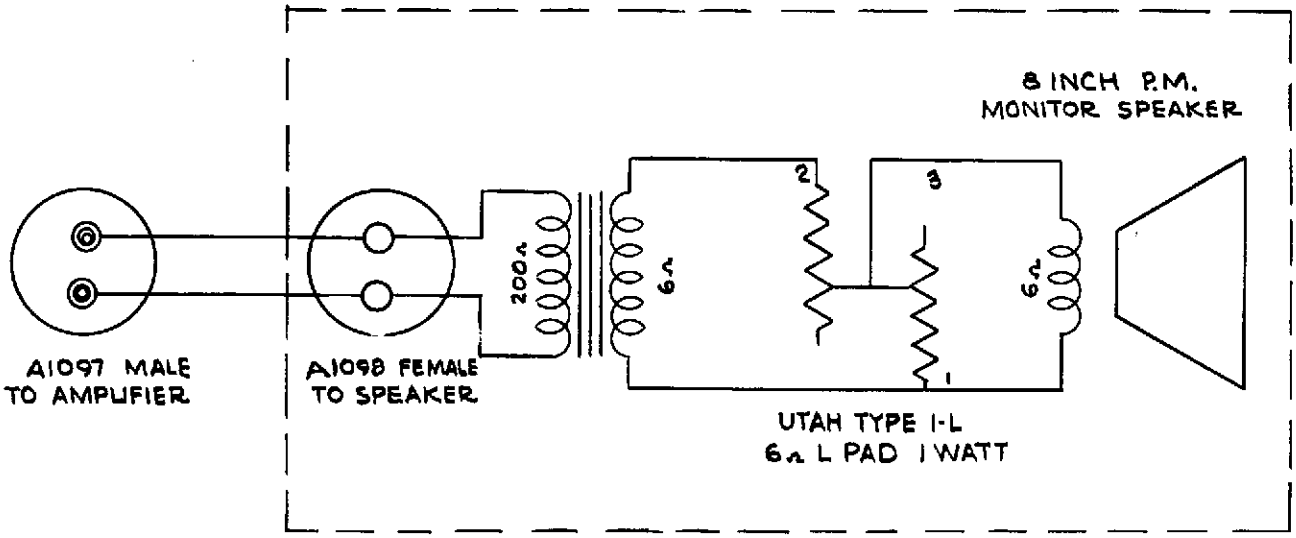
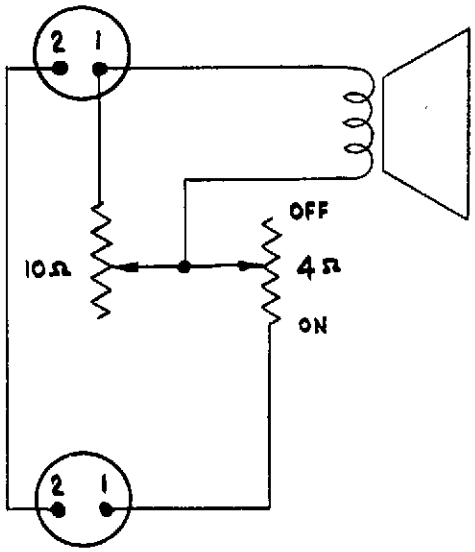
MONITOR SPEAKER	
MONITOR SPEAKER MODELS 1564B,C,D, & 1564V	
	DATE

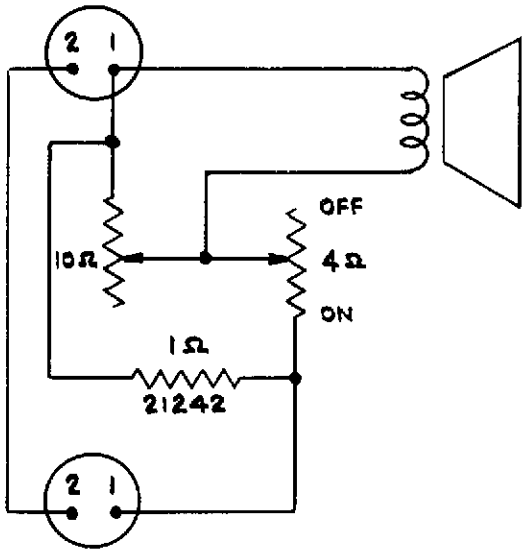


SERVICE DATA
WIRING DIAGRAM
MONITOR SPEAKER
MODELS 156 G,H — MODELS 179 A,B
DATE: 1-5-46



PART 21241

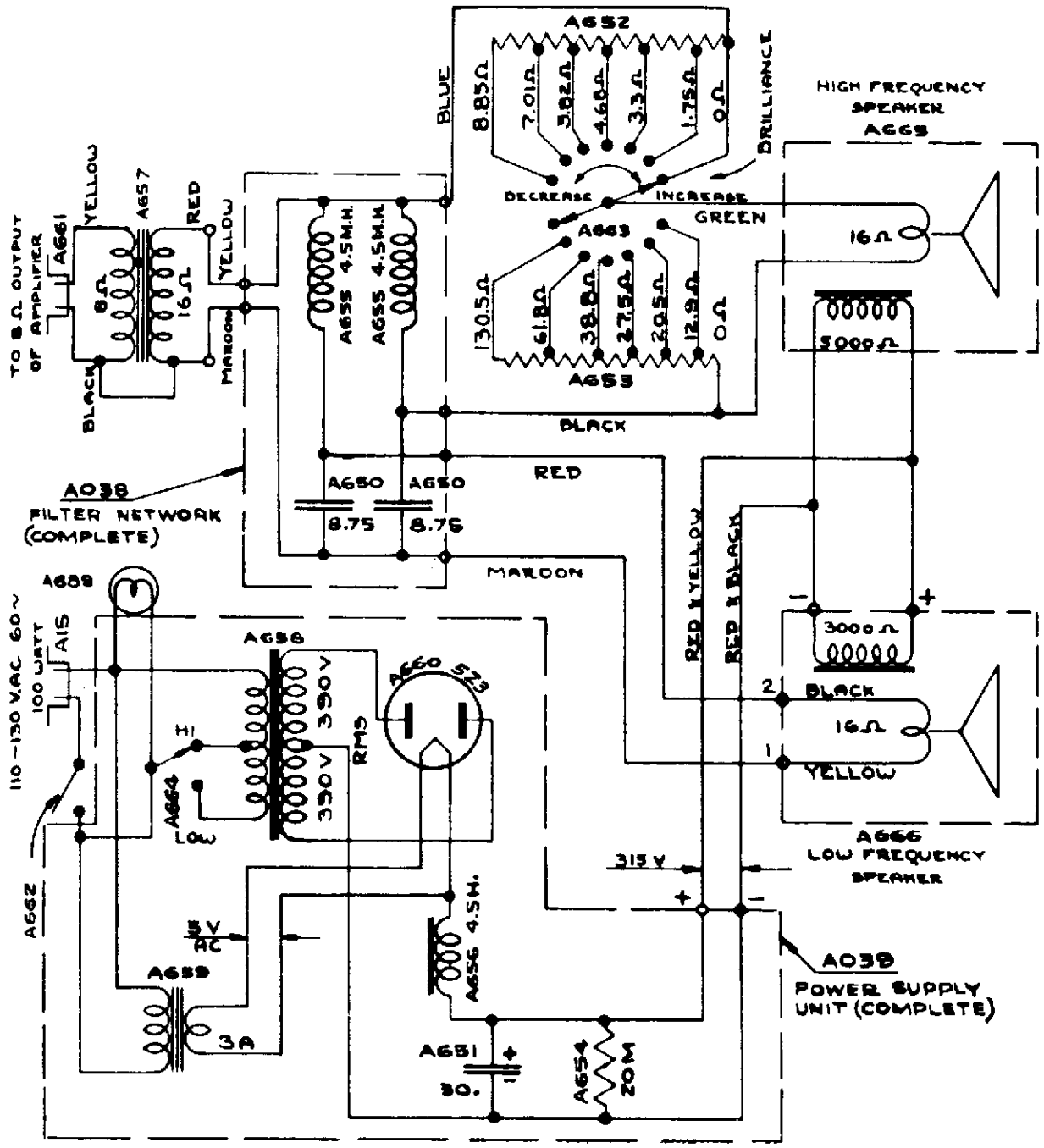
MONITOR SPEAKER FOR USE ON SYSTEMS UP TO 15 WATTS OUTPUT



PART 05400

MONITOR SPEAKER FOR USE ON SYSTEMS FROM 16 WATTS TO 50 WATTS OUTPUT

SERVICE DATA	
MONITOR SPEAKER WIRING DIAGRAMS	
FOR USE WITH PARTS 05400 AND 21241	4-19-51



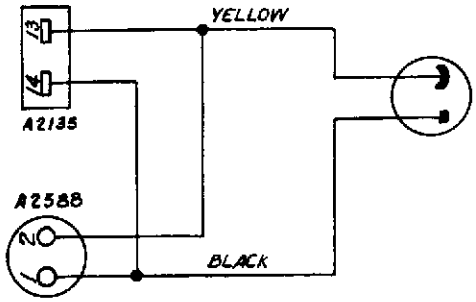
SERVICE DATA

SPEAKER WIRING DIAGRAM

ORCHESTRICON

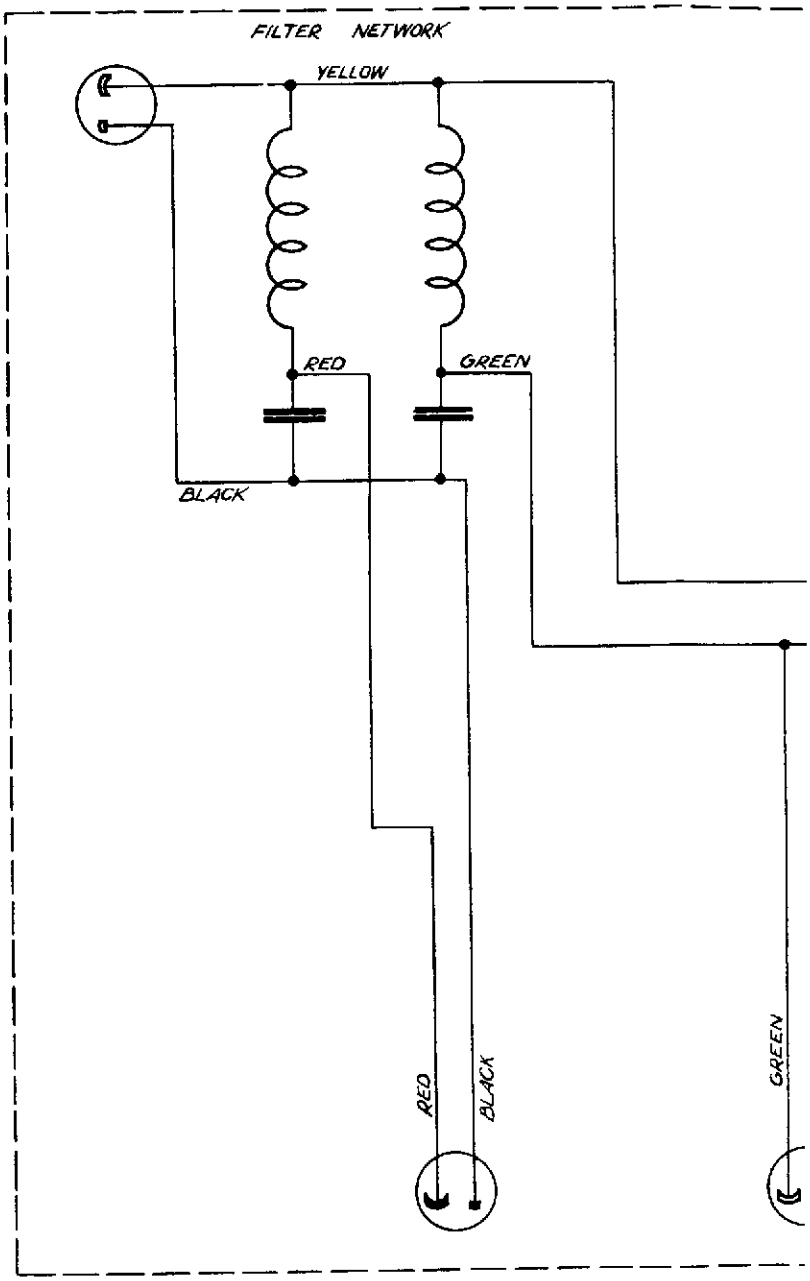
DATE OF ORIGINAL DRAWING	12-21-39
REVISED	10-15-45

Read all notes before starting work. Do not scale drawing
Work to dimensions. All dimensions are given in inches
Unless otherwise specified, chamfer all sharp corners .005x45°
Unless otherwise specified, fractional dimensions are ±
Unless otherwise specified, angular dimensions are ±
Substitutions must be approved by the Engineering Dept

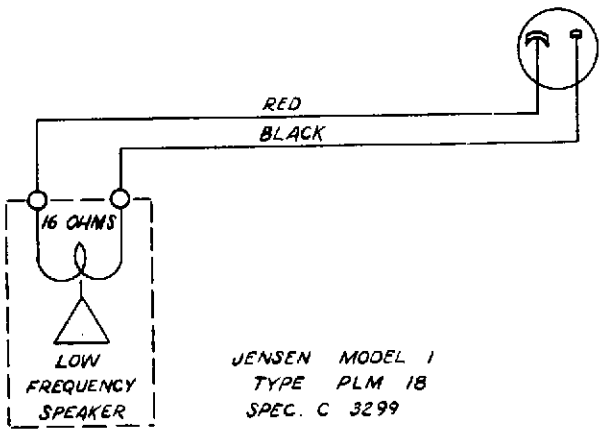


TO 16 OHM
OUTPUT OF
AMPLIFIER

CABLE COMPLETE A0 294

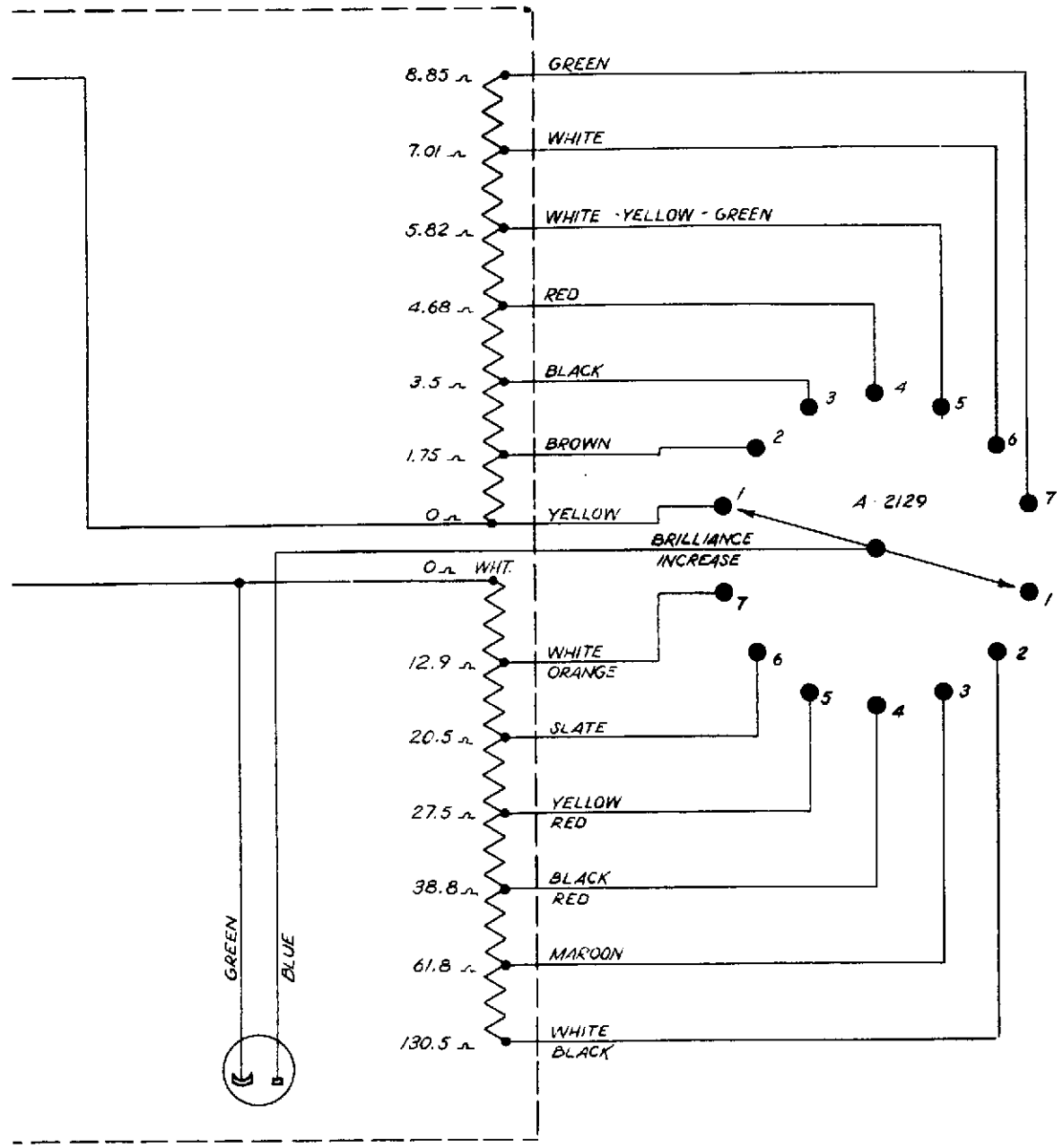


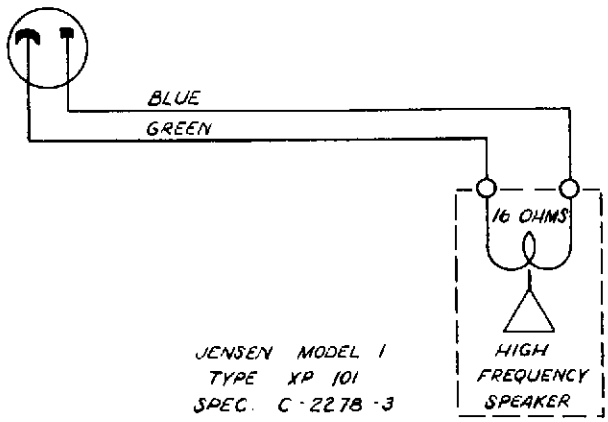
JENSEN MODEL
TYPE A8-1
SPEC. C-2409
A2076



A2076

JENSEN MODEL 1
TYPE PLM 18
SPEC. C 3299



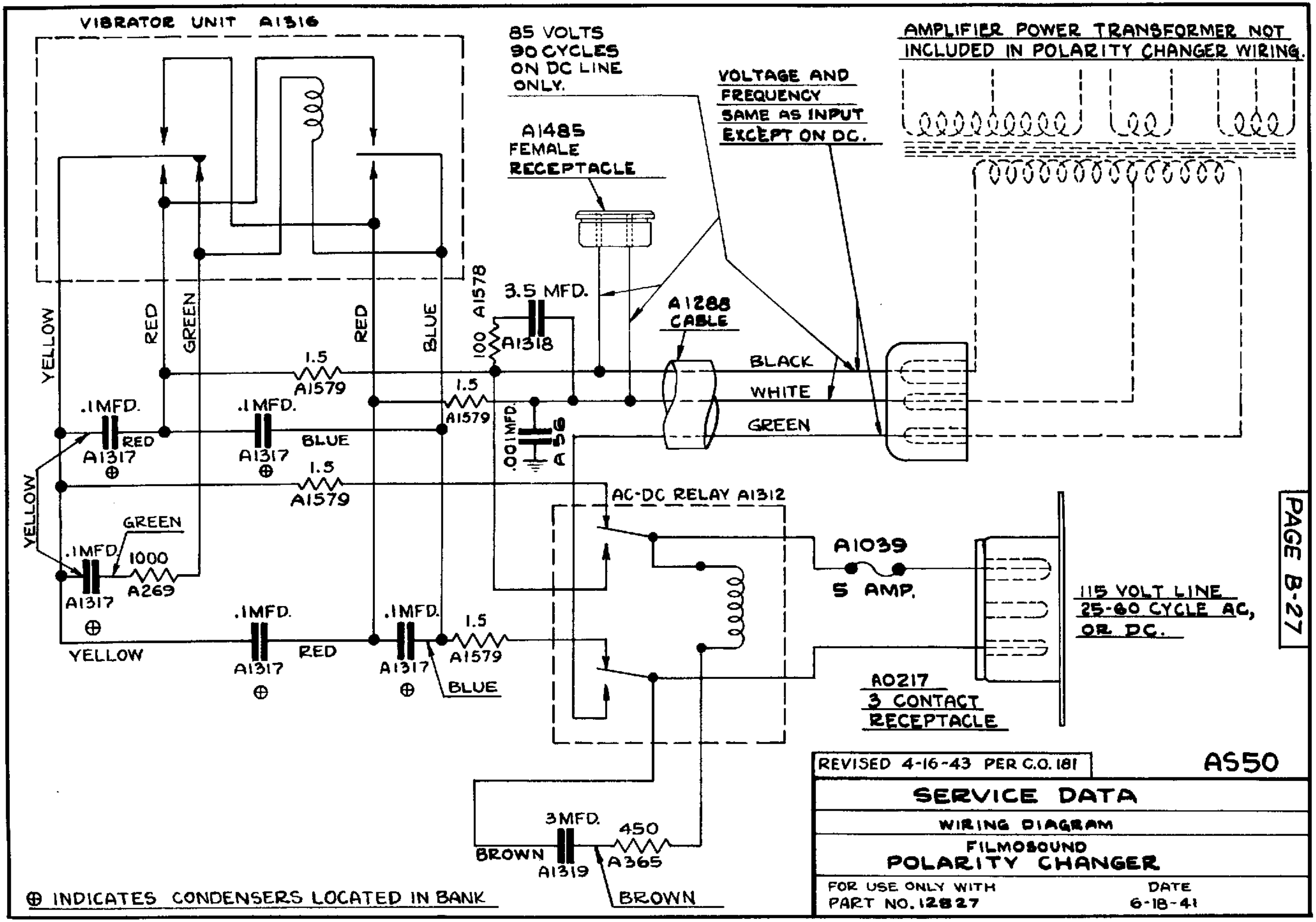


JENSEN MODEL 1
TYPE XP 101
SPEC. C-2278-3

A2077

AS 121

SERVICE DATA			
ORCHESTRICON WIRING DIAGRAM			
DESIGN 150 B			
CHECKED R.A.P.	APP.	APP.	6-23-47


VIBRATOR UNIT A1316
85 VOLTS
90 CYCLES
ON DC LINE
ONLY.
AMPLIFIER POWER TRANSFORMER NOT
INCLUDED IN POLARITY CHANGER WIRING.
VOLTAGE AND
FREQUENCY
SAME AS INPUT
EXCEPT ON DC.
A1485
FEMALE
RECEPTACLE
3.5 MFD.
100 A1578
A1318
A1288
CABLE
BLACK
WHITE
GREEN
YELLOW
RED
GREEN
RED
BLUE
1.5
A1579
.1MFD.
RED
A1317
BLUE
.001MFD.
AC-DC RELAY A1312
A1039
5 AMP.
115 VOLT LINE
25-60 CYCLE AC,
OR DC.
A0217
3 CONTACT
RECEPTACLE
GREEN
1000
A269
YELLOW
3MFD.
450
BROWN
A1319
A365
BROWN
⊕ INDICATES CONDENSERS LOCATED IN BANK

REVISED 4-16-43 PER C.O. 181

AS50

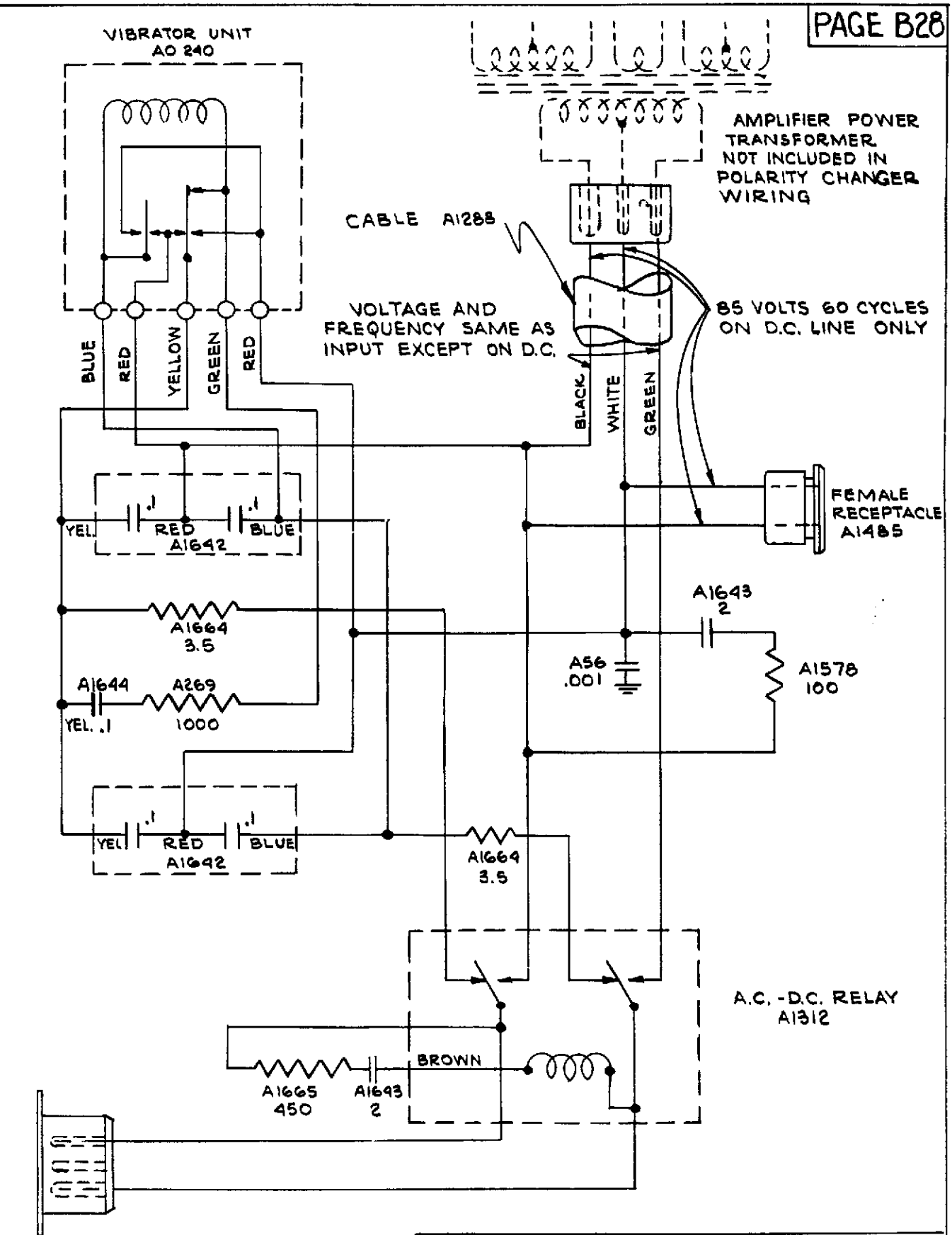
SERVICE DATA

WIRING DIAGRAM

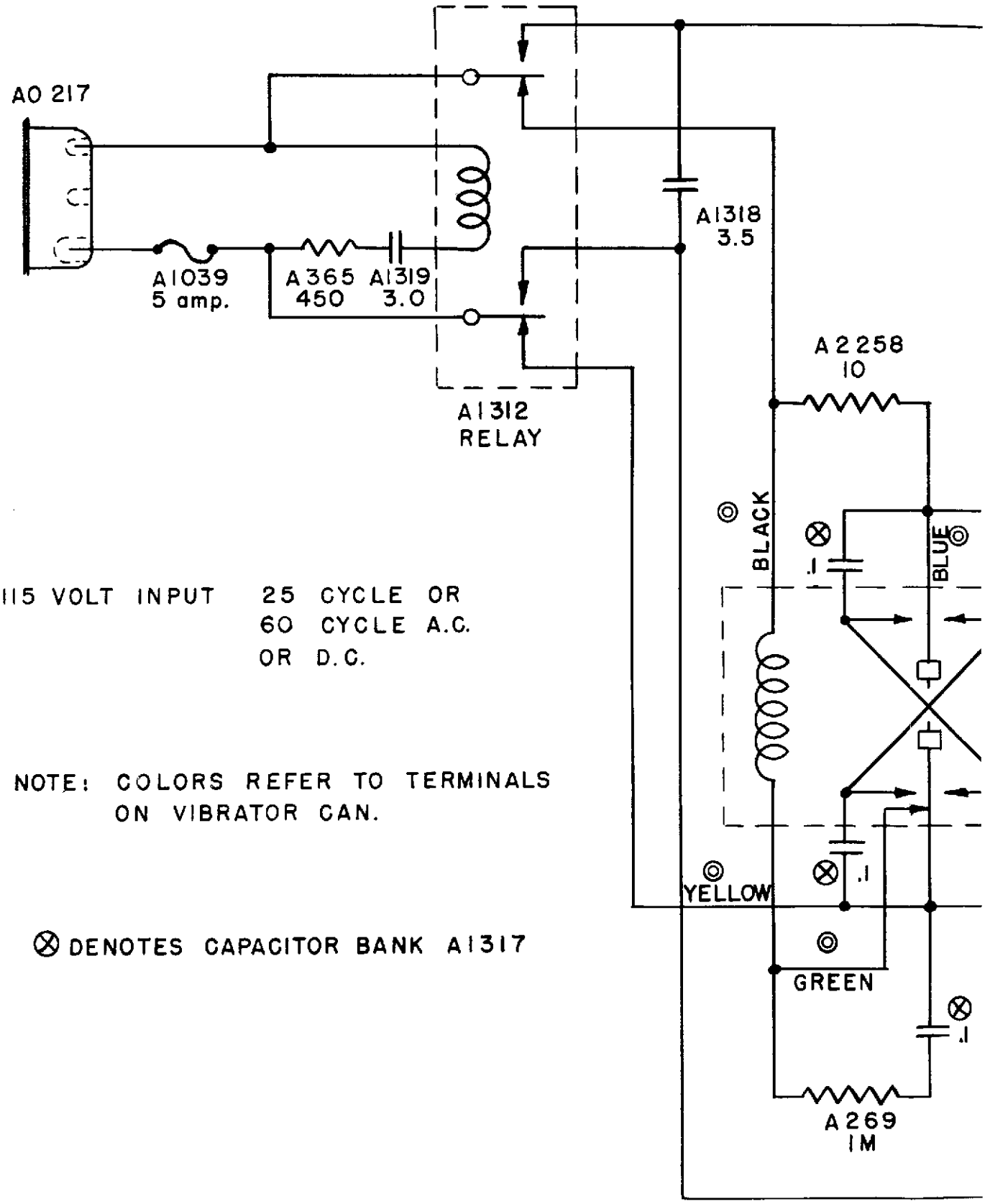
FILMOSOUND
POLARITY CHANGER

FOR USE ONLY WITH PART NO. 12827

DATE 6-18-41



SERVICE DATA
WIRING DIAGRAM
FILMOSOUND POLARITY CHANGER
FOR USE ONLY WITH PART 13931 — DATE: 1-7-46

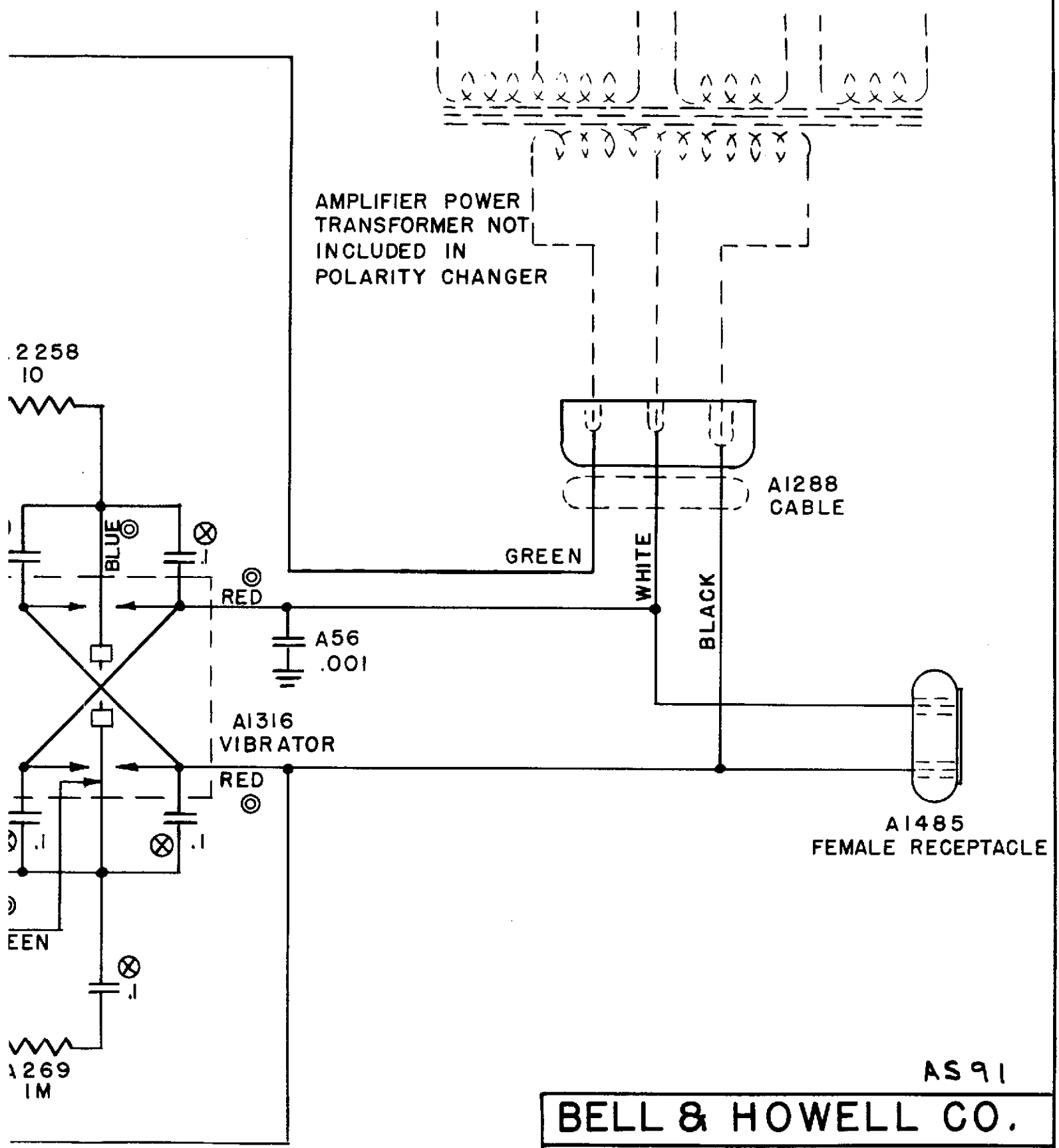


115 VOLT INPUT 25 CYCLE OR
60 CYCLE A.C.
OR D.C.

◎ NOTE: COLORS REFER TO TERMINALS ON VIBRATOR CAN.

⊗ DENOTES CAPACITOR BANK A1317

9



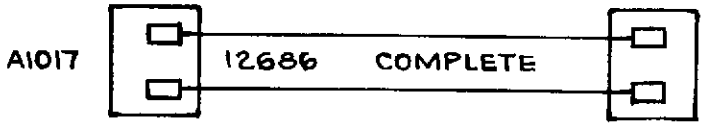
AS 91

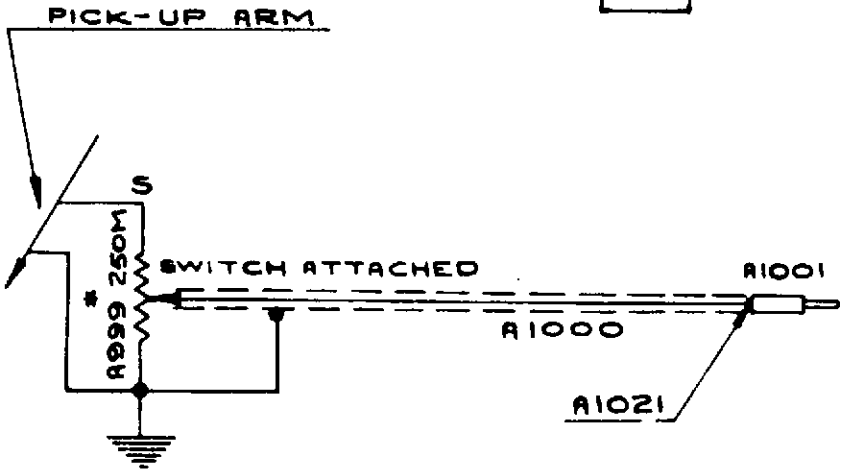
BELL & HOWELL CO.

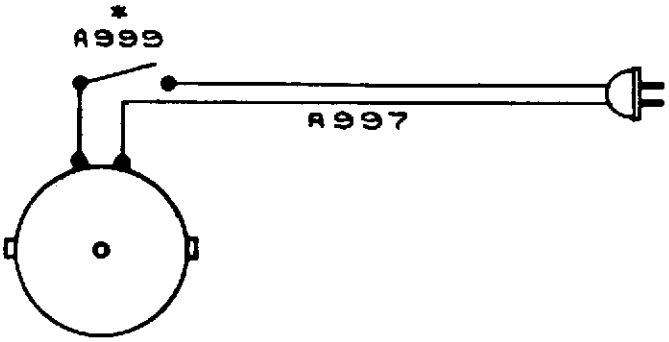
POLARITY CHANGER

DATE 5-20-46	SERVICE DATA	DRN EWT APVD

PART 12827 REVISED

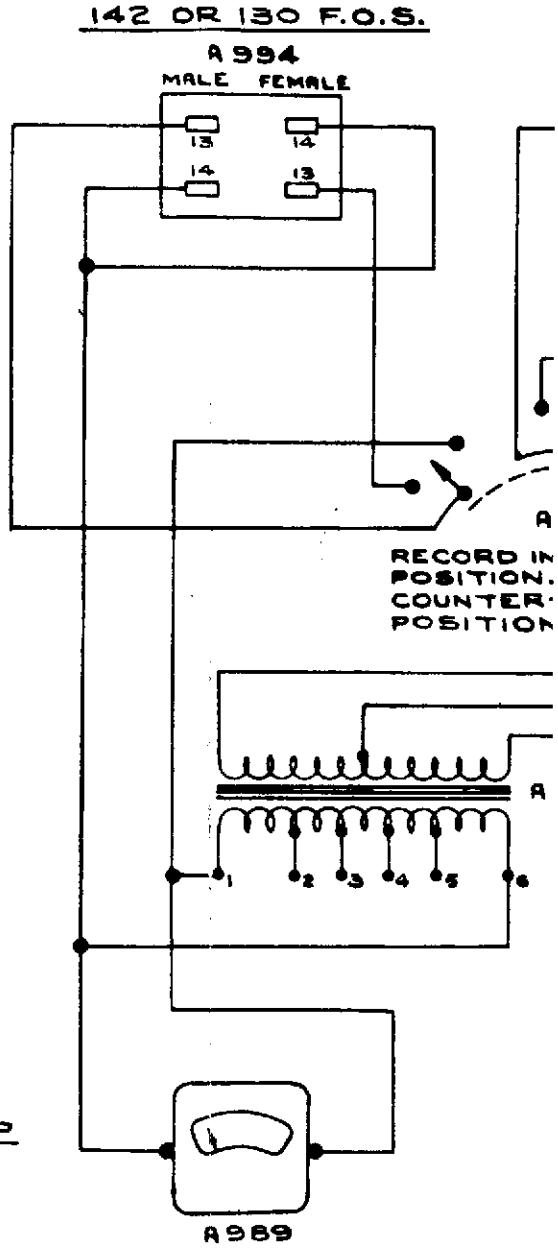






MOTOR

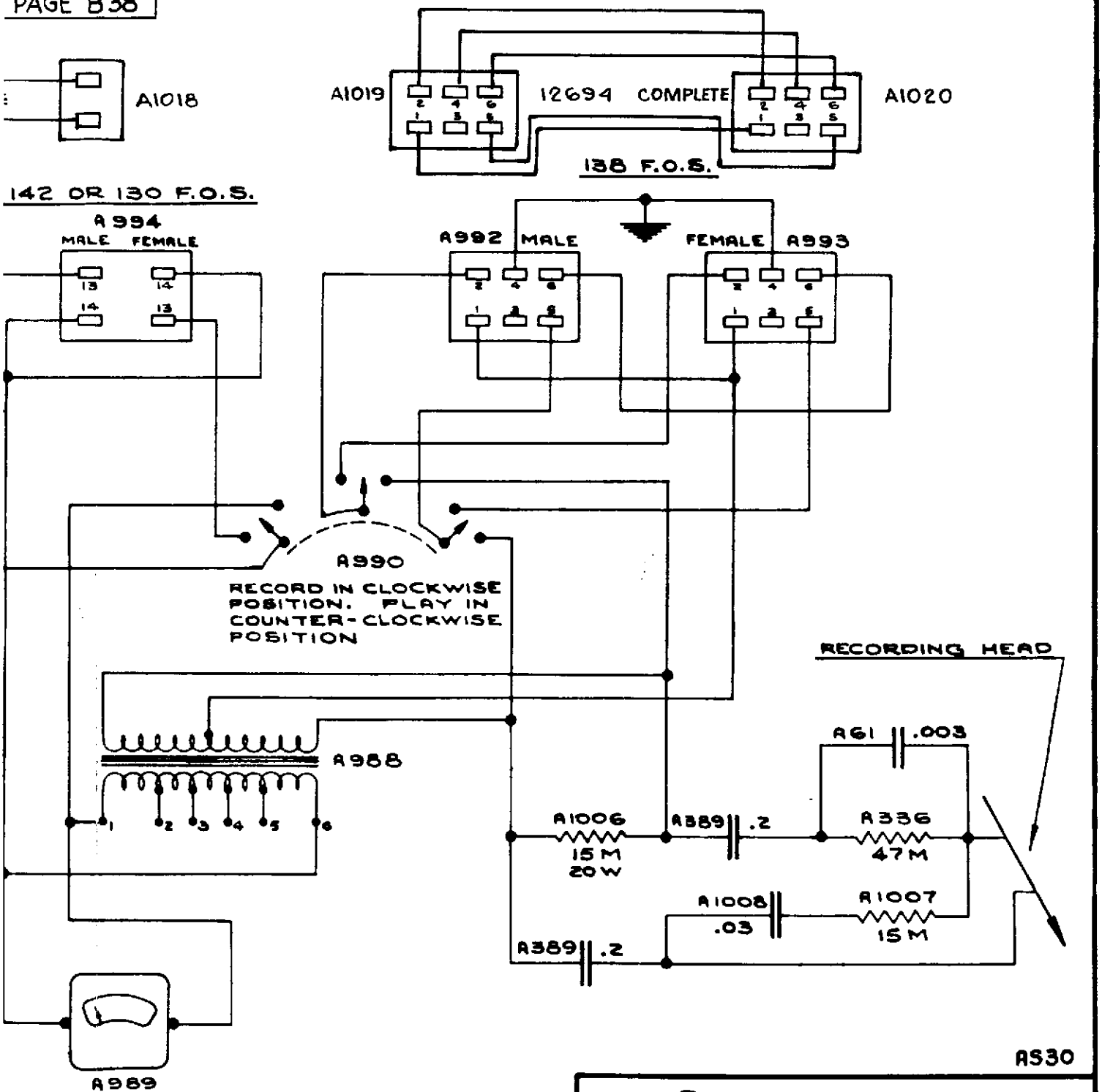
115 VOLTS, 60 CYCLES
0.65 AMPERES
75 WATTS
80 R.P.M.



NOTE :-

5 INDICATES TERMINAL AT CLOCKWISE STOP

* INDICATES UNITS ON SAME SHAFT



AS30

SERVICE DATA

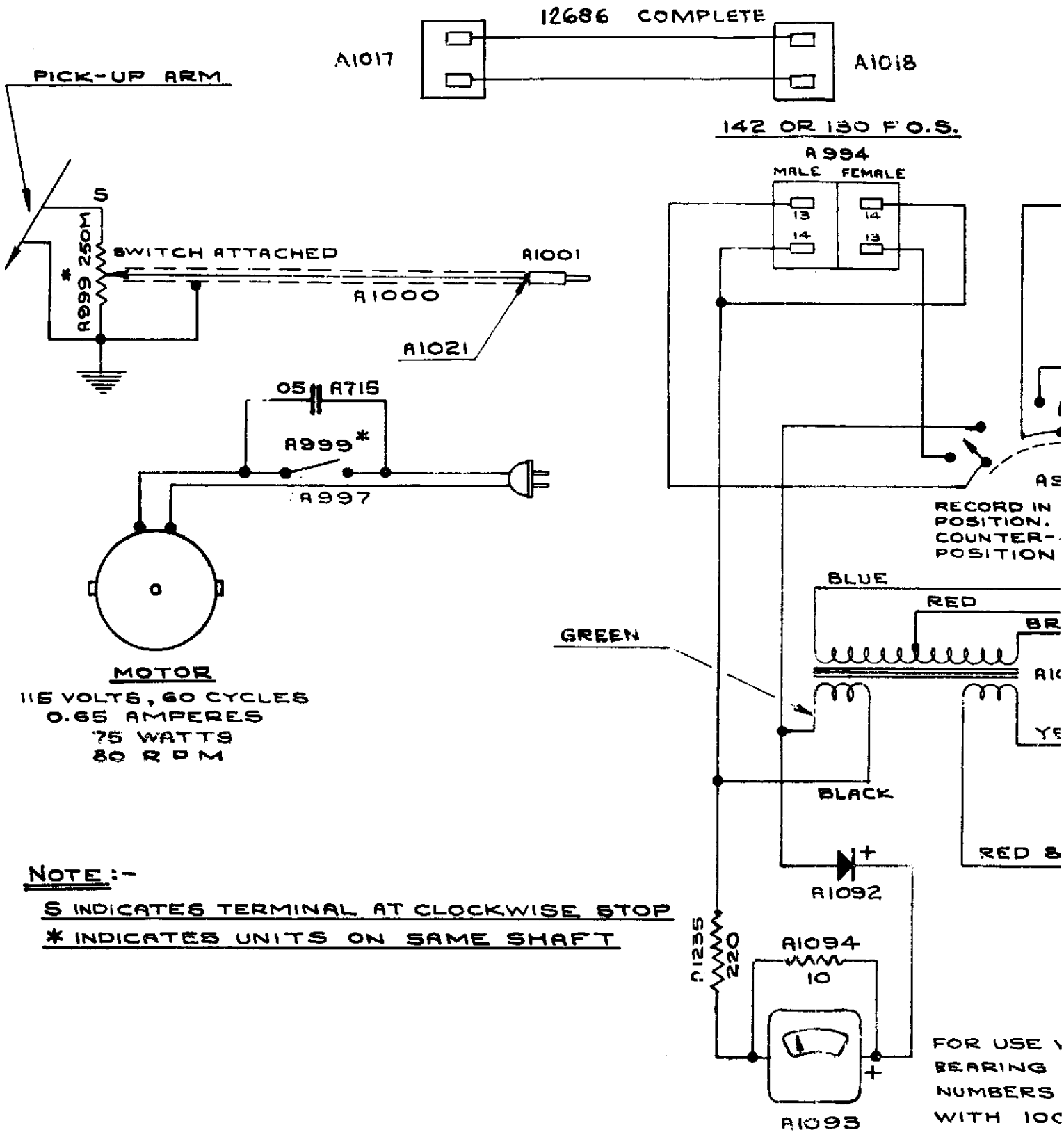
WIRING DIAGRAM

DISC RECORDER

FOR COMMERCIAL, ACADEMY, UTILITY, MASTER, & AUDITORIUM FILMOSOUNDS

FOR USE ONLY WITH DISC RECORDERS
PART Nos 12625 & 12728

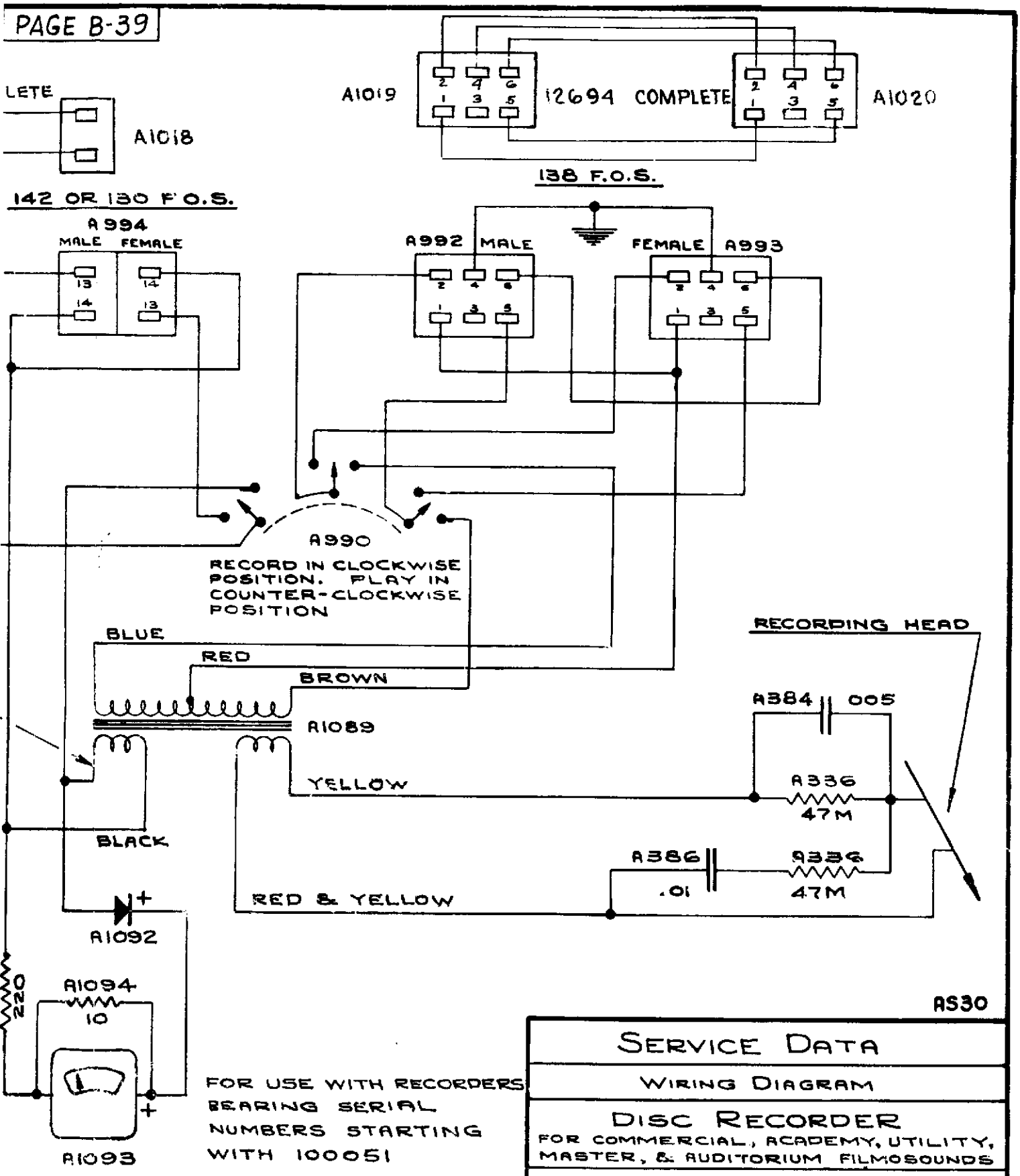
DATE 10-9-40



NOTE :-

S INDICATES TERMINAL AT CLOCKWISE STOP

* INDICATES UNITS ON SAME SHAFT



FOR USE WITH RECORDERS BEARING SERIAL NUMBERS STARTING WITH 100051

SERVICE DATA

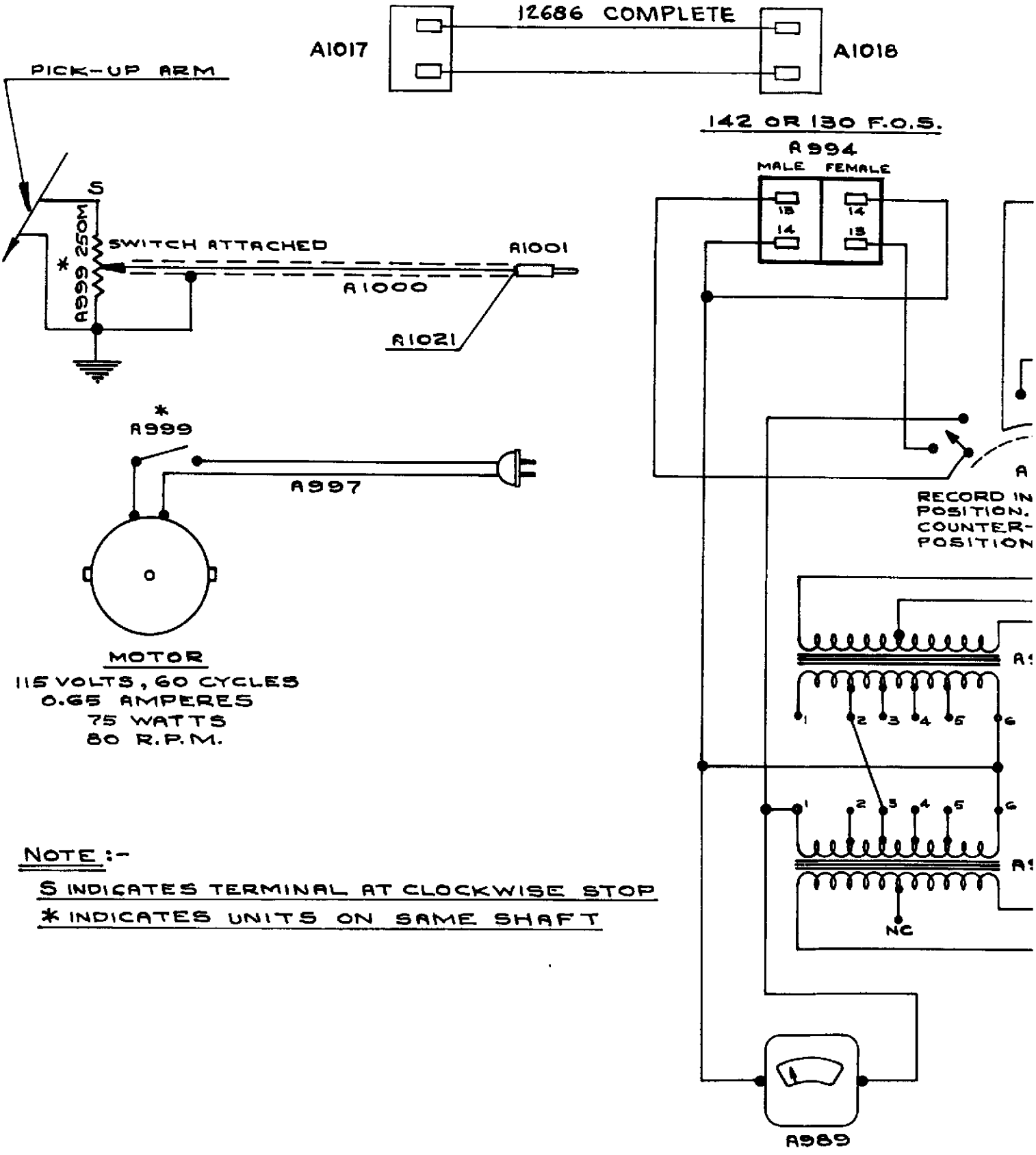
WIRING DIAGRAM

DISC RECORDER

FOR COMMERCIAL, ACADEMY, UTILITY, MASTER, & AUDITORIUM FILMOSOUNDS

FOR USE ONLY WITH DISC RECORDERS PART No's 12625 & 12728

DATE 10-9-40



MOTOR

115 VOLTS, 60 CYCLES
0.65 AMPERES
75 WATTS
80 R.P.M.

NOTE :-

S INDICATES TERMINAL AT CLOCKWISE STOP

* INDICATES UNITS ON SAME SHAFT

E B-40

TE

A1018

142 OR 130 F.O.S.

A1019

12694 COMPLETE

A1020

138 F.O.S.

A994

MALE FEMALE

A992 MALE

FEMALE A993

A990

RECORD IN CLOCKWISE POSITION. PLAY IN COUNTER-CLOCKWISE POSITION.

RECORDING HEAD

A988

A988

NC

A384 .005

A331 27M

A386 .01

A332 30M

A989

A934

SERVICE DATA

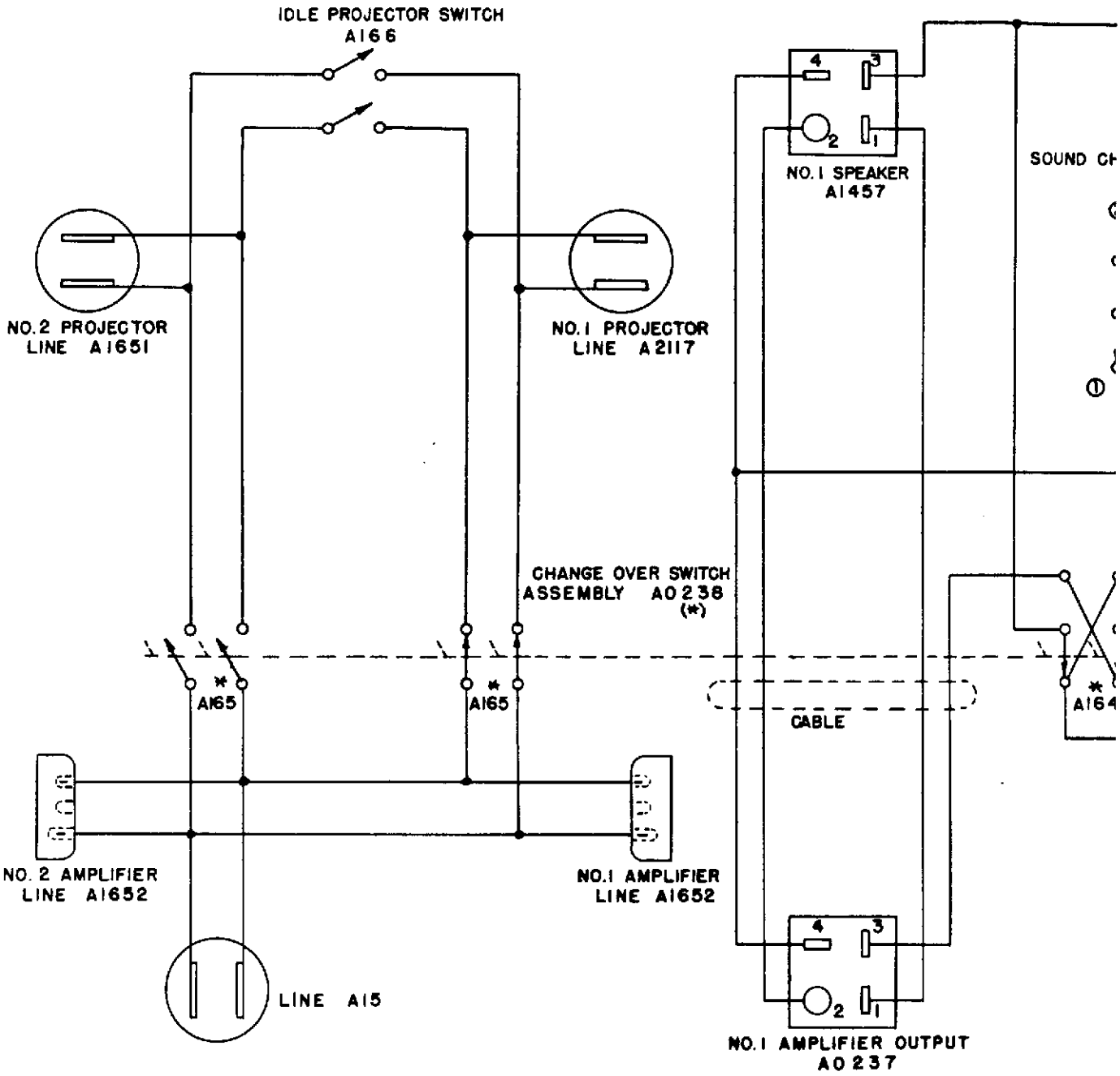
WIRING DIAGRAM

DISC RECORDER

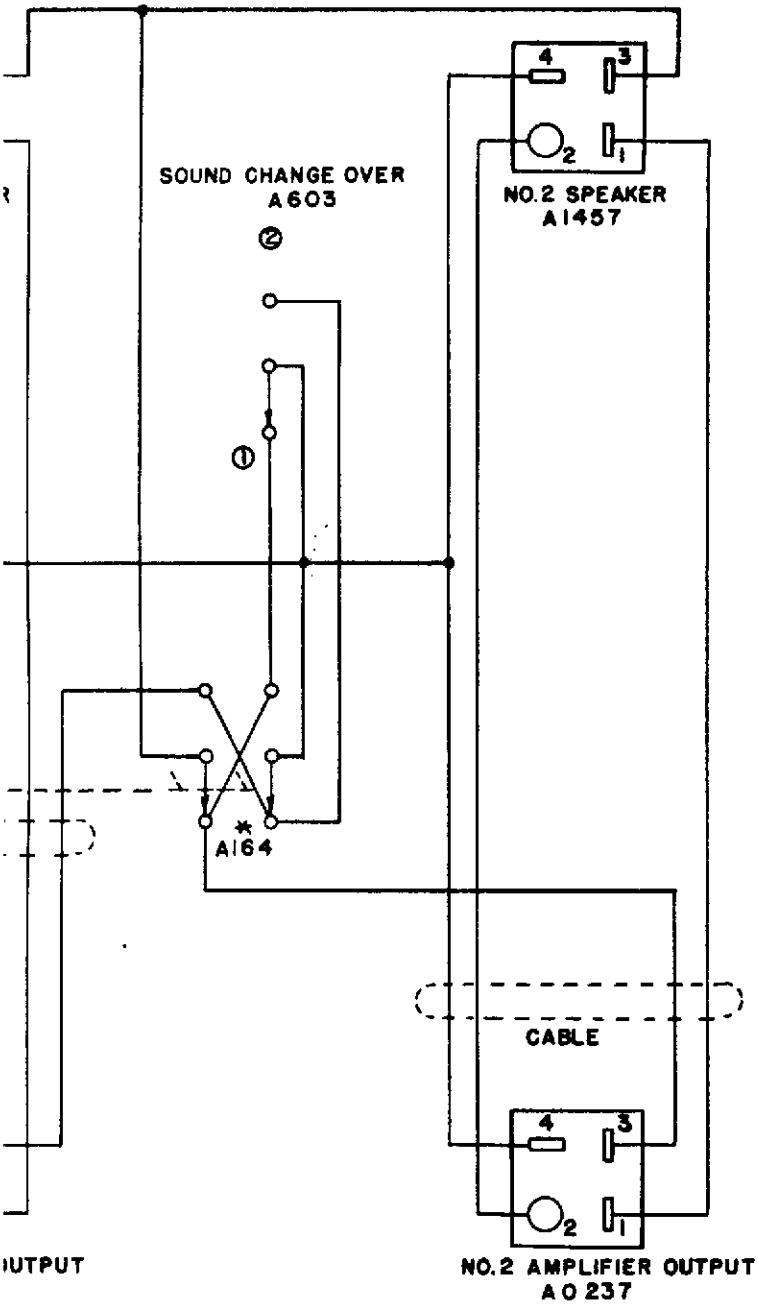
FOR COMMERCIAL, ACADEMY, UTILITY, MASTER, & AUDITORIUM FILMOSOUNDS

FOR USE ONLY WITH DISC RECORDERS PART Nos 12625 & 12728

DATE 11-8-40



SWITCHES SHOWN IN PROJECTOR NO. 1 POSITION



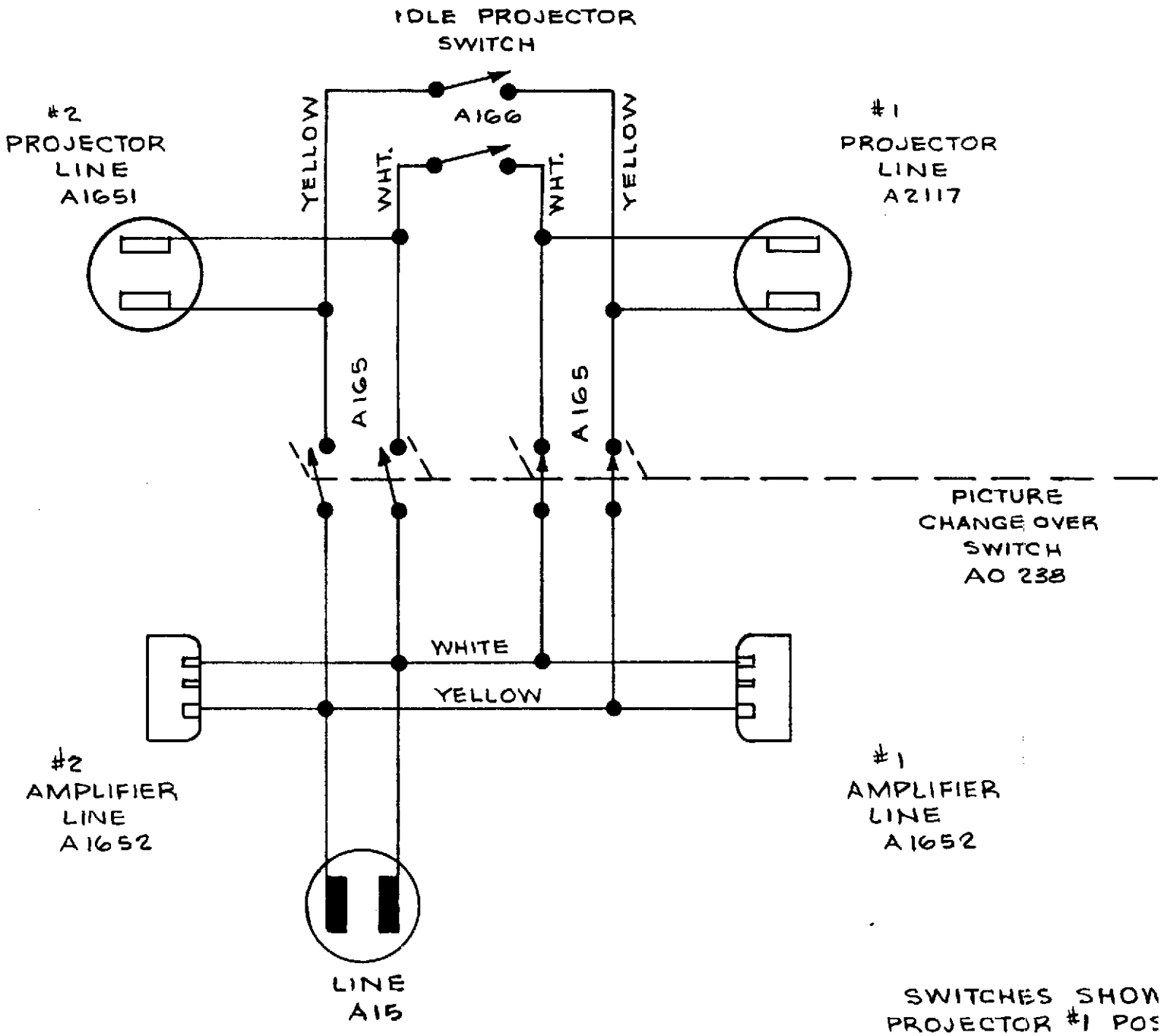
AS102

BELL & HOWELL CO.

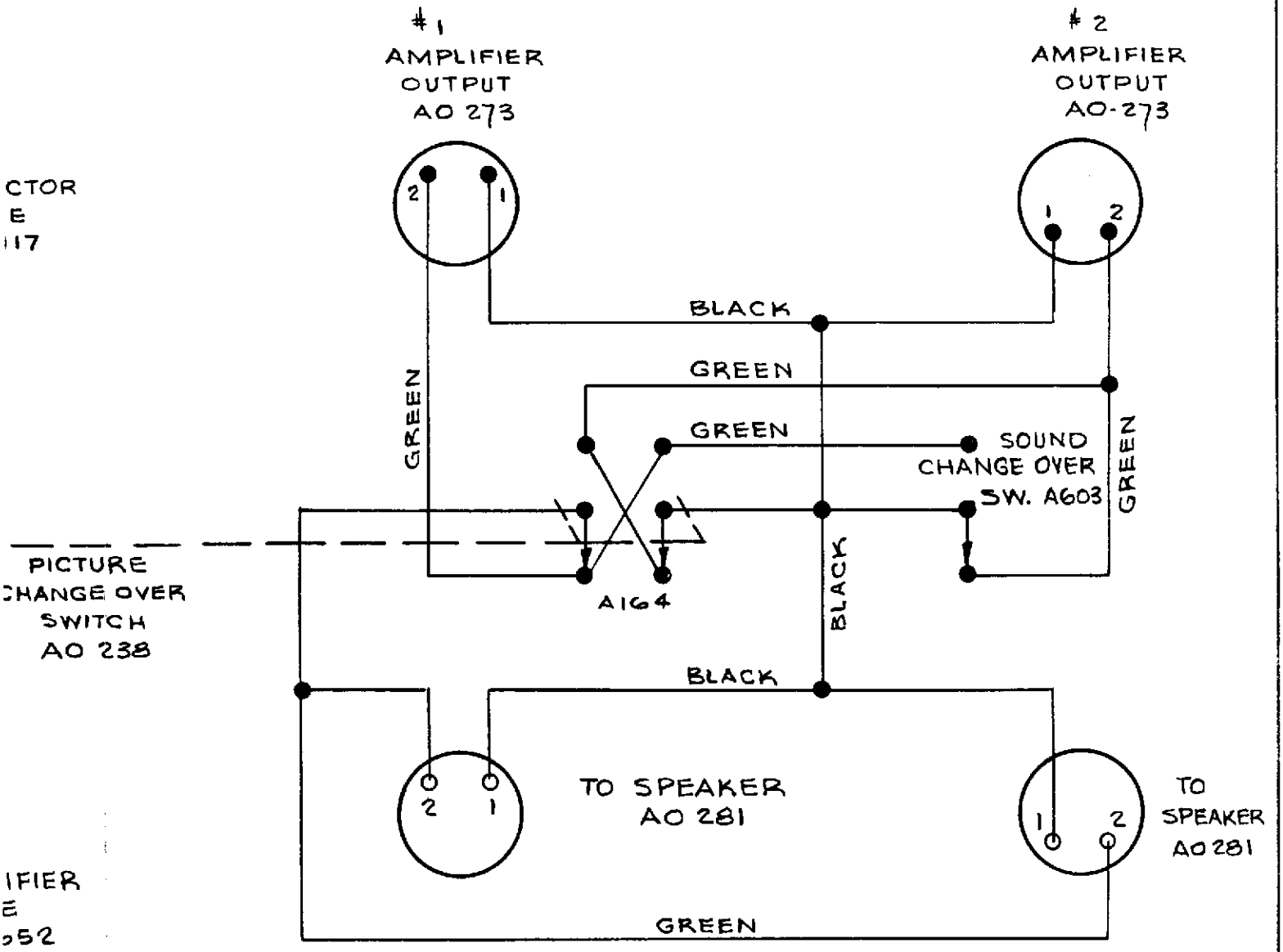
CHANGE OVER BOX

DATE 5-13-46	SERVICE DATA	DRAWN EMJ. APVD

DES. 156 A-D, V

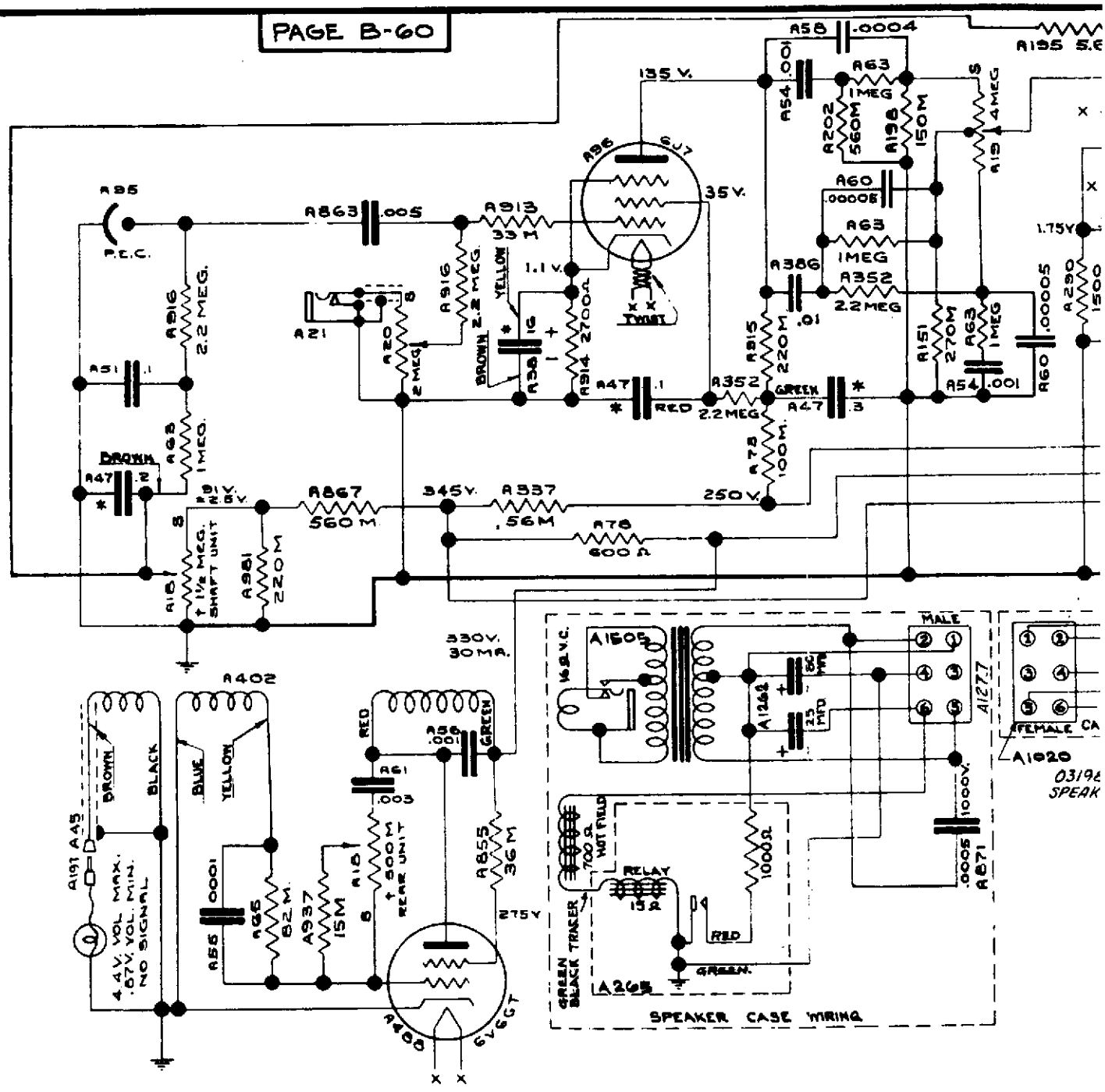


SWITCHES SHOW
PROJECTOR #1 POS



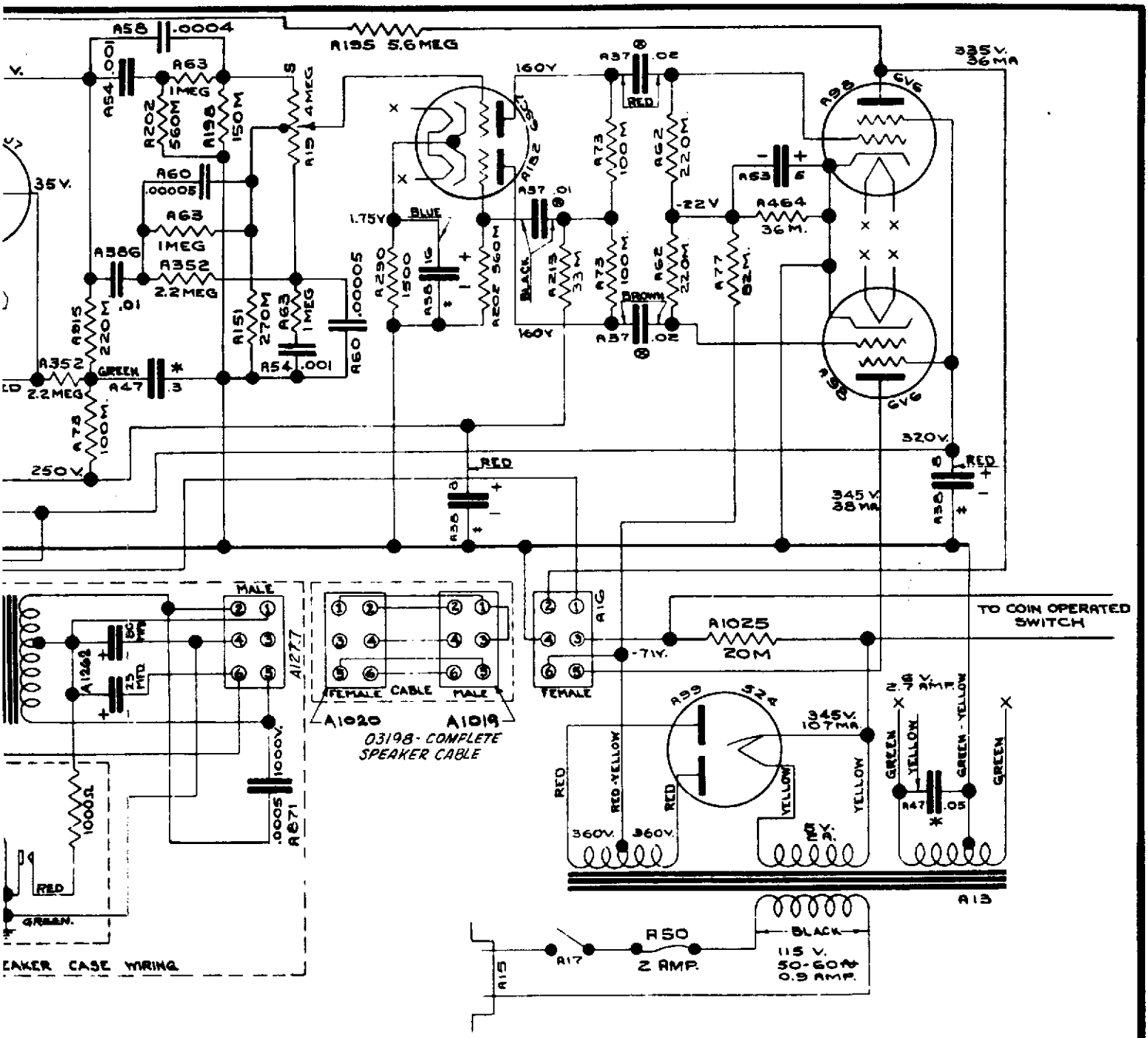
WITCHES SHOWN IN
OJECTOR #1 POSITION

SERVICE DATA
CHANGE-OVER BOX
BELL & HOWELL CO., CHICAGO
PART: 13987 APVD. 5-6-M.



"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 115 V. LINE. ALL VOLTAGES MEASURED TO GROUND
* † ⊕ DENOTE CAPACITORS LOCATED IN BANK
† INDICATED CONTROLS ON SAME SHAFT

WIRING COLOR CODE	
WHITE - GROUND	BROWN - SCREEN
YELLOW - CATHODE	BLUE - PLATE
RED - B+	BLACK - HEATER
GREEN - GRID	



"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 115 V. LINE. ALL VOLTAGES MEASURED TO GROUND

*, †, ⊛ DENOTE CAPACITORS LOCATED IN BANK.

† INDICATED CONTROLS ON SAME SHAFT

WIRING COLOR CODE	
WHITE - GROUND	BROWN - SCREEN
YELLOW - CATHODE	BLUE - PLATE
RED - B+	BLACK - HEATER
GREEN - GRID	

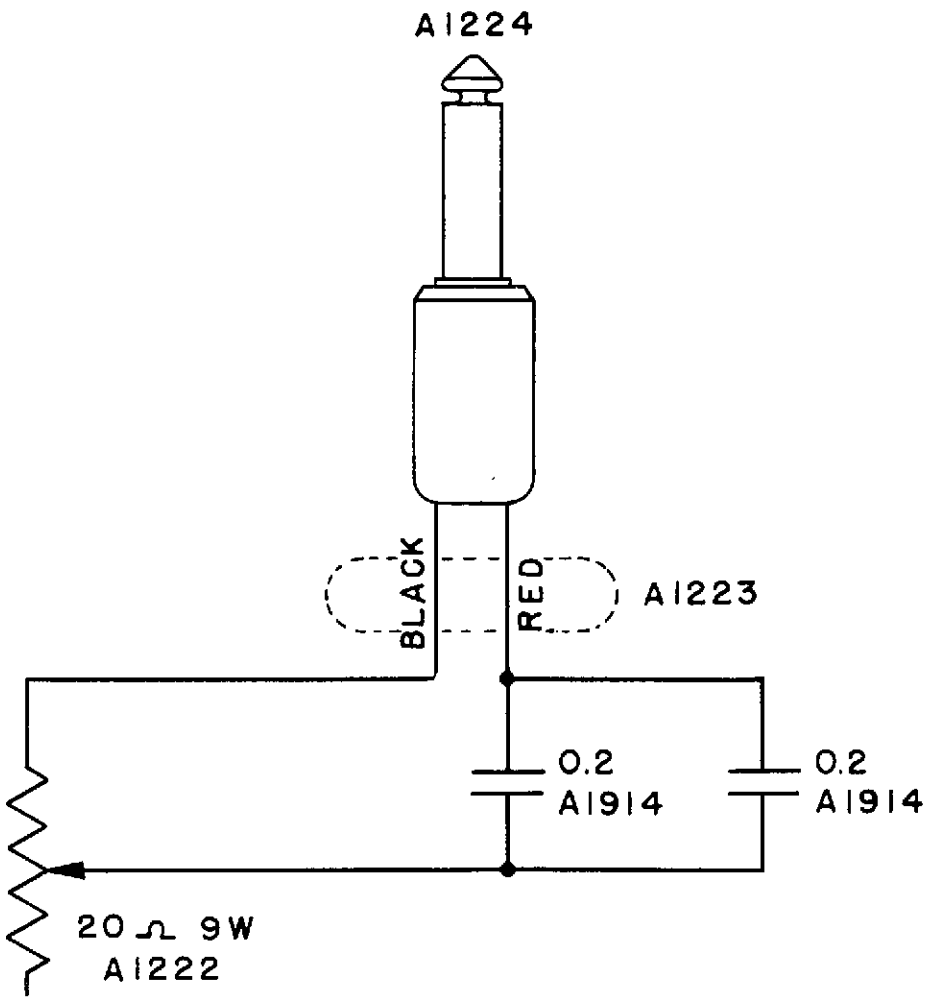
A542

SERVICE DATA

AMPLIFIER WIRING DIAGRAM

60 CYCLE PHONOVISION FILMOSOUND

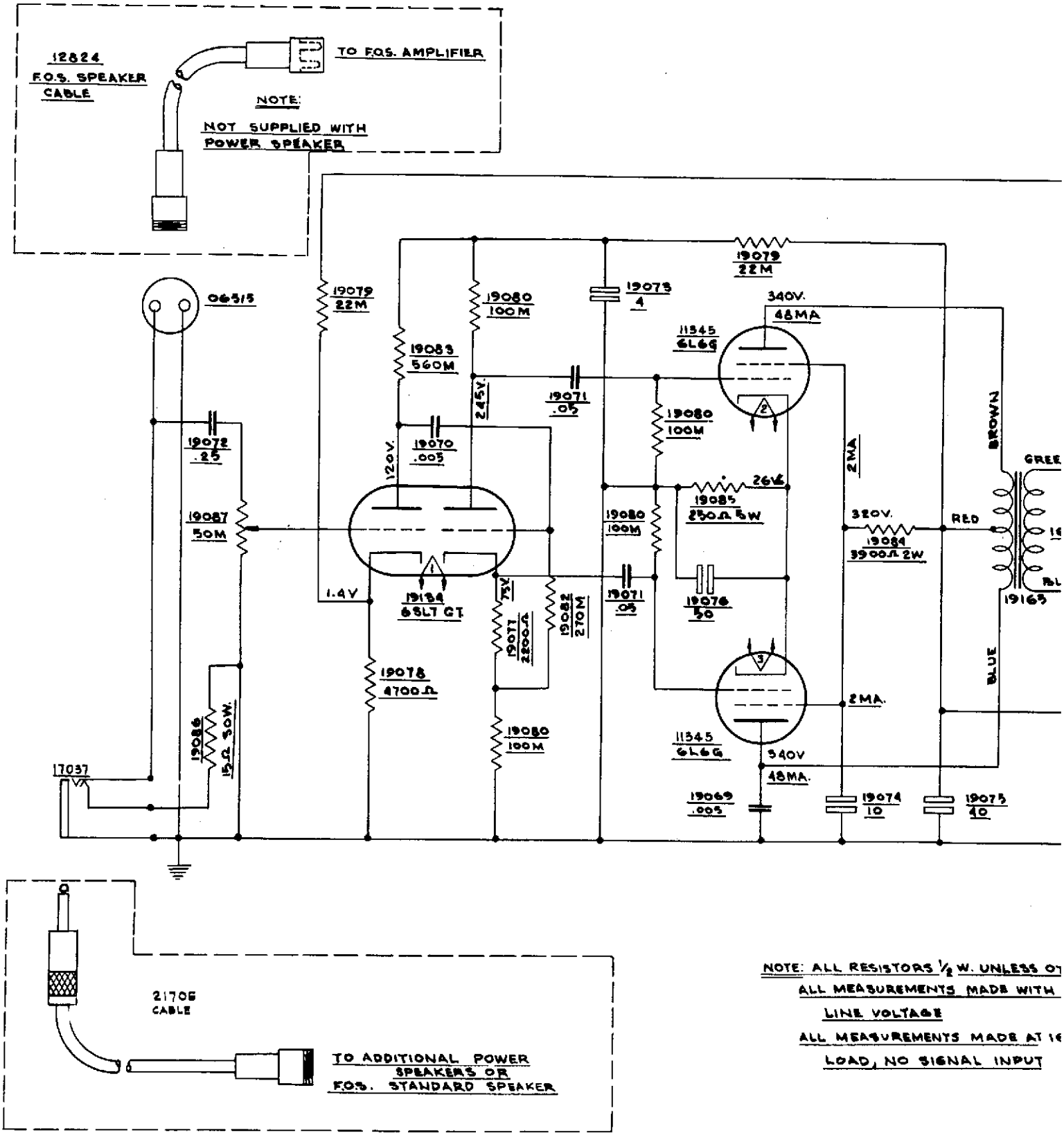
FOR USE ONLY WITH AMPLIFIER PART NO. AM12 DATE 8-5-40



AS 103

SERVICE DATA	
REMOTE VOLUME CONTROL	
B & H #12828	
	5-1-46

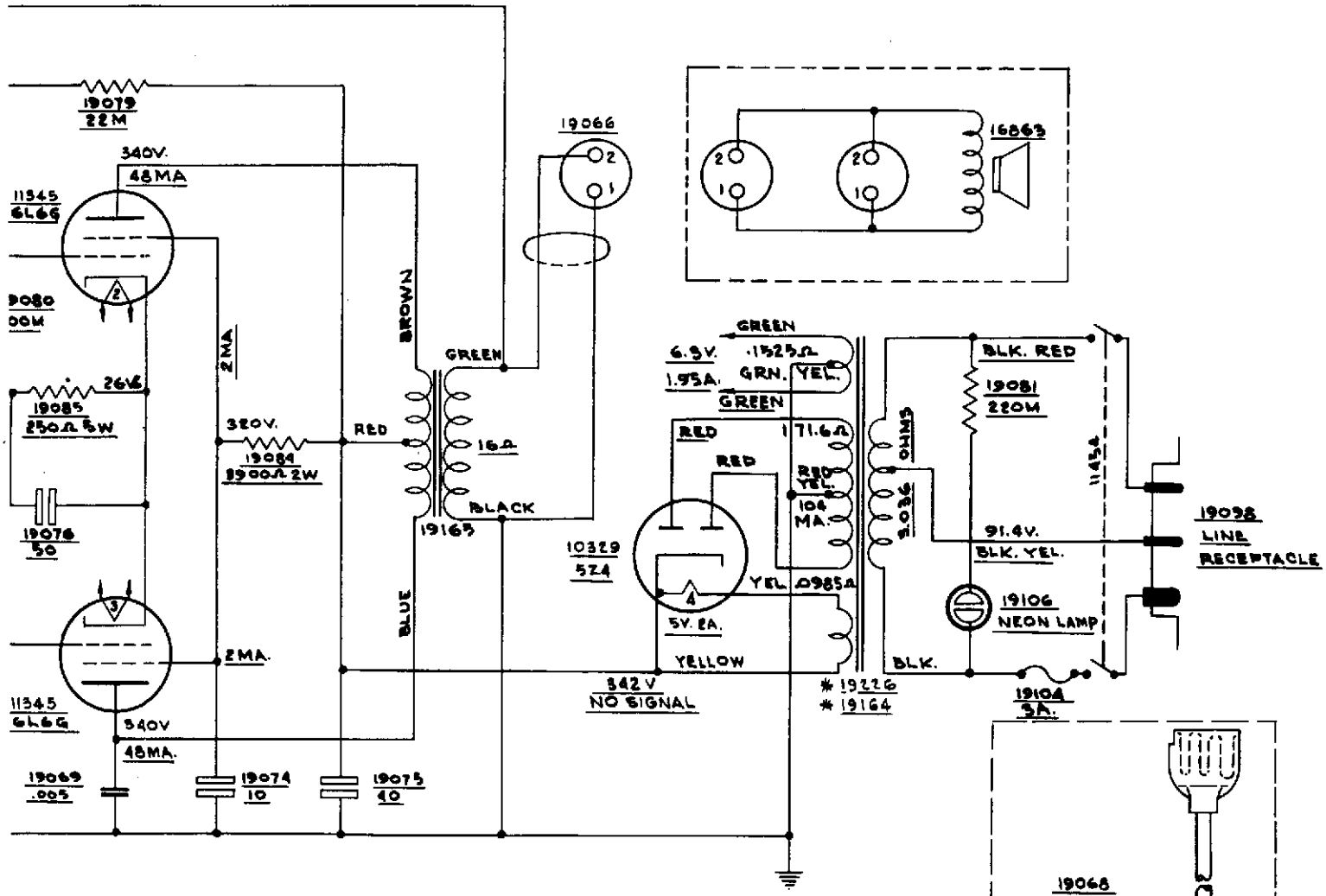
B70



NOTE: ALL RESISTORS ½ W. UNLESS OT
ALL MEASUREMENTS MADE WITH LINE VOLTAGE
ALL MEASUREMENTS MADE AT 1(LOAD, NO SIGNAL INPUT

*

B70



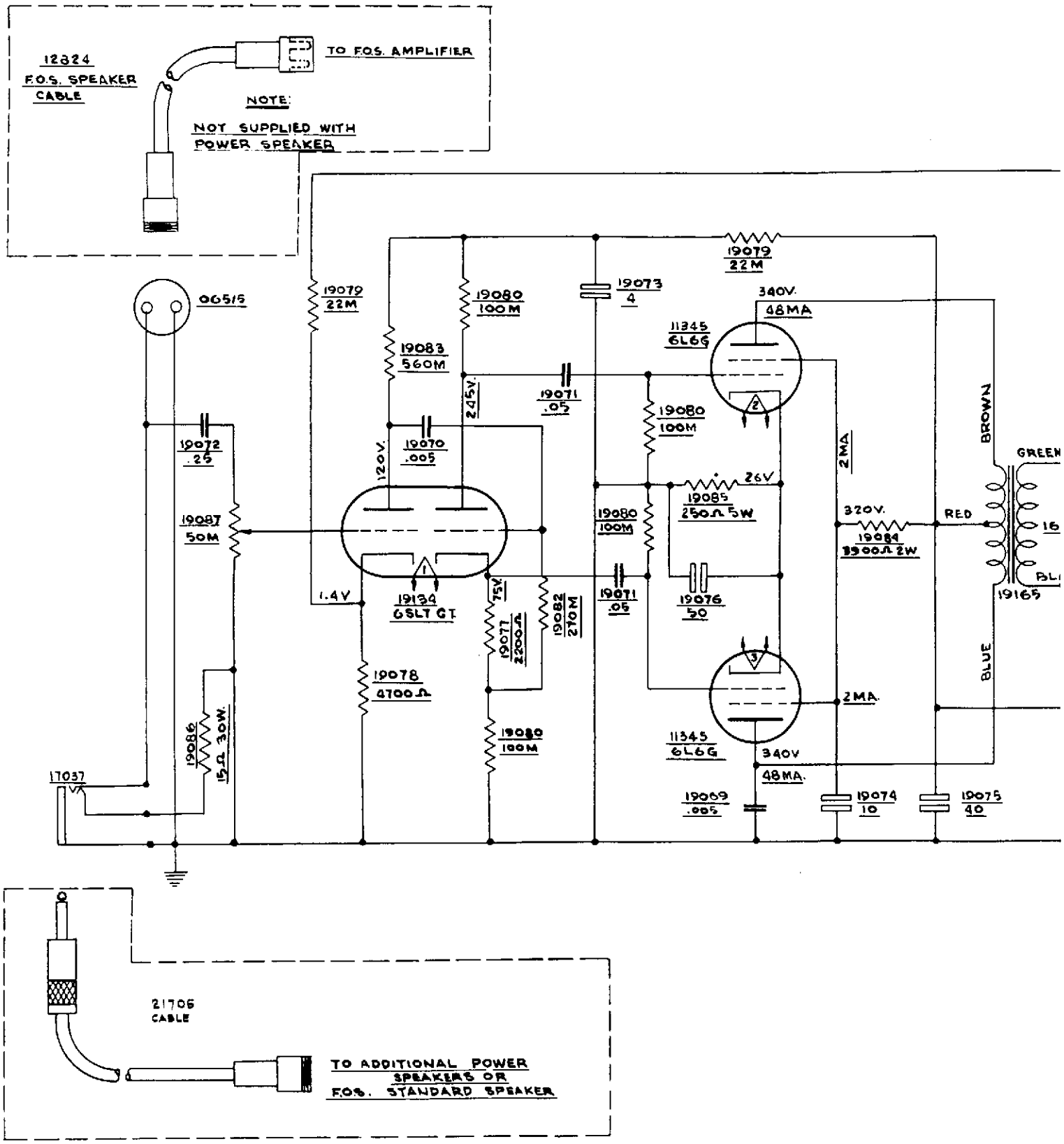
NOTE: ALL RESISTORS 1/2 W. UNLESS OTHERWISE SPECIFIED
ALL MEASUREMENTS MADE WITH 117 VOLT AC
LINE VOLTAGE
ALL MEASUREMENTS MADE AT 16 OHM RESISTANCE
LOAD, NO SIGNAL INPUT

* WIRING FOR 25 TO 60 CYCLE AND 50 TO 60 CYCLE POWER SPEAKERS IS THE SAME EXCEPT FOR THE FOLLOWING:
25 TO 60 ~ POWER TRANSFORMER PART # 19226
50 TO 60 ~ POWER TRANSFORMER PART # 19164

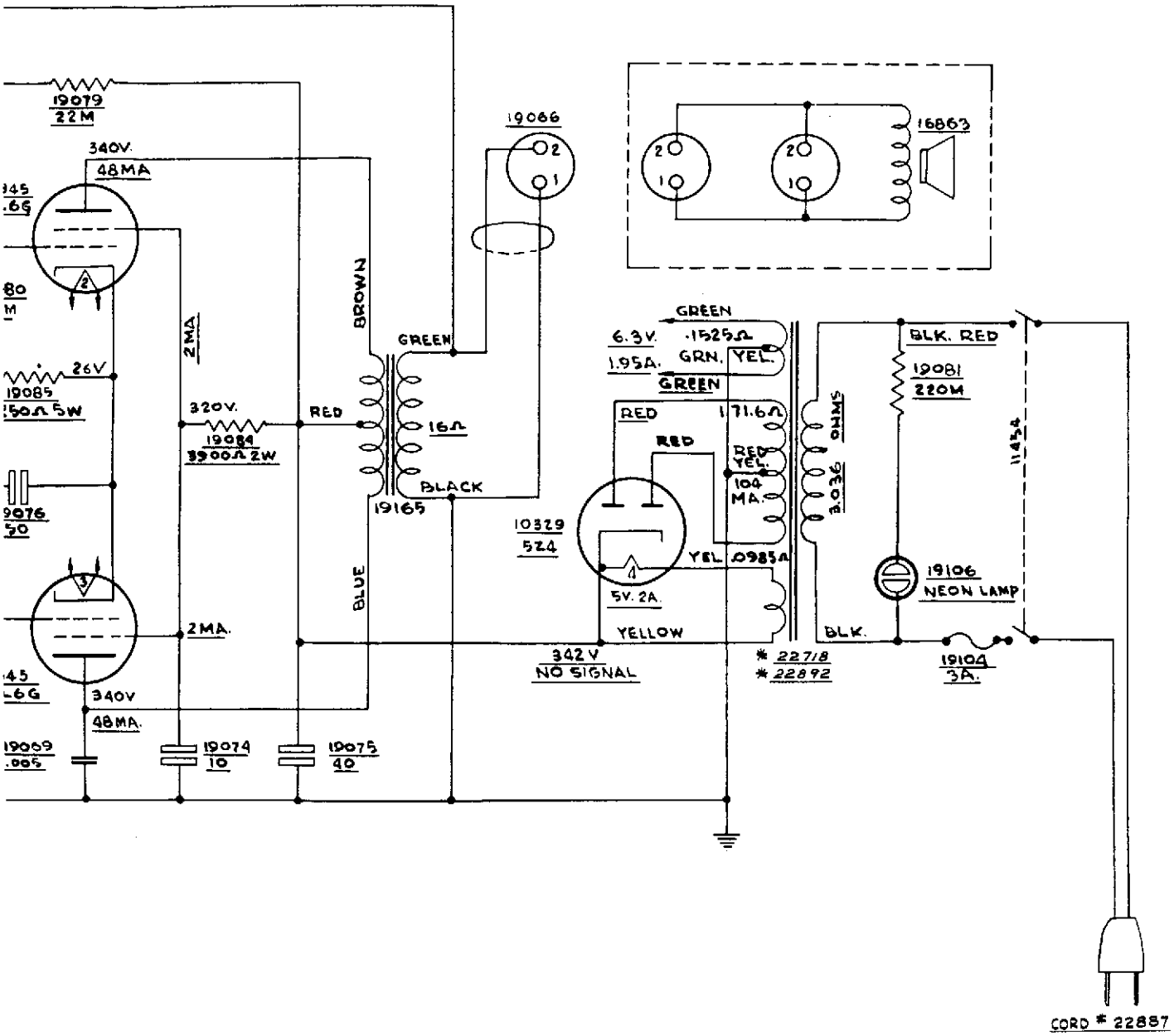
BELL & HOWELL CO. CHICAGO U.S.A.

25 WATT 60 CYCLE POWER SPEAKER
SCHEMATIC
FOR USE WITH 0852B & 0851B AMPLIFIERS ONLY

DATE 1-12-49 | SERVICE DATA | DRAWN EG APVD:


12824
F.O.S. SPEAKER
CABLE
TO F.O.S. AMPLIFIER
NOTE:
NOT SUPPLIED WITH
POWER SPEAKER
19079
22M
19080
100M
19073
4
340V.
48MA
11345
6L6G
19083
560M
245V.
19071
.05
19080
100M
2MA
BROWN
GREEN
06515
19072
.25
120V.
19070
.005
26V
19085
250Ω 5W
320V.
RED
19084
3500Ω 2W
19087
50M
19080
100M
19076
50
19065
1.4V
19134
6SLT GT
75V.
19077
2200Ω
19082
270M
19071
.05
BLUE
19078
4700Ω
19080
100M
2MA.
11345
6L6G
340V
48MA.
17037
19086
15Ω 30W.
19069
.005
19074
10
19075
40
21706
CABLE
TO ADDITIONAL POWER
SPEAKERS OR
F.O.S. STANDARD SPEAKER

B-71



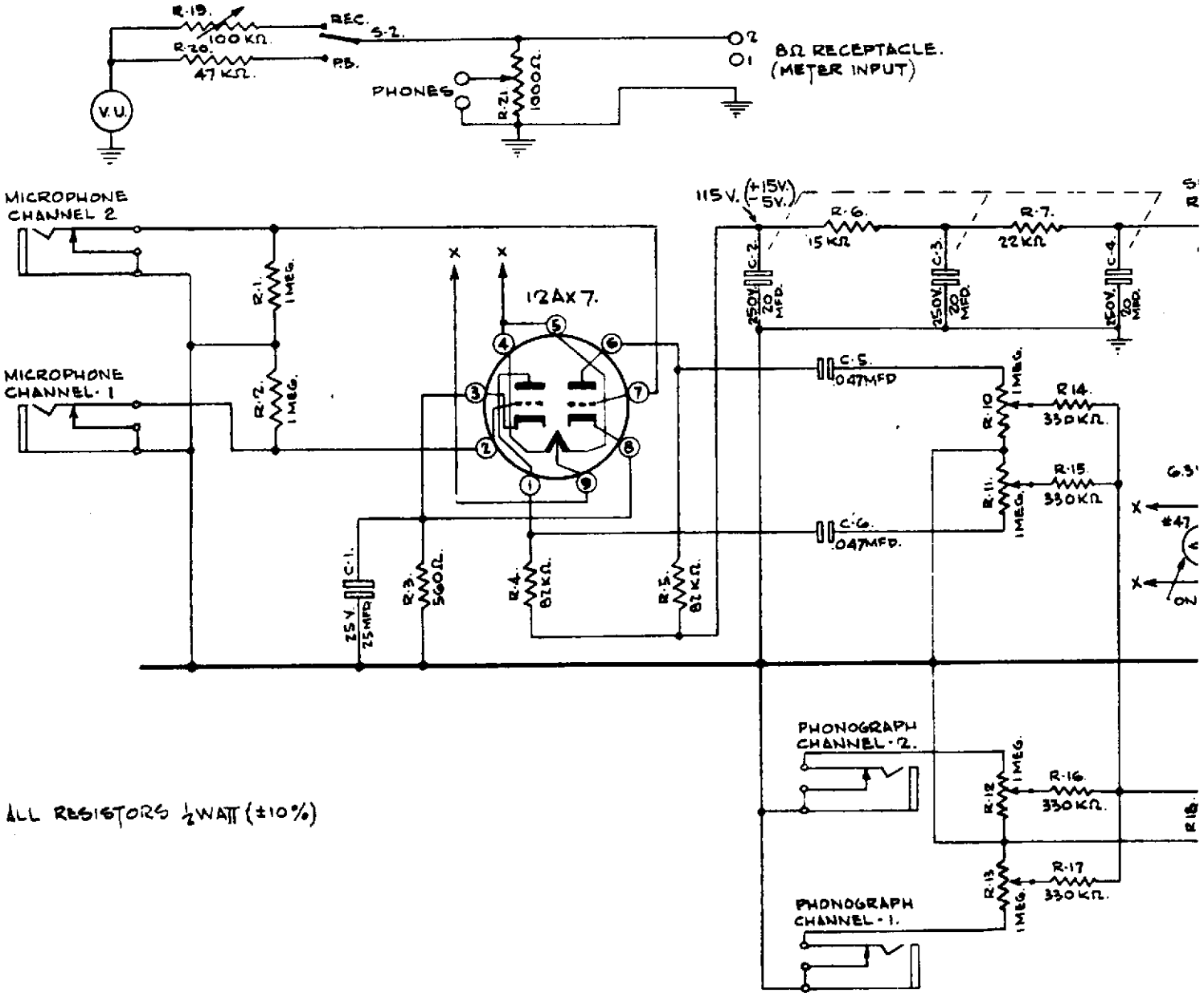
* WIRING FOR 25 TO 60 CYCLE AND 50 TO 60 CYCLE POWER SPEAKERS IS THE SAME EXCEPT FOR THE FOLLOWING:
25 TO 60 ~ POWER TRANSFORMER PART # 22892
50 TO 60 ~ POWER TRANSFORMER PART # 22718

REVISED 6-20-51

BELL & HOWELL CO. CHICAGO U.S.A.

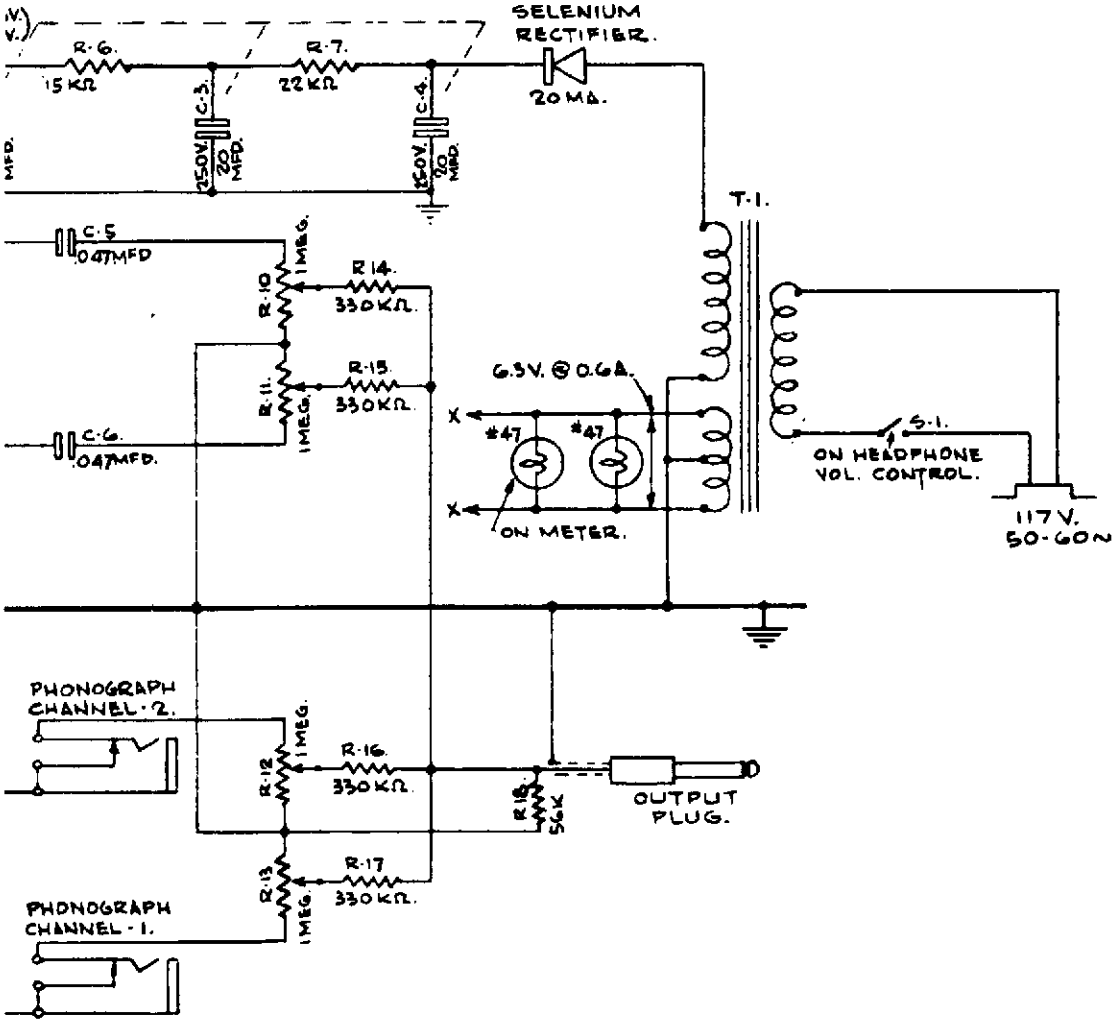
25 WATT 60 CYCLE POWER SPEAKER SCHEMATIC
FOR USE WITH 0G517 & 0G528 AMPLIFIERS ONLY

DATE 5-23-51 | SERVICE DATA | DRAWN WK APVD



ALL RESISTORS ½WATT (±10%)

8Ω RECEPTACLE.
METER INPUT)



SERVICE DATA	
WIRING DIAGRAM	
MONITOR MIXER DESIGN 202	MODELS-ALL
FOR USE ONLY WITH PART NO. 25996	DATE 11-30-55

SECTION C

DESIGN 120, Models A, B, C, D

GENERAL INFORMATION.

The amplifier uses 2A3 tubes in the output. Filmosounds with serial numbers up to 161595 and from 162157 to 165485 inclusive are of this type. These amplifiers contain a microphone transformer with a 200-ohm primary and use a double-button carbon microphone with a Western Electric No. 110 or a Kellogg No. 191 plug. The voltage for the microphone is obtained from the 45 oscillator tube. The tone control and microphone volume control are mounted on the same shaft. The tone control is disconnected when the plug is inserted.

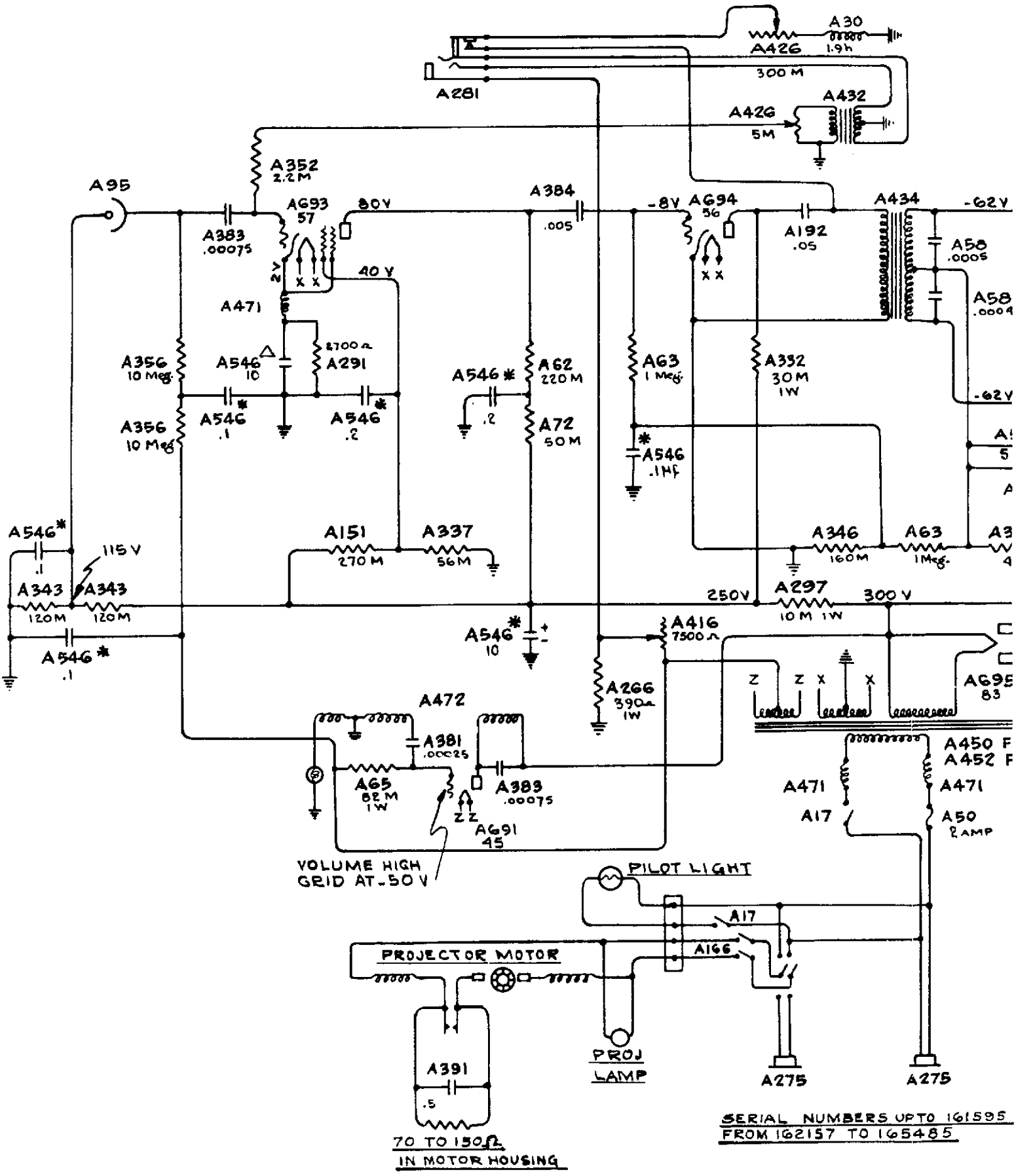
FILM VOLUME.

Film volume is controlled by changing the voltage on the oscillator tube. This in turn controls the voltage on the exciter lamp and the bucking voltage supplied to the phototube. As this bucking voltage is decreased, the positive voltage on the anode remaining constant, the effective voltage on the phototube is increased and the volume is higher. The 45 tube oscillates at a frequency of approximately 25,000 cycles.

SPEAKER.

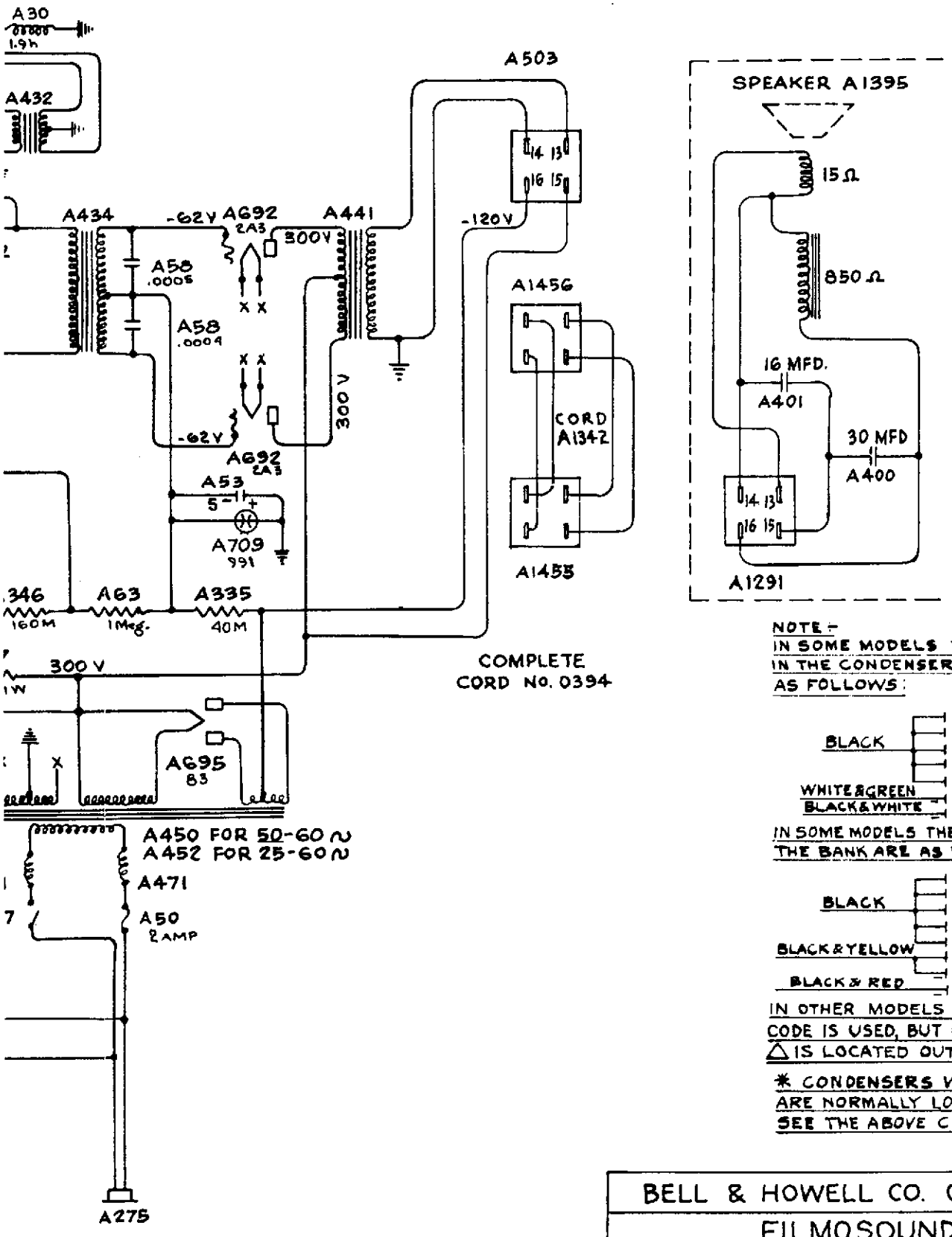
Note that the speaker field is connected in the "B" negative lead. The voltage divider across the field provides the negative voltage for the bias on the 56 and 2A3 tubes. The 991 neon lamp, A709, acting through the 40,000-ohm resistor, maintains a constant bias voltage on

the 2A3 tubes. The 4 mfd condenser, A53, prevents flickering of the neon lamp and reduces hum. The voice coil impedance required is 15 ohms, and the plate load impedance is 10,000 ohms. The power output of each of these models is 10 watts.



SERIAL NUMBERS UPTO 161595
FROM 162157 TO 165485

GE C3



COMPLETE
CORD No. 0394

NOTE –
IN SOME MODELS THE CONDENSERS IN THE CONDENSER BANK ARE AS FOLLOWS:

BLACK	A546	RED
	A546	BLUE
	A546	GREEN
	A546	GREEN
	A546	GREEN
WHITE & GREEN	A546	BROWN
BLACK & WHITE	+A546	RED & WHITE

IN SOME MODELS THE CONDENSERS IN THE BANK ARE AS FOLLOWS:

BLACK	A546	RED
	A546	BLUE
	A546	GREEN
	A546	GREEN
	A546	GREEN
BLACK & YELLOW	A546	MAROON
	A546	△YELLOW
BLACK & RED	+A546	RED & BLACK

IN OTHER MODELS THE SECOND COLOR CODE IS USED, BUT CONDENSER MARKED △ IS LOCATED OUTSIDE THE BANK.

✱ CONDENSERS WITH THIS MARK ARE NORMALLY LOCATED IN THE BANK. SEE THE ABOVE CLASSIFICATION.

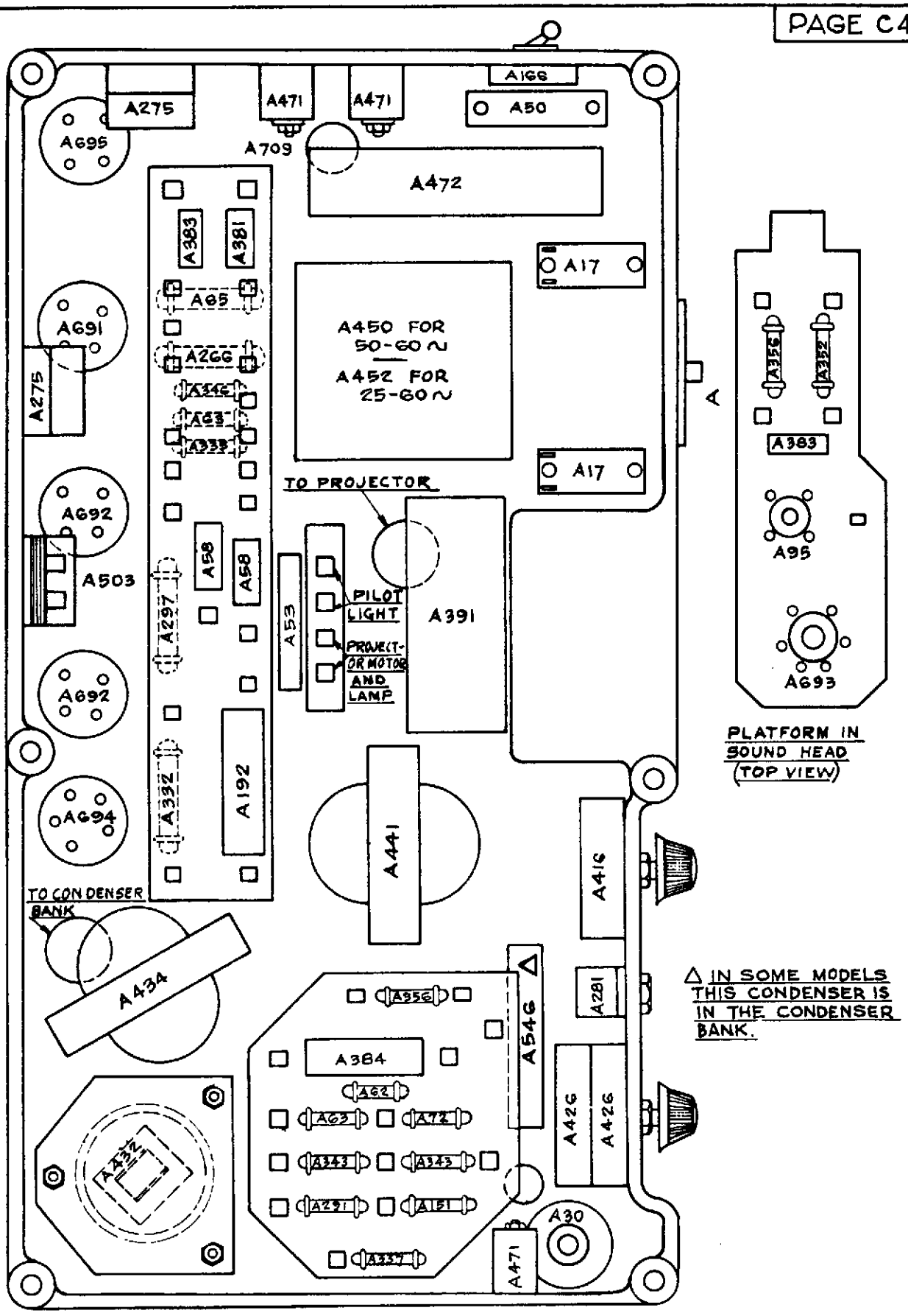
MBERS UP TO 161595 &
7 TO 165485

SUPERSEDES MODEL 120

BELL & HOWELL CO. CHICAGO, U.S.A.

FILMOSOUND
DESIGN 120 MODELS A B C & D

DATE 5-13-36	SERVICE	DRAWN
REV. 10-16-45	DATA	APVD.



SERVICE DATA

BOTTOM VIEW OF AMPLIFIER

FILMOSOUND

DESIGN 120 — MODELS A B C & D

FOR USE ONLY WITH PART NO. 01849 — DATE 5-13-36 REV. 10-16-45

SUPERSEDES MODEL 120

DESIGN 120, SPECIAL ERPI MODEL

GENERAL INFORMATION.

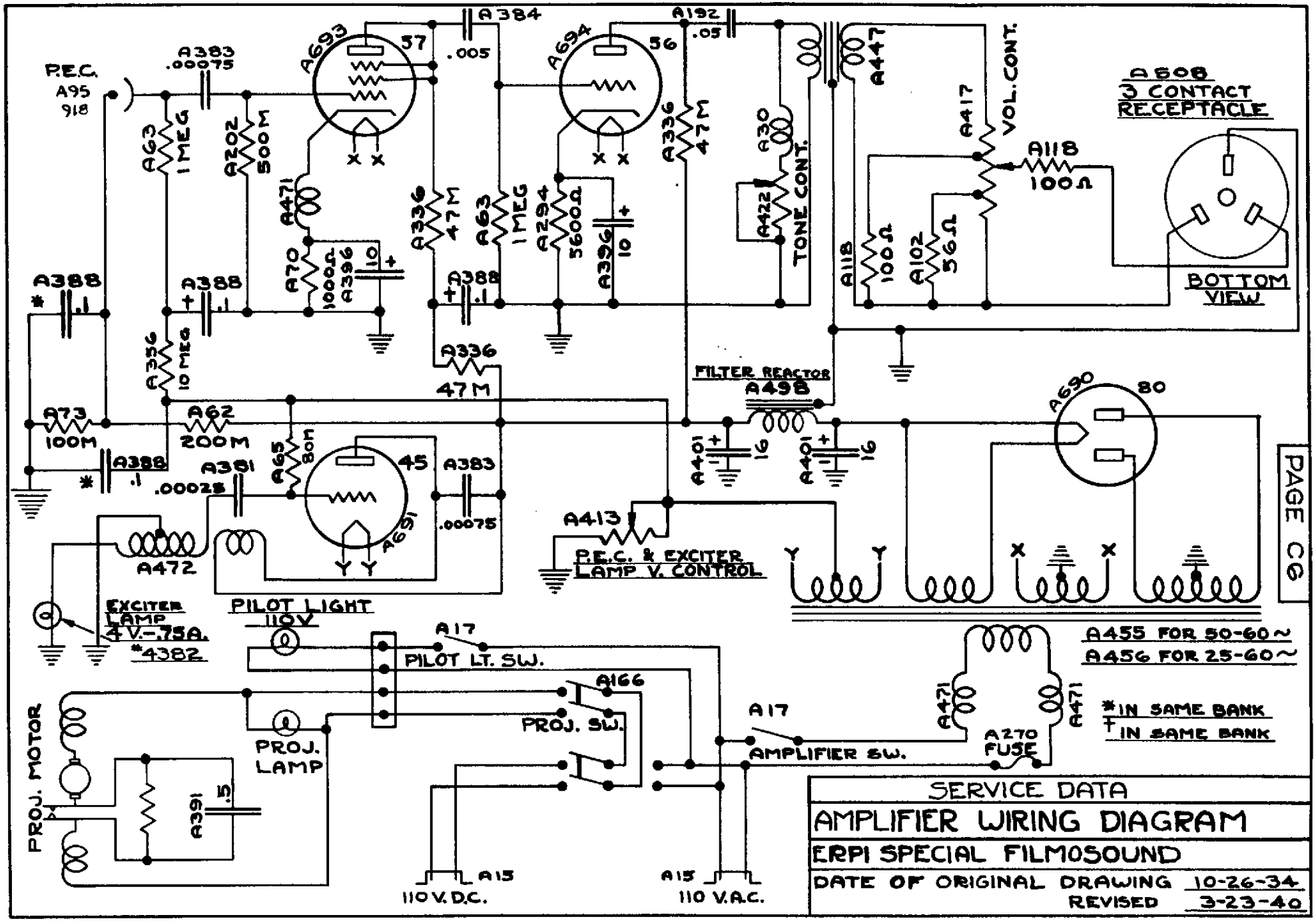
This projector has a standard Design 120 mechanism but has only a pre-amplifier which terminates in a low impedance line. The final amplifier was manufactured by Western Electric. It is located in the speaker and uses Western Electric special parts and tubes. Due to the special design of the final amplifiers, we have never serviced them and recommend that you do not attempt their repair.

VOLUME REGULATION.

Complaints of poor volume regulation can be corrected by changing the original output circuit to the one shown on the schematic diagram, page C-6. Parts are obtainable from Bell & Howell Company.

TESTING.

For testing, the output may be connected into the microphone input of a standard Filmosound of almost any model. The upper and lower right terminals of the output receptacle when connected together will form the sleeve connection to the microphone plug, and the lower left terminal, the tip connection. Headphones may also be used but the output will be extremely low.


P.E.C.
A95
918
A383
.00075
A63
1 MEG
A202
500Ω
A693
57
A384
.005
A694
56
A192
.05
A336
47Ω
A30
TONE CONT.
A422
A447
A417
VOL. CONT.
A118
100Ω
A102
56Ω
A508
3 CONTACT
RECEPTACLE
BOTTOM
VIEW
A471
A70
1000Ω
A396
10
A336
47Ω
A63
1 MEG
A294
5600Ω
A396
10
A388
.1
A388
.1
A388
.1
A356
10 MEG
A336
47 M
FILTER REACTOR
A498
A73
100M
A62
200M
A388
.1
A391
.00025
A65
80Ω
45
A383
.00075
A691
A690
80
A472
A413
P.E.C. & EXCITER
LAMP V. CONTROL
A40
10
A40
10
PAGE C6
EXCITER
LAMP
4 V.-.75A.
*4382
PILOT LIGHT
110V
A17
PILOT LT. SW.
A166
PROJ. SW.
PROJ. LAMP
PROJ. MOTOR
A391
.1
A17
AMPLIFIER SW.
A471
A471
A270
FUSE
A455 FOR 50-60~
A456 FOR 25-60~
*IN SAME BANK
†IN SAME BANK
A15
110 V. D.C.
A15
110 V. A.C.
SERVICE DATA
AMPLIFIER WIRING DIAGRAM
ERPI SPECIAL FILMOSOUND
DATE OF ORIGINAL DRAWING 10-26-34
REVISED 3-23-40

DESIGN 120, MODELS B, D

(with hum balancer and adjustment on phototube voltage)

- - - - - - - - - - -

GENERAL INFORMATION.

This amplifier uses 2A3 tubes in the output. Filmosounds with serial numbers from 161963 to 161965, 161967 to 161991, 161993 to 161999, 162010 to 162054, 165486 to 165493, and 171468 to 171479 are of this type. These Filmosounds can be distinguished by the hum balancing control mounted on top of the amplifier casting between the amplifier and pilot light switches, and the phototube voltage control on top of the casting above the volume control.

There is no microphone transformer in this amplifier. A 5,000-ohm input is used, and voltage is supplied on the ring contact of the jack. A double-button carbon microphone with an external transformer is used. A Western Electric No. 110 or Kellogg No. 191 plug should be used.

FILM VOLUME.

Film volume is controlled by varying the voltage on the exciter lamp with a variable series resistor. Thus, the oscillator is not changed. The voltage on the phototube is adjusted by control A425. Thus, the phototube is not controlled by the volume control and will pick up any light reaching it, producing a hum in the speaker. Turning the volume control down will not eliminate this hum. It is important that the phototube in these Filmosounds be shielded from 60-cycle light if this hum is to be avoided.

The hum balancer adjusts the bias on the 2A3 tubes, and, in this way, compensates for unmatched tubes having different plate currents.

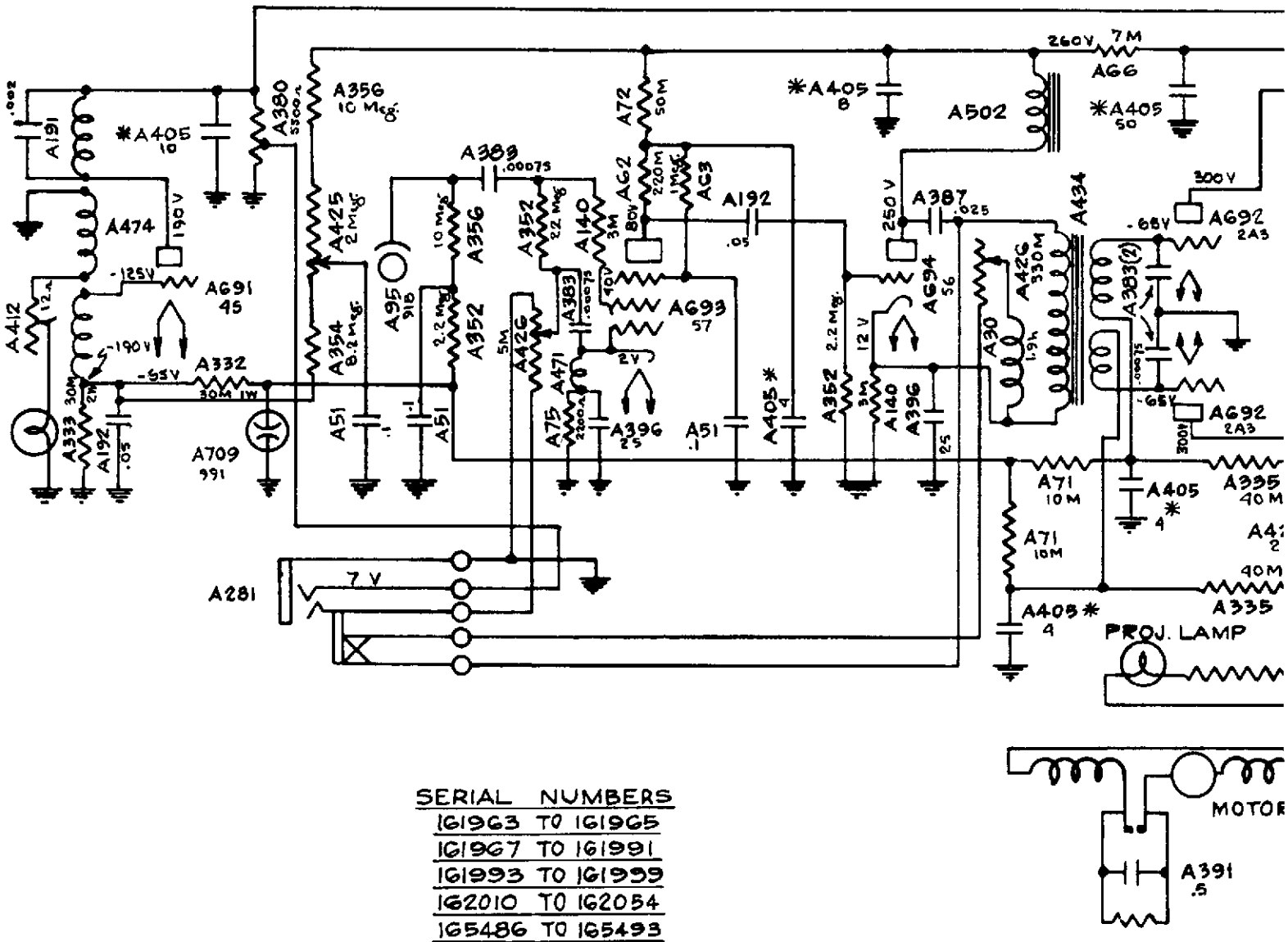
The bias voltage for the 2A3 tubes is obtained from the oscillator, by the drop in resistor A333. As in the other amplifier using 2A3 tubes, the 991 neon lamp regulates the bias voltage by acting through resistor A332. However, in this amplifier, if the 991 neon lamp does not function the bias becomes so high that the tubes will not operate. Sometimes the oscillator will not start if the amplifier is turned on with the volume control advanced. Under these conditions the 2A3 tubes have no bias and the fuse will blow. This point should be watched.

SPEAKER.

Note that the speaker field and resistor A380 are connected across the "B" supply. The current through this circuit, plus the plate current of the oscillator tube, furnishes the field excitation. Filtering is accomplished by condensers as no filter choke is used.

WARNING

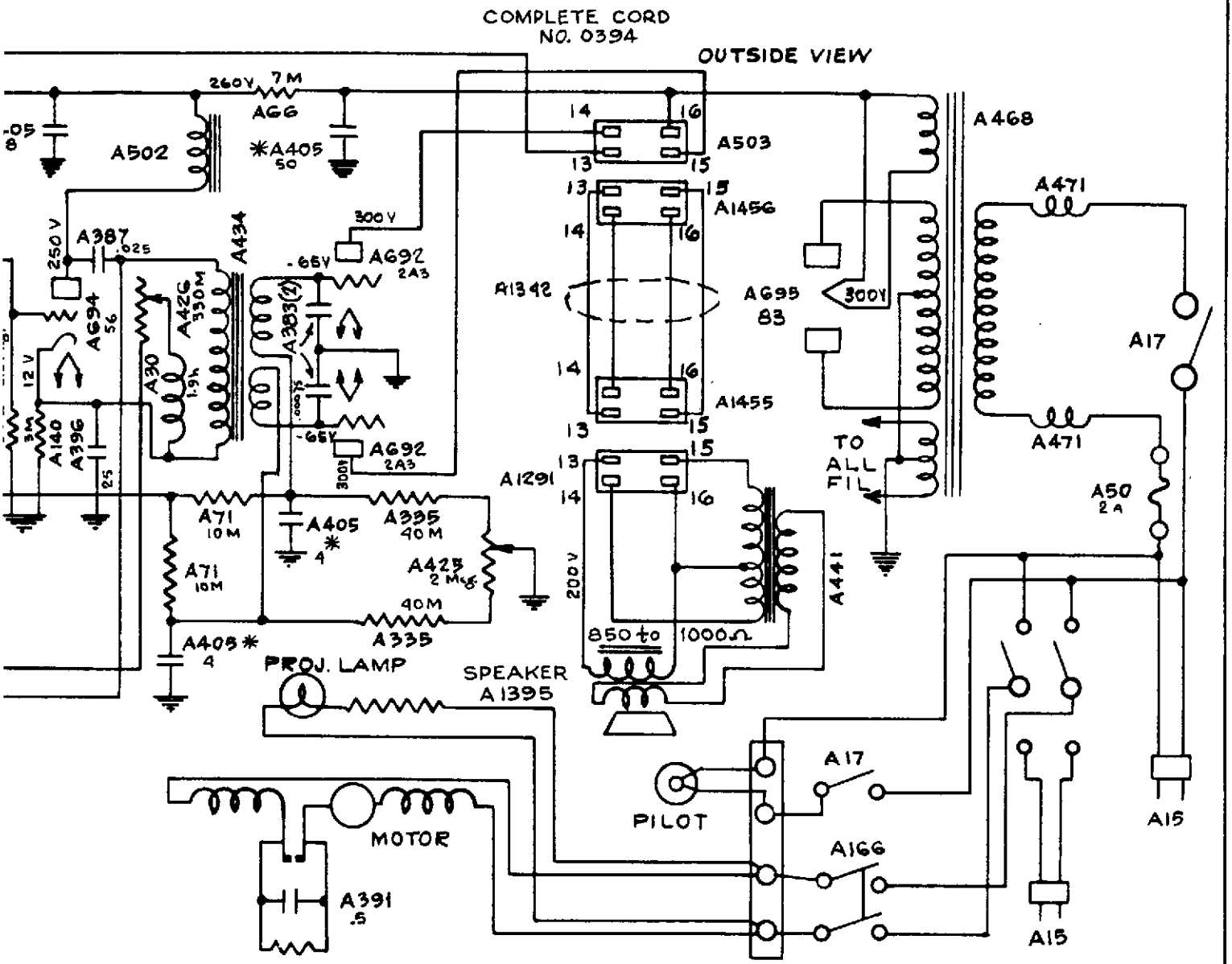
Do not press on resistor A330 when handling this amplifier. It will last indefinitely if not disturbed but will not withstand any flexing.



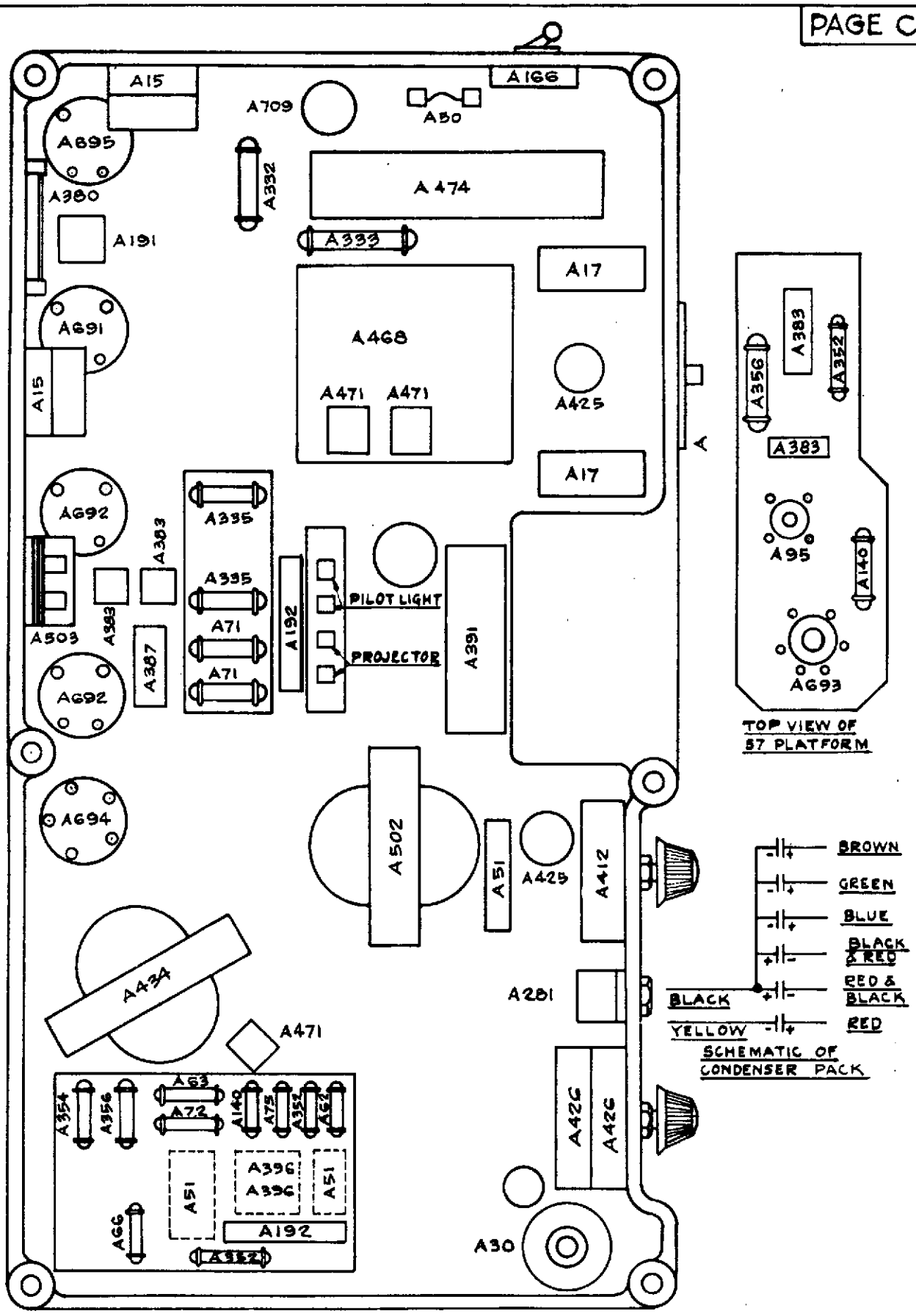
SERIAL NUMBERS
161963 TO 161965
161967 TO 161991
161993 TO 161999
162010 TO 162054
165486 TO 165493
171468 TO 171479

NOTE

*MOUNTED IN CONDENSER BANK.



SERVICE DATA	
WIRING DIAGRAM	
FILMOSOUND DESIGN 120 MODELS B&D WITH HUM BALANCER	
SUPERSEDES MODEL A	FOR USE ONLY WITH PART NO. 02564
	DATE 5-21-36 REV. 10-17-45



SERVICE DATA

BOTTOM VIEW OF AMPLIFIER

FILMOSOUND

DESIGN 120 MODELS B & D WITH HUM BALANCER

SUPERSEDES MODEL A

FOR USE ONLY WITH PART NO. 02564

DATE 5-23-36
REV. 10-17-45

DESIGN 120 - MODELS E, F, G, H

GENERAL INFORMATION.

In this type of amplifier, 6B5 output tubes are used. All of the tubes are of the 6-volt series. The 991 neon lamp is not used, as the 6B5 tubes are self-biased. This Filmosound uses a diaphragm-type crystal microphone with a Yaxley No. 75A plug. The cell-type crystal microphone may also be used, but the output is not as great. The sleeve of the plug is the ground terminal.

FILM VOLUME.

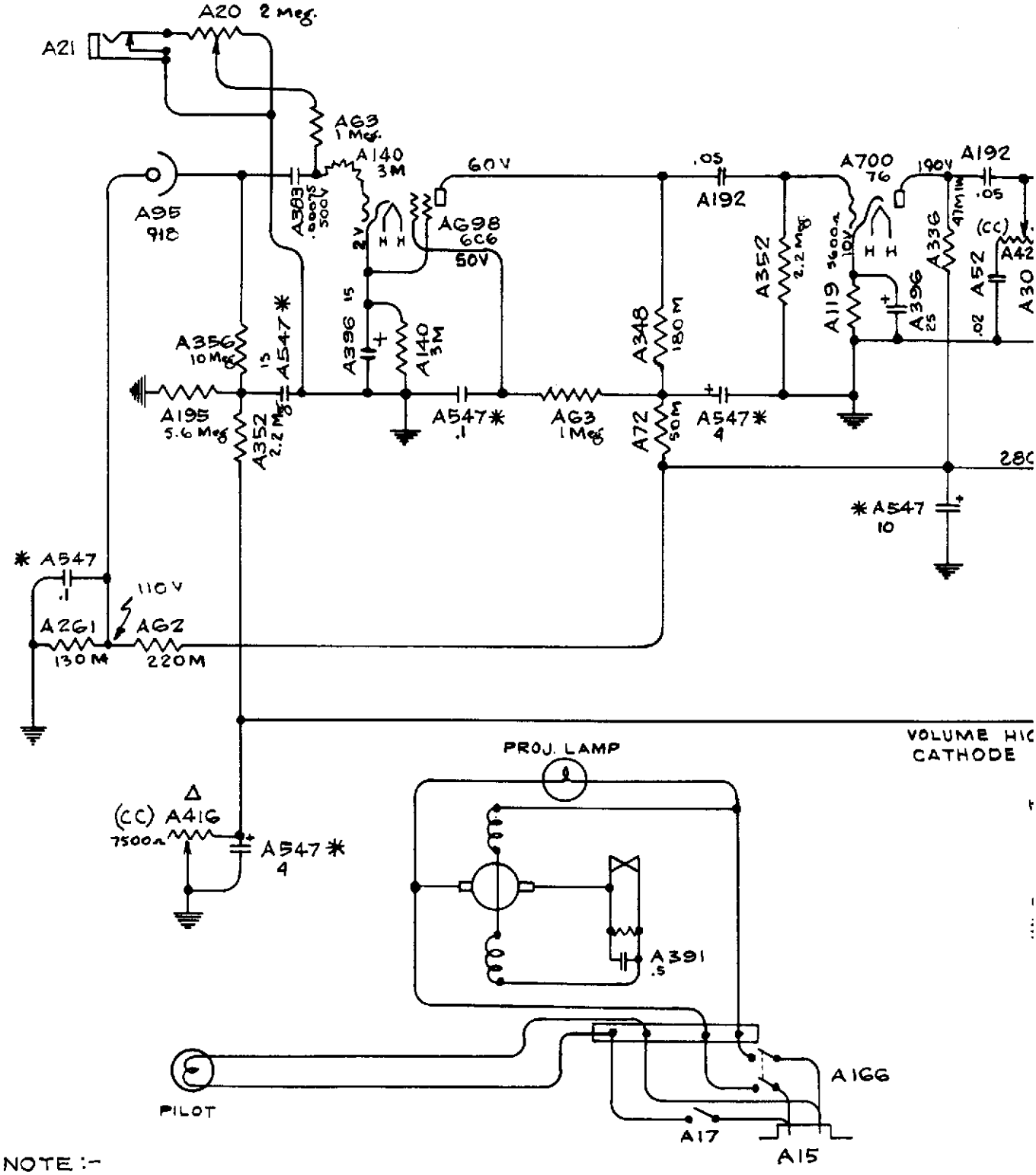
Film volume is controlled by varying the voltage on both the phototube and the exciter lamp.

SPEAKER.

A 12-inch speaker is used, with its 6,350-ohm field connected directly across the B supply. A tap on the field provides reduced voltage for the oscillator. The speaker voice coil has an impedance of 18 ohms.

CAUTION

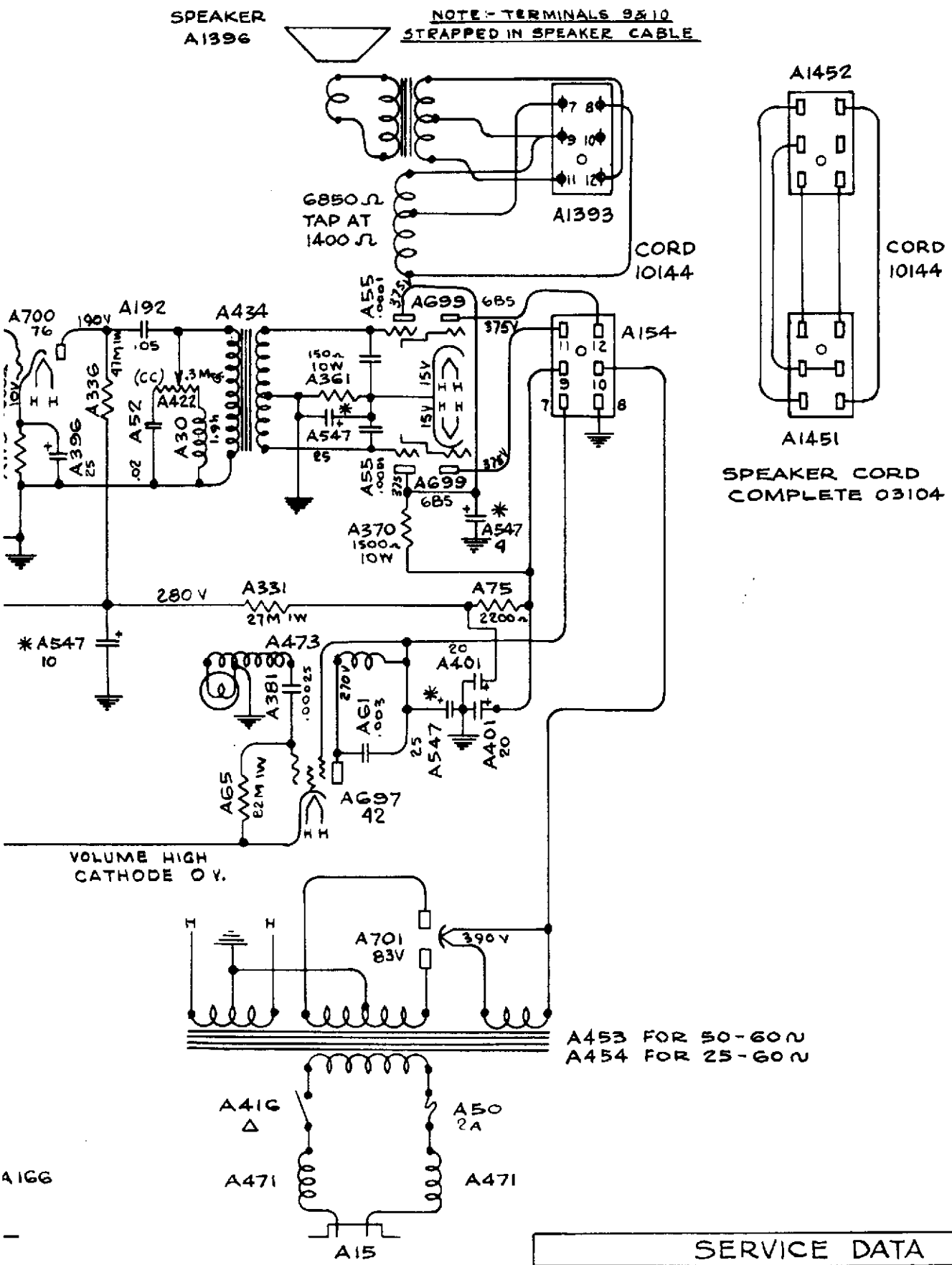
Do not leave the lead to the exciter lamp close to the microphone volume control when working on this amplifier, as this may cause feed back. Keep the lead straight and pulled back toward the power transformer.



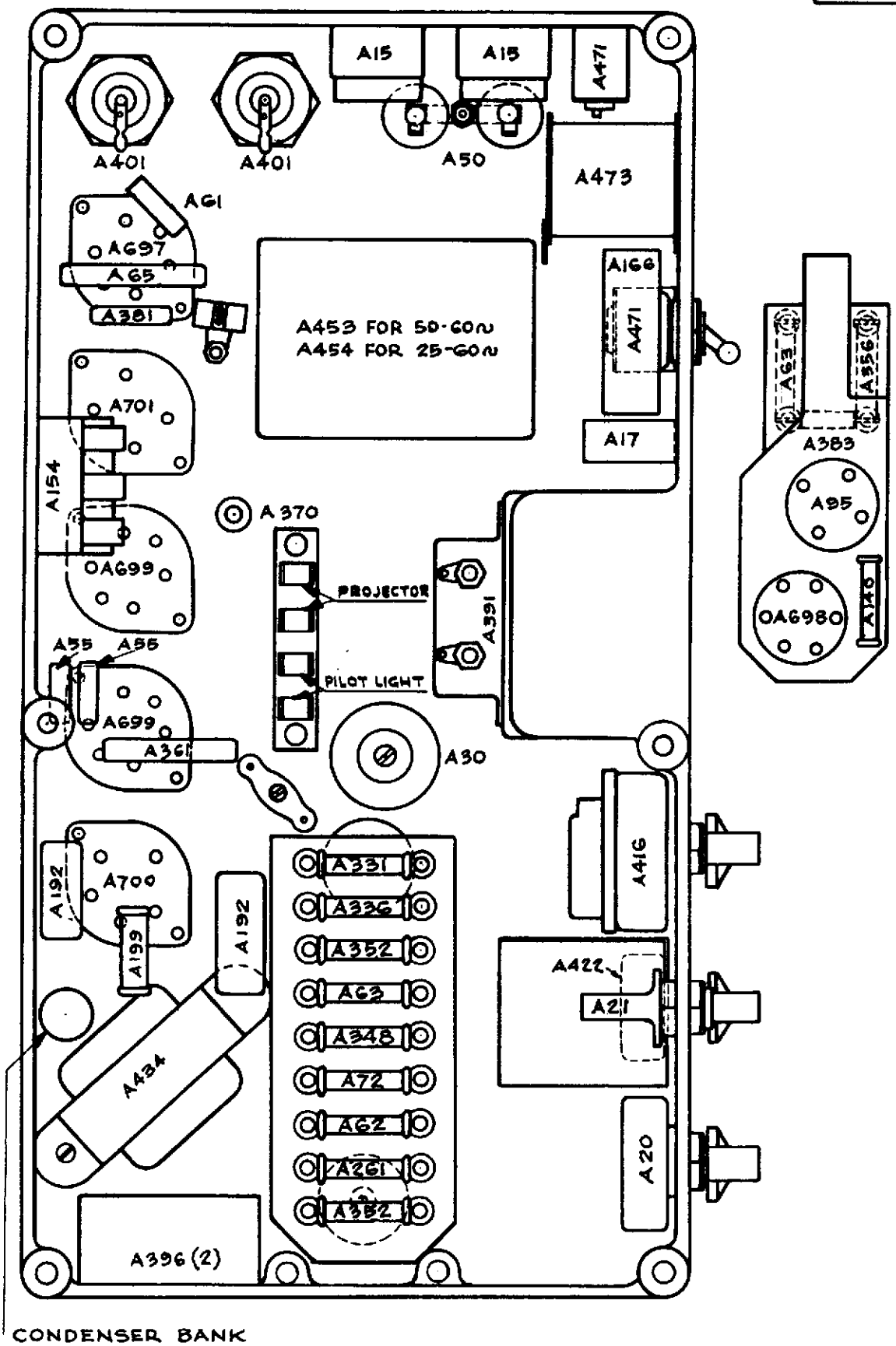
NOTE :-

Δ COMBINED IN SAME UNIT

* MOUNTED IN CONDENSER BANK



SERVICE DATA		
WIRING DIAGRAM		
FILMOSOUND		
DESIGN 120	MODELS E & F	
SUPERSEDES MOD. E & F 1-20-36	FOR USE ONLY WITH PART NO. 02668	DATE 5-22-36 REV. 10-18-45



SERVICE DATA

BOTTOM VIEW OF AMPLIFIER

FILMOSOUND

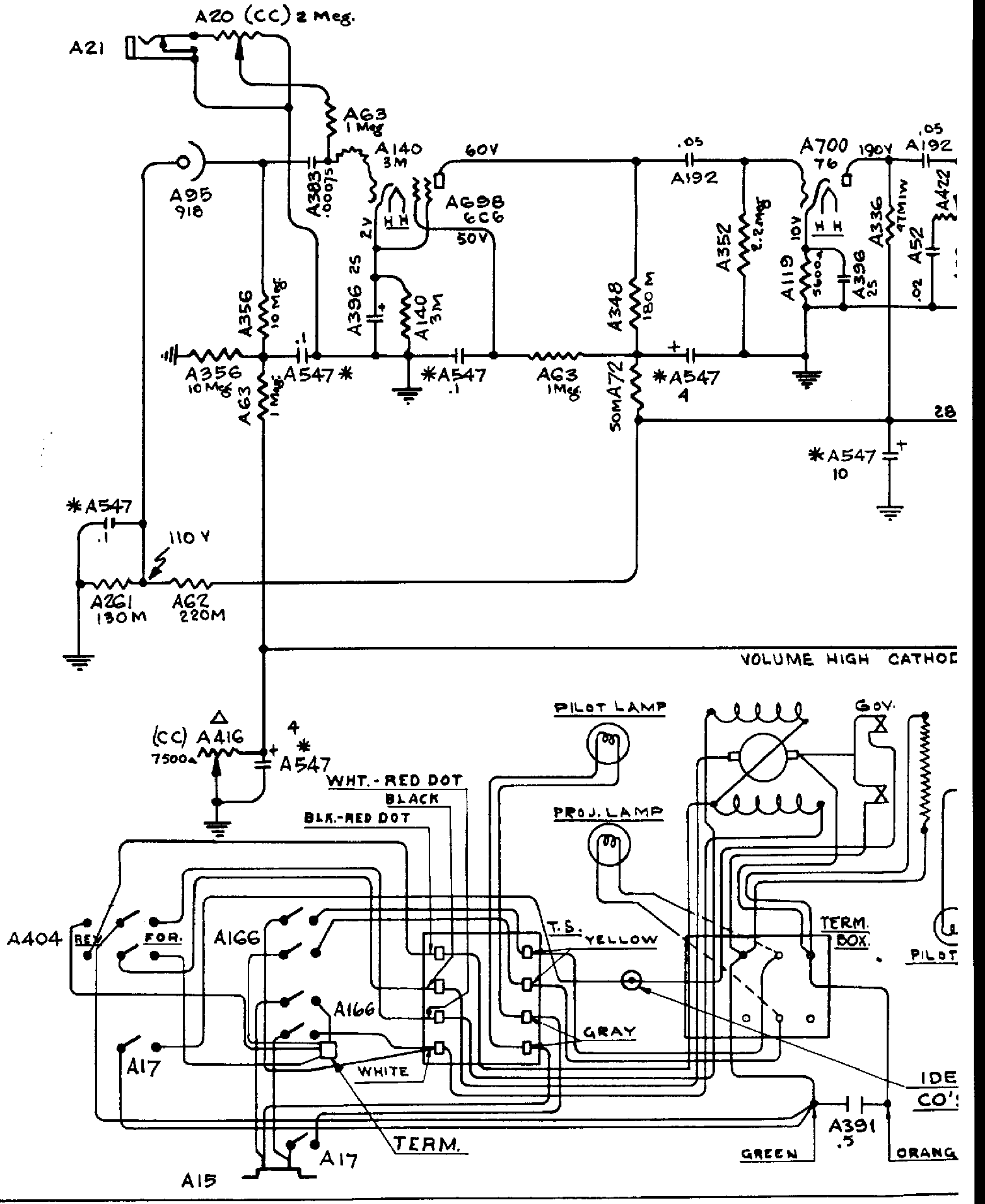
DESIGN 120 — MODELS E & F

SUPERSEDES MOD. ABC & D

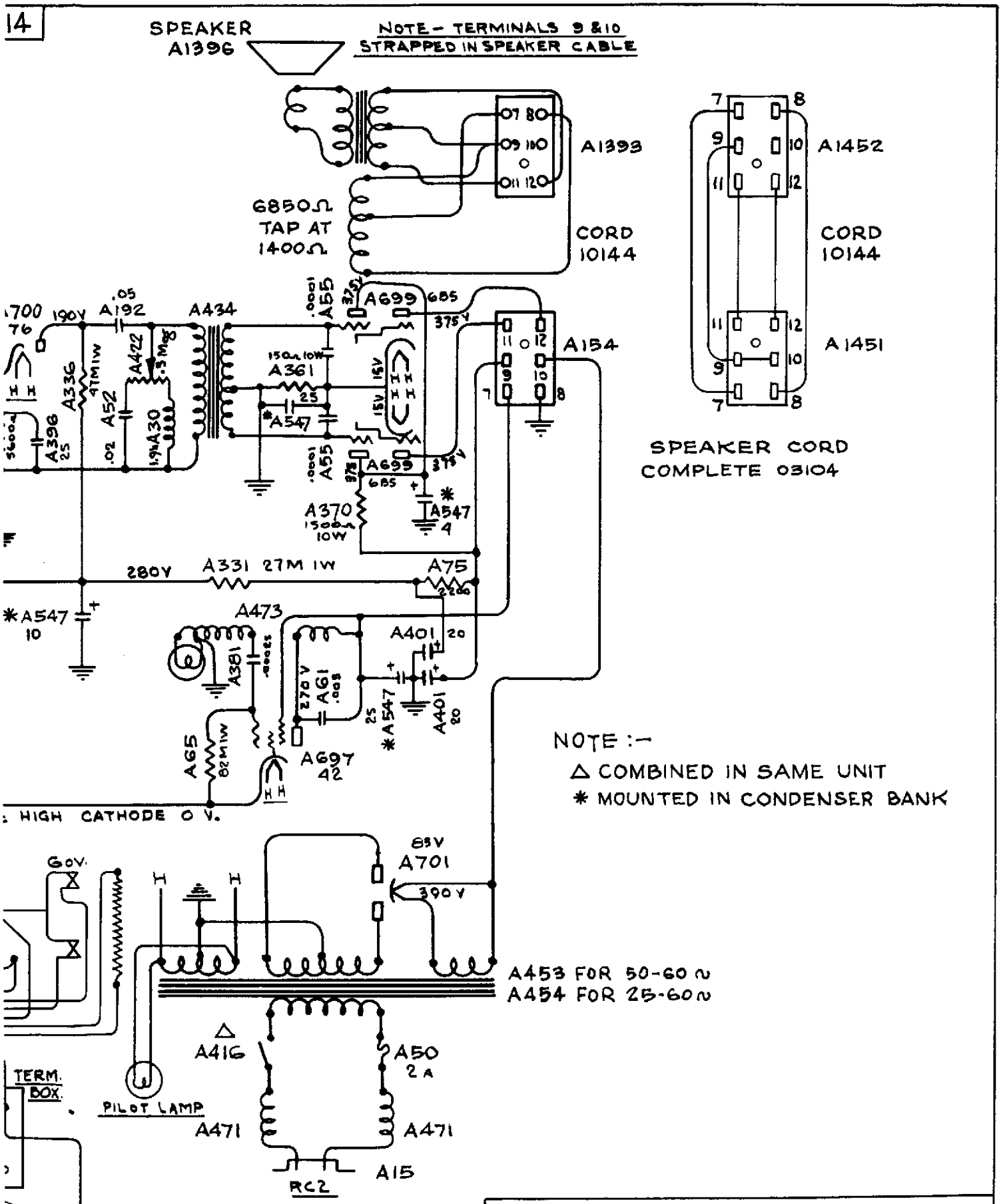
FOR USE ONLY WITH PART NO. 02668

DATE 1-21-36

REV. 10-19-45


A20 (CC) 2 Meg.
A21
A63 1 Meg
A140 3M
60V
.05
A192
A700 76
190V
A192 .05
A95 918
A383 .00075
A698 6C6
50V
2V
A352 2.2 Meg
10V
A336 47M 1W
A422
A396 25
A140 3M
A356 10 Meg
A348 180 M
A119 3600Ω
A396 25
A52 .02
A356 10 Meg
A547 *
*A547 .1
A63 1 Meg
*A547 4
A63 1 Meg
50mA72
28
*A547 10
*A547 .1
110 V
A261 130M
A62 220M
VOLUME HIGH CATHOD
(CC) A416 7500Ω
4 * A547
PILOT LAMP
GOV.
WHT.-RED DOT
BLACK
BLK.-RED DOT
PROJ. LAMP
A404
REV.
FOR.
A166
T.S.
YELLOW
TERM. BOX.
PILOT
A166
GRAY
A17
WHITE
IDE
CO'
A391 .5
TERM.
A17
GREEN
ORANG
A15

14



SERVICE DATA

WIRING DIAGRAM

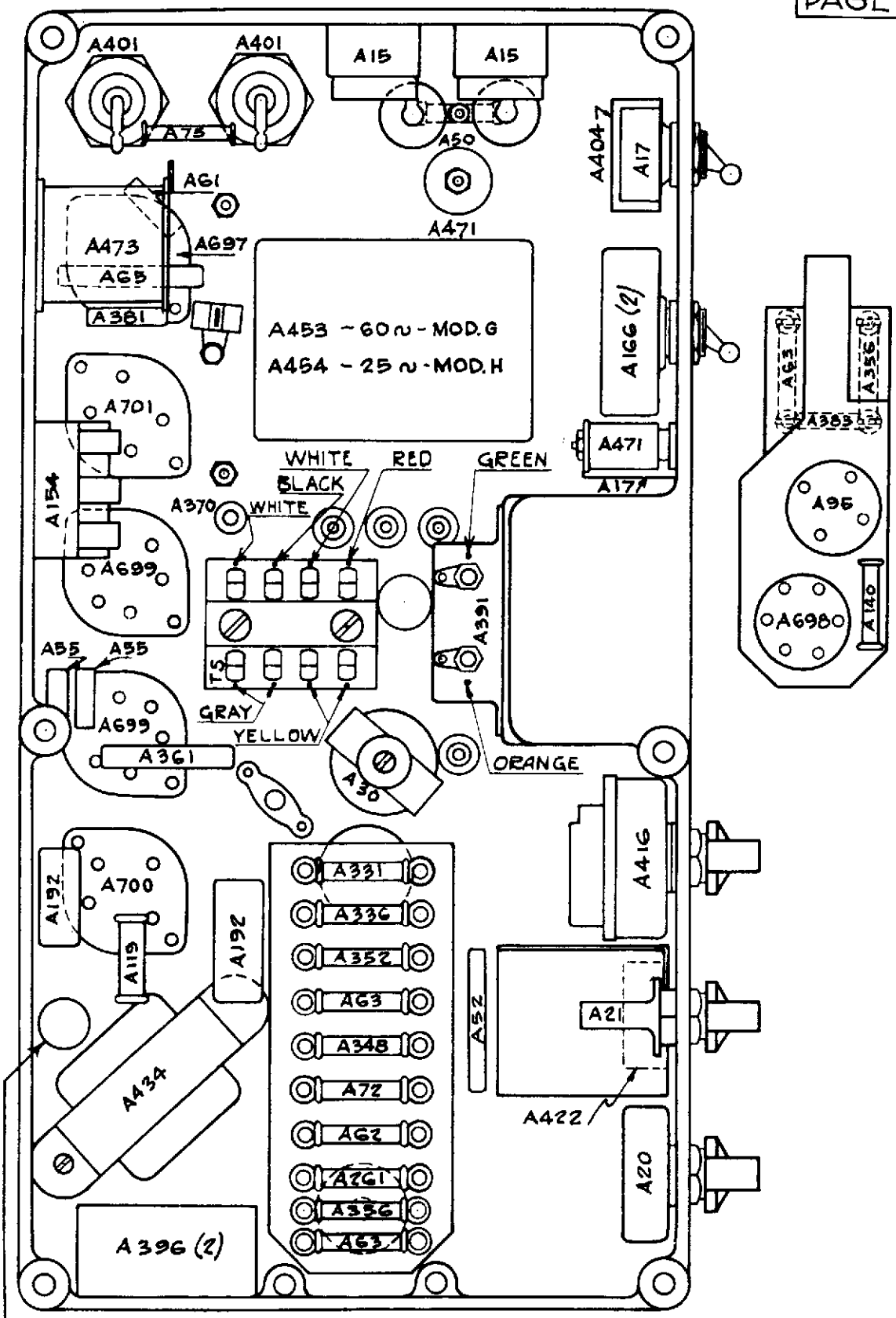
FILMOSOUND

DESIGN 120 — MODELS G & H

SUPERSEDES MOD. E & F

FOR USE ONLY WITH PART NO. 02791

DATE 3-26-37
REV. 10-19-45



SERVICE DATA

BOTTOM VIEW OF AMPLIFIER

FILMOSOUND

DESIGN 120 MODELS G & H

SUPESEDES MOD. E & F

FOR USE ONLY WITH PART NO. 02791

DATE 3-29-37

REV. 10-22-45

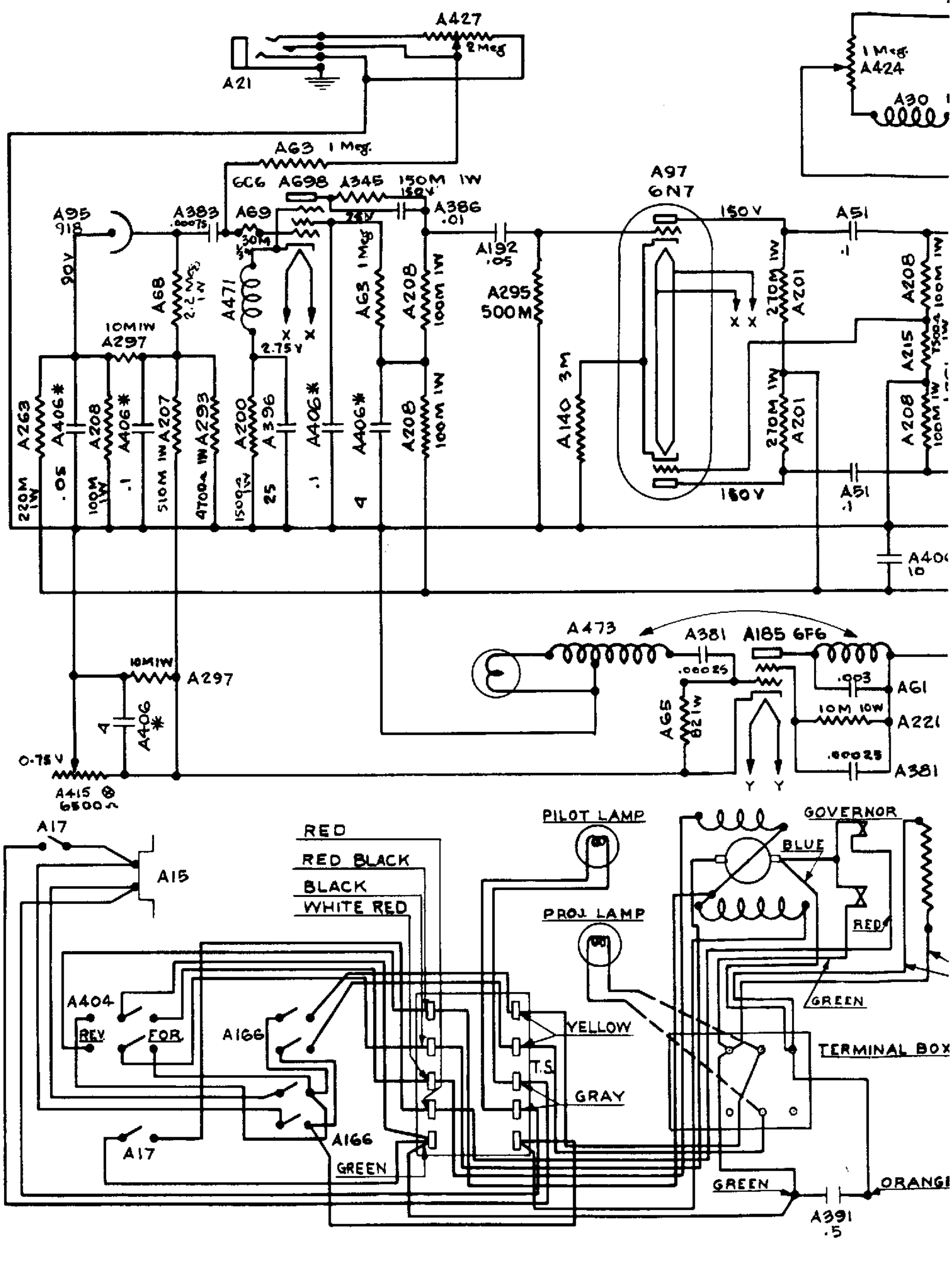
DESIGN 120 - Model J (60-CYCLE), K (25-CYCLE)

GENERAL INFORMATION.

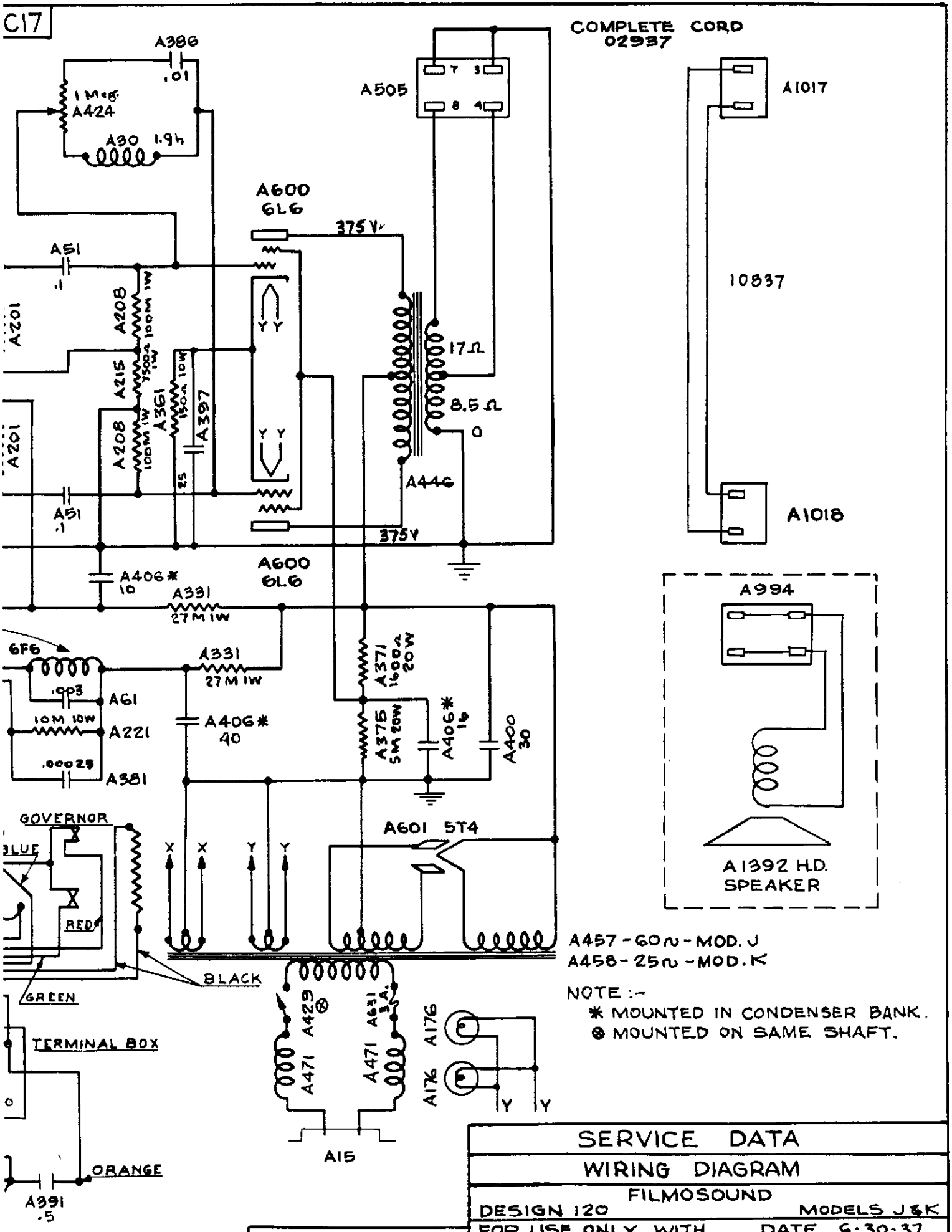
In this amplifier, two 6L6 tubes are used in the output. The amplifier uses a crystal microphone with a Mallory type 75A plug, No. A1378. These amplifiers were made in two series of which very few of the first (page C-17) will be encountered. The second series is readily distinguished by the switch located on the microphone control. This switch must be in the "off" position for the amplifier to operate with film. A close examination of the circuit (page C-19) will show that the input circuits to the second tube are transferred. Also note that the oscillator tube was changed from a pentode to a triode connected pentode.

A three-ampere fuse is used.

The power output is 25 watts.


A427
2 Meg
A21
1 Meg
A424
A30
A63 1 Meg
6C6 A698 A345 150M 1W
A97
6N7
A95
918
A383
.00075
A69
A386
.01
150 V
A51
.1
90V
A68
2.2 Meg 1W
A471
A63 1 Meg
A208
100M 1W
A192
.05
A295
500M
270M 1W
A201
A208
A215
10M 1W
A297
2.75 V
A140 3M
A263
A406*
A207
A293
A200
A396
220M 1W
.05
100M 1W
.1
510M 1W
4700Ω 1W
1500Ω 1W
25
4
X X
150 V
A400
10
A473
A381
A185 6F6
.00025
.003
A61
10M 10W
A221
A381
A65
82 1W
Y Y
A297
A406*
0-75 V
A415
6500Ω
A17
A15
RED
RED BLACK
BLACK
WHITE RED
PILOT LAMP
PROJ. LAMP
GOVERNOR
BLUE
RED
GREEN
A404
REV
FOR
A166
YELLOW
T.S.
GRAY
TERMINAL BOX
A166
A17
GREEN
GREEN
ORANGE
A391
.5

C17



A457 - 60Ω - MOD. J
A458 - 25Ω - MOD. K

NOTE :-
* MOUNTED IN CONDENSER BANK.
⊗ MOUNTED ON SAME SHAFT.

SERVICE DATA

WIRING DIAGRAM

FILMOSOUND

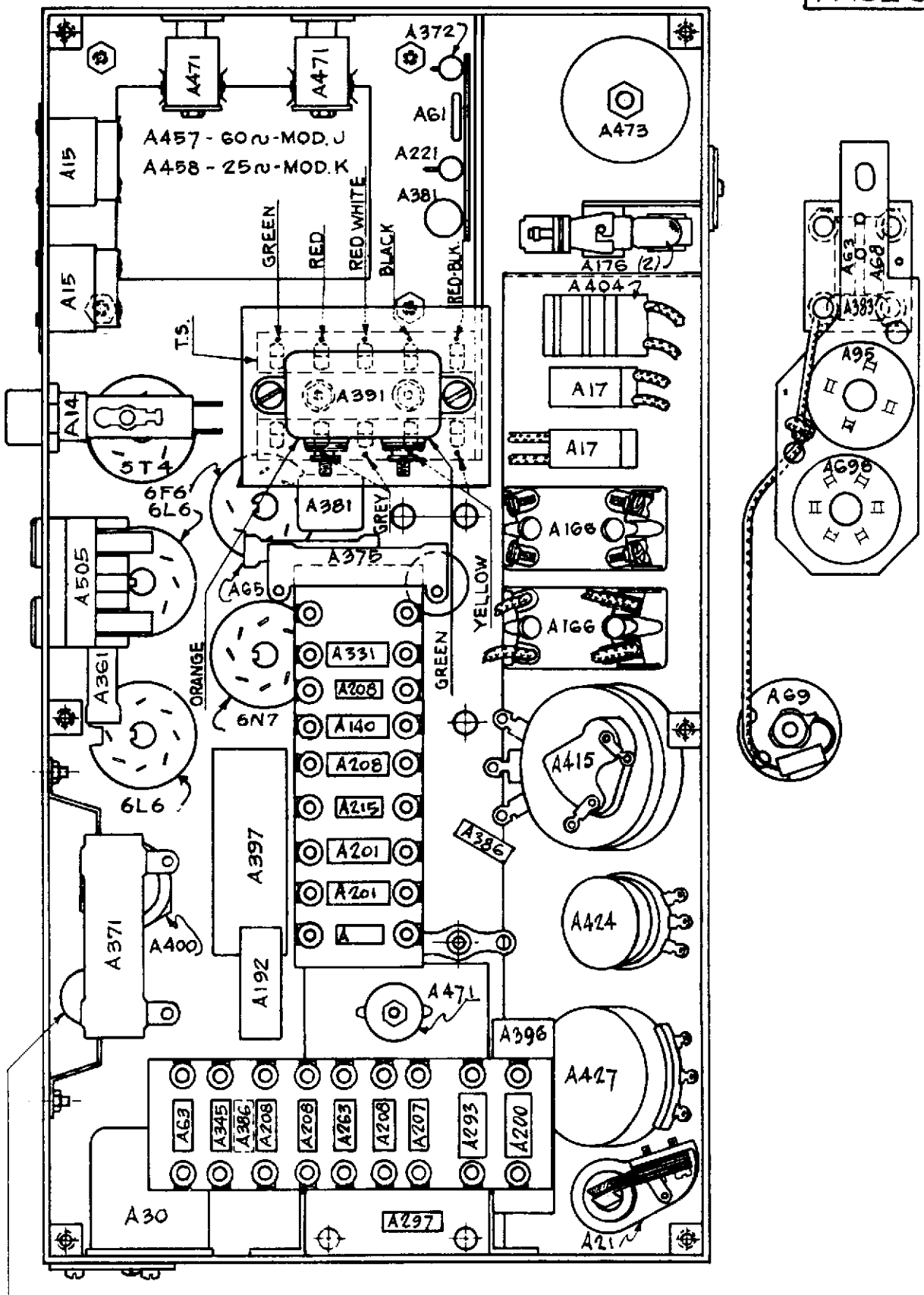
DESIGN 120 MODELS J & K

SUPESEDES MOD. G

FOR USE ONLY WITH PART NO. 02936

DATE 6-30-37

REV. 10-23-45



TO CONDENSER BANK.

SERVICE DATA

BOTTOM VIEW OF AMPLIFIER

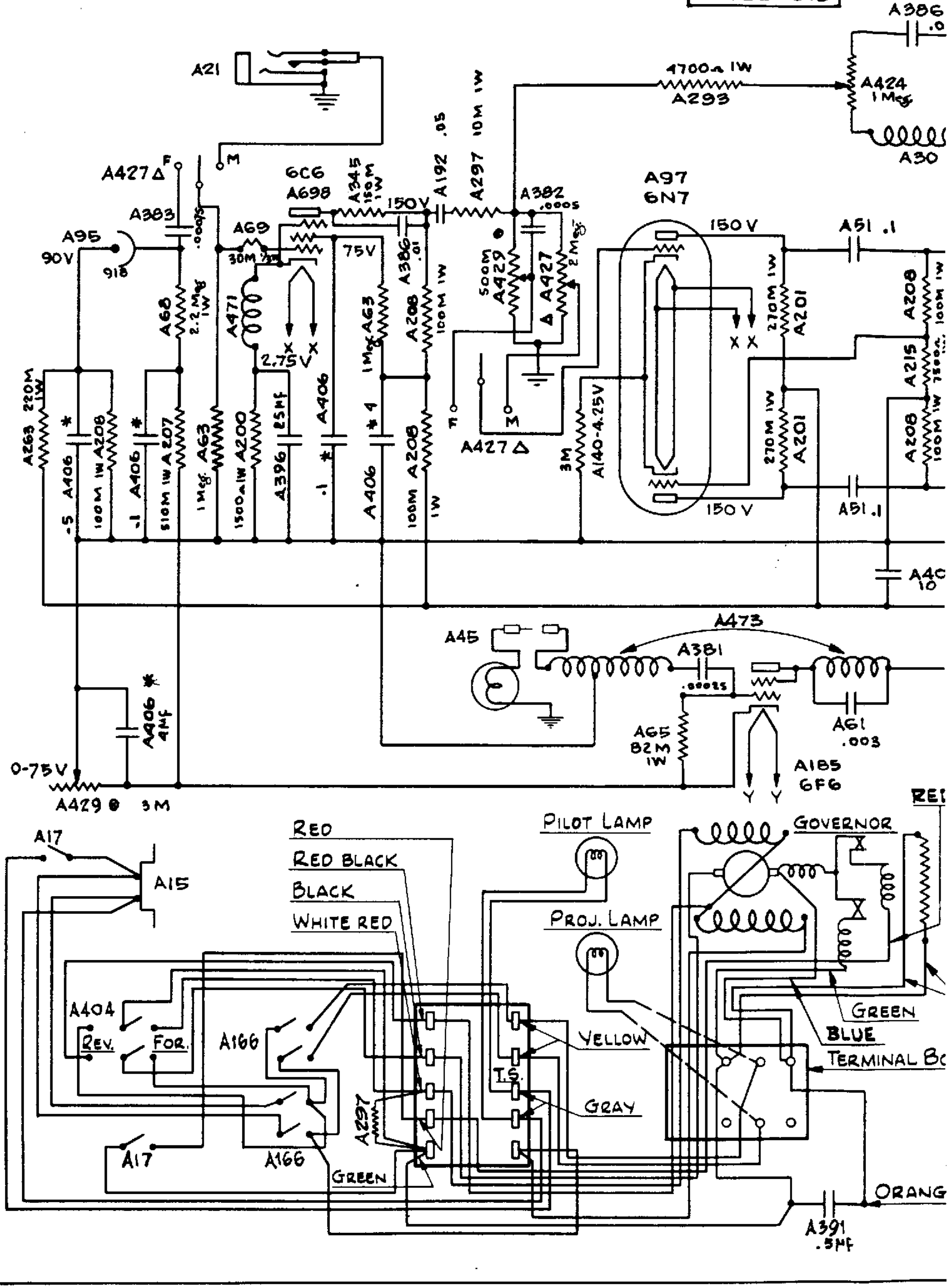
FILMOSOUND

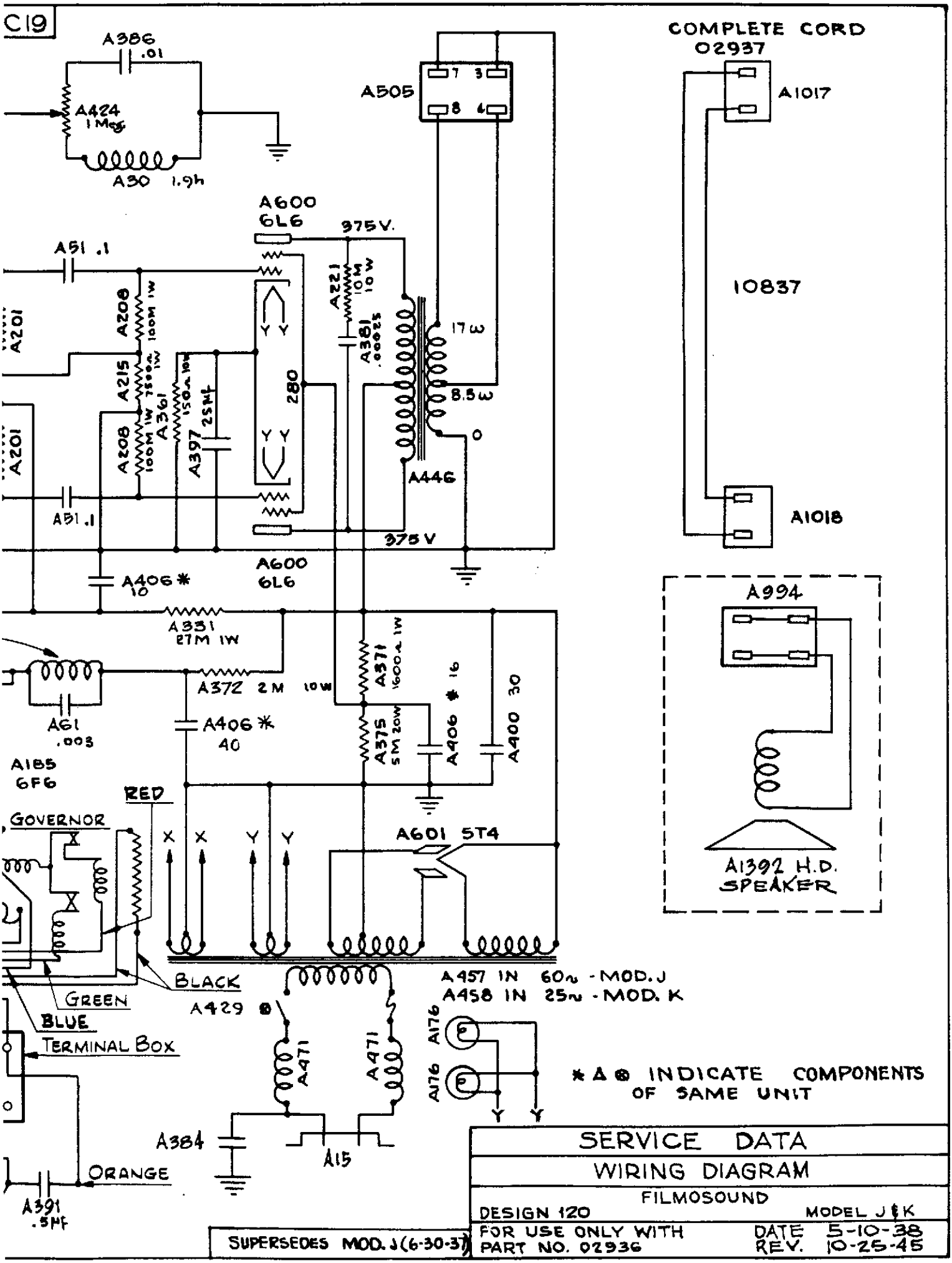
DESIGN 120 — MODEL J & K

SUPERSEDES MODEL G

FOR USE ONLY WITH PART NO. 02936

DATE 2-21-38
REV. 10-22-45


A386
A21
4700Ω 1W
A293
A424 1Meg
A30
A427 Δ
F
M
A383
.00075
A95
90V
918
6C6
A698
A69
30M
A345 150M 1W
150V
75V
A386 .01
A192 .05
A297 10M 1W
A382 .0005
A97
6N7
150 V
A51 .1
500M A429
A427 2Meg
A471
2.75V
X X
A68 2.2Meg 1W
A263 220M 1W
-.5 A406
100M 1W A208
.1 A406
510M 1W A207
1 Meg A63
1500Ω 1W A200
A396 25Mf
A406
.1
A406
4
1Meg A63
A208 100M 1W
A208 100M 1W
A427 Δ
3M
A140-4.25V
270M 1W A201
270M 1W A201
A208 100M 1W
A215
A208 100M 1W
A51 .1
A40 10
A45
A473
A381
.00025
A65 82M 1W
A61 .003
A185 6F6
Y Y
0-75V
A429 3M
A406 4Mf
RED
RED BLACK
BLACK
WHITE RED
PILOT LAMP
PROJ. LAMP
GOVERNOR
A17
A15
A404
REV.
FOR.
A166
A297
T.S.
YELLOW
GRAY
GREEN
BLUE
TERMINAL BO
A17
A166
GREEN
ORANG
A391 .5Mf



SERVICE DATA

WIRING DIAGRAM

FILMOSOUND

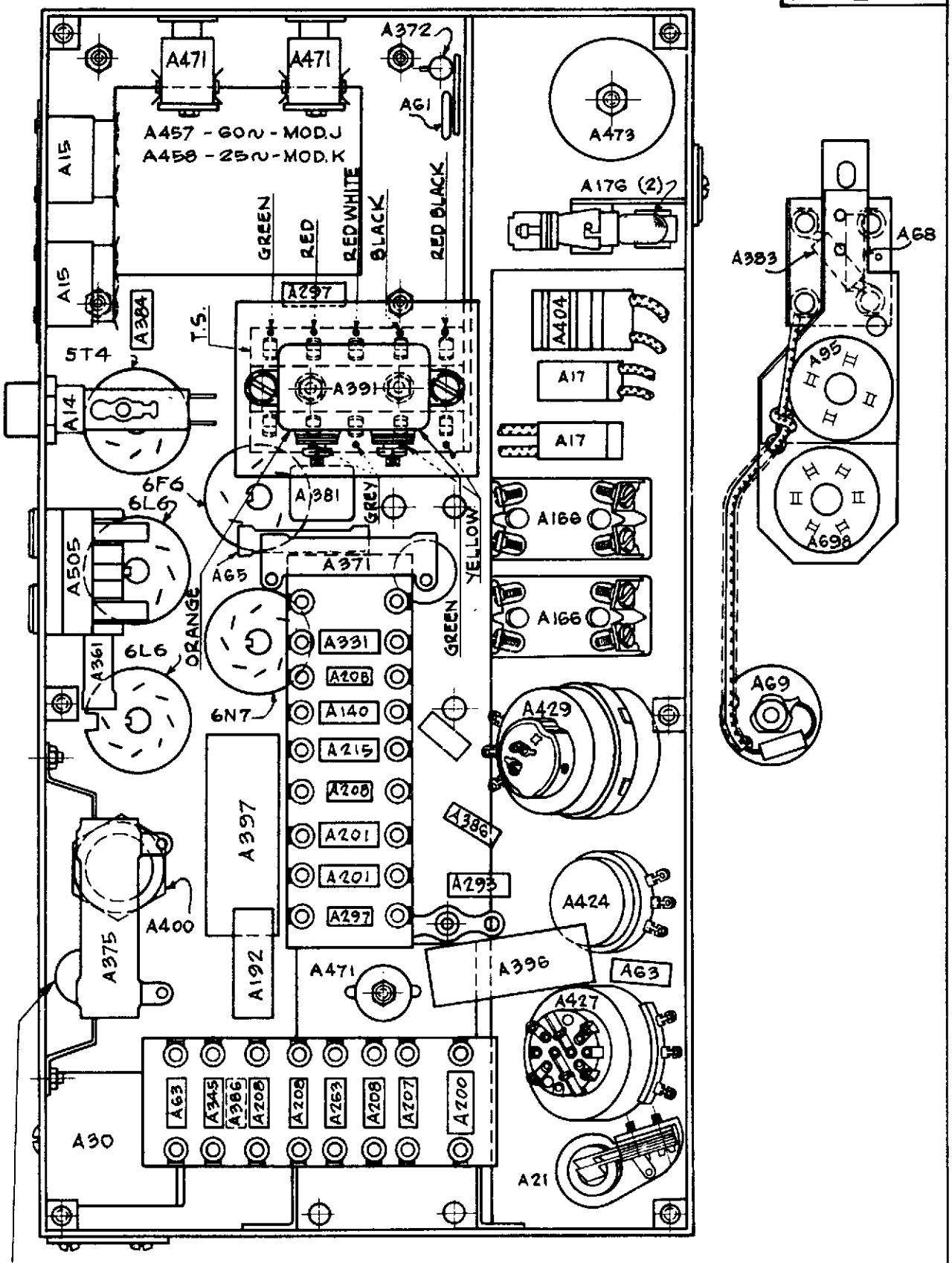
DESIGN 120 MODEL J & K

FOR USE ONLY WITH PART NO. 02936

DATE 5-10-38

REV. 10-25-45

SUPERSEDES MOD. J (6-30-37)



SERVICE DATA

BOTTOM VIEW OF AMPLIFIER

FILMOSOUND

DESIGN 120 MODELS J,K

SUPERSEDES MOD J 2-21-38

FOR USE ONLY WITH PART NO. 02936

DATE 5-5-38

REV. 10-23-45

SECTION D

DESIGN 130, MODEL C

GENERAL INFORMATION.

This is the 1000- or 1200-watt lamp Filmosound, with amplifier separate from the projector. The phototube and exciter lamp are connected to the amplifier through cables. A rather elaborate switching arrangement is used on the amplifier, so study the instruction book until you are familiar with it. Try all the switches to understand their actions. When the amplifier line switch is in any "on" position, a resistance is in series with the transformer primary for "stand by" purposes. It is necessary to have the projector switch in the "on" position, which corresponds to the change-over lever position, in order to apply full voltage to the amplifier.

Note that the first 6C6 tube is connected as a pentode, the second as a triode, the 42 tube as a triode driver, and the 45 tubes as push-pull parallel output. The bias for the 42 and 45 tubes is obtained from the drop in resistor A362, which is in the negative return of the "B" supply. Three chokes are provided for filtering, as well as several condensers.

FILM VOLUME.

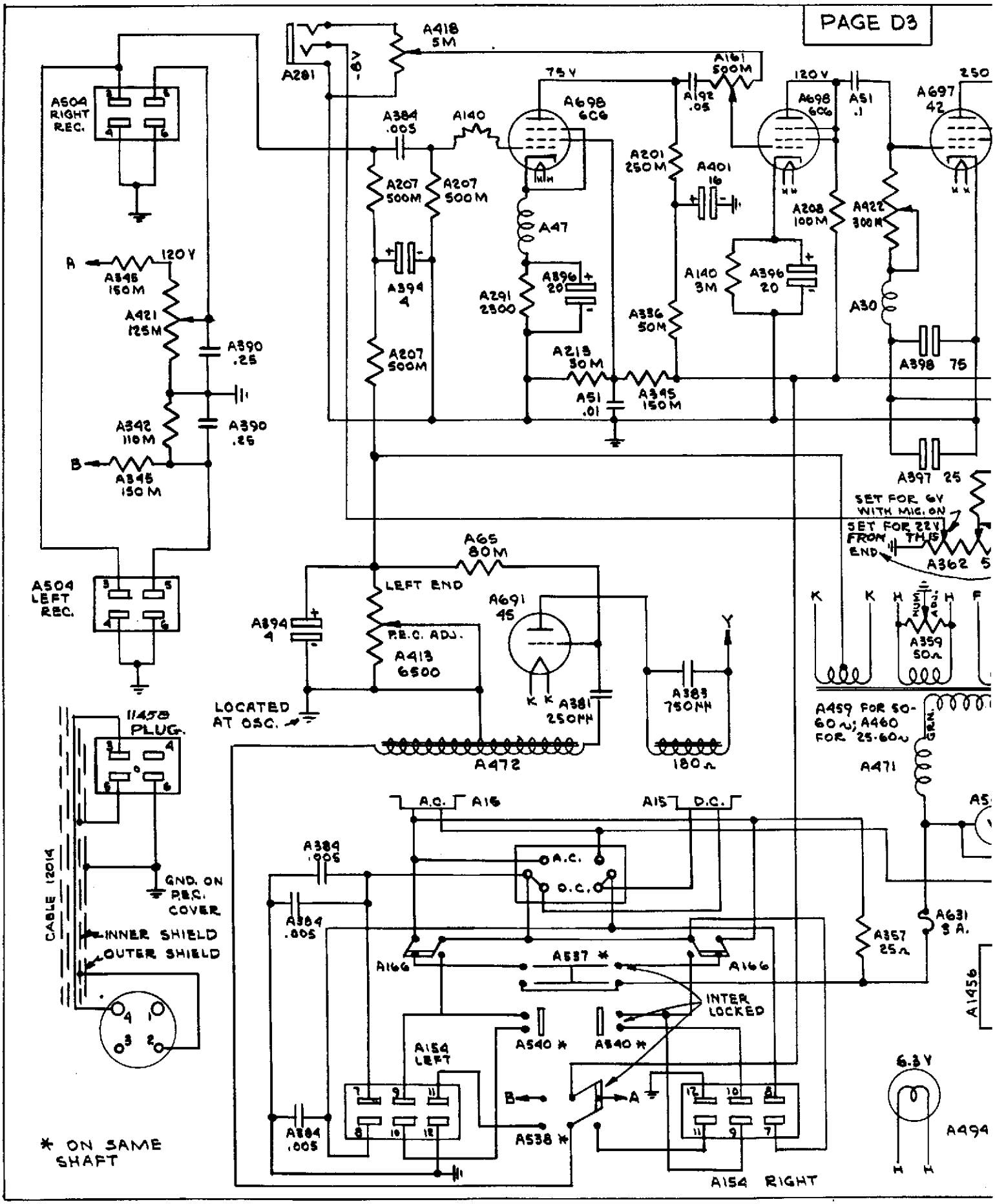
The volume is controlled by a gain control in the grid of the second 6C6 tube. Thus the voltages on the exciter lamp, and phototube are not changed by this control. The control, A413, is an adjustable control that adjusts the voltage on the oscillator as in the volume control of the Design 120, Model E. In this way the phototube voltages and exciter lamp voltages at both ends are set to the proper values. The semi-variable control, A421, gives an additional adjustment on the right phototube voltage so both projectors will give equal volumes.

SPEAKER.

The speaker has its own field supply, provided by an 80 tube, condenser, and power transformer in the speaker case. Voltage is applied through terminals 13 and 14 of the speaker cable. This voltage, approximately 90 volts, is obtained from the power transformer of the amplifier. The voice coil impedance required is 36 ohms. The plate load impedance is 2000 ohms.

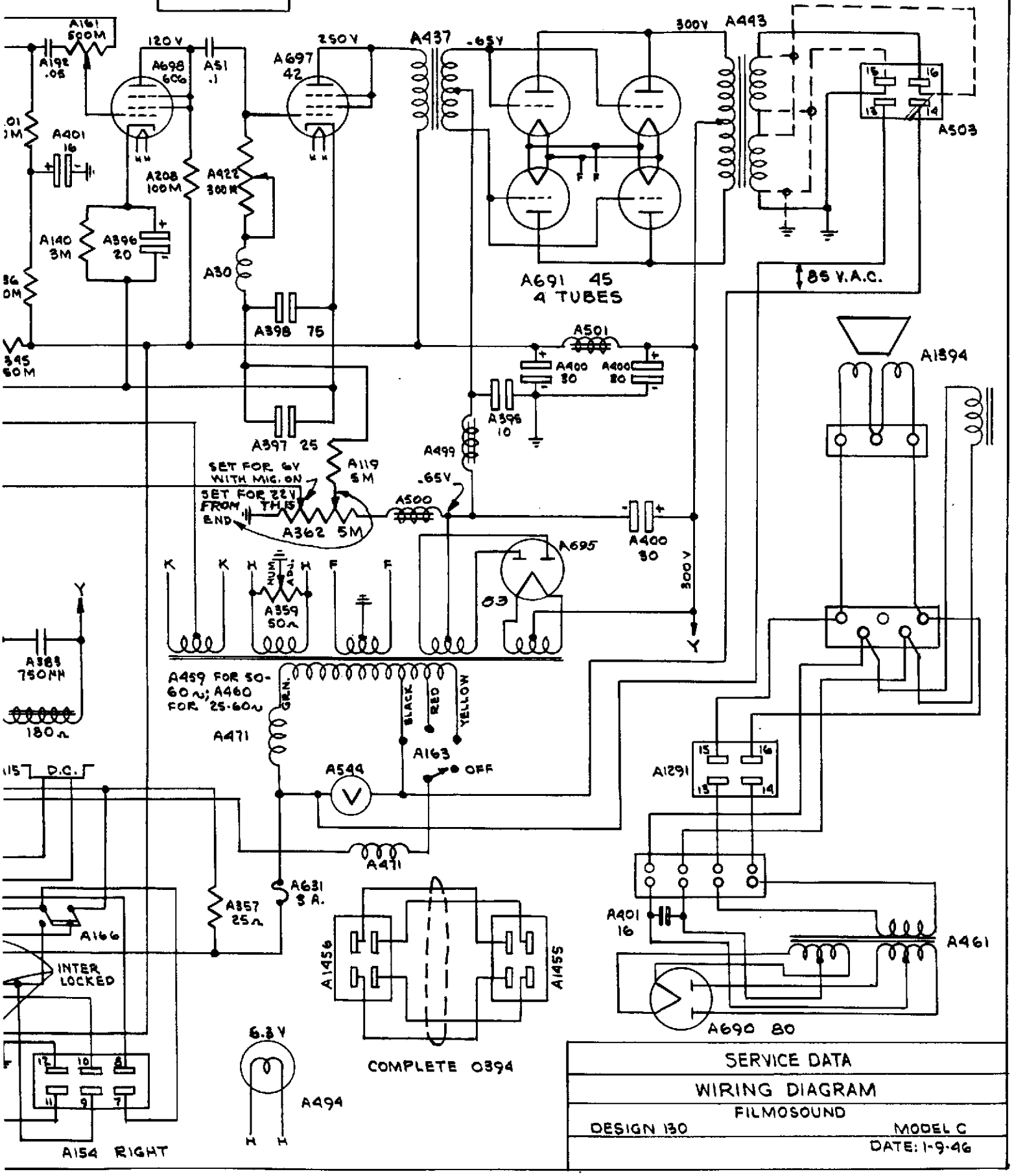
MICROPHONE.

This Filmosound uses a double-button carbon microphone with an external microphone transformer. Voltage is provided on the ring contact of the jack. A Western Electric No. 110 or Kellogg No. 191 plug should be used.


A418 5M
A281
-6V
A504 RIGHT REC.
A384 .005
A140
A698 6C6
75 V
A161 500M
A192 .05
120 V
A698 6C6
A51 .1
A697 42
250
A201 250M
A401 16
A207 500M
A207 500M
A47
A394 4
A291 2500
A396 20
A140 3M
A396 20
A208 100M
A422 300M
A30
A336 50M
A218 30M
A51 .01
A395 150M
A398 75
A397 25
SET FOR 6V WITH MIC. ON
SET FOR 22V FROM THIS END
A362 5
A207 500M
A345 150M
120 V
A421 125M
A390 .25
A342 110M
A390 .25
A345 150M
A504 LEFT REC.
A65 80M
LEFT END
A394 4
P.E.C. ADJ.
A413 6500
A691 45
A381 250MM
A383 750MM
180Ω
A472
LOCATED AT OSC.
K K H H F
A359 50Ω
A459 FOR 50-60Ω; A460 FOR 25-60Ω
GRN
A471
11458 PLUG
CABLE 12014
GND. ON P.E.C. COVER
INNER SHIELD
OUTER SHIELD
A.C. A16
A15 D.C.
A384 .005
A384 .005
A.C.
D.C.
A631 3 A.
A357 25Ω
A166
A537 *
A166
INTER LOCKED
A540 *
A540 *
A154 LEFT
A384 .005
A538 *
B
A
A154 RIGHT
6.3 V
A494
* ON SAME SHAFT

PAGE D3

--- 8Ω CONNECTIONS ___ 36Ω CONNECTIONS



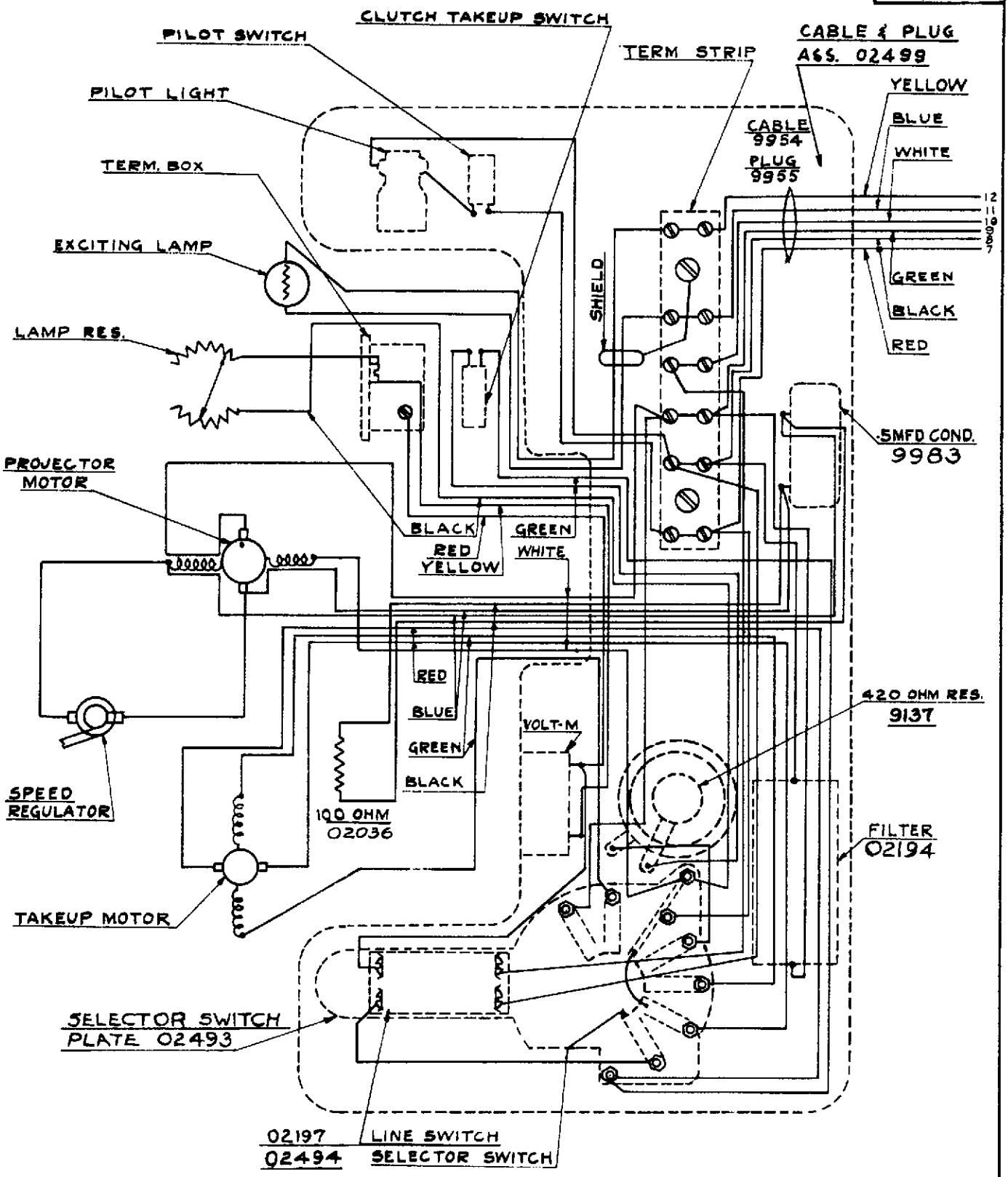
SERVICE DATA

WIRING DIAGRAM

FILMOSOUND

DESIGN 130 MODEL C

DATE: 1-9-46



BASE ASSEMBLY SEEN FROM BOTTOM FOR WIRING

BELL & HOWELL CO
CHICAGO U.S.A.

FILMOSOUND
DESIGN 130
MODEL C & D

SERVICE DATA

DRAWN
APVD.
6-29-36

SUPERSEDES MOD A&B

DESIGN 130, MODEL D, E
(Dual and Single Switch)

GENERAL INFORMATION.

These two amplifiers are similar except for the output transformers. The Design 130, Model D has an electro-dynamic speaker and the Design 130, Model E, has the permanent-magnet type speaker. The amplifiers use four 6L6 tubes in the output and a 6F6 tube as the oscillator.

The single-dual switch when in "single" position changes the output impedance to match one speaker and also cuts a resistance into the output tube screens, thus lowering the output to 25 watts.

See 130-C General Information par. 1

FILM AND MICROPHONE VOLUME.

Film volume is controlled by a 500,000-ohm control in one grid of the 6N7 tube. The semi-variable control on the left end of amplifier controls the oscillator. The setting of this control will determine the maximum output of amplifier. The control on the right end is in the right PEC input voltage circuit and is for balancing both projector outputs.

Microphone volume is controlled by a 500,000-ohm control in the second 6N7 grid.

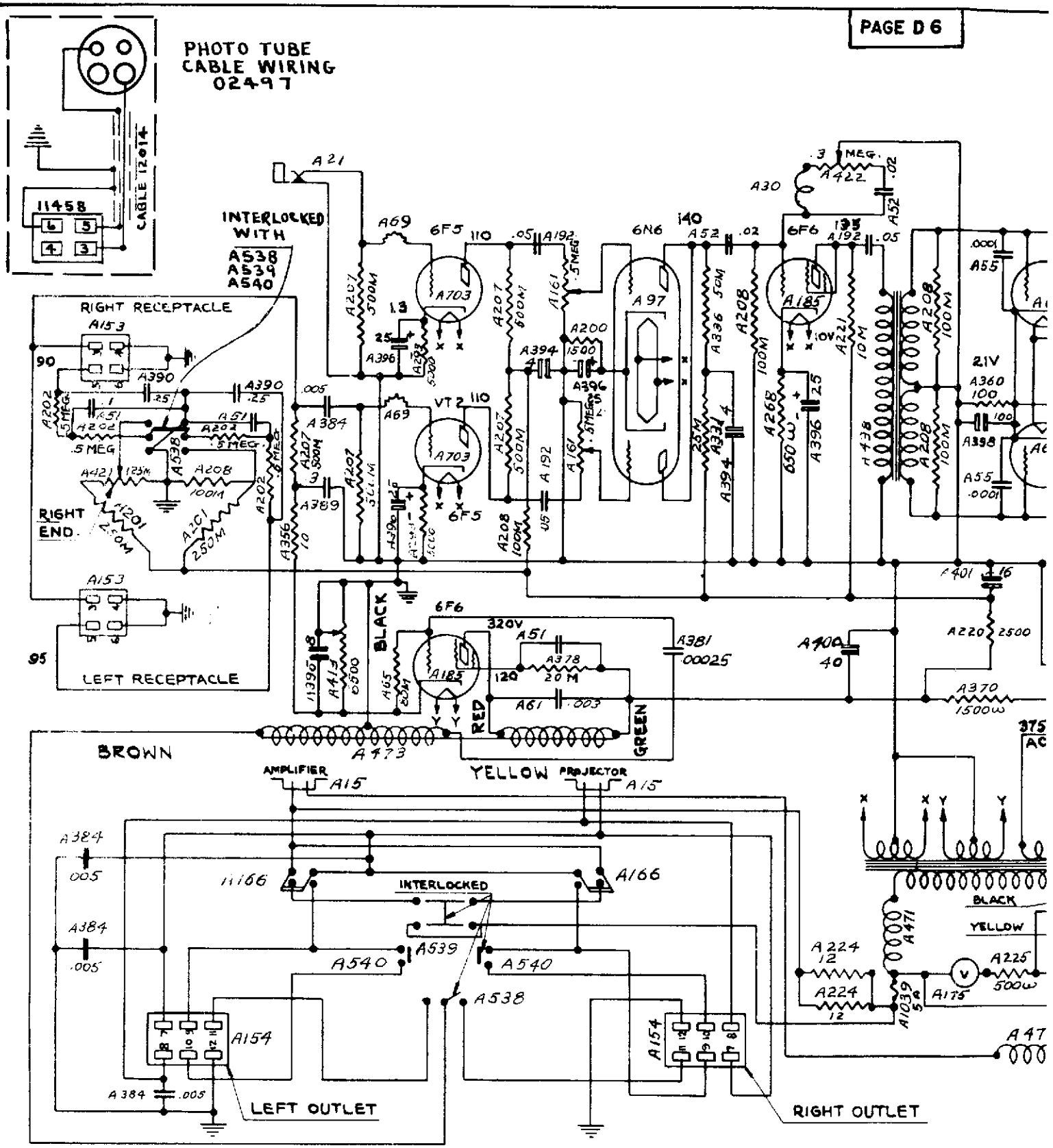
SPEAKER.

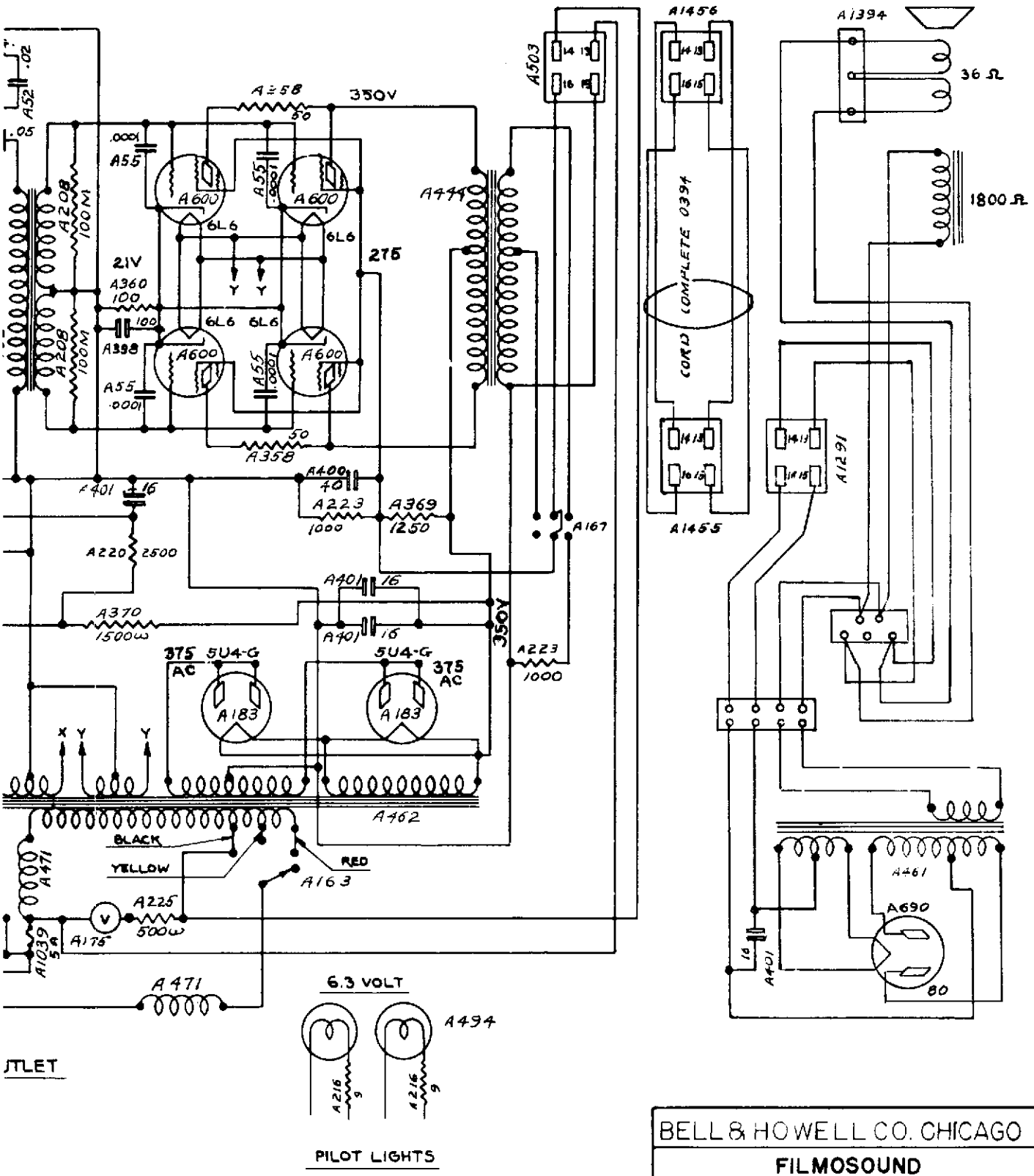
The Design 130, Model D, speaker has a separate field supply, provided by an 80 tube in the speaker case, which is fed through terminals 13 and 14 of the speaker cable. This voltage, approximately 90 volts, is obtained from the power transformer of the amplifier.

TUBES.

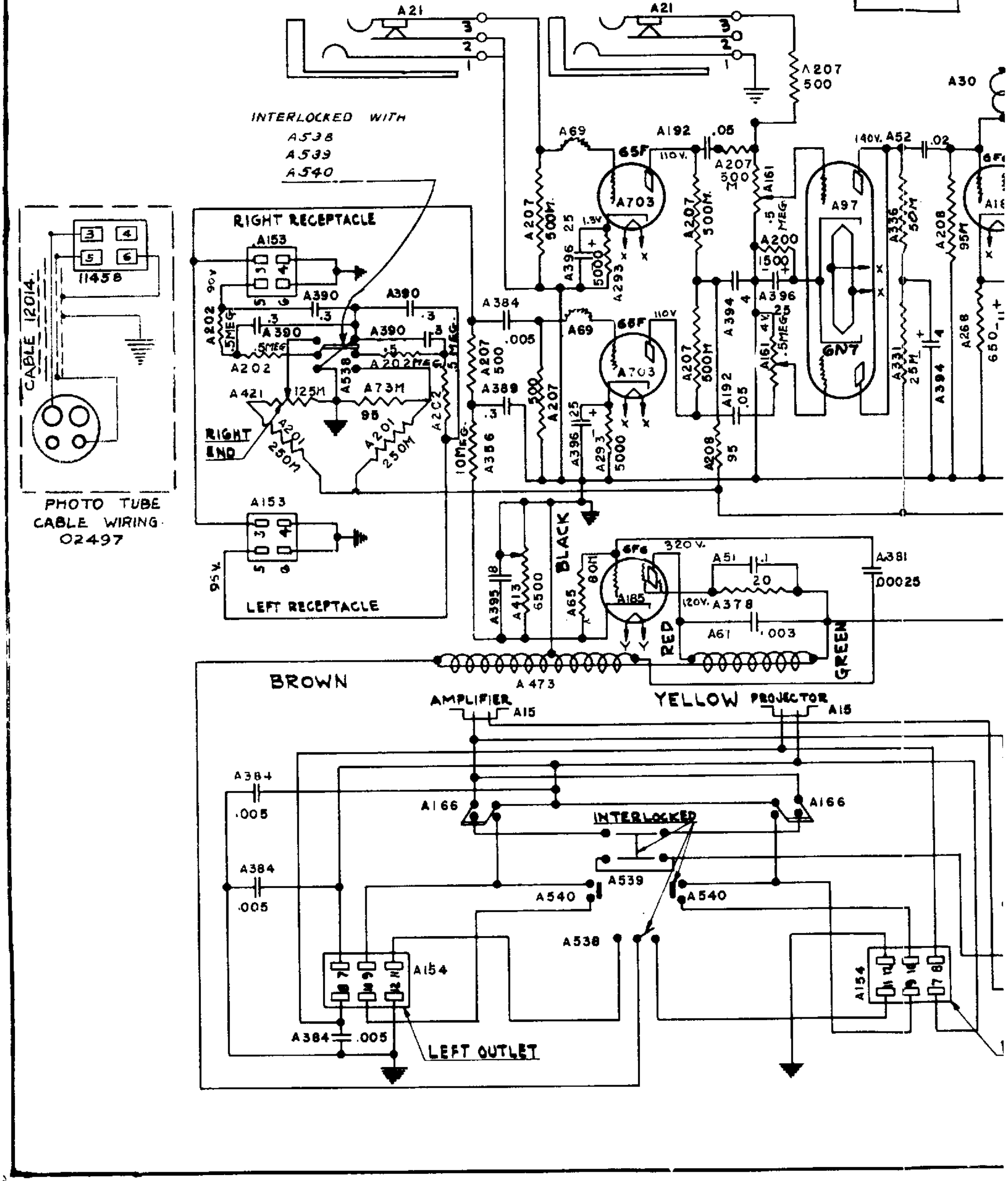
When replacing the 6L6 tubes in the amplifier, use the glass type 6L6G tubes but do not intermix with metal tubes.

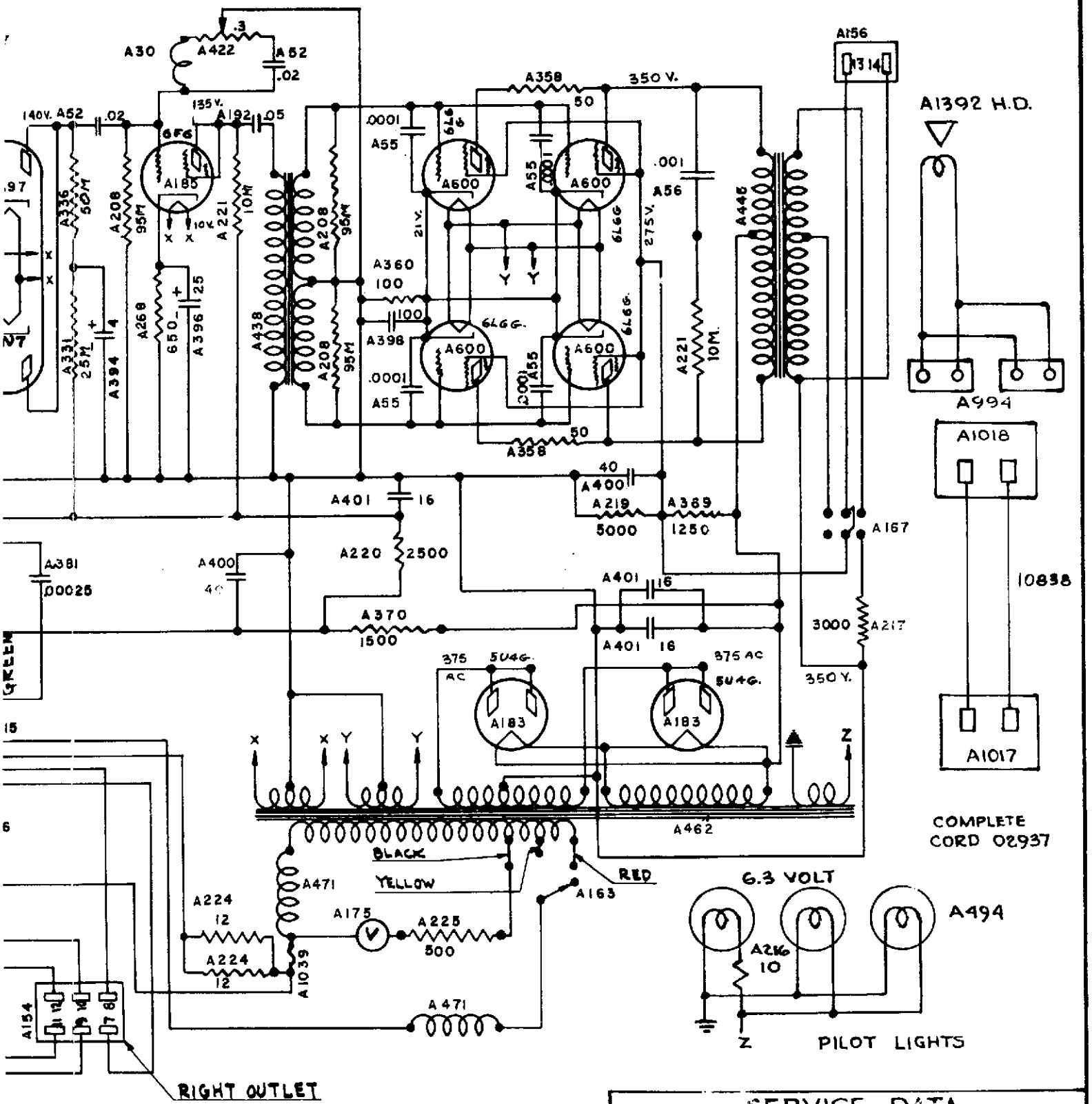
PHOTO TUBE CABLE WIRING 02497



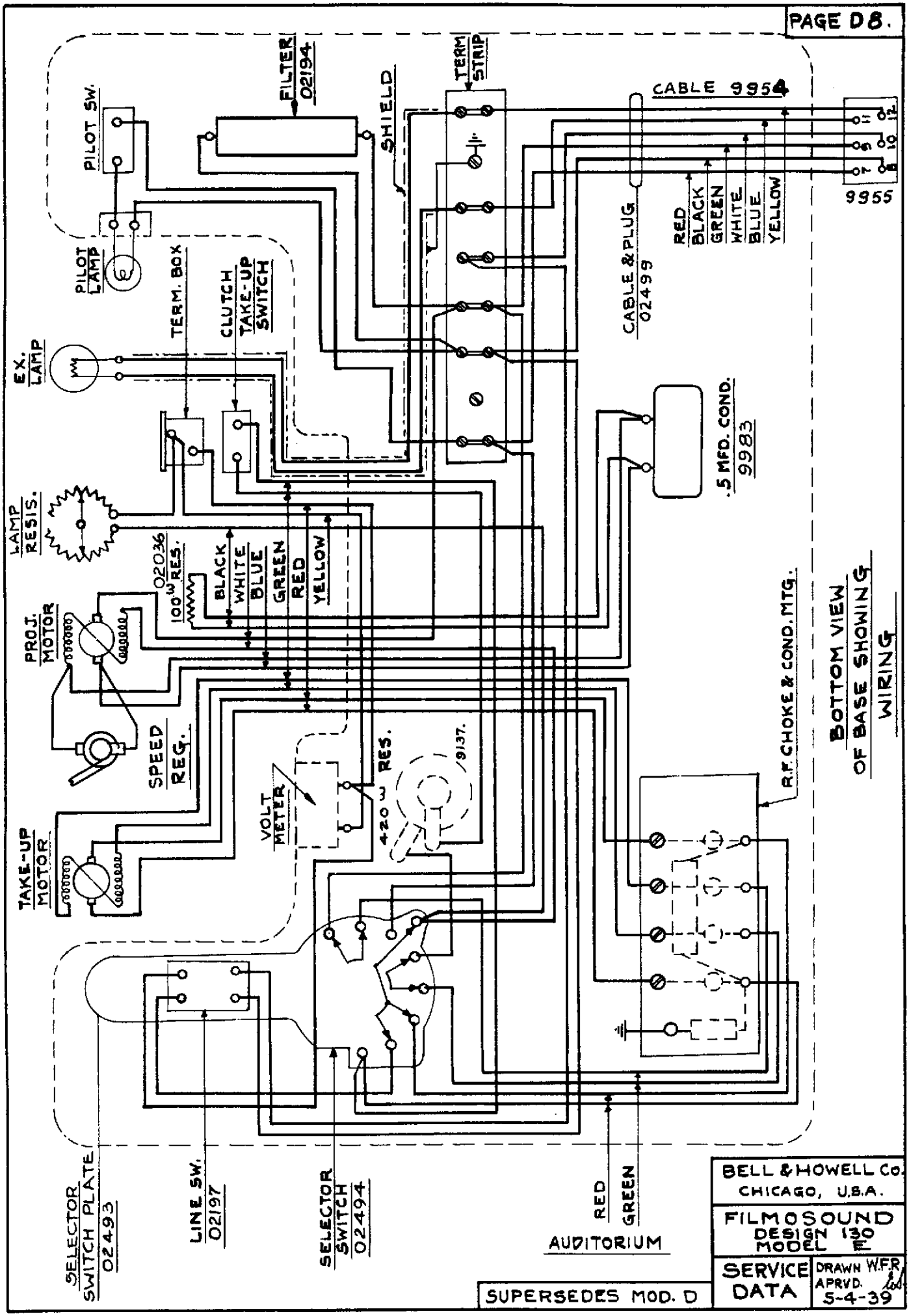


BELL & HOWELL CO. CHICAGO U.S.A.		
FILMOSOUND DESIGN 130 MODEL D		
SUPERSEDES MOD. C	DATE 12 10 45	SERVICE DATA
		DRAWN HE. APVD.


A21
A21
3
2
1
A207
500
A30
INTERLOCKED WITH
A538
A539
A540
A69
A192
.05
65F
110V.
A207
500
A161
.5 MEG
A97
140V.
A52
.02
6GN7
A703
A207
500M.
A396
25
1.5V
5000
A293
A200
1500
A396
25
A394
4
A161
4V.
.5MEG
A336
50M
A208
95M
A331
25M
A394
4
A268
650
RIGHT RECEPTACLE
A153
CABLE 12014.
11458
A202
.5MEG
90V
A390
.3
A202
A421
125M
A538
A73M
95
A202
.5 MEG
A201
250M
RIGHT END
A384
.005
A207
500
A389
.3
A356
10MEG.
A69
65F
110V
A703
A396
125
A293
5000
A207
500M
A192
.05
A208
95
PHOTO TUBE
CABLE WIRING
02497
A153
95V.
LEFT RECEPTACLE
A395
18
A413
6500
BLACK
A65
80H
6F6
320V.
A185
A51
.1
20
120V.
A378
A61
.003
RED
GREEN
A381
.00025
A473
BROWN
AMPLIFIER
A15
YELLOW
PROJECTOR
A15
A384
.005
A166
A166
INTERLOCKED
A384
.005
A539
A540
A540
A538
A154
A384
.005
LEFT OUTLET
A154



SERVICE DATA	
WIRING DIAGRAM	
FILMOSOUND	
DESIGN 130	MODEL E
FOR USE ONLY WITH PART NO.	DATE 12-21-45 REV.



BELL & HOWELL CO.
CHICAGO, U.S.A.

FILMOSOUND
DESIGN 130
MODEL E

SERVICE DATA

DRAWN W.F.R.
APRVD.
5-4-39

SUPERSEDES MOD. D

DESIGN 130 and 140 - AMPLIFIER NO. 03600

GENERAL INFORMATION.

This amplifier differs from other Design 130 types in that all three input tubes as well as the phase inverter have their filaments connected in series and are operated by the current flowing in the output tube cathode circuit.

Frequency characteristics of the amplifier may be altered by means of a tapped control on the rear of the amplifier.

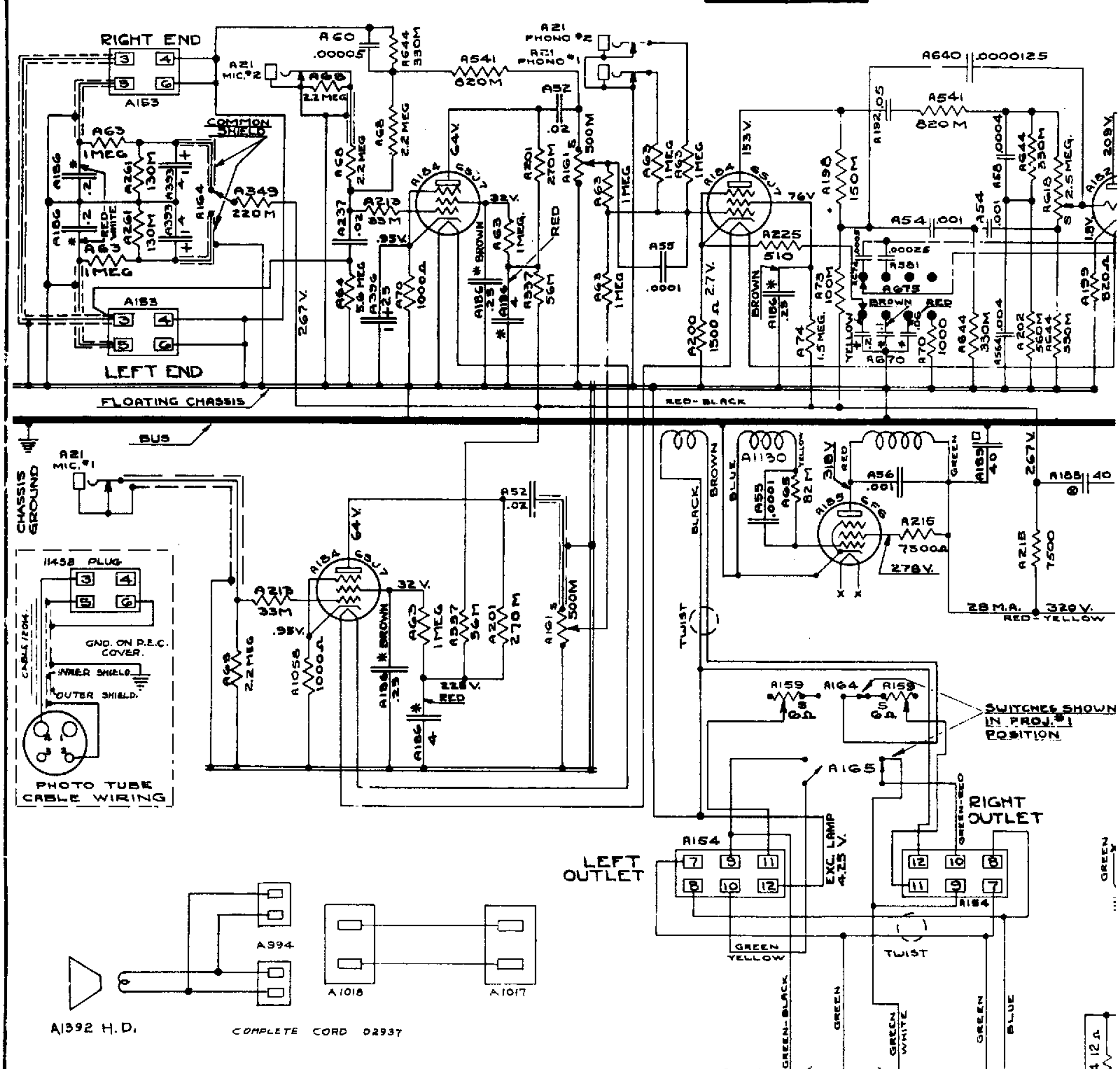
Two microphone inputs are featured, one of which is under separate control. The second is mixed at a fixed level with the photocell input. Control is by the main film volume control.

Two phonograph inputs are provided, neither of which has a volume control. Phonovolume should be controlled by means of the volume control on the phonograph.

The output transformer has a tapped secondary controlled by means of a switch on the rear of amplifier. The permanent-magnet type speaker has an impedance of 16 ohms.

The power output is 25 watts with a single speaker and 50 watts with dual speakers.

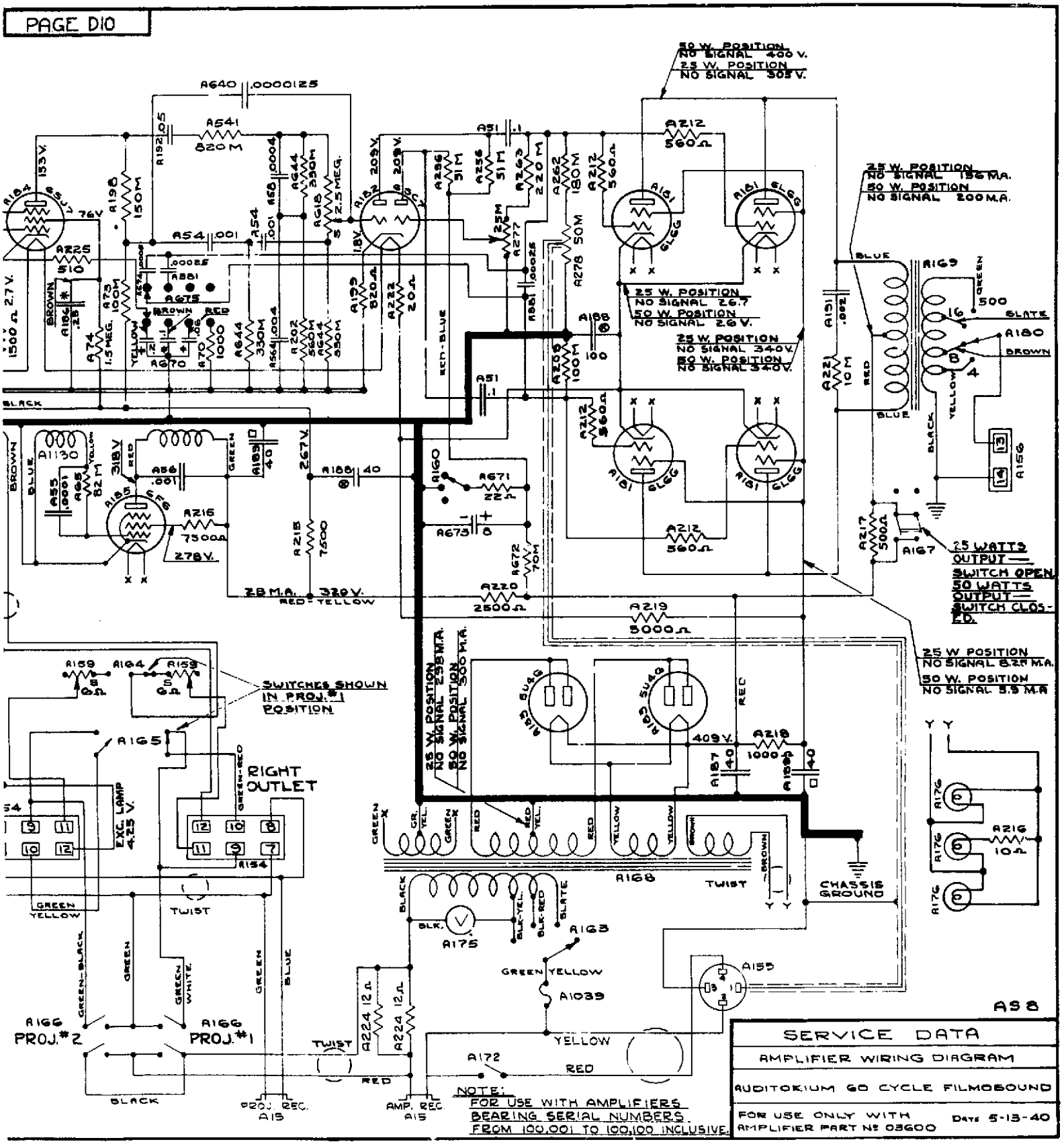
See General Information 130-C, par. 1.



"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 115 V. LINE. ALL VOLTAGES MEASURED TO GROUND. * ⊗ □ ⏚ DENOTE CAPACITORS LOCATED IN BANK.

WIRING COLOR CODE

WHITE - GROUND	BROWN - SCREEN
YELLOW - CATHODE	BLUE - PLATE
RED - B+	BLACK - HEATER
GREEN - GRID	



A58

SERVICE DATA

AMPLIFIER WIRING DIAGRAM

AUDITORIUM 60 CYCLE FILMOSOUND

FOR USE ONLY WITH AMPLIFIER PART Nº 03600

Date 5-13-40

SECTION E

DESIGN 138, MODELS A to L, GB, GB2, O AND P

GENERAL INFORMATION.

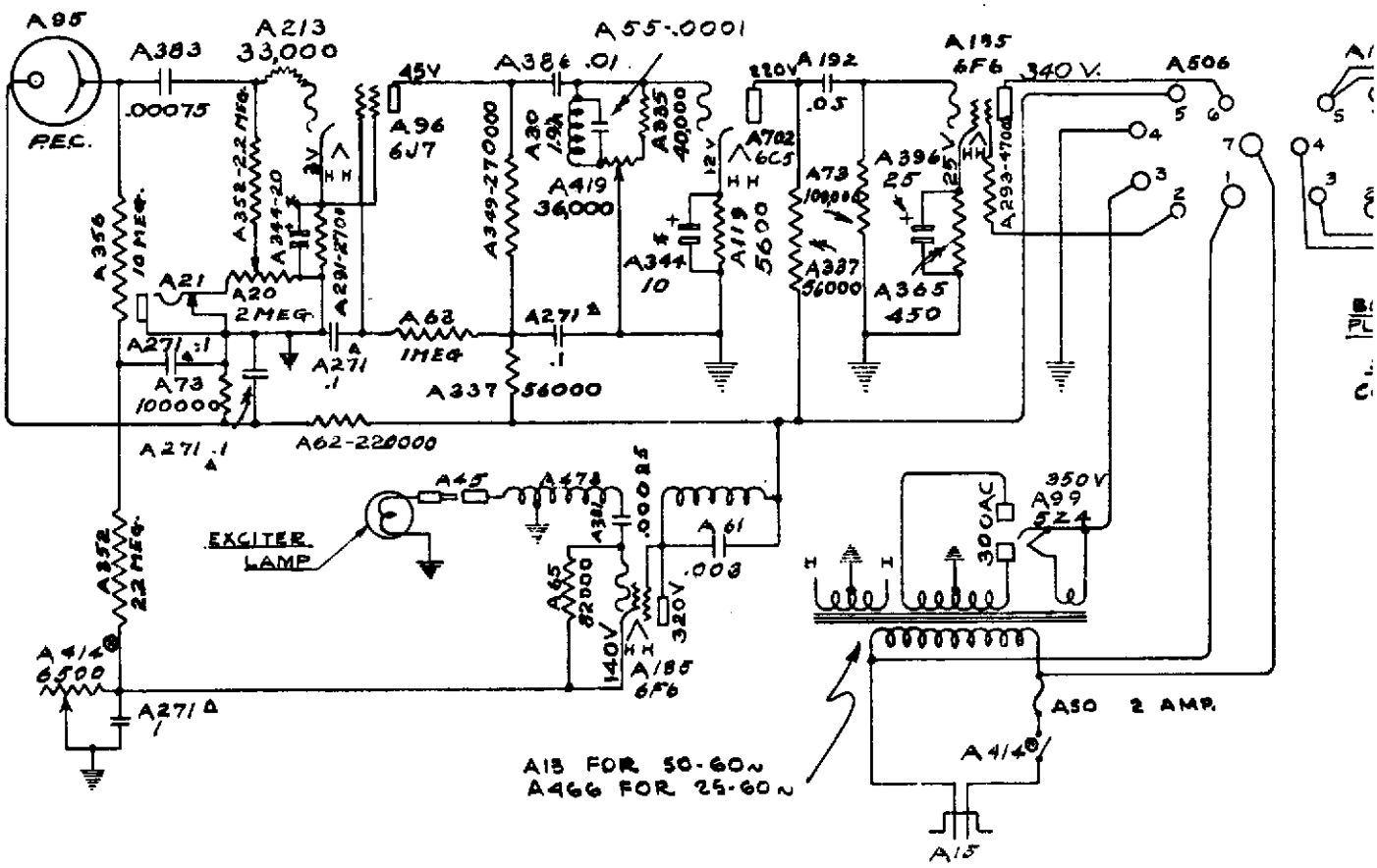
This amplifier was designed originally to be serviced only at the factory. Therefore, in order to work on it, the rivets in the bottom plate will have to be removed. This is best accomplished by using a hammer and sharp chisel applied to the peened end of the rivet. When reinstalling the plate be sure to place "shakeproof" lock washers between it and the chassis in order to insure a perfect electrical connection.

FILM VOLUME.

Film volume is controlled by single control acting on the photocell and oscillator tube. Failure of the volume to shut off will be due to either resistances A62 and A73 changing value, or to a leaky section of condenser bank A271 connected to this pair of resistors or connected to the junction of resistors A356 and A352. The voltage of this latter point, when measured with a 20,000 ohms per volt, or better, voltmeter, should equal the voltage at junction point of resistors A62 and A73. It should be between 100 and 115 volts.

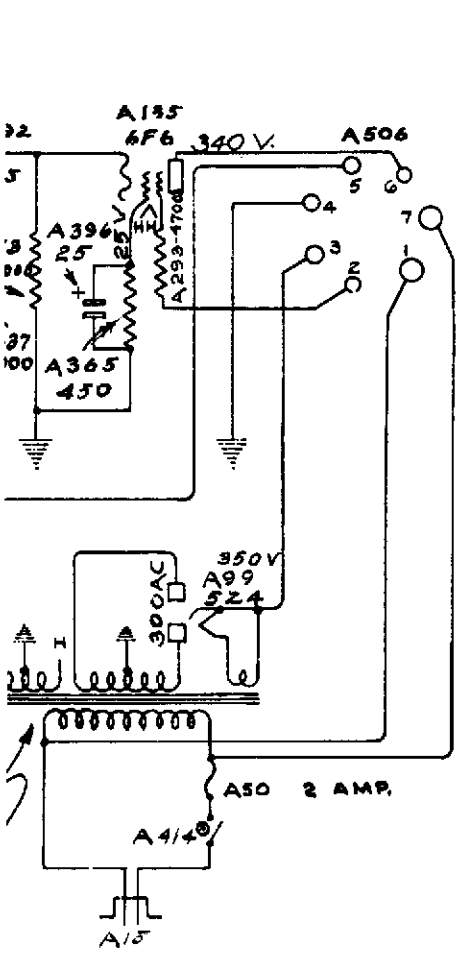
Low volume and the burning up of resistor A293 will be caused by poor contact of terminal #6 of the speaker cord receptacle A506. When it is known that the speaker is not of the booster type, we recommend that pin No. 1 be broken off the speaker cord plug and inserted in the No. 1 opening of the receptacle. A bit of Dupont household or General Electric glyptol cement will hold it in place. This will prevent the plug from being inserted improperly in the amplifier.

The power output of each of these models is 3.5 watts.

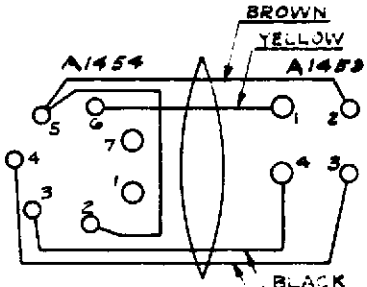


NOTE: ⊙, *, Δ DENOTE COMPONENTS OF SAME UNIT

E2.



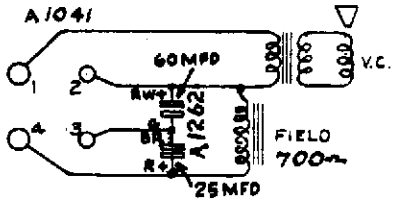
CORD
USE A1342



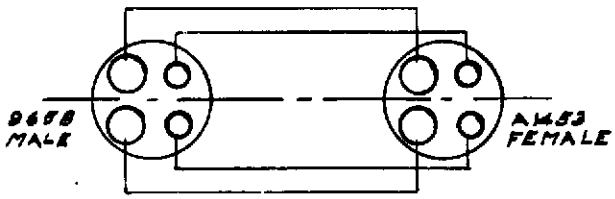
BOTTOM VIEW OF ALL
PLUGS & RECEPTACLES

SPEAKER CABLE
COMPLETE # 02695

SPEAKER 8" A1040
12" A1053
VC 1.8Ω 8"
6Ω 12"



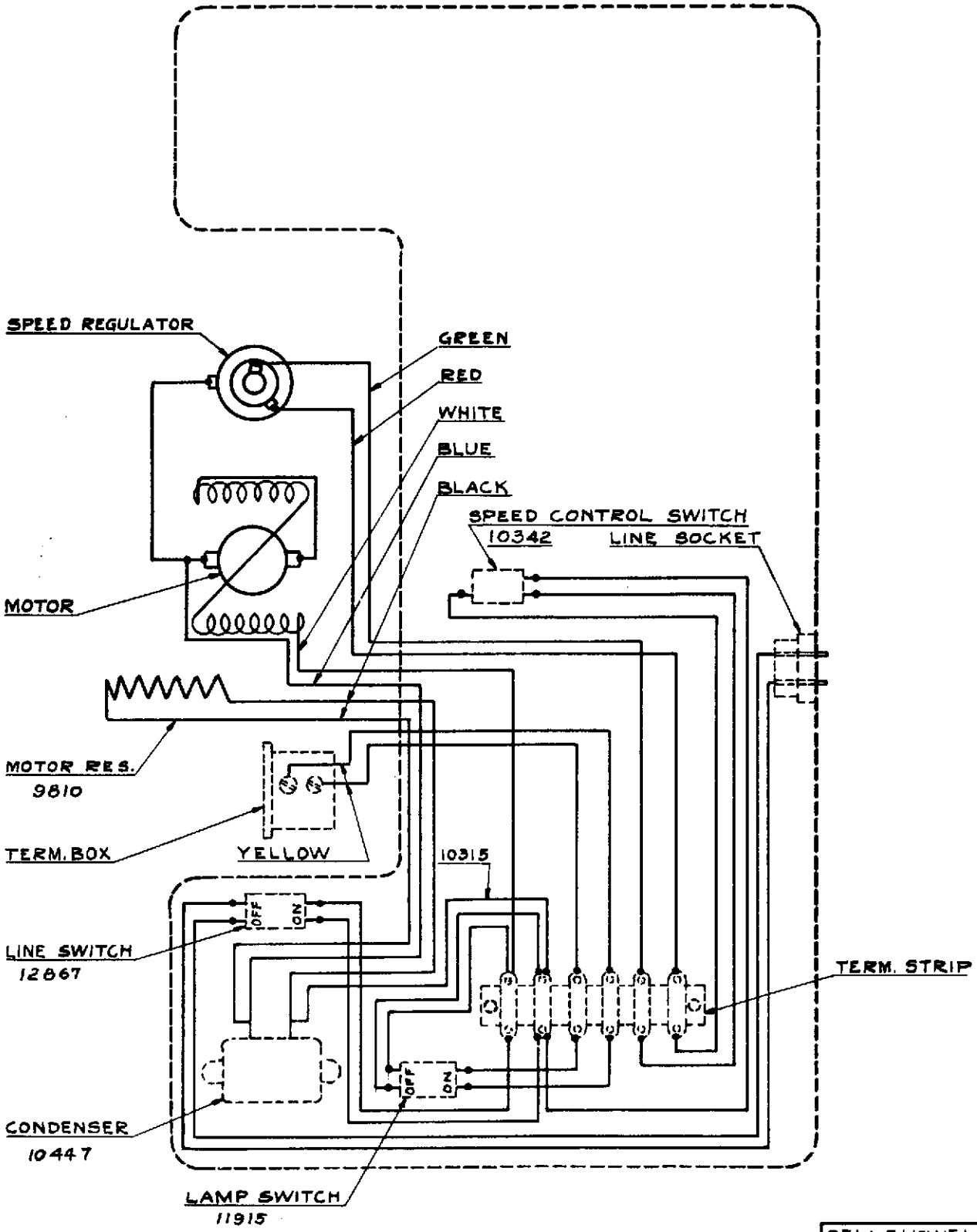
SPEAKER CASE



SPEAKER EXTENSION
CABLE # 02361

SAME UNIT

	BELL & HOWELL CO. CHICAGO U.S.A.		
	FILMOSOUND A-B-C-D-E-F-G-H DESIGN 138 MODELS J-K-L-GB-RB-SB-TB.		
REVISED	12 18 45	SERVICE DATA	drawn. C.J.N. apvd.



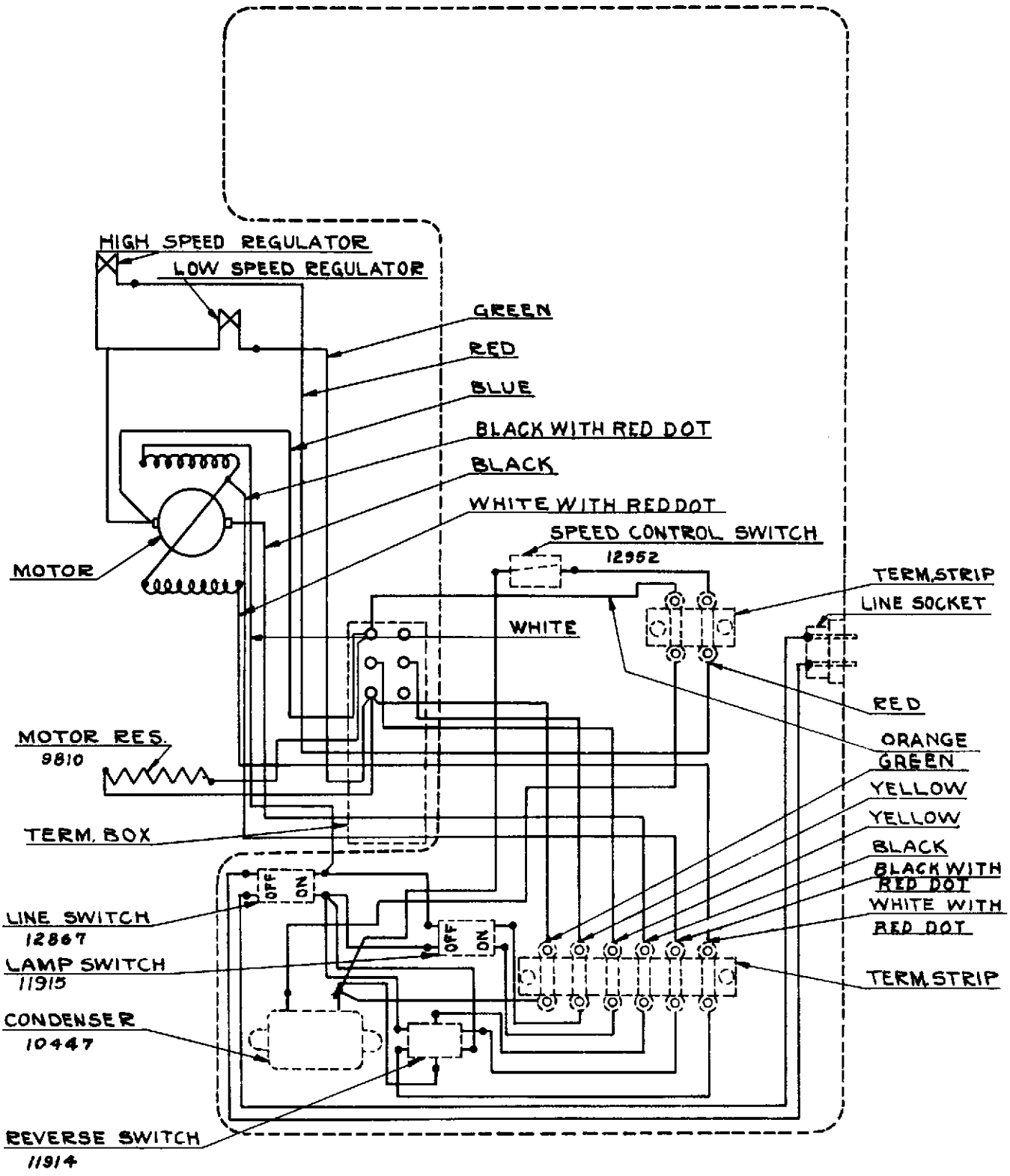
BASE ASSEMBLY SEEN FROM BOTTOM
FOR WIRING

BELL & HOWELL CO.
CHICAGO, U.S.A.

FILMOSOUND
DESIGN 138
MODELS A.B.C.E&D

SERVICE DATA

DRAWN
APVD
6-29-36



BASE ASSEMBLY SEEN FROM BOTTOM FOR WIRING

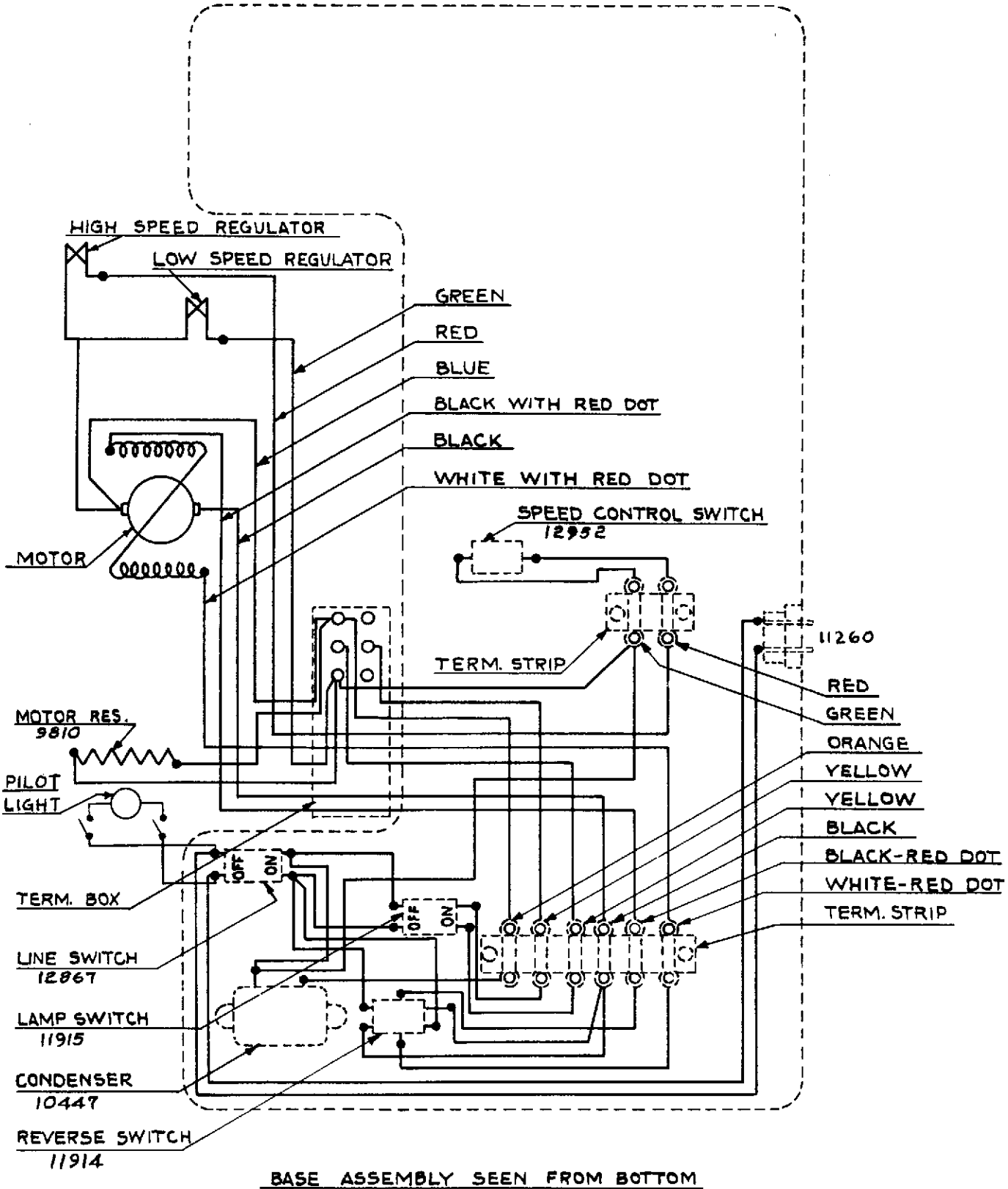
BELL & HOWELL CO.
CHICAGO, U.S.A.

FILMOSOUND
DESIGN 138
MODELS F-G-J & K

SERVICE DATA

DRAWN
APVD W.S.D.
4-12-37

SUPERSEDES MOD. A B C & D



BASE ASSEMBLY SEEN FROM BOTTOM
FOR WIRING

BELL & HOWELL CO.
CHICAGO U.S.A.

FILMO SOUND
DESIGN 138
MODELS-H-L-M2

SERVICE DATA

DRAWN ASG.
APRVD. W.S.D.
1-3-38

SUPERSEDES MOD. E.

DESIGN 138, BOOSTER AMPLIFIER NO. 02634

GENERAL INFORMATION.

This amplifier was designed for use with the Design 138, Models A to L Filmosound to increase the output. It provides an output stage of two 6F6 tubes in push-pull.

The amplifier is located in the speaker case, and may be exposed by removing the four knurled screws on the back grill of the case. To remove the amplifier for servicing, remove the four screws holding it in the case, and cut off the eyelets holding the bottom cover plate.

The special speaker cable furnished with the booster amplifier connects the 6F6 tube in the Design 138 amplifier as a triode, and supplies 110 volts A.C. to the power transformer in the booster. Note that condensers A401, A501, A366, and A401 supply the filtering for the Design 138 amplifier, as they replace the speaker field and the condenser pack in the regular Design 138 speaker case. Resistors A298 and A333 provide a stabilizing action and keep the volume down, to reduce extraneous noises. The addition of the booster amplifier adds another stage of amplification so the hum, hiss, and microphonic noises will be increased. The tone control A420, with shaft extending through the rear grill, allows the hiss to be reduced by attenuating the high frequencies.

SPEAKER.

The speaker used with the booster is identical to that supplied with the Design 120, Models E and F Filmosounds. They have a 6,850-ohm field and 18-ohm voice coil. The tap supplies reduced voltage for the screen grids.

The speaker field is connected directly across the "B" supply of the booster. Condenser A401 provides sufficient filtering for the plate voltage. Remember in servicing that there are voltages from two "B"

supplies, one in the Design 138 amplifier and one in the booster amplifier.

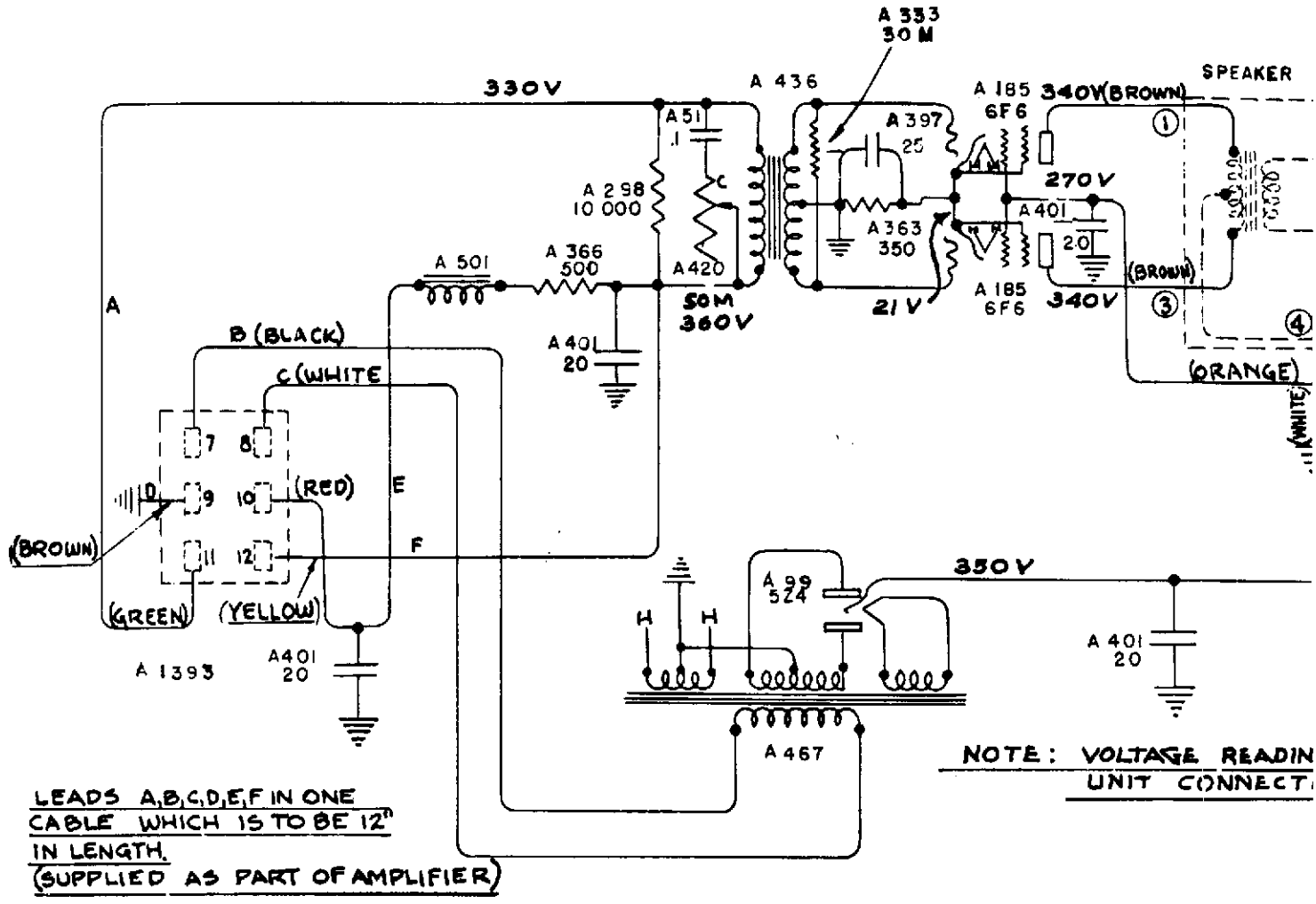
The speaker cord should be very carefully checked for opens within the cord itself.

Voltage readings should be taken with the booster connected to the corresponding amplifier. The power should be on.

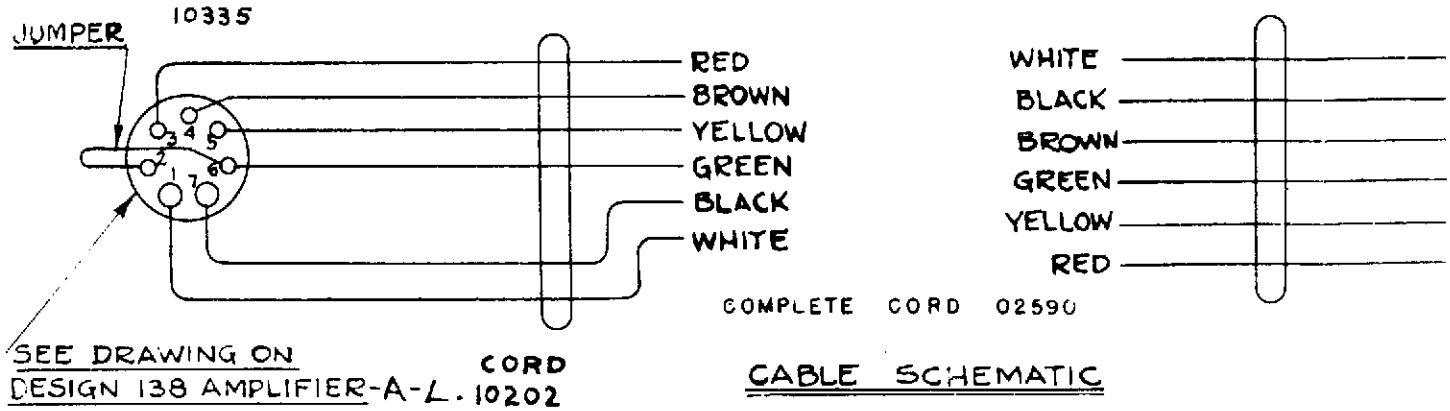
Resistance readings should be taken with the power shut off.

All values are approximate.

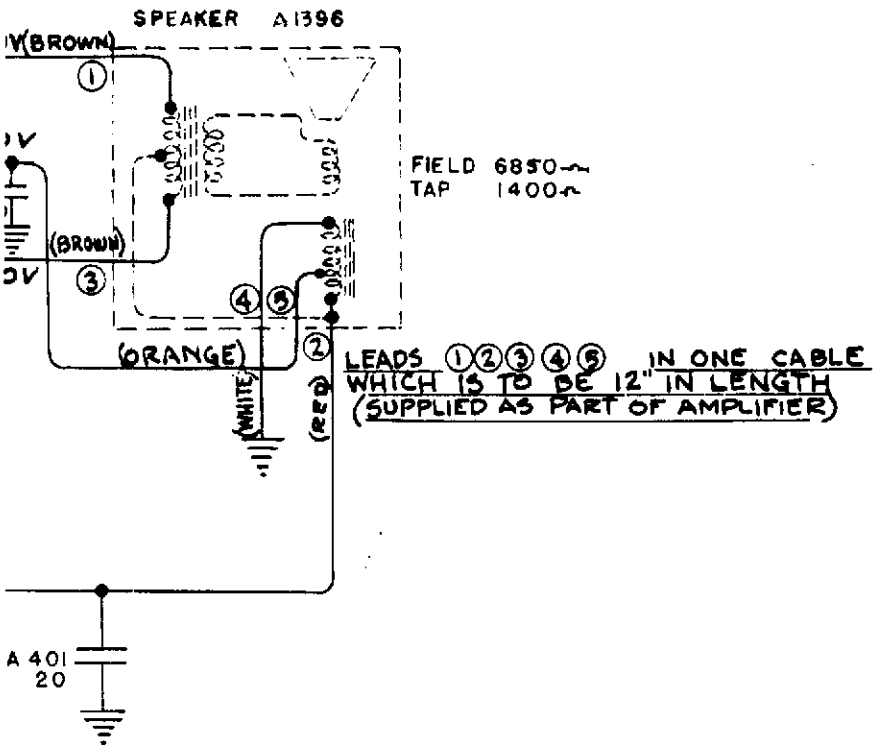
The power output of this amplifier is 12 watts.



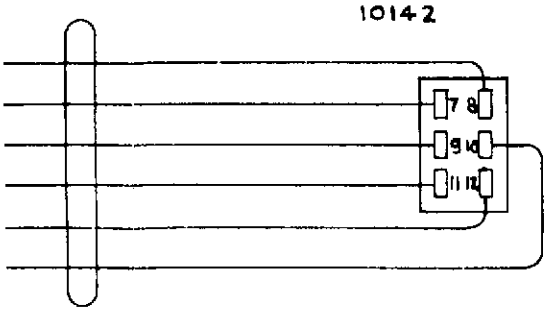
BOOSTER AMPLIFIER SCHEMATIC



CABLE SCHEMATIC



VOLTAGE READINGS MADE WITH UNIT CONNECTED TO F.O.S. AMPLIFIER.



BELL & HOWELL CO. CHICAGO USA		
02634 BOOSTER AMPLIFIER FOR DESIGN 138 FILMOSOUND		
12 19 45	SERVICE DATA	drawn. C.J.N. apvd.

REVISED 12-19-45

DESIGN 138, MODELS M, M-2, and MA

GENERAL INFORMATION.

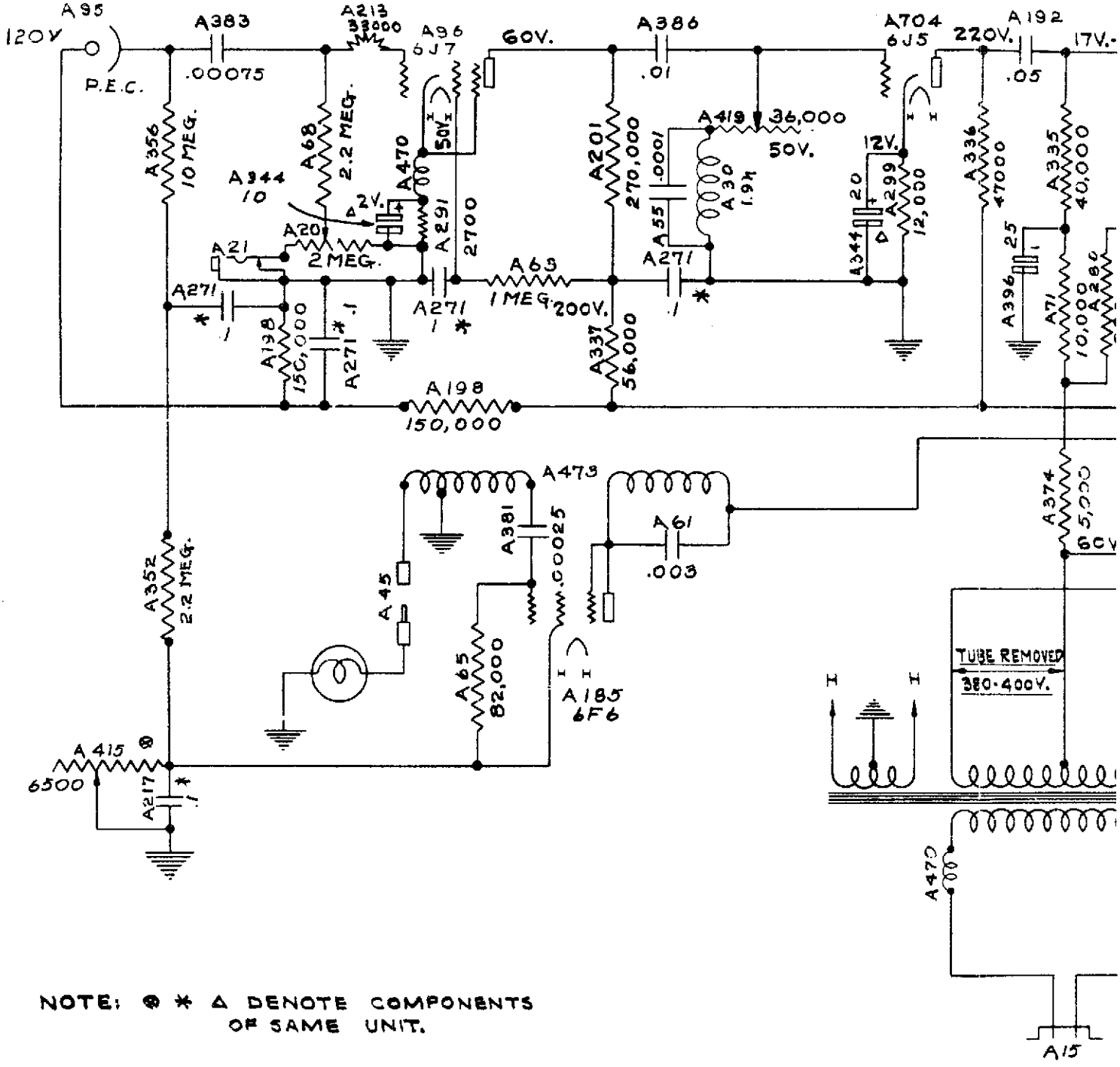
The amplifier for the 138-M series of Filmosounds uses a 6L6 tube in the output and a 6F6 tube as the oscillator.

The voice coil impedance required is 1.8 ohms. The required plate load impedance is 4000 ohms. The power output is 8 watts.

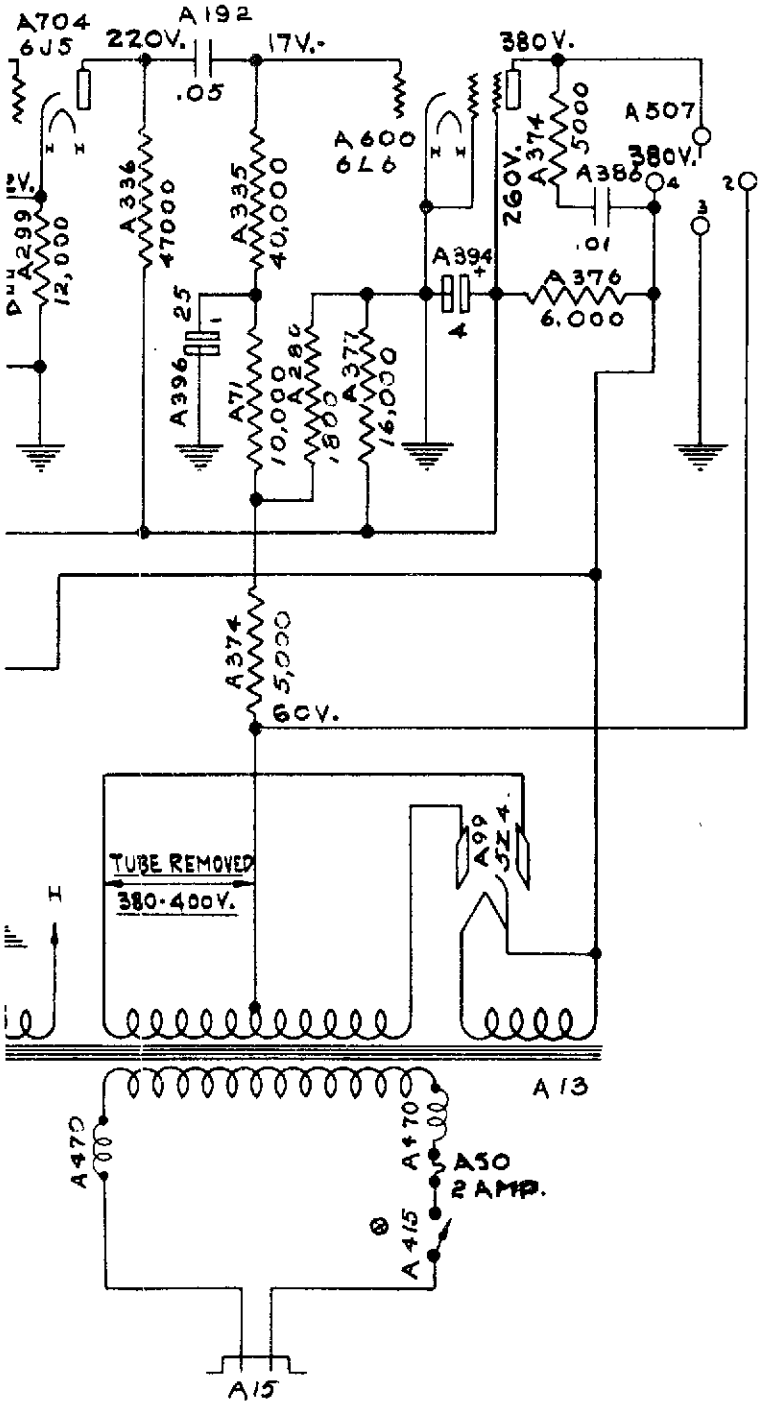
The 6L6 tube operates on semi-fixed bias and, if distortion is noticed, the resistance A374 in the transformer high-voltage center tap circuit should be checked.

112 V. LINE
(2000 ω PER VOLT VOLTMETER READING)

"0" VOL. ON
55V. VOL. OFF

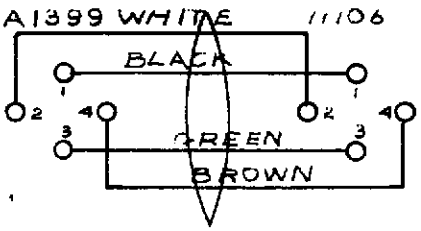


NOTE: ⊛ * Δ DENOTE COMPONENTS OF SAME UNIT.

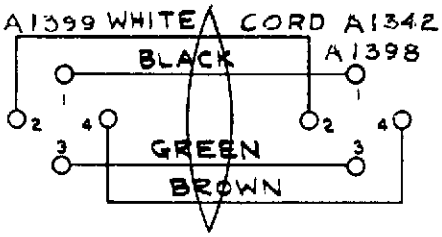


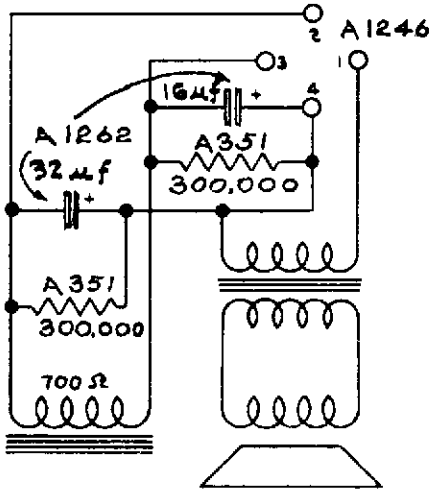
EXTENSION CORD

CORD COMPLETE 03076



CORD COMPLETE 02992





A1215 - 12" SPEAKER 6 lbs.
A1096 8" SPEAKER 1.8 lbs.

BELL & HOWELL CO. CHICAGO USA

FILMOSOUND M. MA
DESIGN 138 MODELS

REVISED 12 20 45

SUPERSEDES MOD. A B C E F H J L

12·20·45 | SERVICE DATA | DRAWN C.J.N. APVD.

DESIGN 138, UTILITY, COMMERCIAL AND ACADEMY

(Amplifiers No. 03202, 03389, 03401, 03413, 03473, 03634, and 12634)

GENERAL INFORMATION.

The various models of the Utility, Commercial, and Academy Filmosounds are identified by the following method:

Utility	Commercial	Academy
138-R,-U,-X	138-S,-V,-Y	138-T,-W,-Z
Two cases 12" speaker	Single case 8" speaker	Two cases 8" speaker

Several different amplifiers were used in these models. Bell & Howell keeps a very accurate record of the type of amplifier used with every Filmosound serial number. Under no circumstances should they be changed to another type. Amplifiers may be identified by the numbers appearing on the front of the chassis to the left of the control panel or by a small plate attached to the bottom plate of amplifier. When replacing the amplifier bottom plate, place a small amount of Dupont household or General Electric glyptol cement on the screw threads. This will prevent the screws from working loose.

All amplifiers of this series use 6V6 tubes connected in push-pull and deliver 12 watts of undistorted power.

SPEAKER.

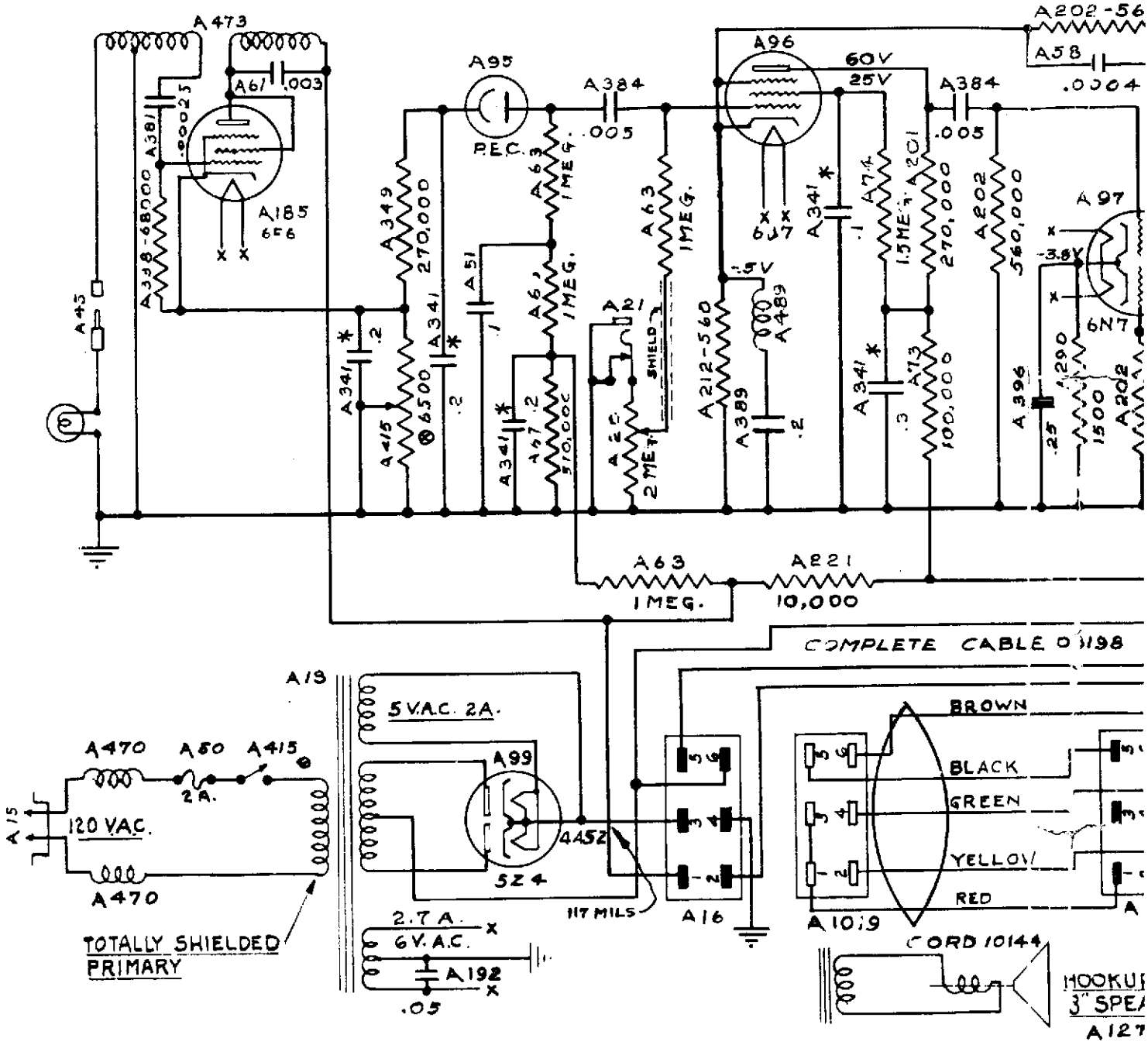
While the circuits vary somewhat, speakers are all interchangeable for testing purposes. The relay used in the later ones is only for discharging the filter condensers.

DESIGN 138, AMPLIFIER NO. 03202

GENERAL INFORMATION.

This amplifier uses a 6F6 tube as an oscillator. The speaker is different from the rest of these models, having a 50M, 10-watt resistor, part No. 11324, in the circuit. No relay is used.

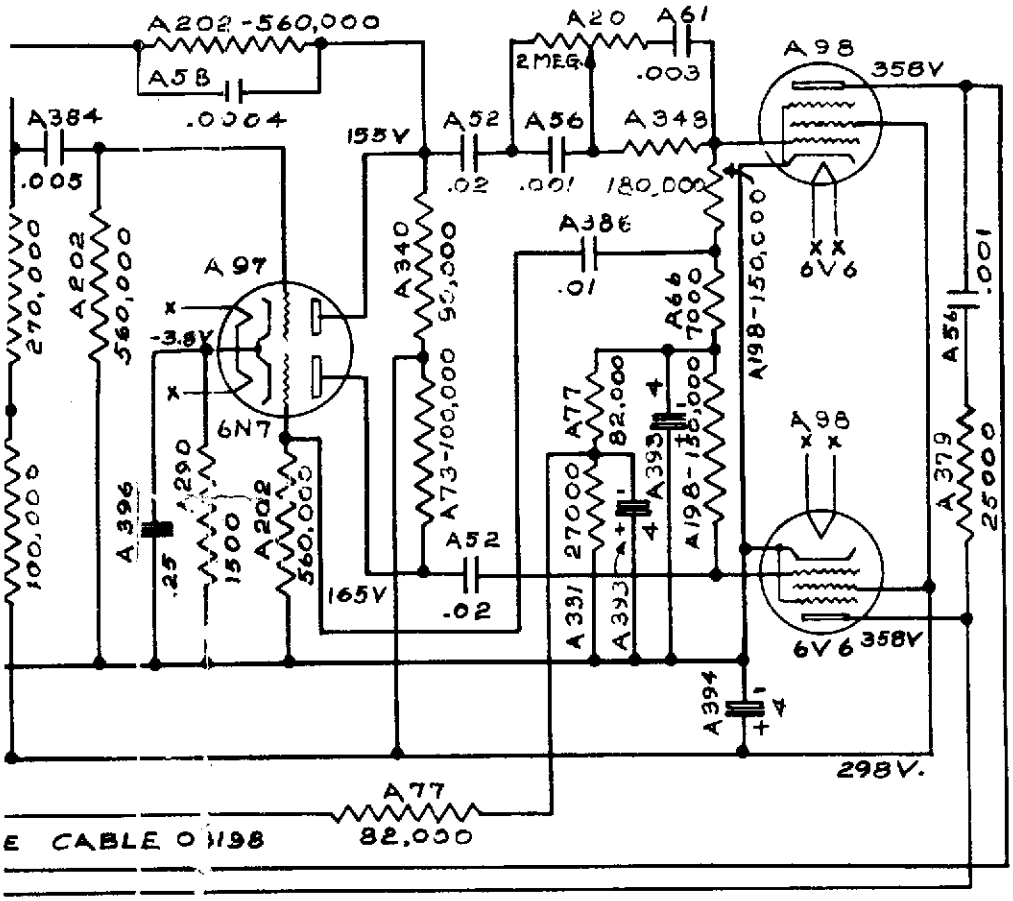
Note that inverse feedback is used and that the tone control is in the input circuit of one of the output tubes.

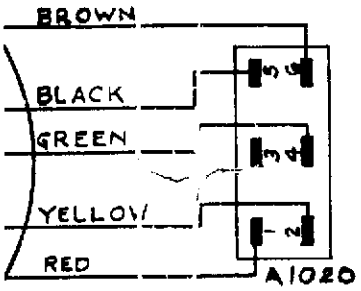


NOTE: * ⊗ DENOTE COMPONENTS OF SAME UNIT.

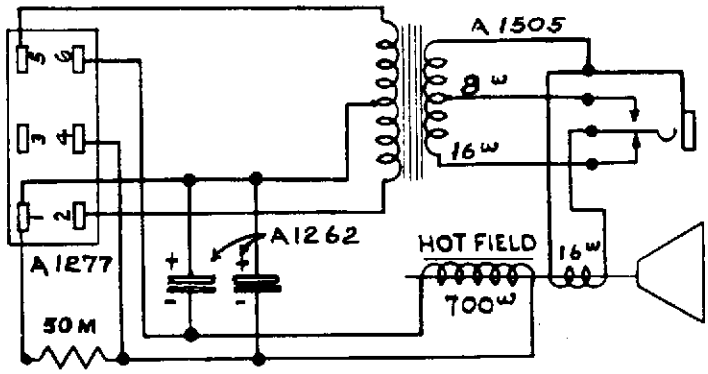
ALL GROUND
EX. VOLTS MIN.
EX. VOLTS MA

SUPERSEDES M&MA





HOOKUP ON
3" SPEAKER
A1276



12" SPEAKER
A1279

ALL GROUND LEADS ARE GREEN.
EX. VOLTS MIN. = 1.9 V.
EX. VOLTS MAX. = 4.1 V

BELL & HOWELL CO. CHICAGO U.S.A.			
FILMOSOUND DESIGN 138 MODELS R S T RA SA TA			
ERSEDES M & MA 4-12-38	REVISED 12 21 45	12 20 45	SERVICE DATA
			DRAWN
			APVD

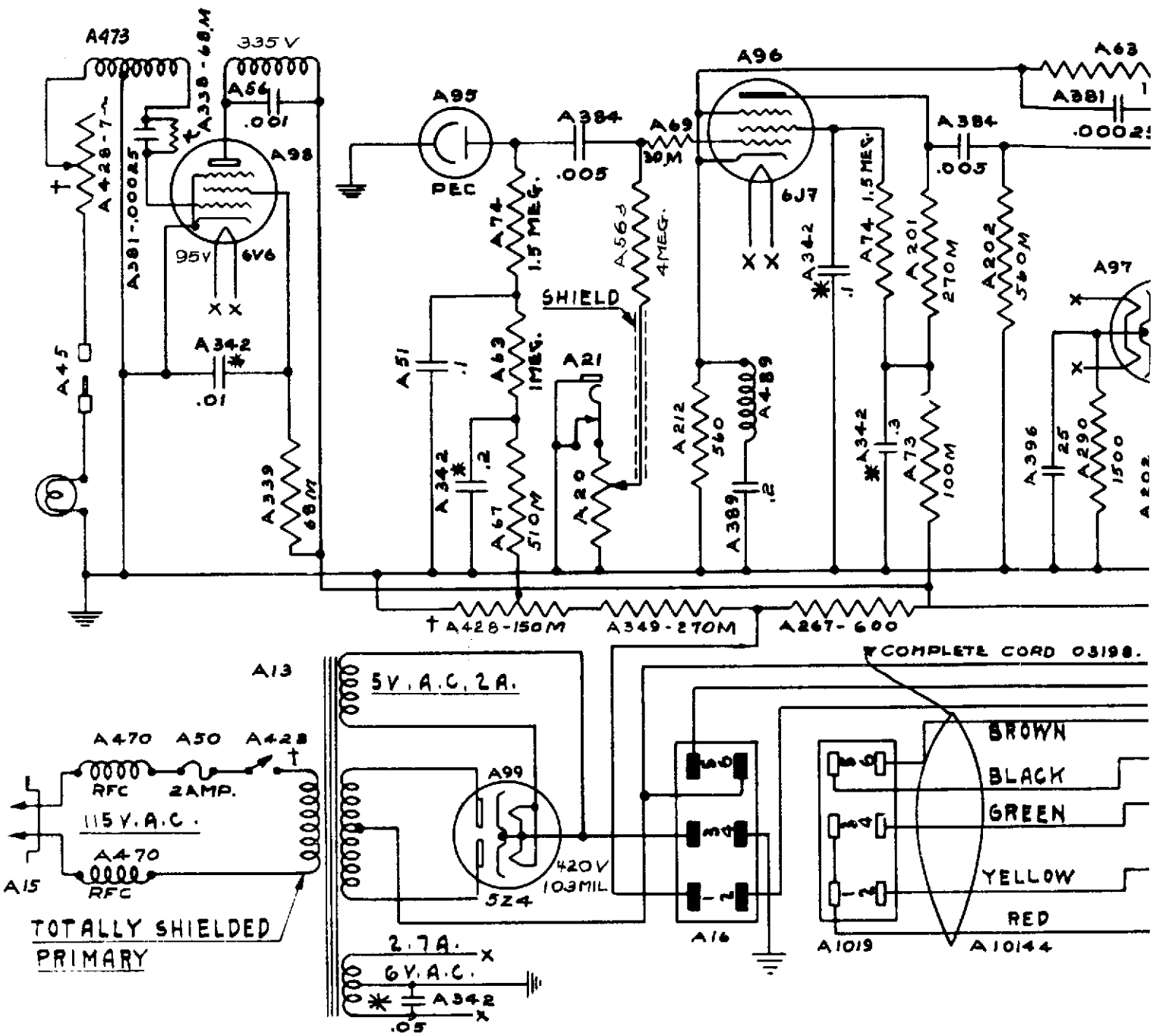
03202. FOR AMPLIFIER WITH SERIAL NOS. FROM 76615 TO 77214

DESIGN 138, AMPLIFIER NO. 03389

GENERAL INFORMATION.

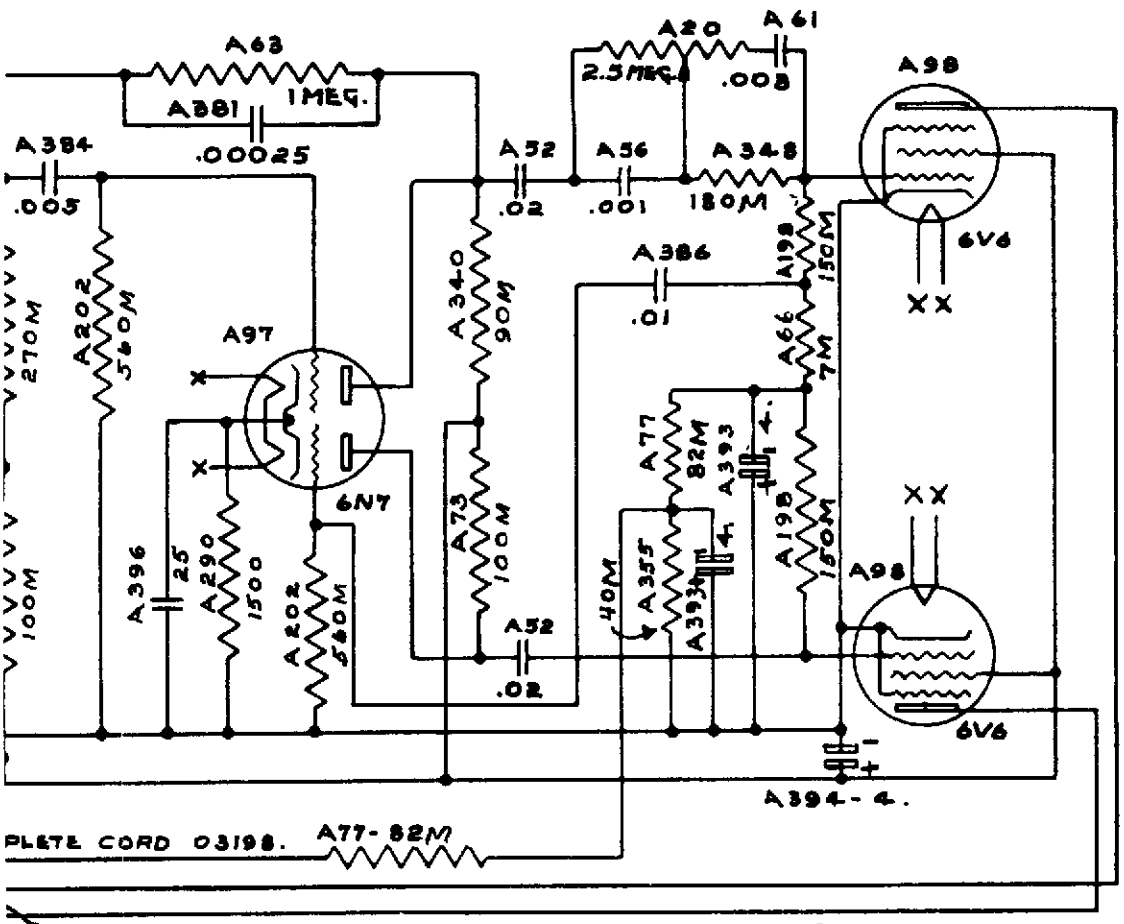
Many of these amplifiers became unstable after being in use for some time. Therefore, the following changes must be made whenever an amplifier wired like the diagram on page E-14 is encountered. A 7,000-10,000-ohm, 1/2-watt resistor should be inserted between the oscillator grid leak condenser combination and the tube grid or oscillator coil lead. The 70M screen resistor should be changed to a 30M, 1/2-watt resistor, A-170, and the bypass condenser should be disconnected and taped. Do not clip the lead at the condenser. Resistors A74 and A67 in the photocell and 6J7 grid circuit should be transposed. When re-installing resistor A-67, mount it with very short leads and place close to the coupling condenser A384. If amplifier is microphonic, move the condenser resistor combination slightly by means of a thin screw driver placed thru one of the bottom plate holes. Install a 50M, 1-watt resistor, A336, across the outside terminals of the photocell section of the volume control. The series feed resistor A349 (275M) should be changed to resistor A1043, 100M, 1/2-watt. The voltage at the junction point of the control and resistor should be between 100 and 120 volts. If the voltage is too high or too low, change the 100M resistor to one of lower or higher value. Do not remove original resistor from terminal strip. Lay new resistor in chassis close to the bottom plate stud, connecting it to the opposite end of original resistor which fed A428. Change microphone control A20.

The majority of these amplifiers have already been changed and are usually marked with a dot of red paint on one of the base plate rivets.

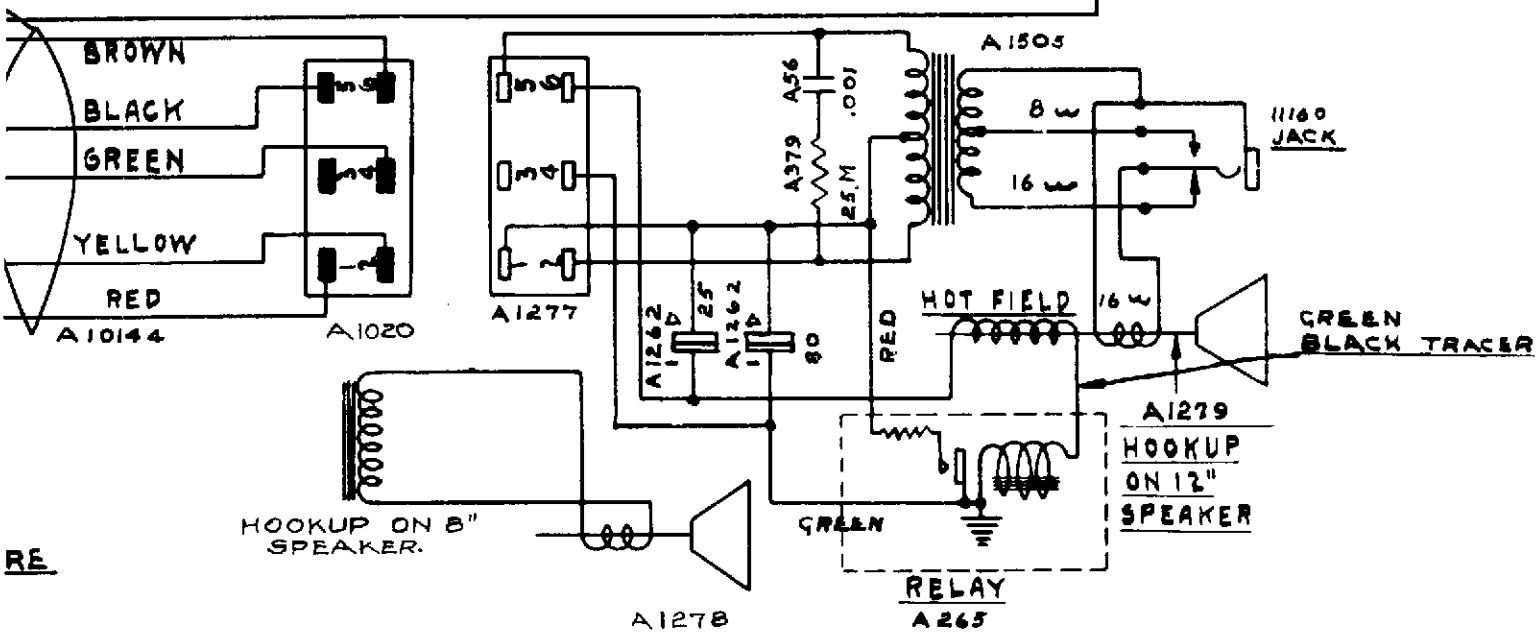


OPERATING LINE VOLTAGE
115 VOLTS - 60 CYCLE A.C.
POWER CONSUMPTION
1. AMPERE.

ALL GROUND LEADS ARE GREEN.
EX. VOLTS MAX. = 4.1
Δ * DENOTE CAPACITOR IN BANK.
† DENOTES POT. ON COMMON SHAFT.



	AT ZERO. OUTPUT AND MIN. VOL CONTROL SET.
6V6 OSC	
IP	26.3
ISC	3.4
EP	335.
ESC	95.
6V6	
IP	34.
EP	348.
BIAS	-23.8
SCREEN	335.
6N7	190.
P.VOLTS	190.
P2 VOLTS	188.
BIAS	-3.9
6J7	
PLATE	85.
SCREEN	24.
CATHODE	-0.5
TOT "B" CUR	130.
TOTAL REC. OUTPUT VOLT.	-420



RE

OR

BELL & HOWELL CO. CHICAGO, U.S.A.		
FILMOSOUND. DESIGN 138		A.S.T. MODELS RA.SA.TA
SUPERSEDES A.S.T. RA.SA.TA 12-1-38	1-3-46	SERVICE DATA
		DRAWN. CJN APVD.

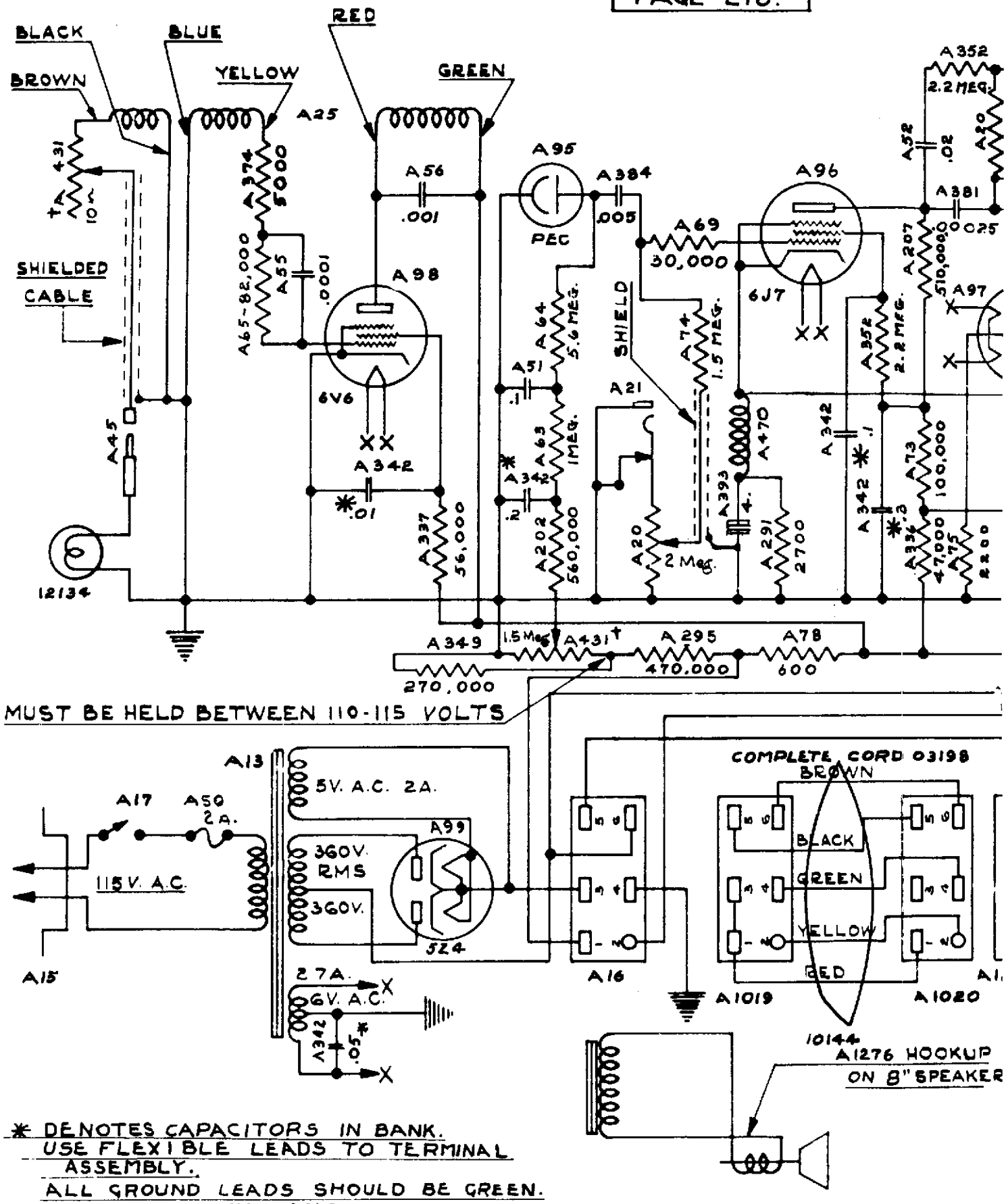
FOR USE WITH AMPLIFIER 03389.

DESIGN 138, AMPLIFIER NO. 03401

GENERAL INFORMATION.

Failure of exciter lamp to operate may be due to shorted turns in oscillator coil. If tubes are known to be good and all voltages are correct then change coil.

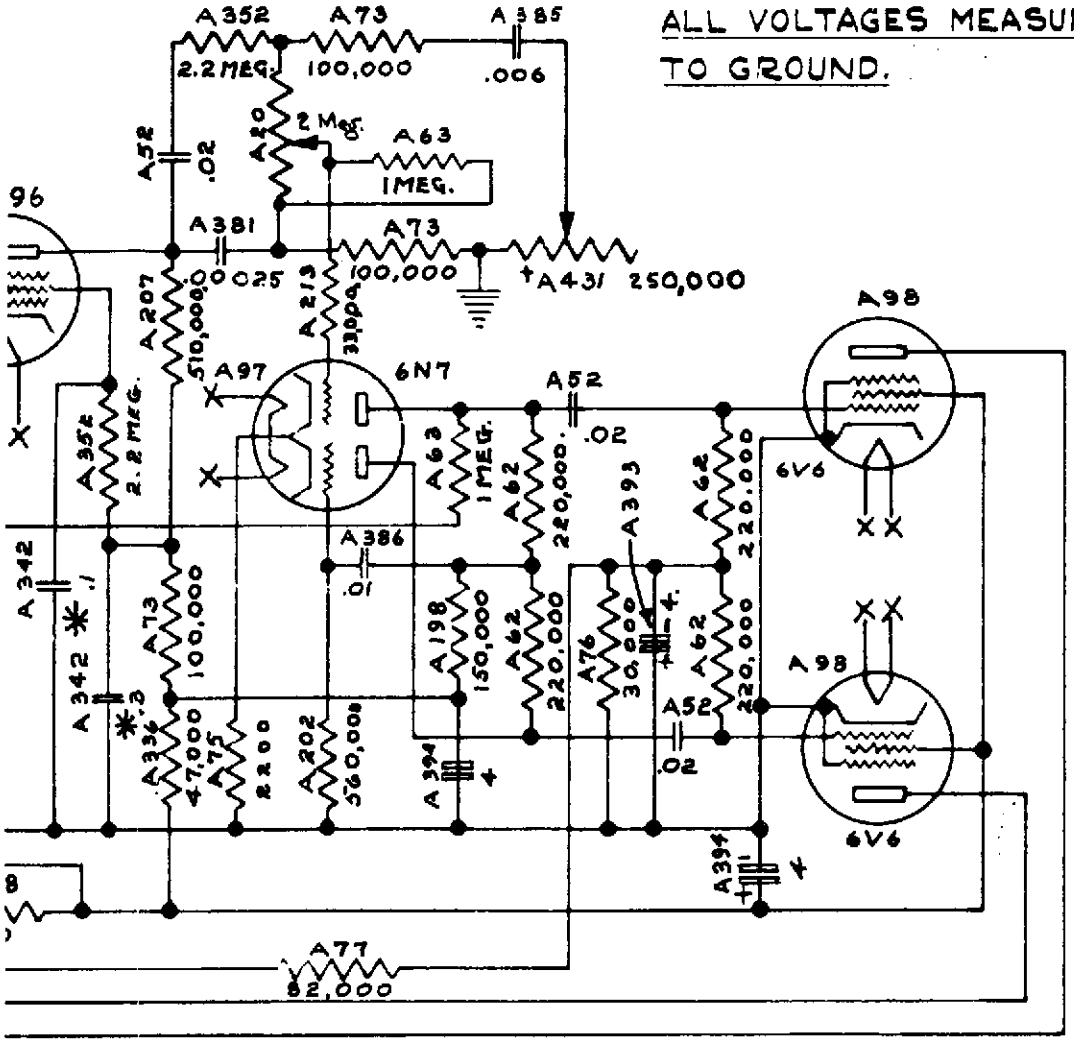
When the exciter lamp voltage is excessive, remove the No. A337 screen resistor. Replace it with a 30M resistor No. A170 and disconnect the by-pass condenser lead. Tape up. Do not clip off at condenser bank.

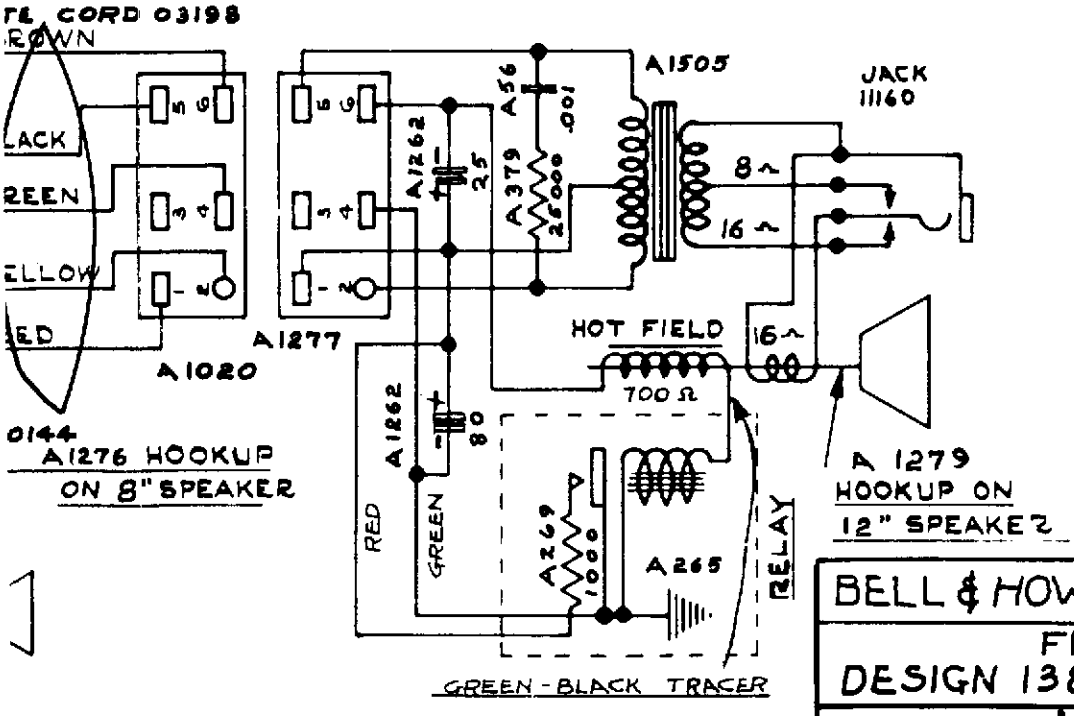


* DENOTES CAPACITORS IN BANK.
USE FLEXIBLE LEADS TO TERMINAL ASSEMBLY.
ALL GROUND LEADS SHOULD BE GREEN.

† DENOTES POT. IN GANG.

ALL VOLTAGES MEASURED TO GROUND.





0144
A1276 HOOKUP ON 8" SPEAKER

A 1279 HOOKUP ON 12" SPEAKER

6V6 OSC.	AT ZERO OUTPUT AND MIN. VOL. CON SETTING	AT MAX. UNDISTORTED OUTPUT MAX. VOL. CON SETTING.
IP	30.	
ISC	2.8	
EP	326.	
ESC	140.	
6V6		
IP	36.	32.
EP	338.	328.
BIE	-20.	-23.0
SCREEN	326.	316.
6N7		
P_1 VOLTS	75.	72.
P_2 VOLTS	76.	72.
BIAS	-2.	1.8
6J7		
PLATE	60.	55.
SCREEN	27.5	24.
CATHODE	-1.0	-1.0
TOTAL "B" CURRENT	110	120
TOTAL REC. OUTPUT VOLT	425	405

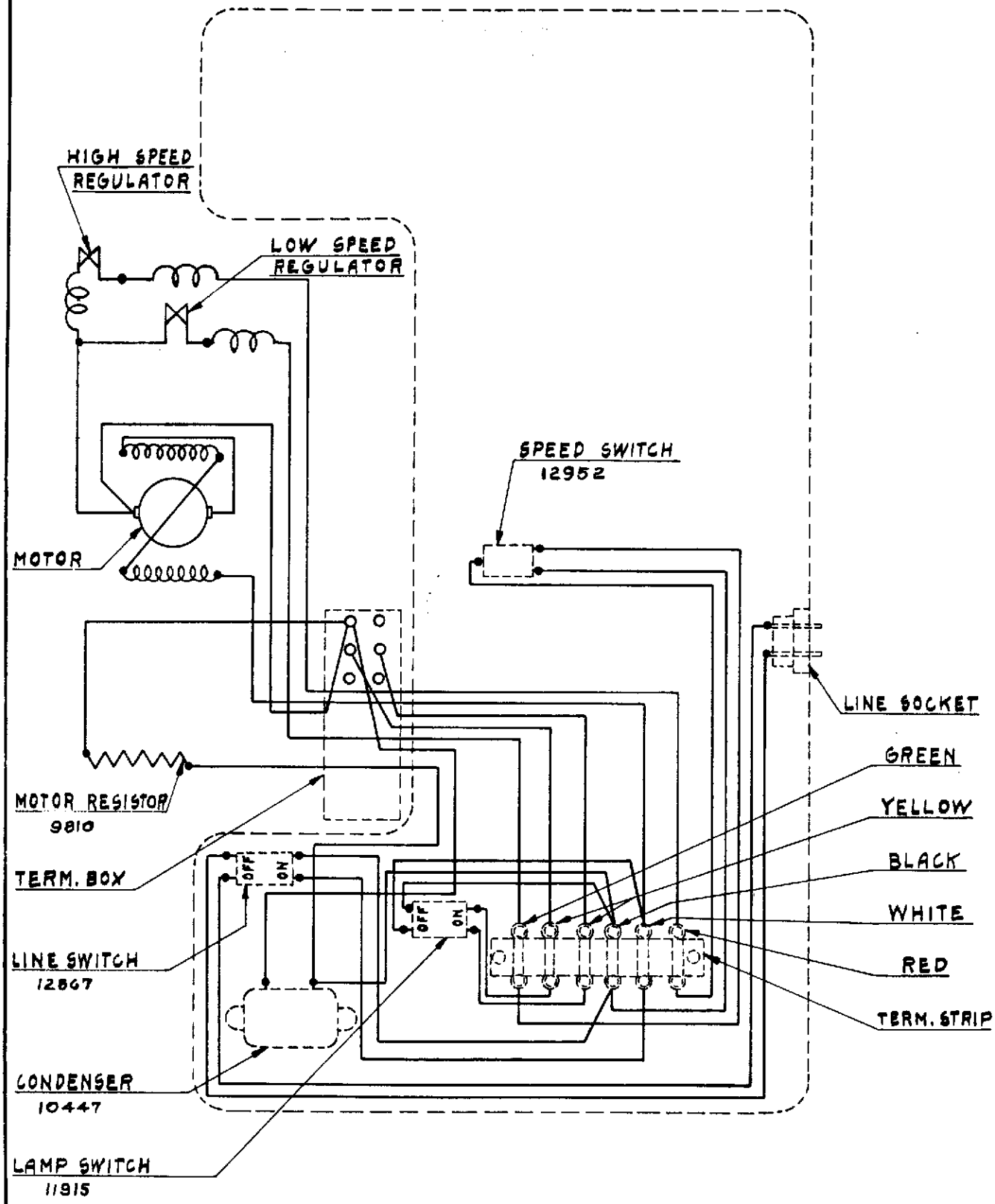
BELL & HOWELL CO. CHICAGO, USA.

FILMOSOUND TA.

DESIGN 138 MODELS R,S,T,RA,SA

2-1-46	SERVICE DATA	DRAWN C.J.N. APV'D.

FOR USE WITH AMPLIFIER 03401



BOTTOM VIEW OF BASE ASSEMBLY
SHOWING WIRING

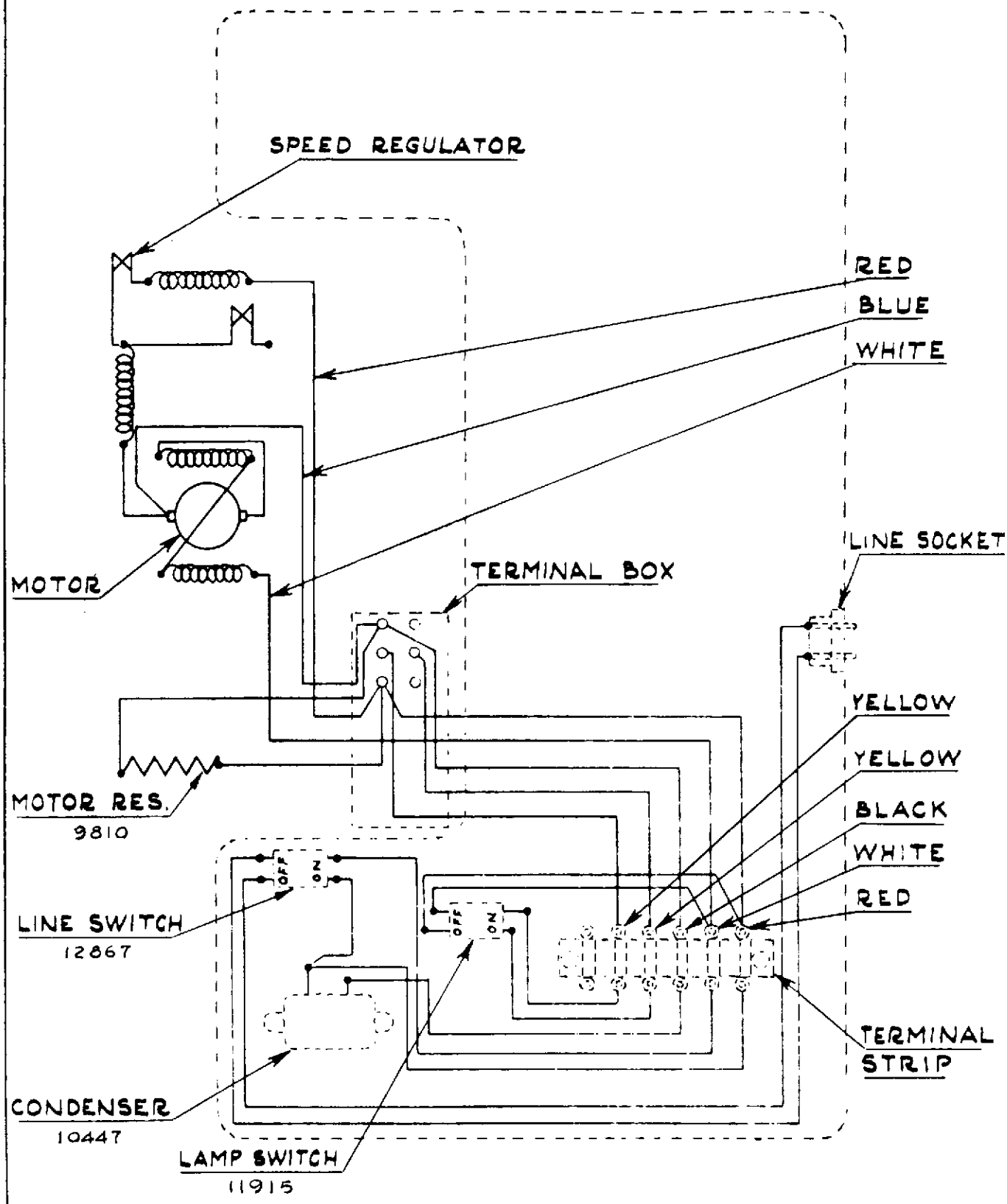
ACADEMY

BELL & HOWELL CO.
CHICAGO U.S.A.

FILMOSOUND
DESIGN 138

SERVICE DATA

DRAWN F.L.
APRD.
10-24-38



BASE ASSEMBLY SEEN FROM BOTTOM SHOWING WIRING

COMMERCIAL

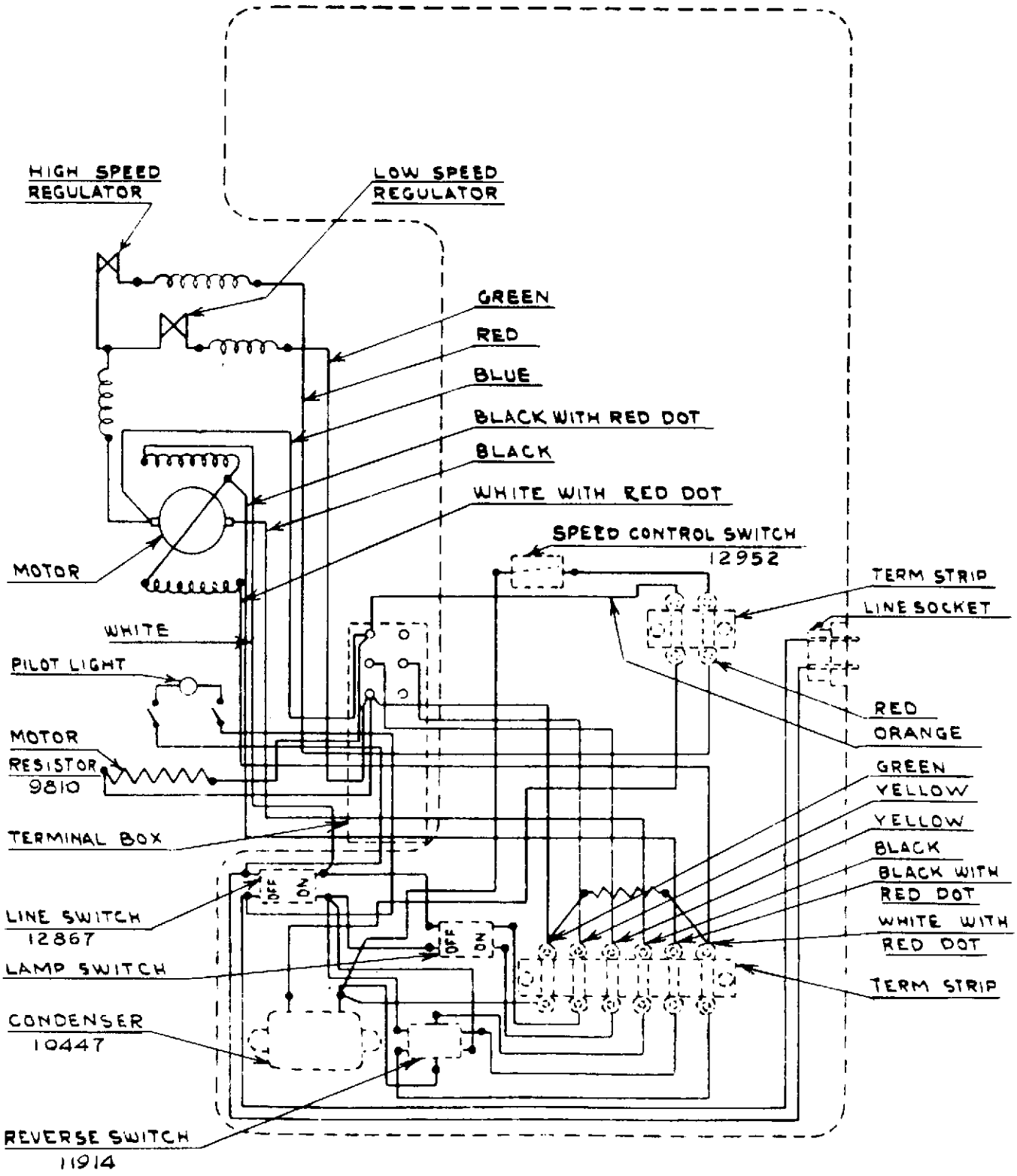
BELL & HOWELL CO
CHICAGO, ILL.

FILMOSOUND DESIGN 138 MODELS

SERVICE DATA

DRAWN R.O.L
APV'D
1-19-39

SUPERSEDES MOD'S. S-SA-SB (10-21-38)



BASE ASSEMBLY SEEN FROM BOTTOM FOR WIRING

UTILITY

BELL & HOWELL CO
CHICAGO, U S A

FILMOSOUND
DESIGN 138

SERVICE DATA

DRAWN
APVD
11-29-38

DESIGN 138, AMPLIFIERS NO. 03413, 03473, 03634, and 12634

GENERAL INFORMATION.

All of the above amplifiers are very much alike, the main difference being in the tone control circuits.

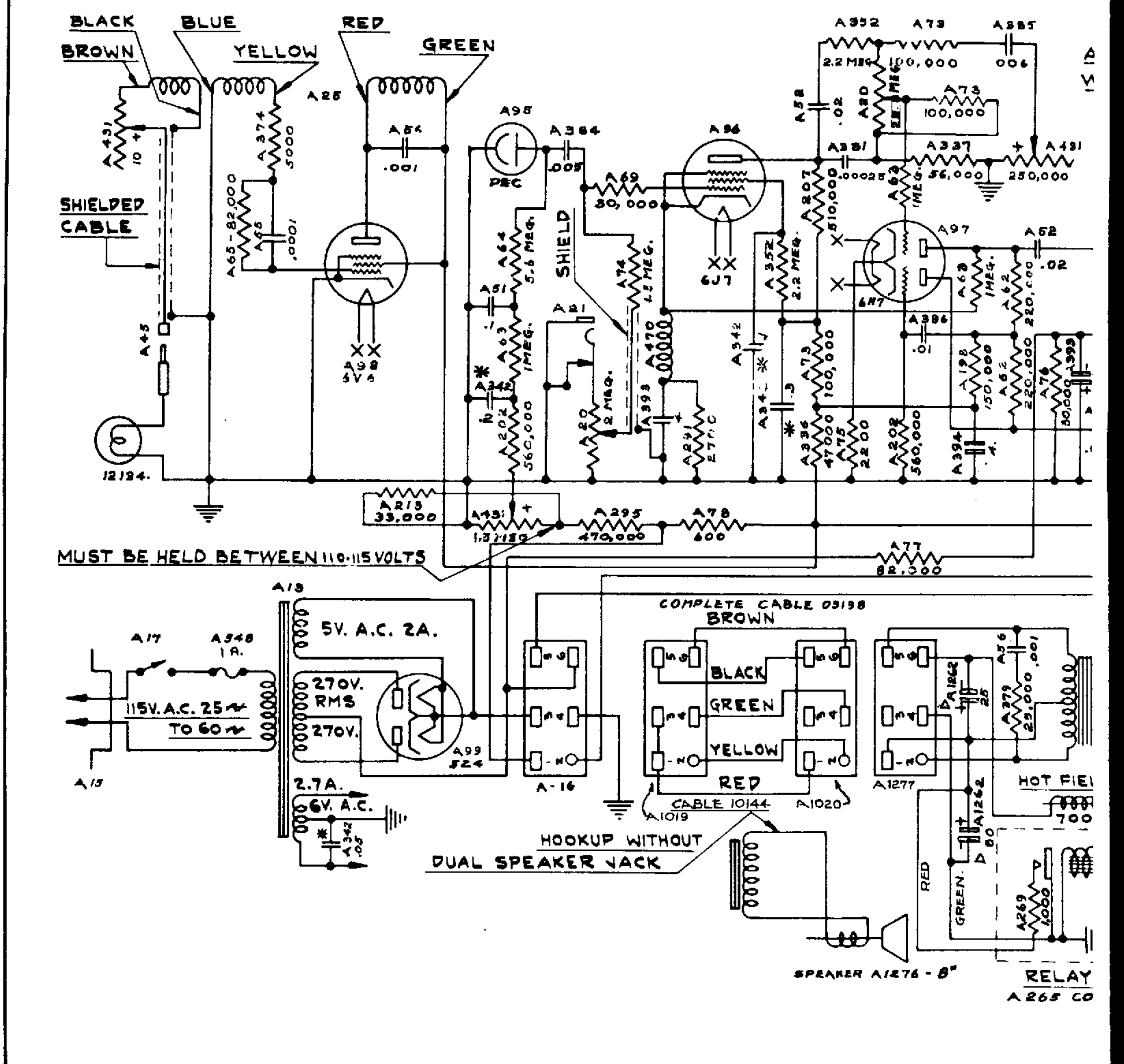
Low volume may be caused by a shorted section in condenser A37 and leaking between sections of condenser A38. The latter will usually become very hot when it is not in satisfactory condition. Fading of volume can also be caused by this condenser.

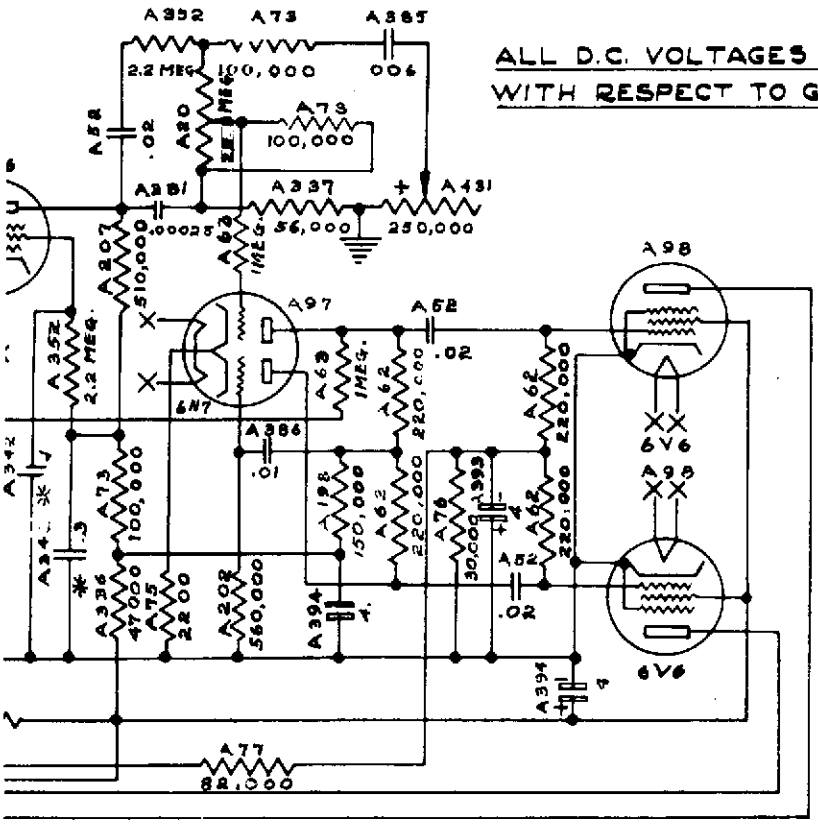
NOTE

The 03634 and 12634 amplifiers use a 6SC7 phase inverter tube rather than the 6N7 tube. The two tubes are not interchangeable.

Metal 6V6 tubes may be used thruout although a glass 6V6GT tube will usually be found in the oscillator socket. 6V6GT tubes may be used exclusively but it will be necessary to install grounded metal shields on the tubes in the output sockets.

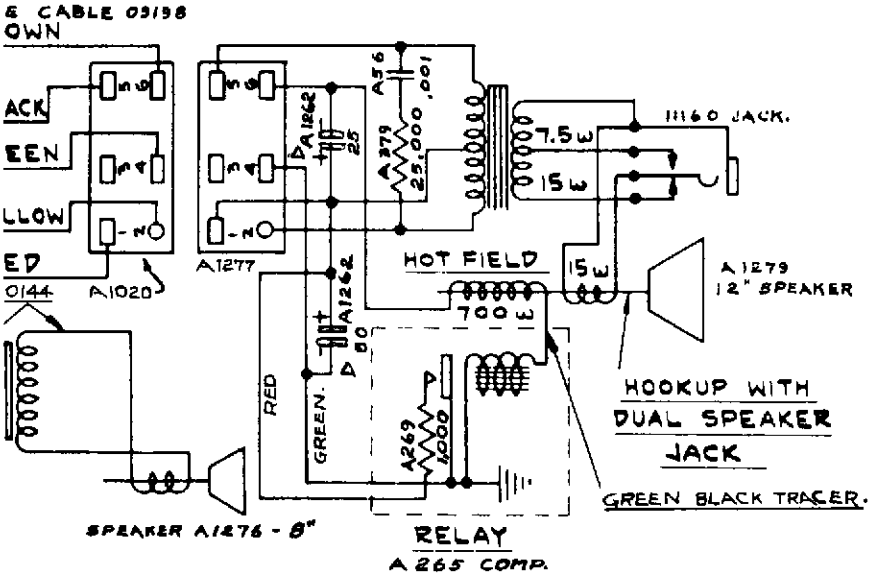
The 03413 amplifier is a 25-cycle amplifier. There are three series of them -- all bearing the same part number. The first series followed the 03401 circuit, the second the 03473 circuit and the third the 12634 circuit. Diagrams of the first two circuits are shown.


BLACK
BLUE
RED
GREEN
BROWN
YELLOW
SHIELDED CABLE
A25
A374 5000
A64 .001
A65-82,000
A98 6V6
A95 PEC
A384 .005
A69 30,000
SHIELD
A64 5.6 MEG.
A74 1.5 MEG.
A63 1MEG.
A81
A80 2 MEG.
A470
A96 6J7
A352 2.2 MEG.
A207 510,000
A97 6N7
A352 A79 A385
2.2 MEG 100,000 .006
A73 100,000
A381 .00025
A337 56,000
A431 250,000
A52 .02
A63 1MEG.
A62 220,000
A386 .01
A198 150,000
A75 100,000
A336 47000
A202 560,000
A394
A76 30,000
A45
12124.
A213 33,000
A431 1.5 MEG
A295 470,000
A78 600
A77 82,000
MUST BE HELD BETWEEN 110-115 VOLTS
A13
A17
A548 1A.
5V. A.C. 2A.
270V. RMS
270V.
115V. A.C. 25~ TO 60~
A15
A99 5Z4
2.7A.
6V. A.C.
A342 .05
A-16
COMPLETE CABLE 03198
BROWN
BLACK
GREEN
YELLOW
RED
A1019
CABLE 10144
A1020
HOOKUP WITHOUT
DUAL SPEAKER JACK
SPEAKER A1276 - 8"
A1277
A56 .001
A1262 25
A279 25,000
A1262 80
HOT FIEL
700
RED
GREEN.
A269 1,000
RELAY
A265 CO
EX. VOLTS MIN. NO SIGNAL 1.
EX. VOLTS MAX. NO SIGNAL
WITH V.T. METER.



ALL D.C. VOLTAGES ARE WITH RESPECT TO GROUND.

6V6 OSC.	AT ZERO OUT PUT AND MAXIMUM VOLUME CONTROL SETTING
IP	28 MA
ISC	4.5 MA
EP	250 VOLTS
ESC	250 VOLTS
6V6	
IP	28 MA
EP	265 VOLTS
BIAS	-15.6 VOLTS
SCREEN	250 VOLTS
6N7	
P1 VOLTS	70 VOLTS
P2 VOLTS	75 VOLTS
BIAS	1.2 VOLTS
6J7	
PLATE	42 VOLTS
SCREEN	22 VOLTS
CATHODE	-1 VOLT
TOTAL B CURR.	90 MA
TOTAL REC. OUTPUT VOLTS	330



"S" INDICATES TERMINAL AT CLOCKWISE STOP.

ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 115 V. LINE. ALL VOLTAGES MEASURED TO GROUND.

† INDICATES CONTROLS ON SAME SHAFT.

*,Δ DENOTE CAPACITORS LOCATED IN BANKS.

WIRING COLOR CODE.

WHITE - GROUND	BROWN - SCREEN
YELLOW - CATHODE	BLUE - PLATE
RED - B+	BLACK - HEATER.
GREEN - GRID	

COMMERCIAL
ACADEMY
UTILITY.

EX. VOLTS MIN. NO SIGNAL 1.5 VOLTS
EX. VOLTS MAX. NO SIGNAL 4 VOLTS
WITH V.T. METER.

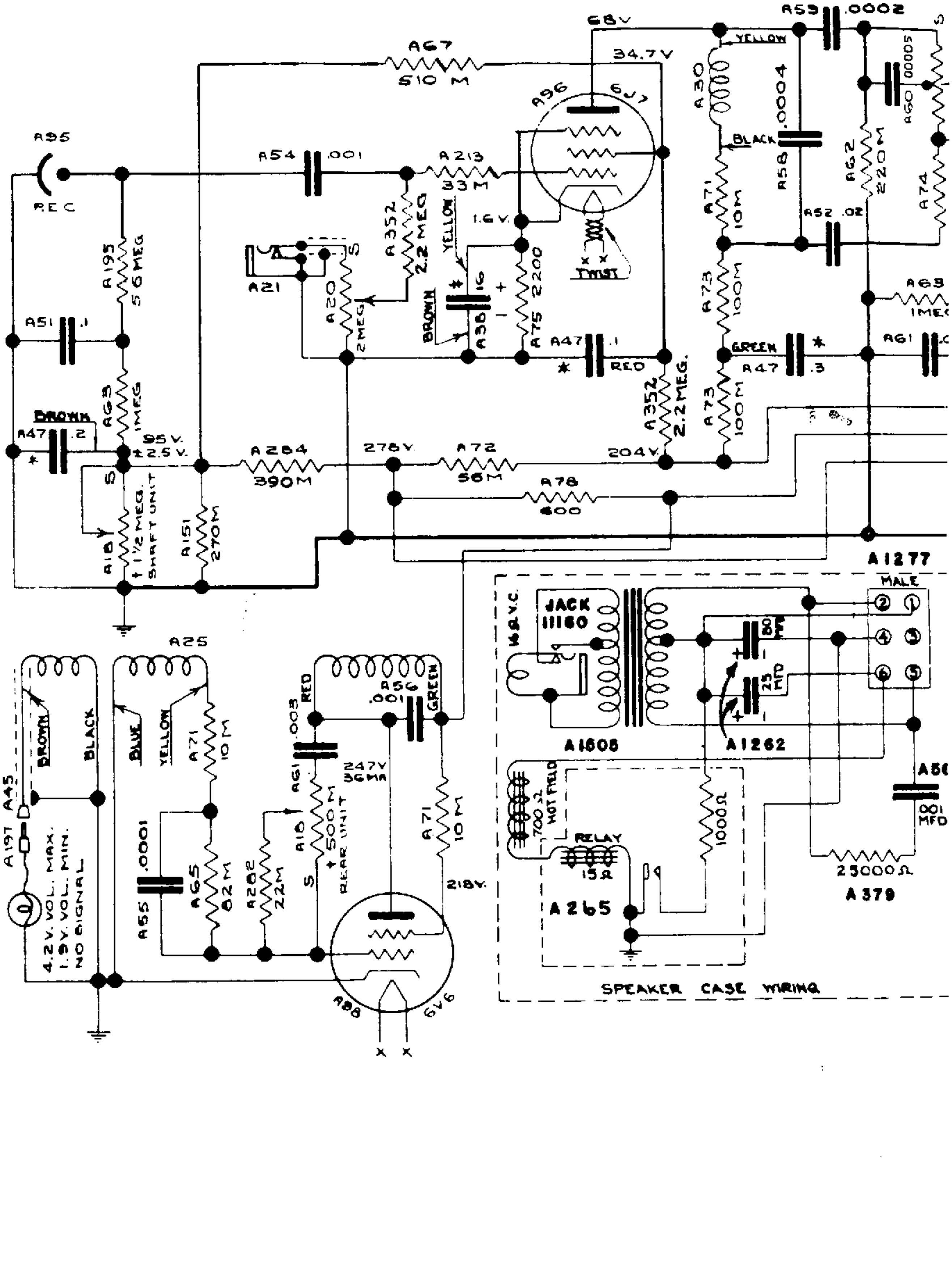
BELL & HOWELL CO. CHICAGO U.S.A.

FILMOSOUND
DESIGN 138 MODELS RB SBTB

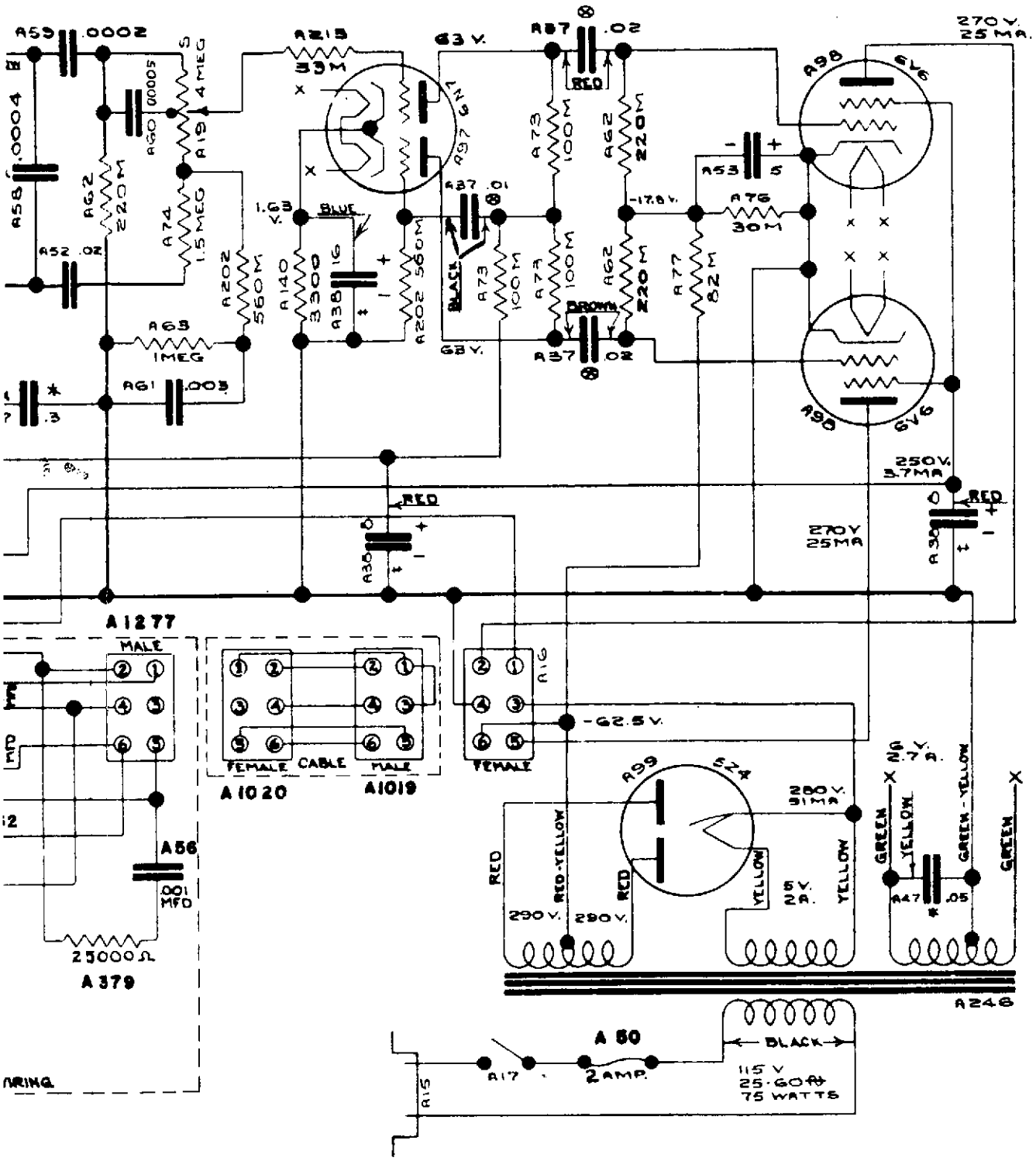
29-12-45	SERVICE DATA	DRAWN CJN APVD.

FOR USE WITH AMPLIFIER *03413.

E 24



A95
REC
A195
56 MEG
A51 .1
A63 1MEG
BROWN
A47 .2
95V. ±2.5V.
A181
1½ MEG. SHAFT UNIT
A151 270M
A67
510 M
A54 .001
A213 33M
A352 2.2 MEG
A21
A20 2MEG
YELLOW
1.6V.
A38 16
BROWN
A75 2200
A47 .1
RED
A96 6J7
TWIST
68V
34.7V
A284
390M
278V.
A72
56M
A78
600
204V.
A352 2.2MEG.
A30
YELLOW
BLACK
A58 .0004
A71 10M
A73 100M
GREEN
A47 .3
A53 .0002
A60 .00005
A62 220M
A52 .02
A74
A63 1MEG
A61
A1277
MALE
A25
BROWN
BLACK
A45
A197
4.2V. VOL. MAX.
1.9V. VOL. MIN.
NO SIGNAL
BLUE
YELLOW
A71 10M
A55 .0001
A65 82M
A282 22M
A16 500M REAR UNIT
RED
.003
A61
A56 .001
GREEN
247V 36MA
A71 10M
218V.
A88 6V6
JACK 11160
16Ω V.C.
A1505
80 MFD
25 MFD
A1262
700Ω HOT FIELD
RELAY 15Ω
A265
1000Ω
25000Ω
A379
.001 MFD
SPEAKER CASE WIRING

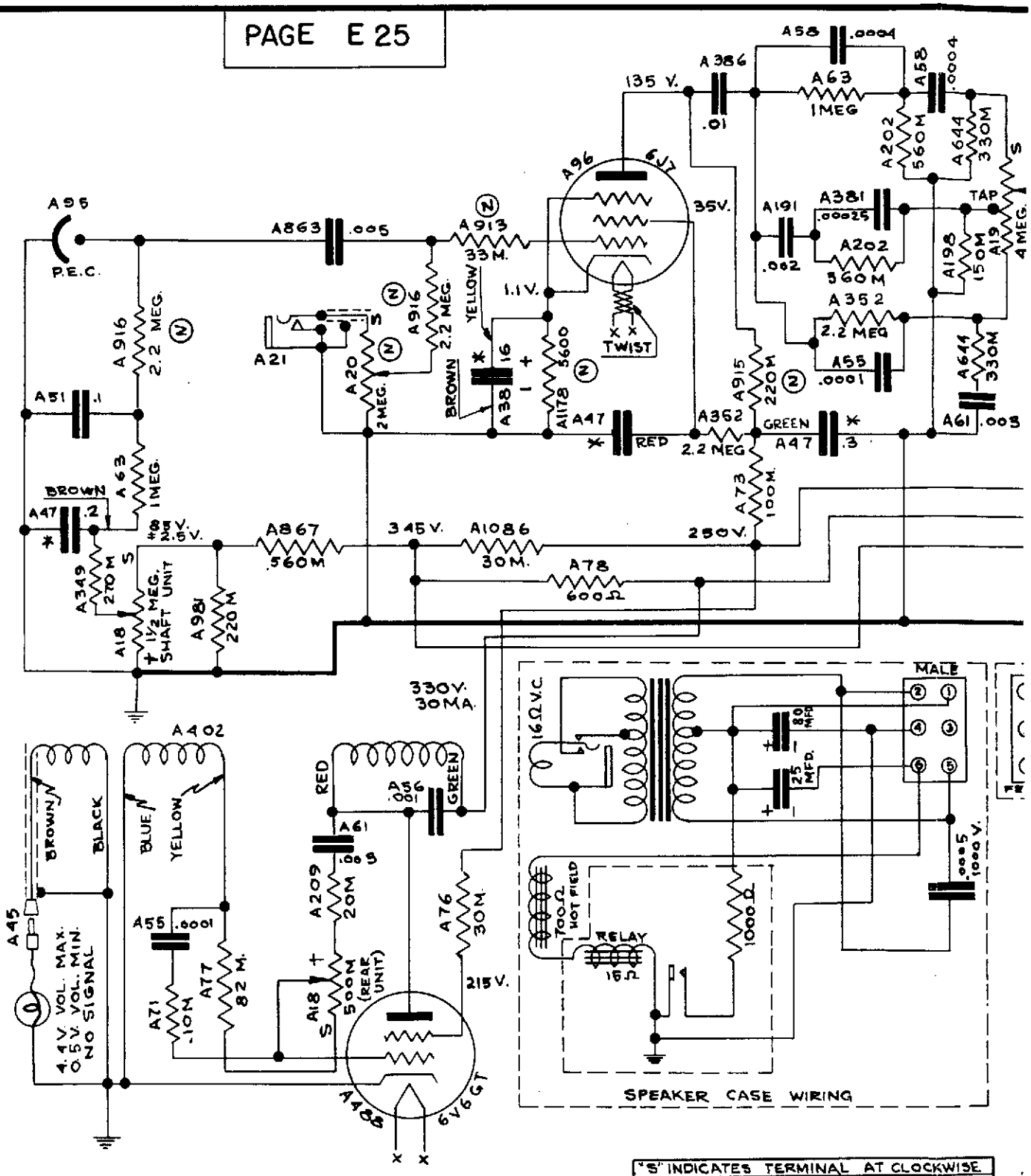


SERVICE DATA

AMPLIFIER WIRING DIAGRAM

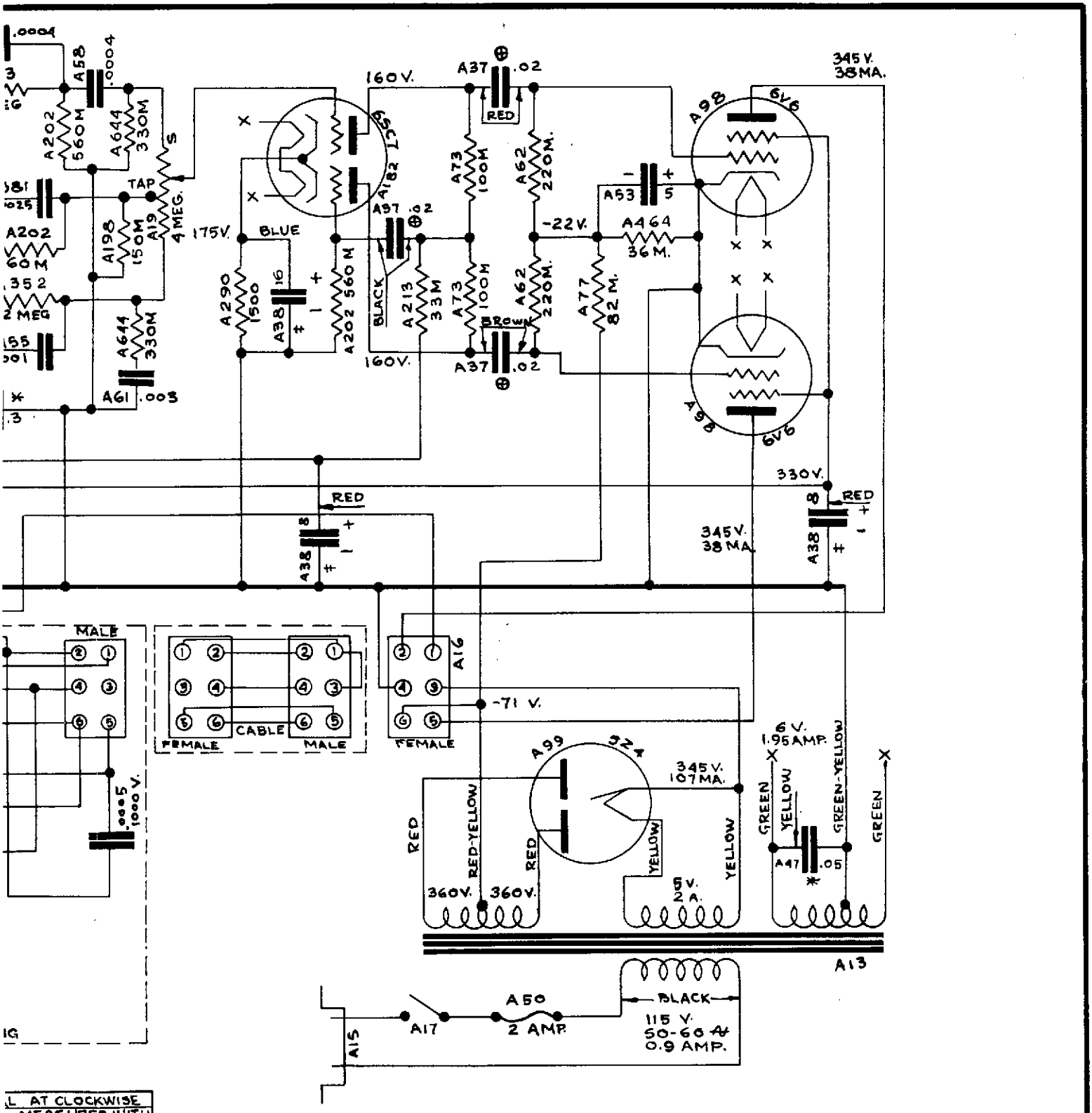
COMMERICAL, ACADEMY, & UTILITY
25 CYCLE FILMOSOUND

FOR USE ONLY WITH AMPLIFIER PART NO. 03413 DATE 3-22-40



"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 115V. LINE. ALL VOLTAGES MEASURED TO GROUND.
✕ ‡ ⊕ DENOTE CAPACITORS LOCATED IN BANK.
† INDICATES CONTROLS ON SAME SHAFT
(N) INDICATES NOISE TESTED RESISTOR

WIRING COLOR CODE	
WHITE - GROUND	BROWN - SCREEN
YELLOW - CATHODE	BLUE - PLATE
RED - B+	BLACK - HEATER
GREEN - GRID	



L AT CLOCKWISE
MEASURED WITH
ON AND NO SIGNAL
LTAGES MEASURED

CITORS LOCATED

ON SAME SHAFT
ESTED RESISTOR

CODE
BROWN - SCREEN
BLUE - PLATE
& AGK - HEATER

AS 117

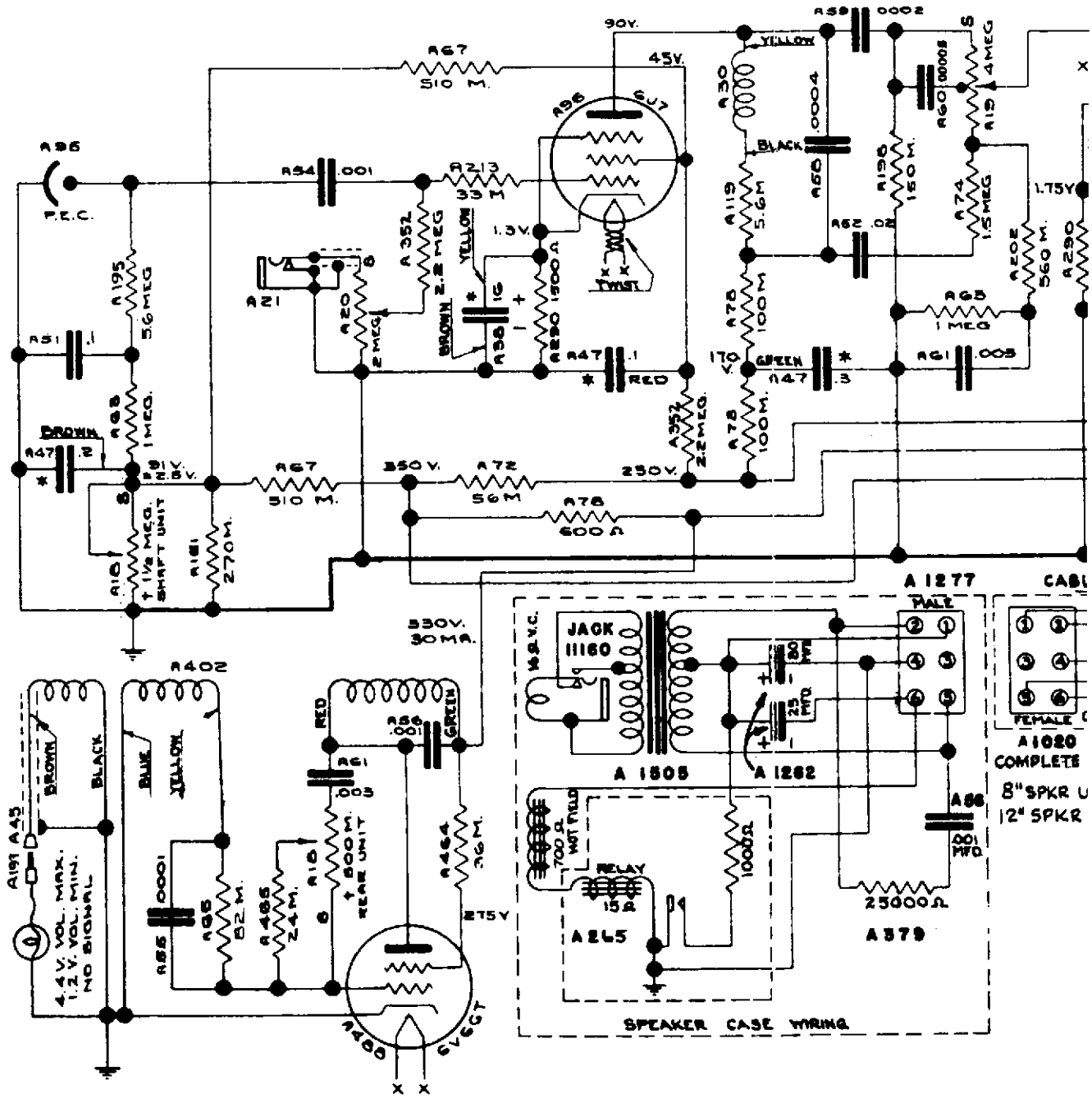
SERVICE DATA

AMPLIFIER WIRING DIAGRAM

COMMERICAL ACADEMY & UTILITY
60 CYCLE FILMOSOUND

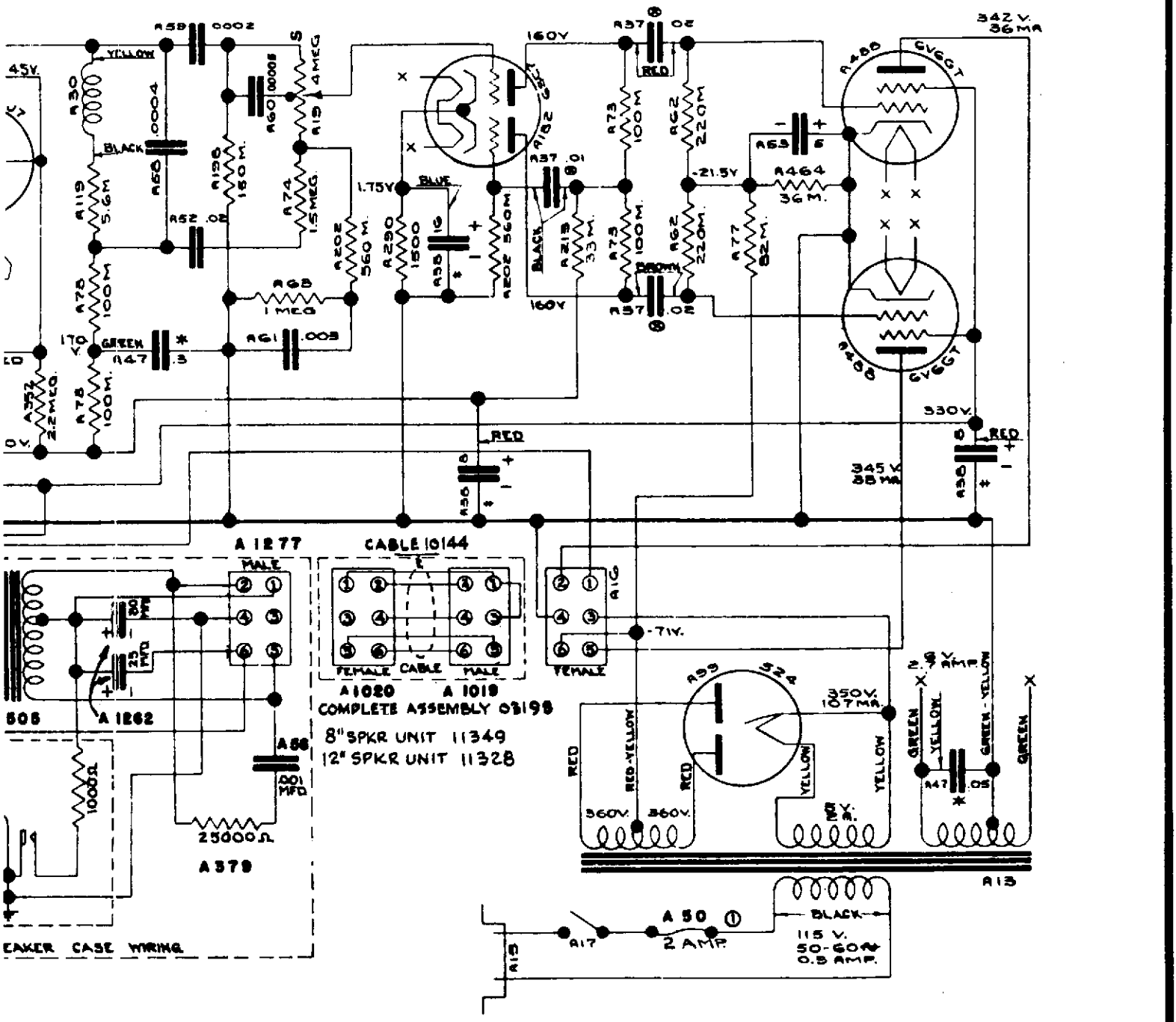
FOR USE WITH
AMPLIFIER 03473

DATE 6-14-46



"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 115 V. LINE. ALL VOLTAGES MEASURED TO GROUND
#1 ② DENOTE CAPACITORS LOCATED IN BANK.
† INDICATES CONTROLS ON SAME SHAFT

WIRING COLOR CODE	
WHITE - GROUND	BROWN - SCREEN
YELLOW - CATHODE	BLUE - PLATE
RED - B+	BLACK - HEATER
GREEN - GRID	



"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 115 V. LINE. ALL VOLTAGES MEASURED TO GROUND
*‡ ◎ DENOTE CAPACITORS LOCATED IN BANK.
† INDICATED CONTROLS ON SAME SHAFT

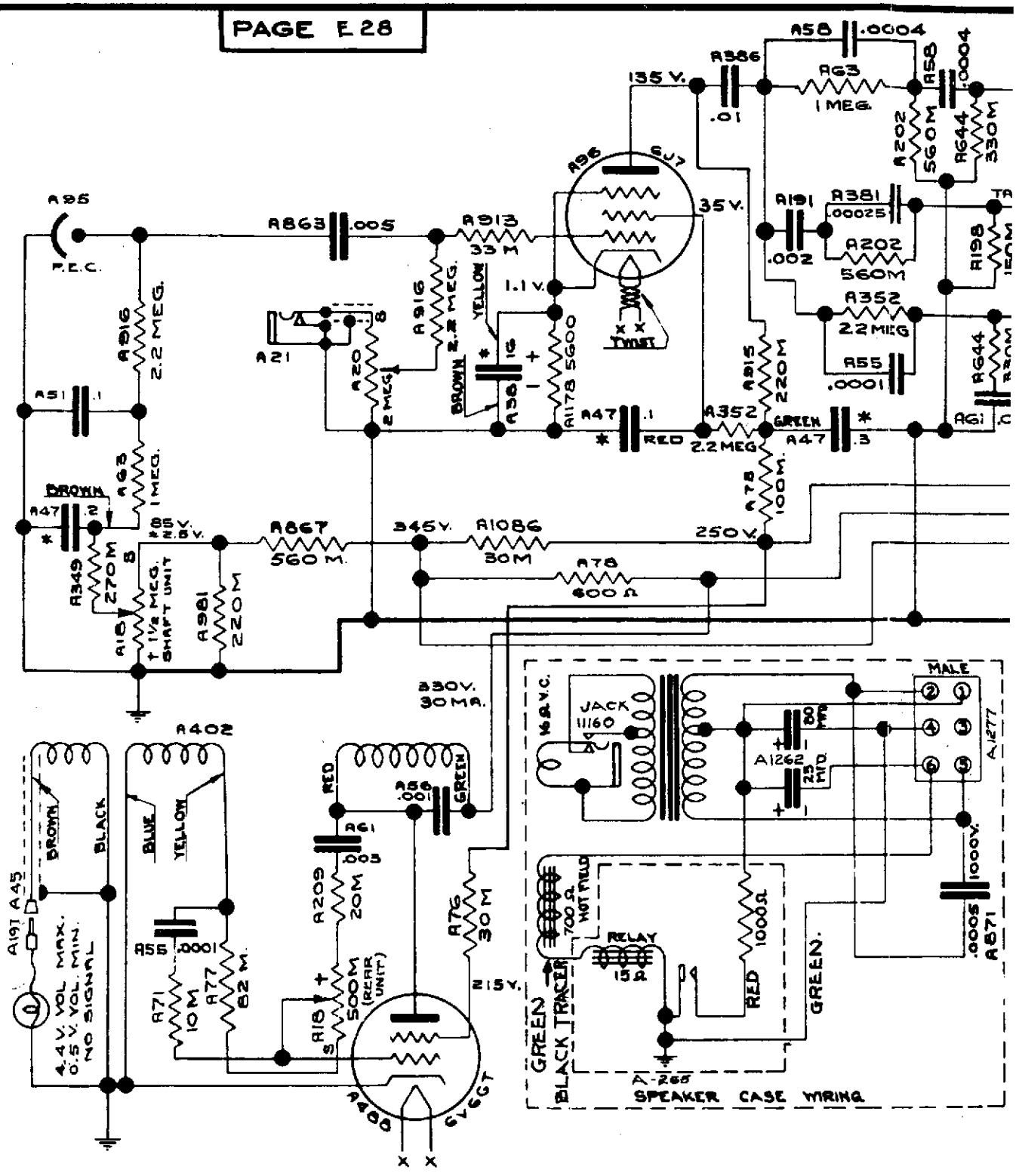
WIRING COLOR CODE	
WHITE - GROUND	BROWN - SCREEN
YELLOW - CATHODE	BLUE - PLATE
RED - B+	BLACK - HEATER
GREEN - GRID	

SERVICE DATA

AMPLIFIER WIRING DIAGRAM

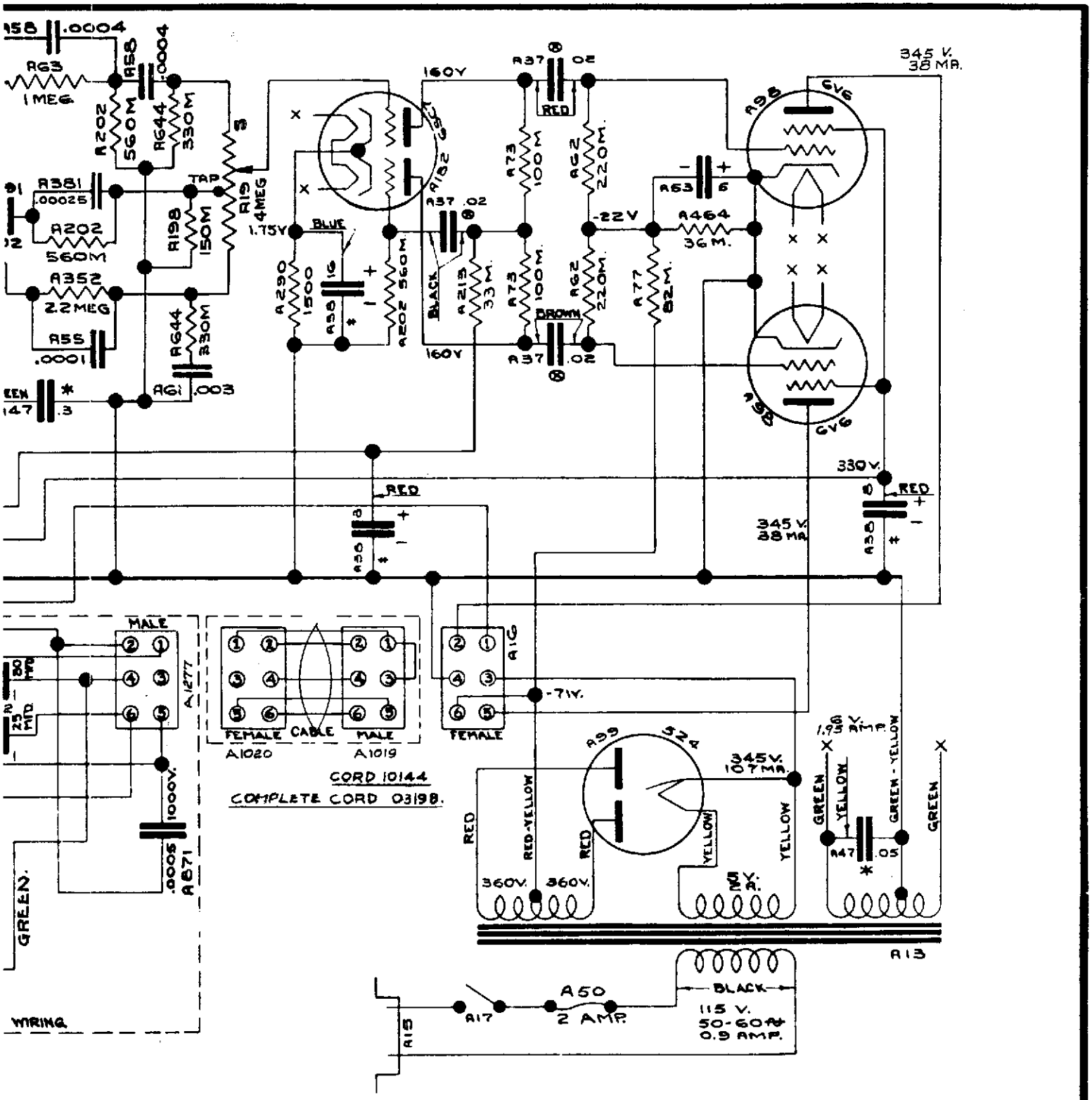
COMMERICAL, ACADEMY, & UTILITY
60 CYCLE FILMOSOUND

FOR USE ONLY WITH AMPLIFIER PART NO. 03634 DATE 3-22-40



"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED W
EXCITER LAMP FULL ON AND NO SIGNA
AT 115 V. LINE. ALL VOLTAGES
MEASURED TO GROUND
*† ⊕ DENOTE CAPACITORS LOCATED
IN BANK.
† INDICATED CONTROLS ON SAME SH.

WIRING COLOR CODE	
WHITE - GROUND	BROWN - SCREE
YELLOW - CATHODE	BLUE - PLATE
RED - B+	BLACK - HEATER
GREEN - GRID	



TERMINAL AT CLOCKWISE
VOLTAGES MEASURED WITH
F FULL ON AND NO SIGNAL
ALL VOLTAGES
GROUND
CAPACITORS LOCATED
CONTROLS ON SAME SHAFT

COLOR CODE	
UND	BROWN - SCREEN
ODE	BLUE - PLATE
	BLACK - HEATER
ID	

FOR USE WITH AMPLIFIERS BEARING SERIAL NUMBERS STARTING WITH 100901.

REVISED ⊗
C.O. 244 3-23-44

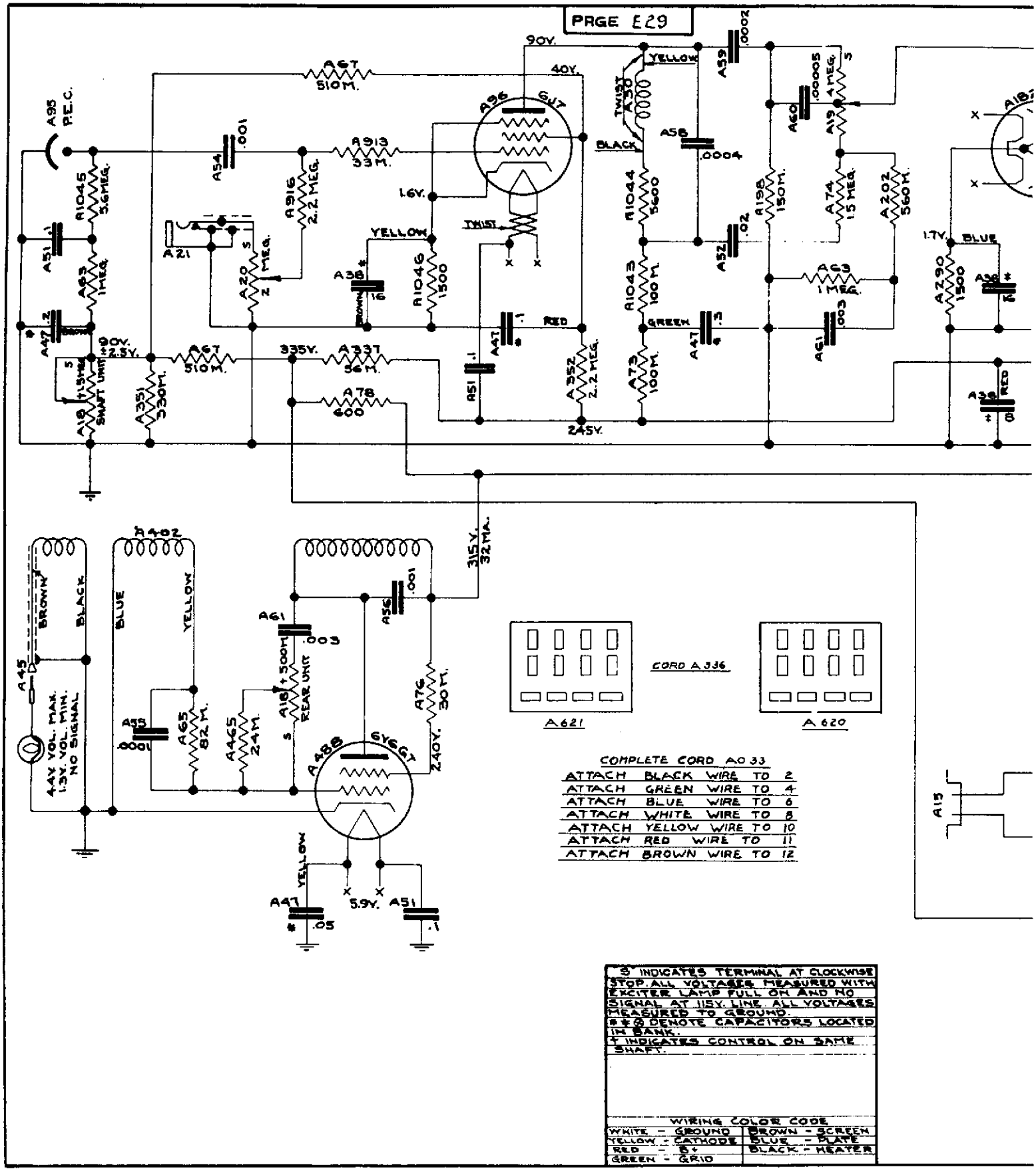
AS 37

SERVICE DATA

AMPLIFIER WIRING DIAGRAM

COMMERICAL, ACADEMY, & UTILITY
60 CYCLE FILMOSOUND

FOR USE ONLY WITH AMPLIFIER PART NO. 12634 DATE 2-6-41



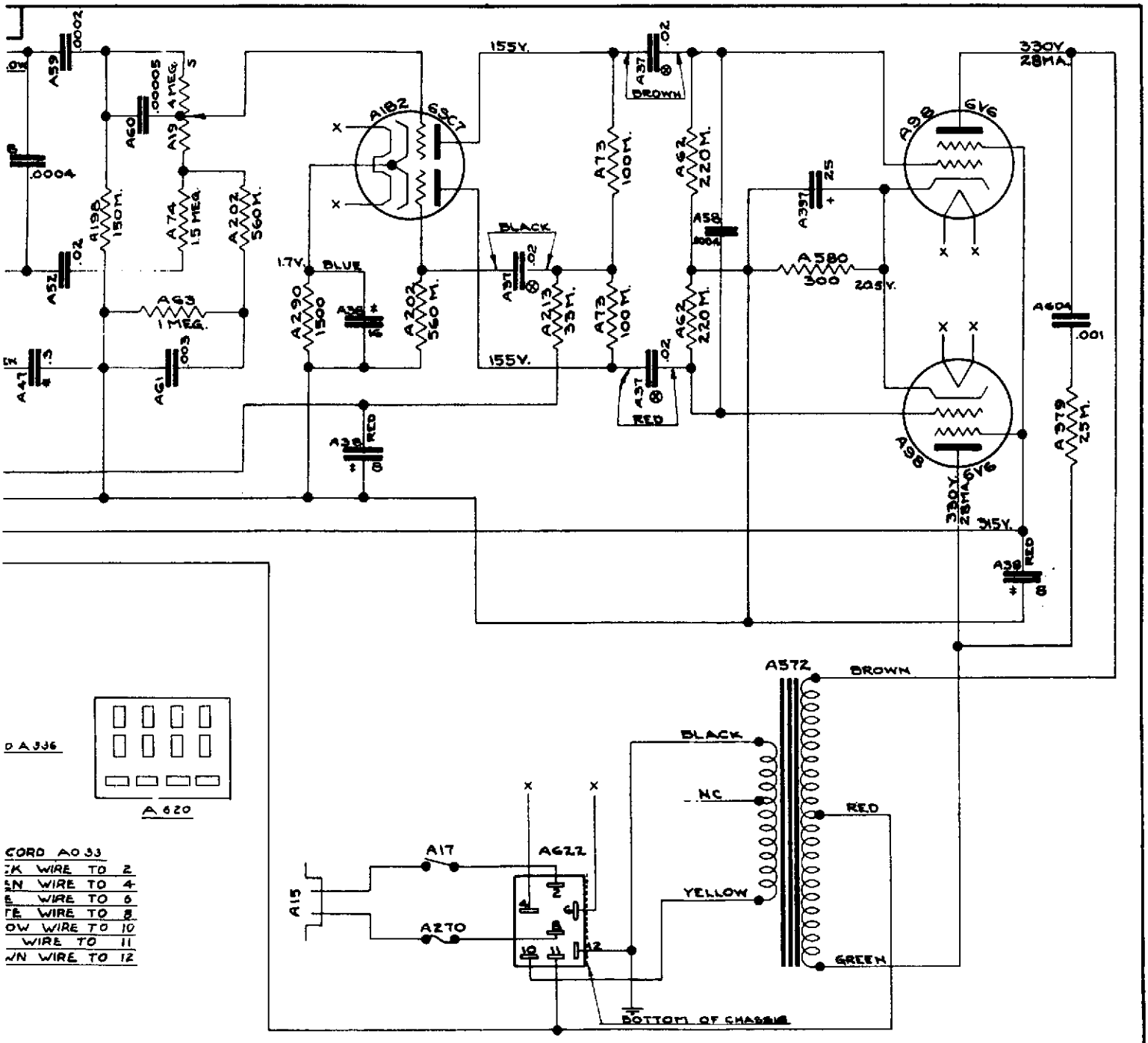
COMPLETE CORD A033

ATTACH	BLACK	WIRE TO	2
ATTACH	GREEN	WIRE TO	4
ATTACH	BLUE	WIRE TO	6
ATTACH	WHITE	WIRE TO	8
ATTACH	YELLOW	WIRE TO	10
ATTACH	RED	WIRE TO	11
ATTACH	BROWN	WIRE TO	12

"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 115V. LINE. ALL VOLTAGES MEASURED TO GROUND.
*, ** & DENOTE CAPACITORS LOCATED IN BANK.
† INDICATES CONTROL ON SAME SHAFT.

WIRING COLOR CODE

WHITE - GROUND	BROWN - SCREEN
YELLOW - CATHODE	BLUE - PLATE
RED - B+	BLACK - HEATER
GREEN - GRID	



CORD A033

CK WIRE TO	2
GN WIRE TO	4
E WIRE TO	6
TE WIRE TO	8
OW WIRE TO	10
WIRE TO	11
WN WIRE TO	12

TES TERMINAL AT CLOCKWISE
VOLTAGES MEASURED WITH
LAMP FULL ON AND NO
T 115V. LINE. ALL VOLTAGES
D TO GROUND.
OTE CAPACITORS LOCATED
ES CONTROL ON SAME

VIRING COLOR CODE

GROUND	BROWN - SCREEN
CATHODE	BLUE - PLATE
B+	BLACK - HEATER
GRID	

REVISED ⊗
C.O. 244 3-23-44

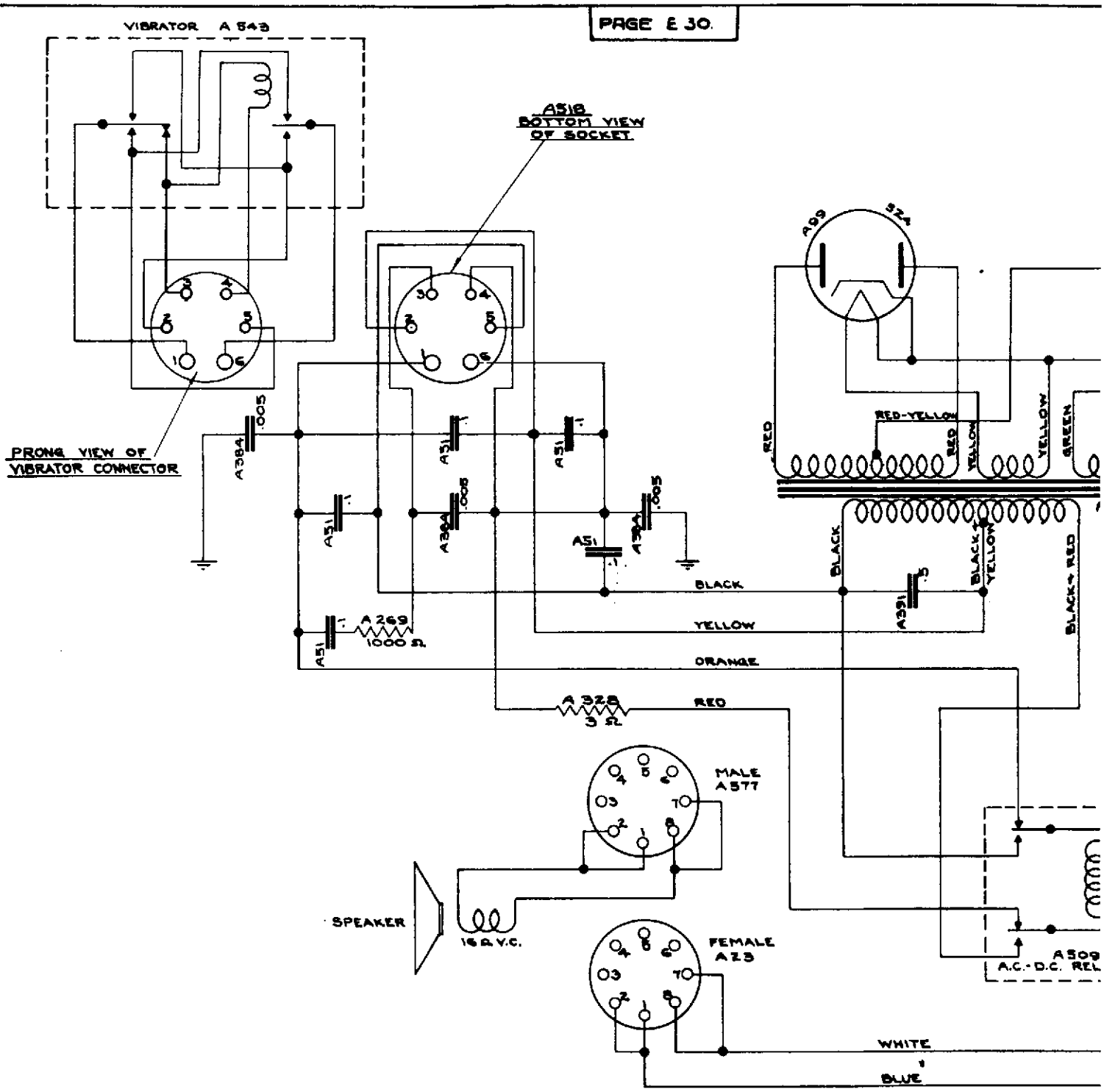
AS13

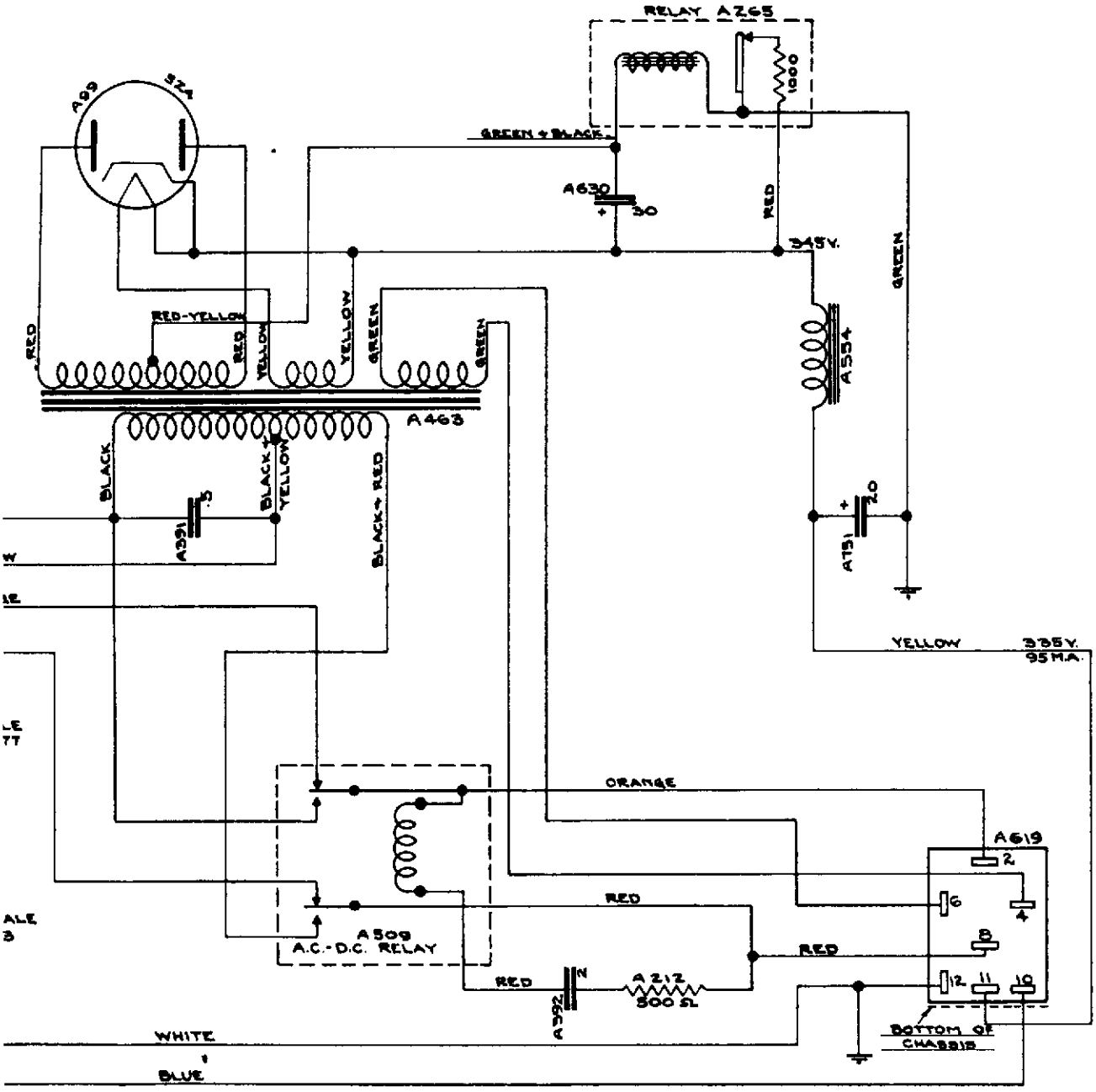
SERVICE DATA

AMPLIFIER WIRING DIAGRAM

COMMERICAL, ACADEMY, & UTILITY
A.C. - D.C. FILMOSOUND

FOR USE ONLY WITH
AMPLIFIER PART# A056 DATE 5-7-40


VIBRATOR A 543
A518
BOTTOM VIEW
OF SOCKET
PRONG VIEW OF
VIBRATOR CONNECTOR
A99
524
RED
RED-YELLOW
RED
YELLOW
YELLOW
GREEN
BLACK
BLACK-YELLOW
BLACK-RED
A384 .005
A51 .1
A384 .005
A51 .1
A51 .1
A384 .005
A51 .1
A391 .1
BLACK
YELLOW
A51 .1
A 269
1000 Ω.
ORANGE
A 328
3 Ω.
RED
MALE
A577
SPEAKER
16 Ω. V.C.
FEMALE
A23
A509
A.C.-D.C. REL
WHITE
BLUE



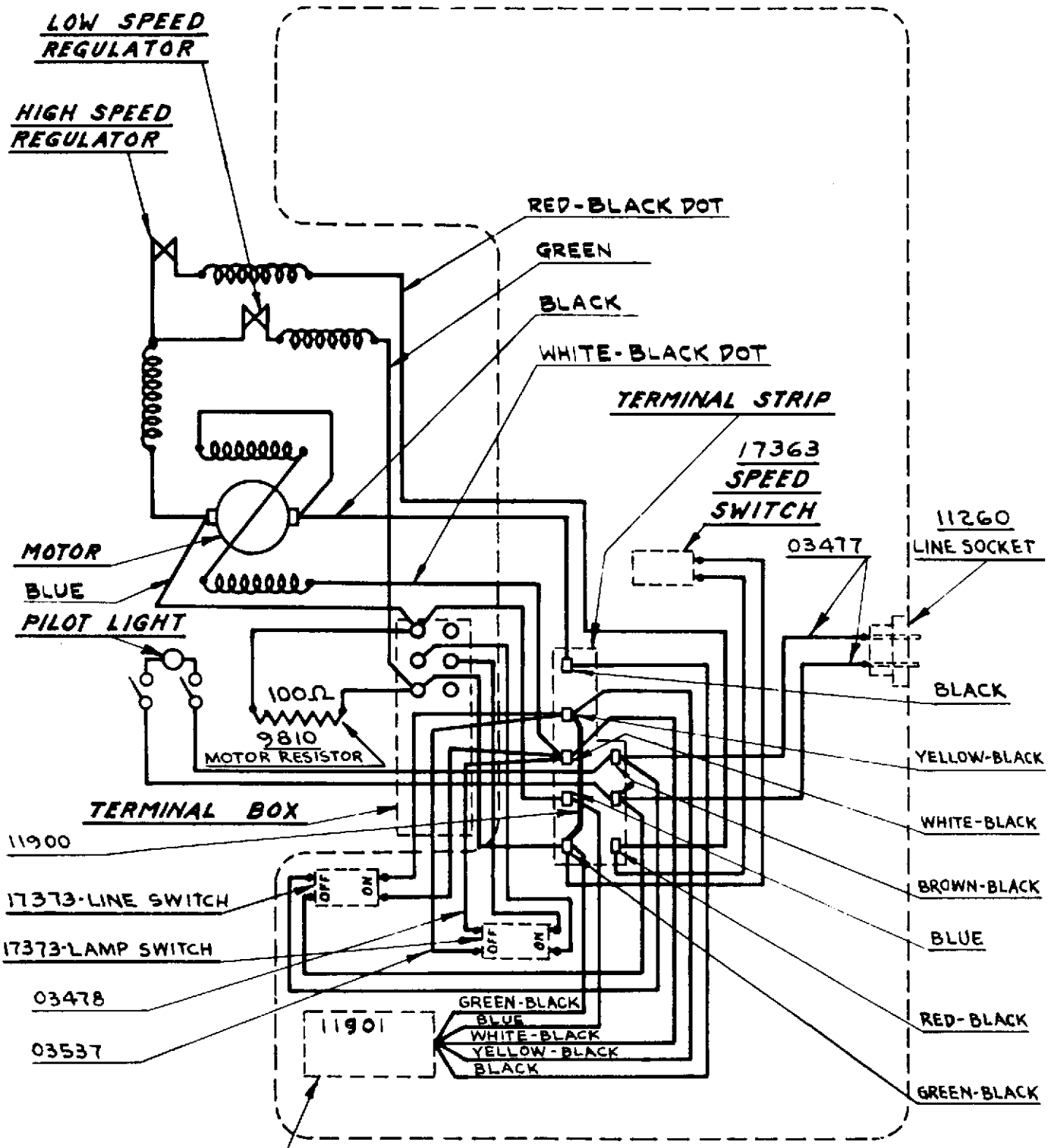
A528

SERVICE DATA

POWER SUPPLY WIRING DIAGRAM

COMMERICAL, ACADEMY + UTILITY
A.C.-D.C. FILMOSOUND

FOR USE ONLY WITH
POWER SUPPLY PART# A051 DATE 5-8-40



BOTTOM VIEW OF BASE ASSEMBLY SHOWING WIRING.

(60 & 25 CYCLE ACADEMY)

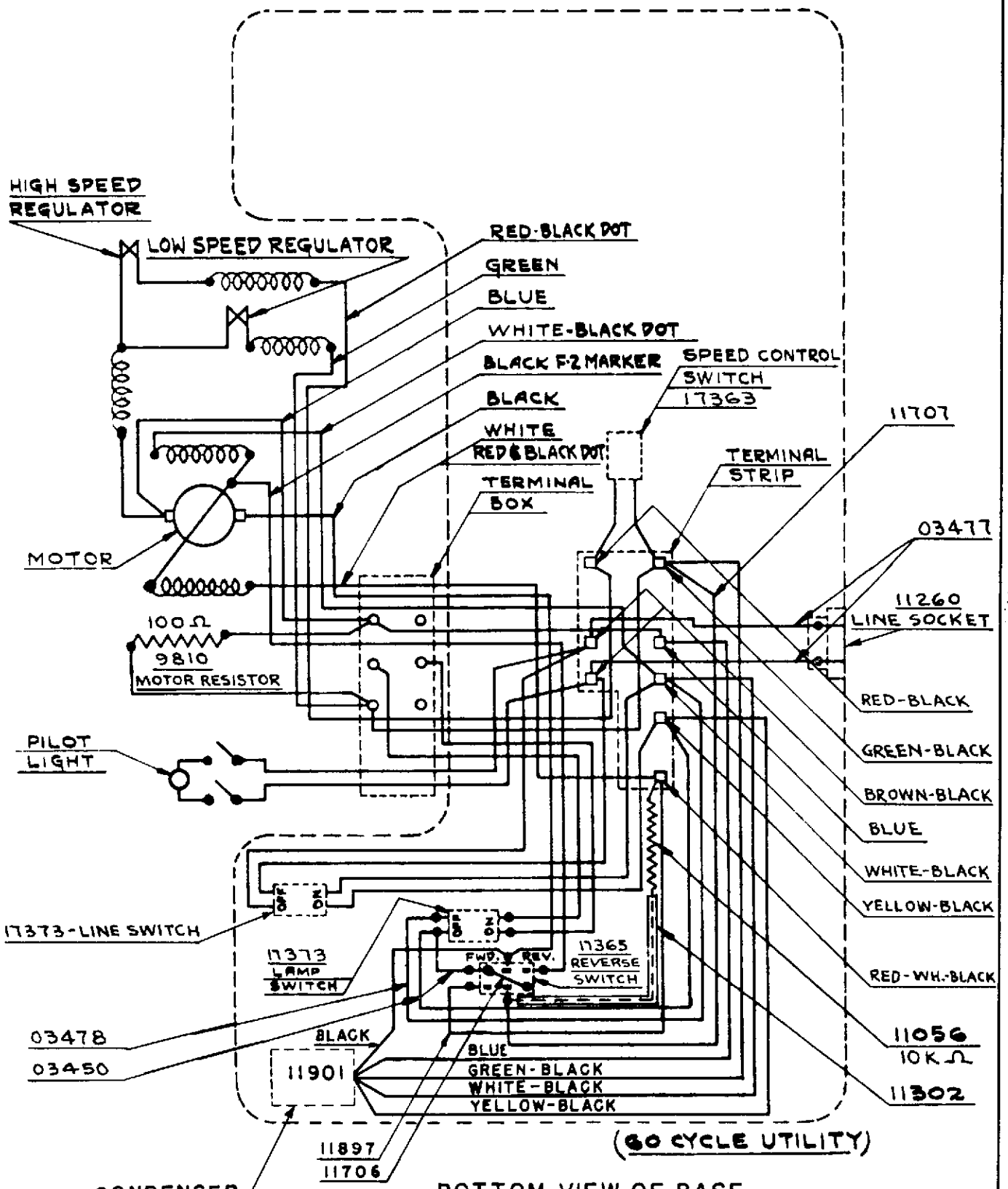
COLOR CODE

11901		12903
GREEN-BLACK	=	WHITE WITH BLACK & GREEN
BLUE	=	WHITE WITH GREEN & RED
WHITE-BLACK	=	WHITE WITH BROWN
YELLOW-BLACK	=	WHITE WITH BLACK & ORANGE
BLACK	=	WHITE WITH BLACK & RED

Bell & Howell Co. Chicago, Ill. U.S.A.

PROJECTOR WIRING DIAGRAM FOR DESIGN 138 MODELS T-W-Z

DATE 2-17-53	SERVICE DATA	DRAWN APVD.



BOTTOM VIEW OF BASE ASSEMBLY SHOWING WIRING

FOR REPLACEMENT ORDER PART #12903

COLOR CODE

11901		12903
GREEN-BLACK	=	WHITE WITH BLACK & GREEN
BLUE	=	WHITE WITH GREEN & RED
WHITE-BLACK	=	WHITE WITH BROWN
YELLOW-BLACK	=	WHITE WITH BLACK & ORANGE
BLACK	=	WHITE WITH BLACK & RED

Bell & Howell Co. Chicago, Ill. U.S.A.

PROJECTOR WIRING DIAGRAM FOR DESIGN 138 MODELS R-U-X

DATE 2-17-53	SERVICE DATA	DRAWN APVD.

SECTION F

DESIGN 140-FILMOARC

GENERAL INFORMATION.

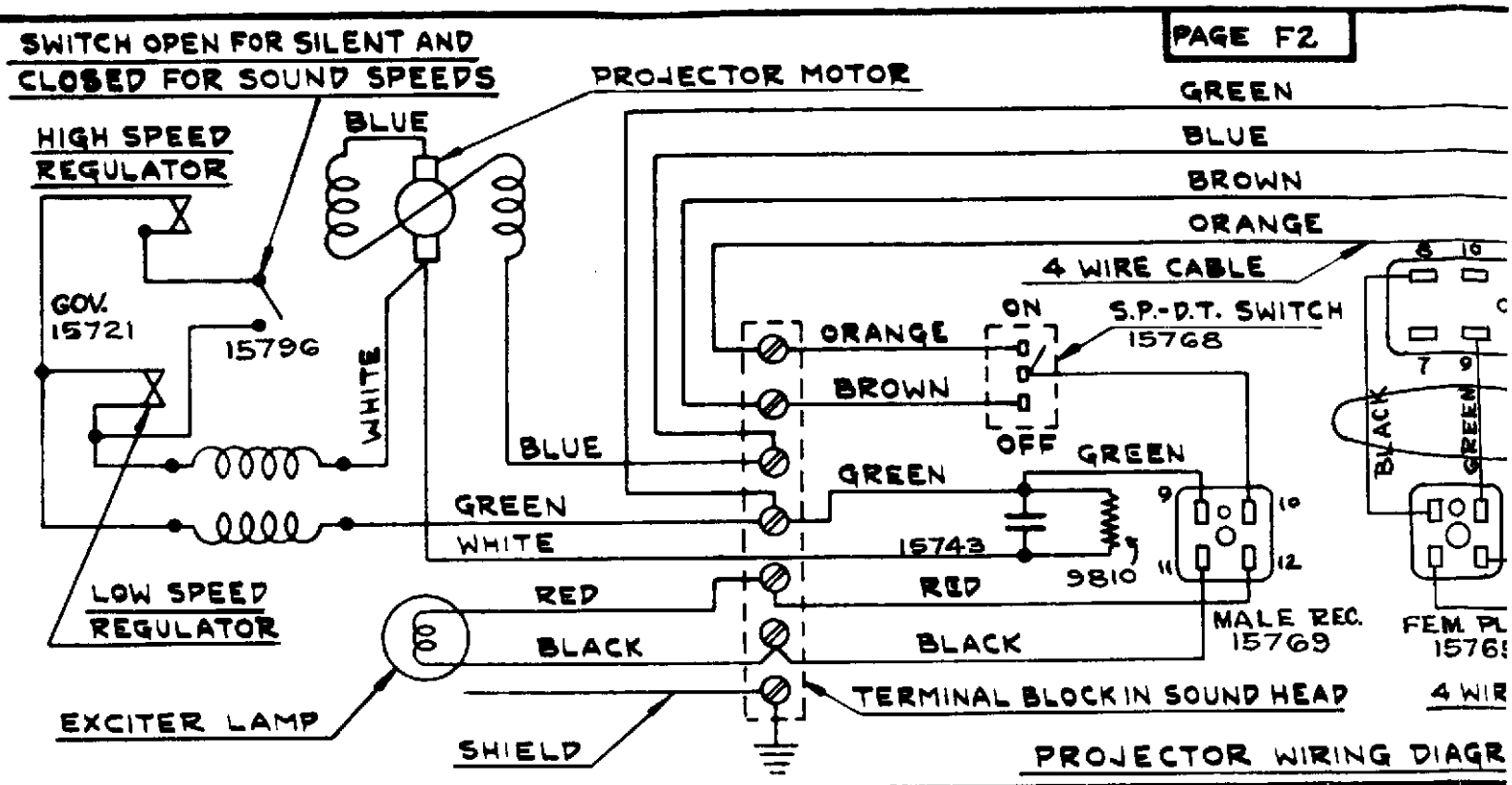
On page F2 will be found the projector and arc lamp - DC current - wiring diagrams. The Bell & Howell Filmoarc uses the Design 130 amplifier, information for which may be found under Section "D" of this manual.

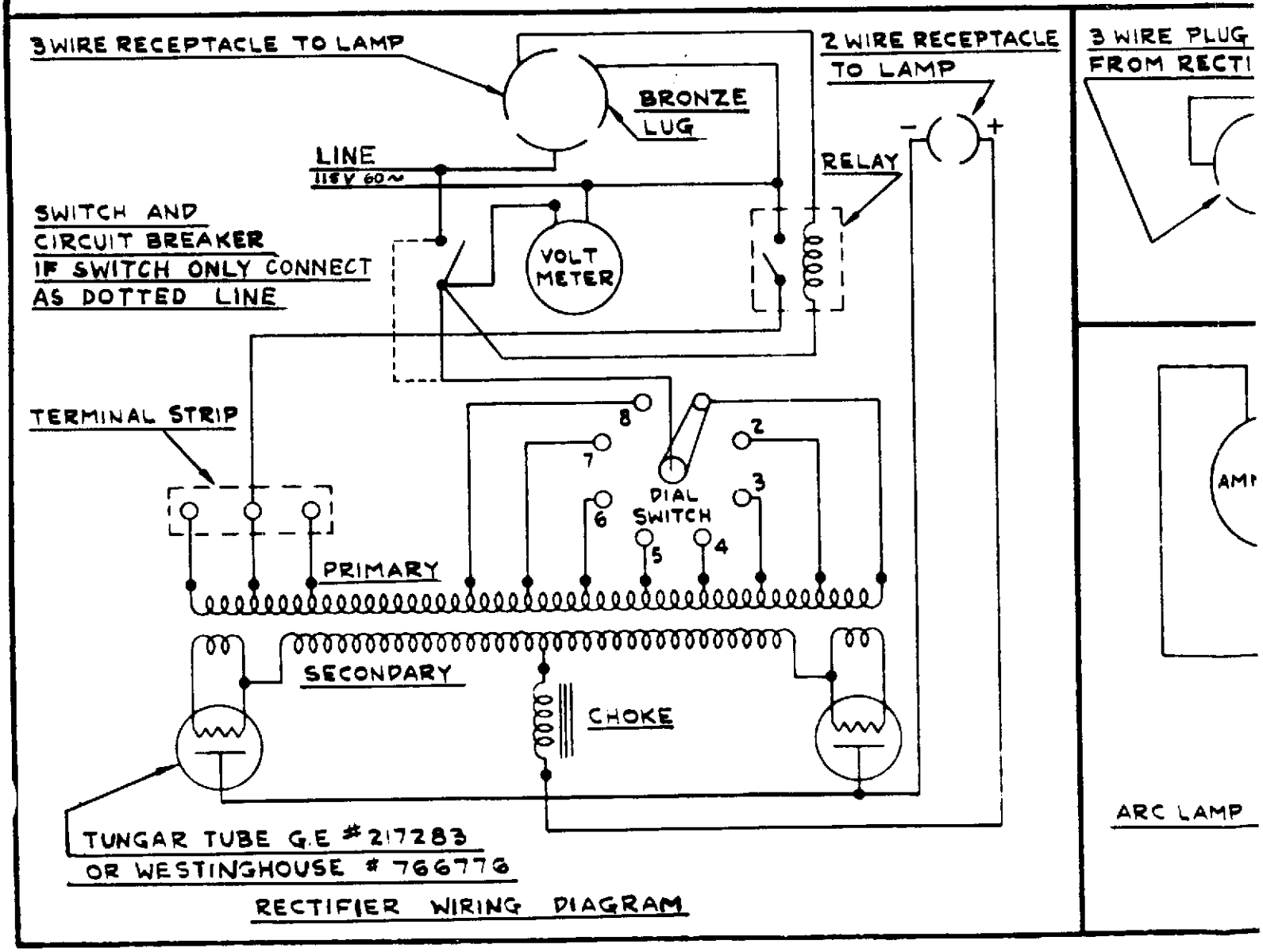
Be sure the speaker selector switch in the rear of the amplifier is set to the "Single Speaker" position for single speaker and "Dual Speaker" position when two speakers are being used.

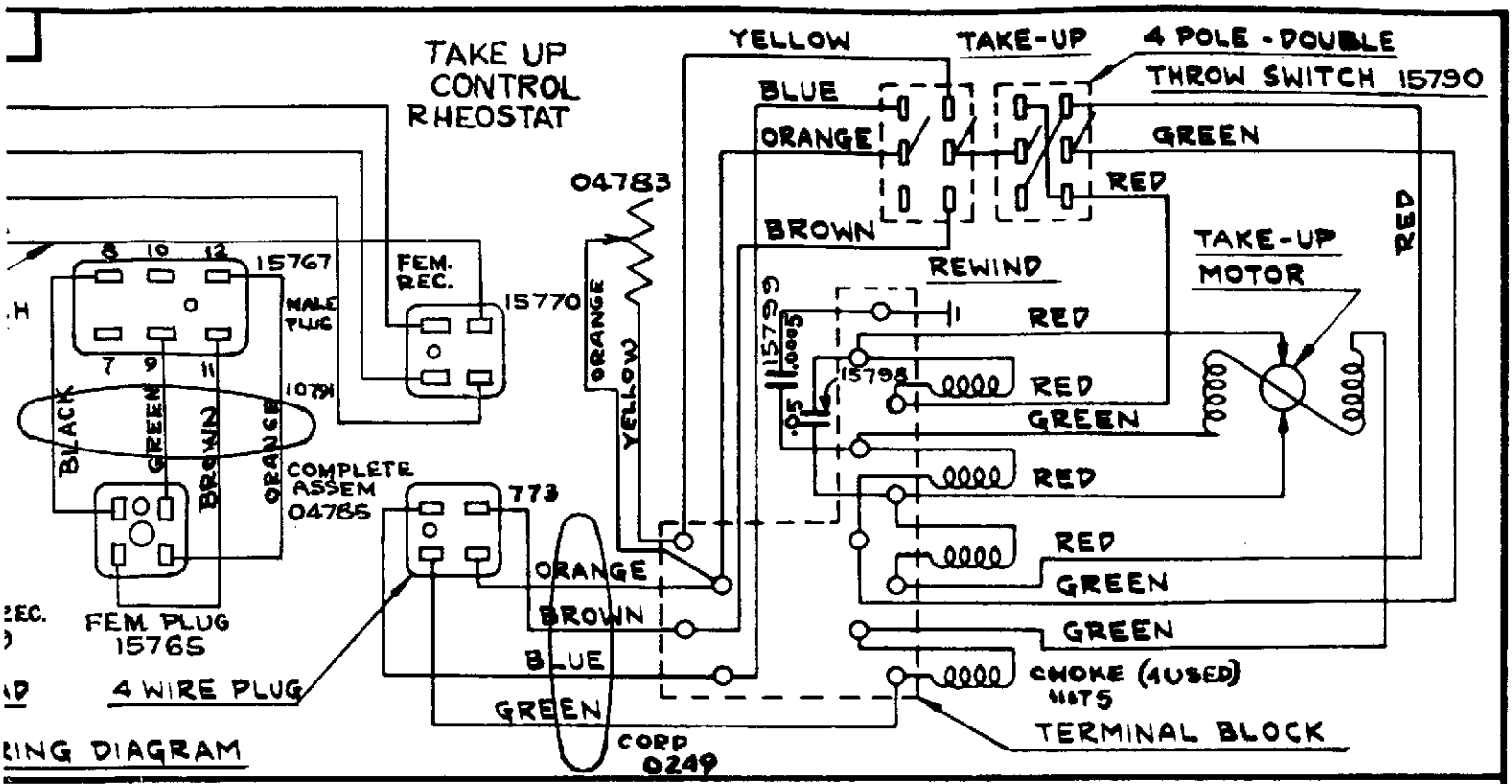
When ordering parts be sure to use the word "DETAIL" and number wherever shown.

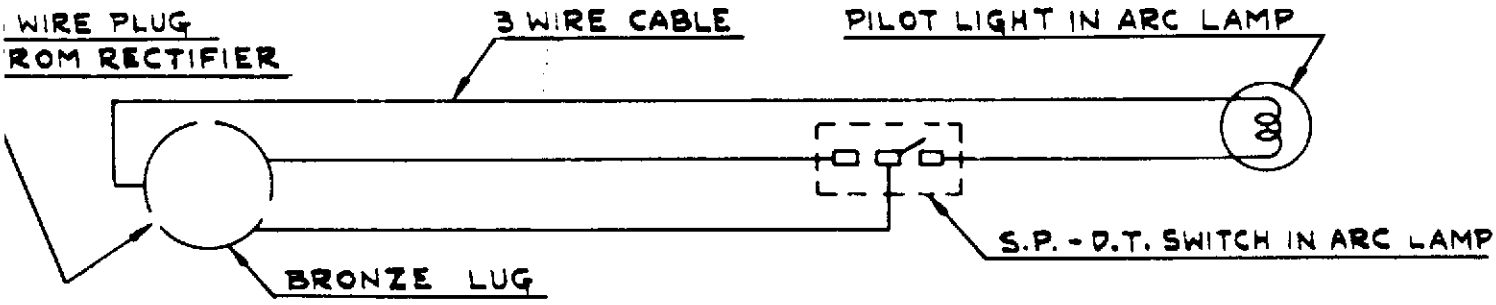
Lamp house and rectifier parts have not been given a Bell & Howell number; therefore, it will be necessary to order them by description.

The Instructions and Manual of Operation for the Filmoarc thoroughly cover the projector lamp housing and rectifier.

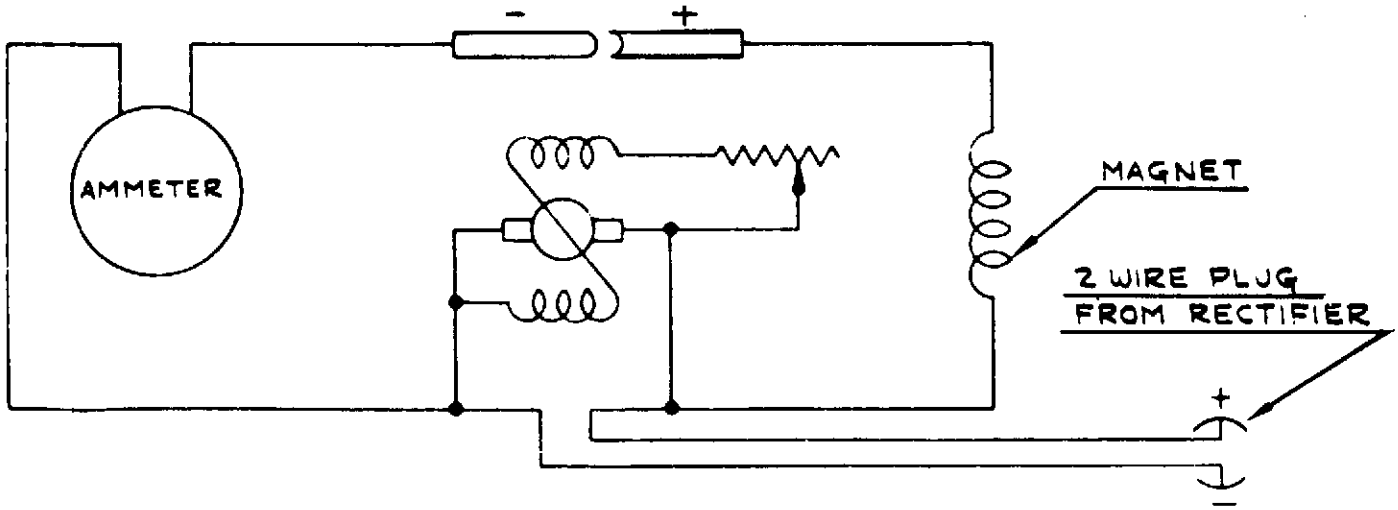

SWITCH OPEN FOR SILENT AND CLOSED FOR SOUND SPEEDS
PROJECTOR MOTOR
HIGH SPEED REGULATOR
BLUE
GOV. 15721
15796
WHITE
BLUE
GREEN
WHITE
LOW SPEED REGULATOR
EXCITER LAMP
RED
BLACK
SHIELD
GREEN
BLUE
BROWN
ORANGE
4 WIRE CABLE
ORANGE
BROWN
ON
OFF
S.P.-D.T. SWITCH 15768
GREEN
GREEN
15743
9810
RED
BLACK
TERMINAL BLOCK IN SOUND HEAD
MALE REC. 15769
FEM. PL. 1576
4 WIR
BLACK
GREEN
PROJECTOR WIRING DIAGR


3 WIRE RECEPTACLE TO LAMP
2 WIRE RECEPTACLE TO LAMP
BRONZE LUG
LINE 115V 60~
RELAY
SWITCH AND CIRCUIT BREAKER IF SWITCH ONLY CONNECT AS DOTTED LINE
VOLT METER
TERMINAL STRIP
DIAL SWITCH
PRIMARY
SECONDARY
CHOKE
TUNGAR TUBE G.E #217283 OR WESTINGHOUSE # 766776
RECTIFIER WIRING DIAGRAM
3 WIRE PLUG FROM RECTI
ARC LAMP





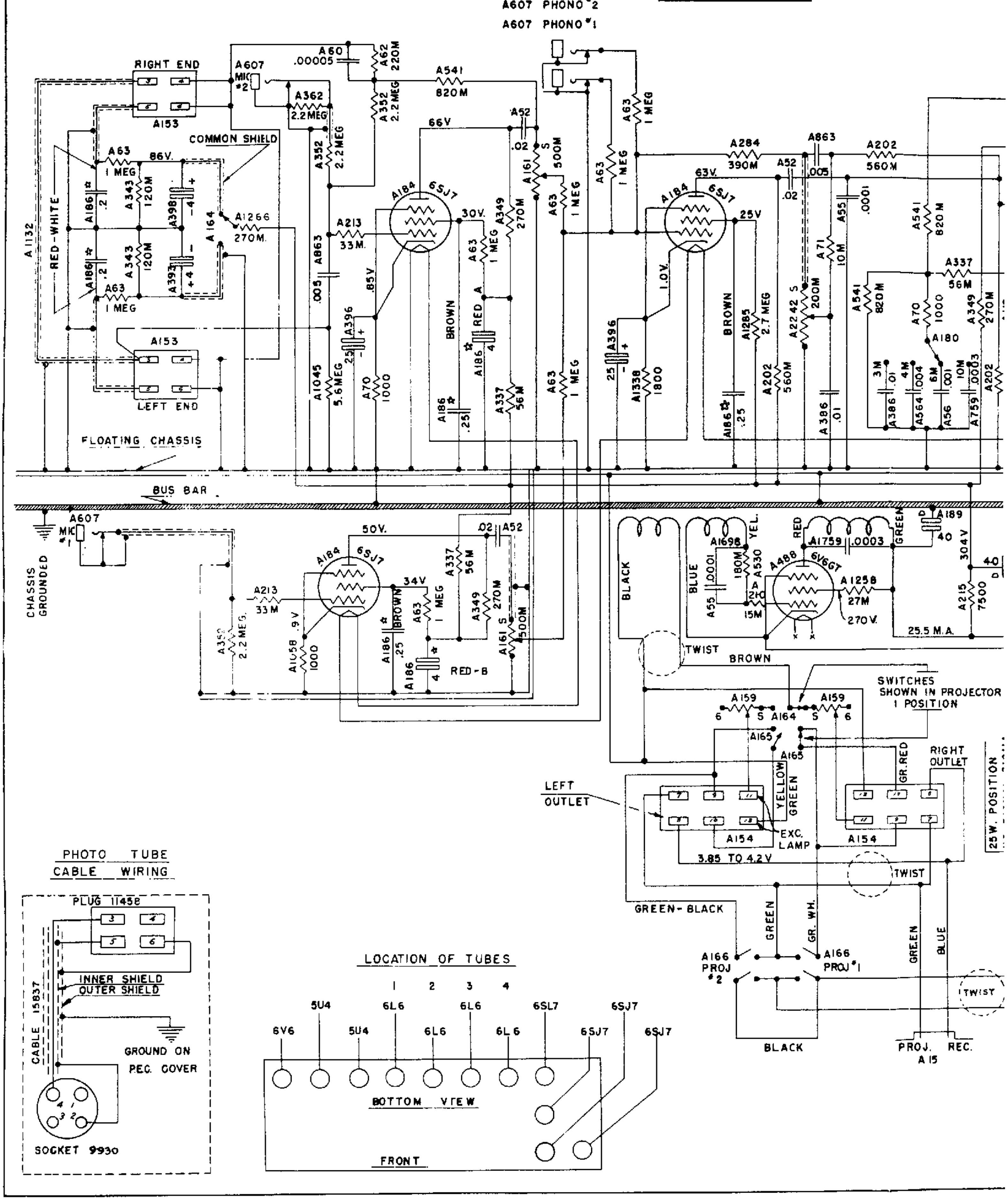
ARC LAMP PILOT LIGHT CIRCUIT WIRING DIAGRAM

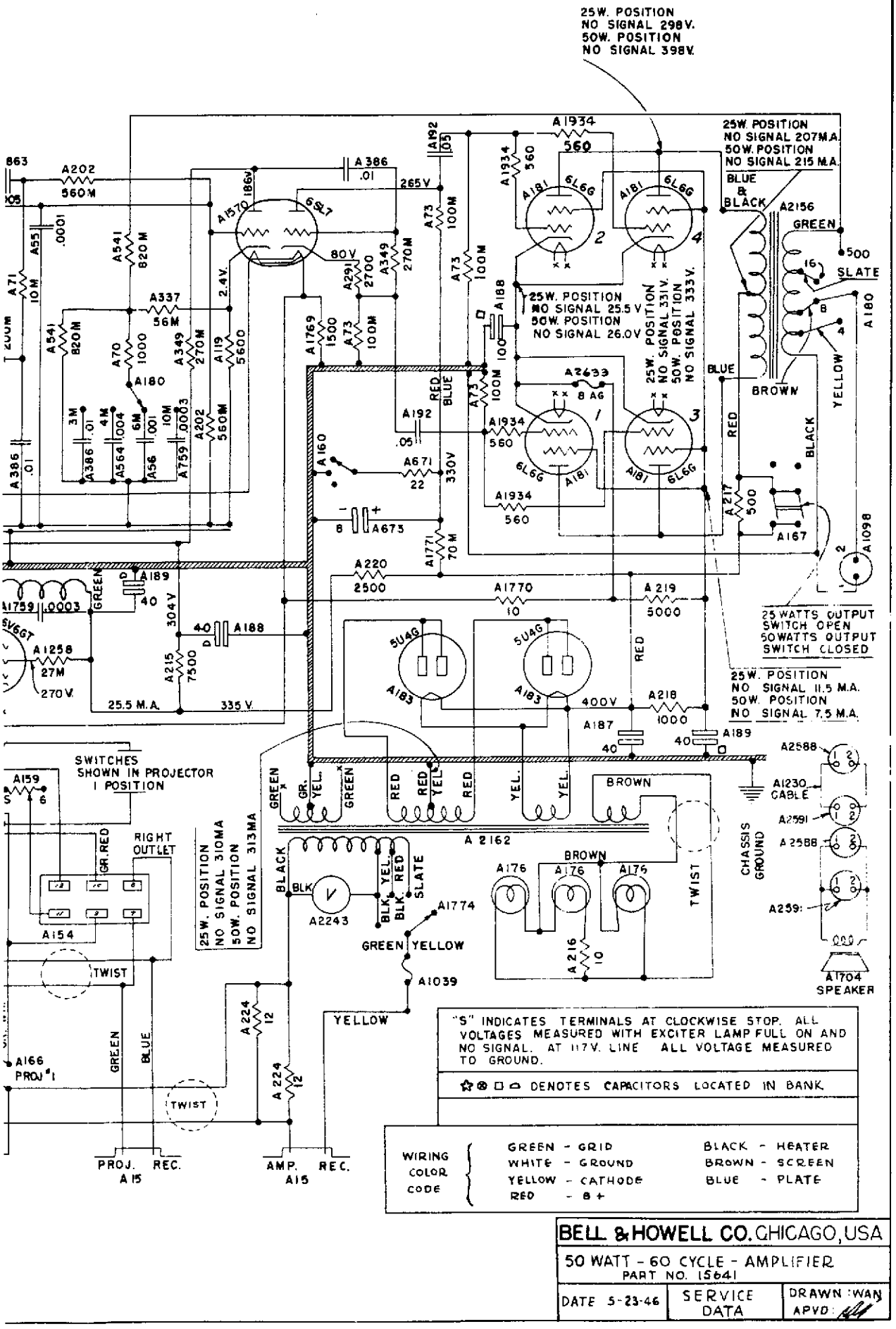


ARC LAMP D.C. CIRCUIT WIRING DIAGRAM

BELL & HOWELL CO. CHICAGO U.S.A.		
FILMO - ARC DESIGN 40 MODELS A-B-C-D-E-F-G-H		
1-28-38	SERVICE DATA	DRAWN PCR. APVD.

F4

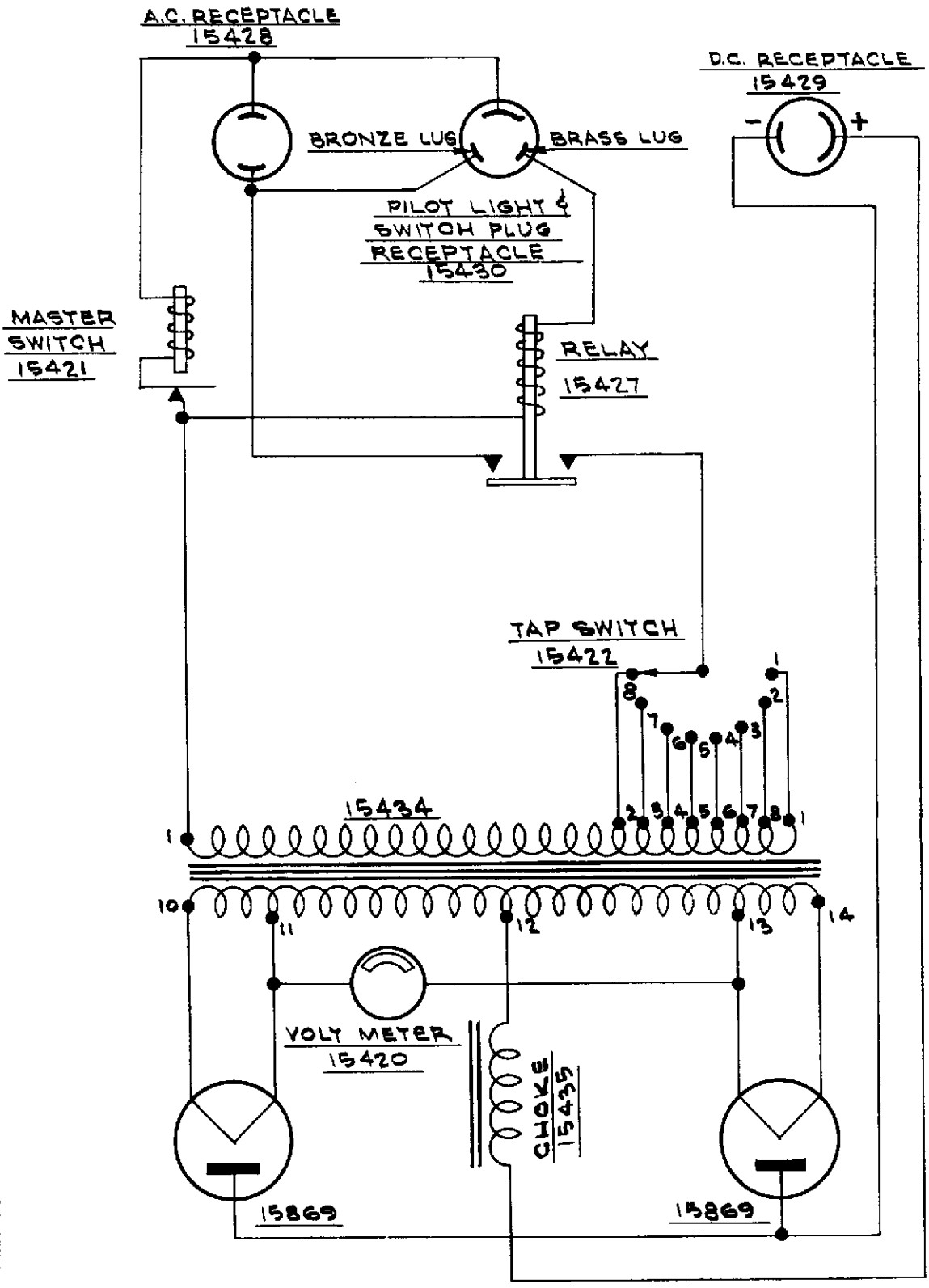

A607 PHONO #2
A607 PHONO #1
RIGHT END
A607 MIC #2
A153
COMMON SHIELD
A1132
RED-WHITE
A164
A1266 270M.
LEFT END
FLOATING CHASSIS
BUS BAR
CHASSIS GROUNDED
A607 MIC #1
A184 6SJ7
66V
30V.
50V.
34V
63V.
25V
BROWN
RED A
RED-B
TWIST
BLACK
BLUE
YEL.
A1698
A488 6V6GT
A1258 27M
270V.
A1759 .0003
GREEN
A189 40
304 V
A215 7500
25.5 M.A.
SWITCHES SHOWN IN PROJECTOR 1 POSITION
A159
A164
A165
LEFT OUTLET
RIGHT OUTLET
A154
EXC. LAMP
3.85 TO 4.2 V
YELLOW
GREEN
GR. RED
GREEN-BLACK
GR. WH.
A166 PROJ #2
A166 PROJ #1
PROJ. A15
REC.
25 W. POSITION
PHOTO TUBE CABLE WIRING
PLUG 11458
INNER SHIELD
OUTER SHIELD
CABLE 15837
GROUND ON P.E.C. COVER
SOCKET 9930
LOCATION OF TUBES
1 2 3 4
6V6
5U4
5U4
6L6
6L6
6L6
6L6
6SL7
6SJ7
6SJ7
6SJ7
BOTTOM VIEW
FRONT



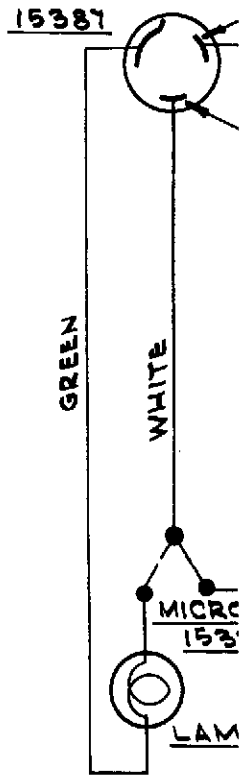
BELL & HOWELL CO. CHICAGO, USA

50 WATT - 60 CYCLE - AMPLIFIER
PART NO. 15641

DATE 5-23-46	SERVICE DATA	DRAWN: WAN APVD:

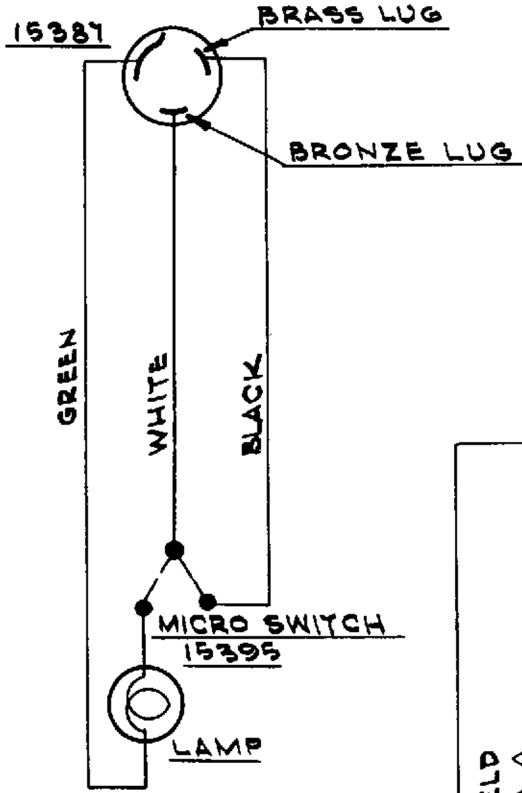


RECTIFIER CIRCUIT

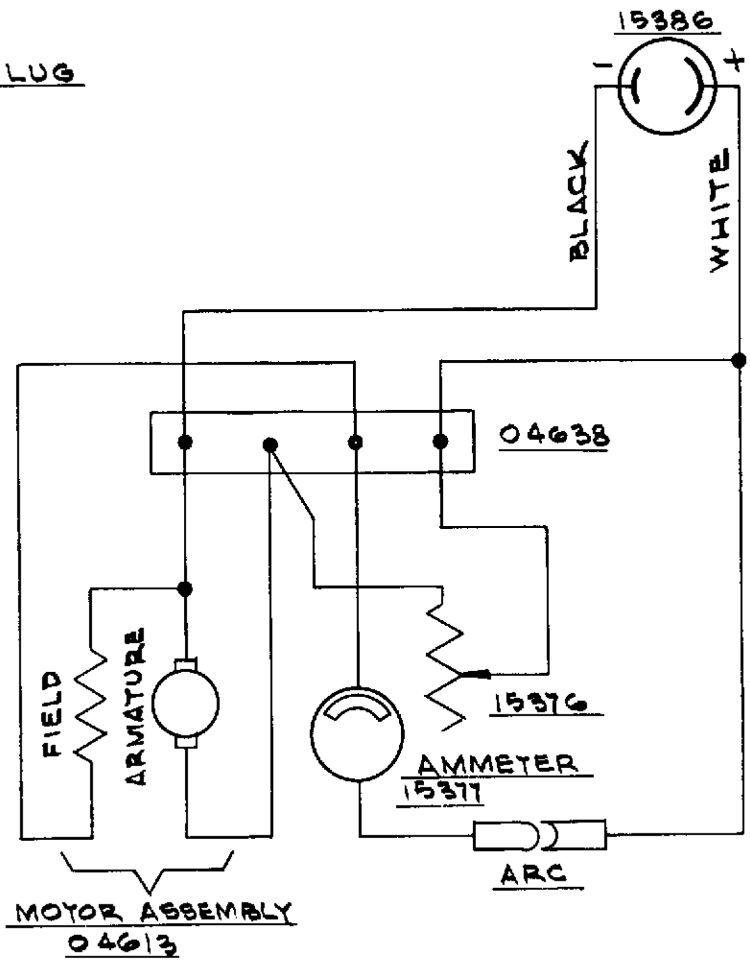


PILOT LIG
SWITCH CI
IN LAMPHO

F5



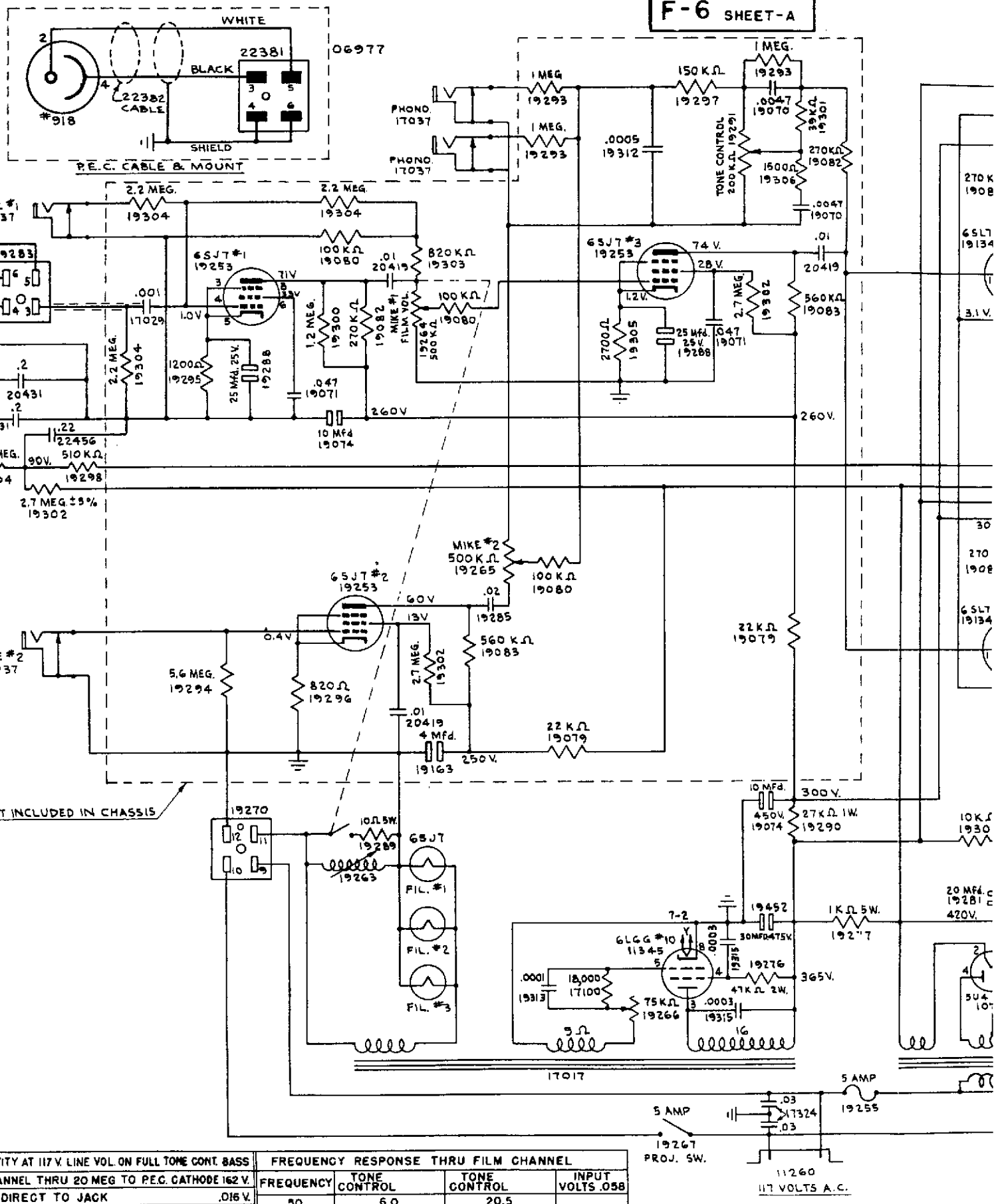
PILOT LIGHT & SWITCH CIRCUIT IN LAMPHOUSE



LAMP CIRCUIT

SERVICE DATA	
WIRING DIAGRAM FILMOARC LAMP & RECTIFIER	
DESIGN 140 FILMOARC	MODEL R
DRAWN E.G.P. APVD.	DATE 4-21-48

F-6 SHEET-A

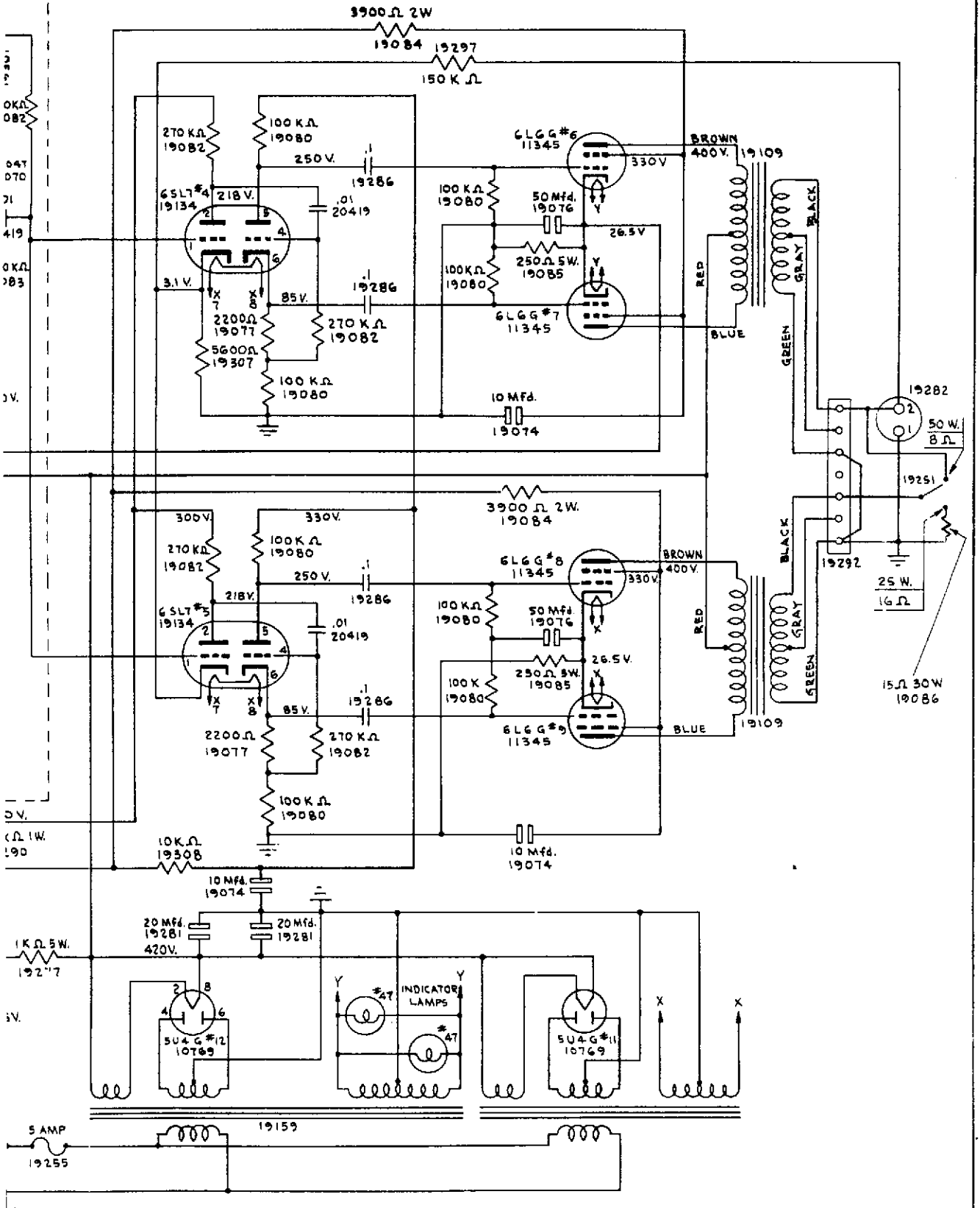


SENSITIVITY AT 117 V. LINE VOL. ON FULL TONE CONT. BASS	
FILM CHANNEL THRU 20 MEG TO P.E.C. CATHODE 162 V.	
MIC. #1 DIRECT TO JACK	.016 V.
MIC. #2 DIRECT TO JACK	.004 V.
PHONO. DIRECT TO JACK	1.1 V.
MEASUREMENT MADE AT 1000 ~ - 8 Ω RES. LOAD OUTPUT VOLTAGE 13.8 V.	
POWER OUTPUT AT 117 V. LINE 400 ~ - 8 Ω LOAD 45 WATTS AT 5%	

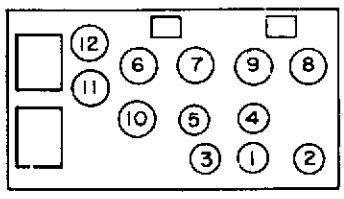
FREQUENCY RESPONSE THRU FILM CHANNEL

FREQUENCY	TONE CONTROL	TONE CONTROL	INPUT VOLTS .058
50	6.0	20.5	
100	3.5	18.0	
500	8.0	13.0	
1M	9.0	9.5	
3M	9.0	1.5	
5M	9.0	0	
7M	9.0	1.5	
10M	9.5	5.5	

WIRE COLOR CODE			
WHITE	GROUND	BLUE	P
YELLOW	CATHODE	BROWN	SC
RED	B +	BLACK	
GREEN	GRID	BLACK & WHITE	



COLOR CODE		
OUND	BLUE	PLATE
IODE	BROWN	SCREEN
B+	BLACK	AC
GRID	BLACK & WHITE	B−

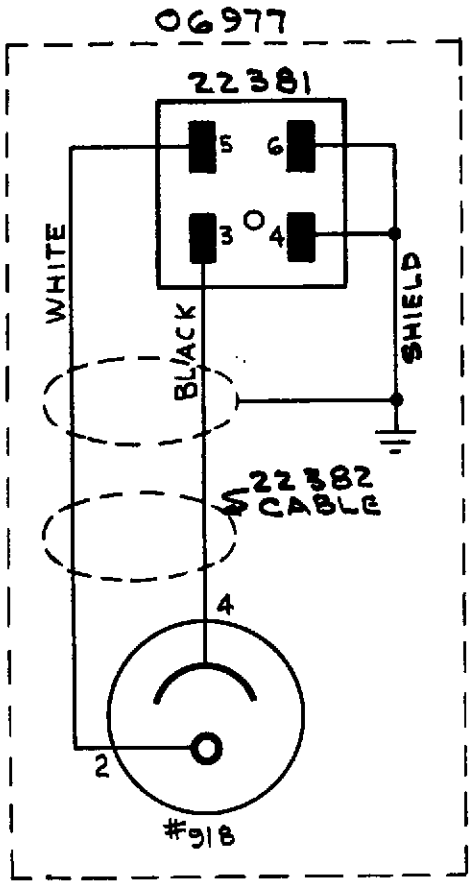


TUBE LAYOUT

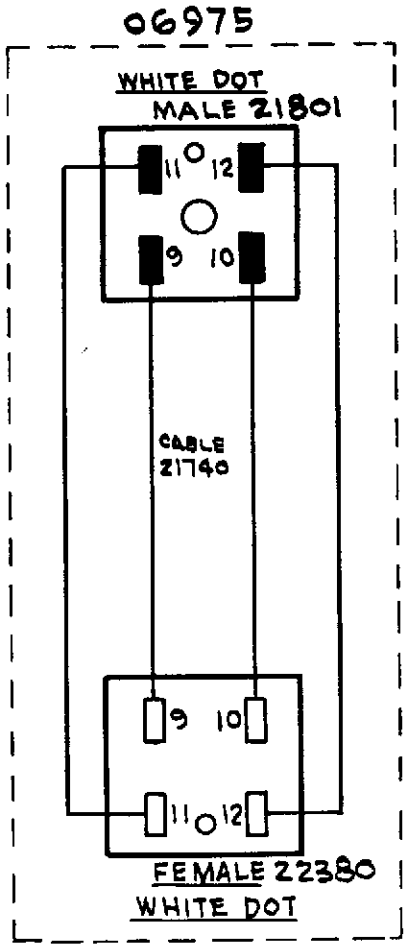
Bell & Howell Co. Chicago U.S.A.

50 W. AMPLIFIER WIRING DIAGRAM FOR DESIGNS 140 S,T,U (06529)

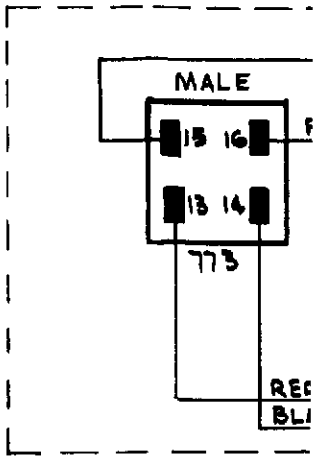
DATE 3-12-52	SERVICE DATA	DRAWN ael APVD. L.L.

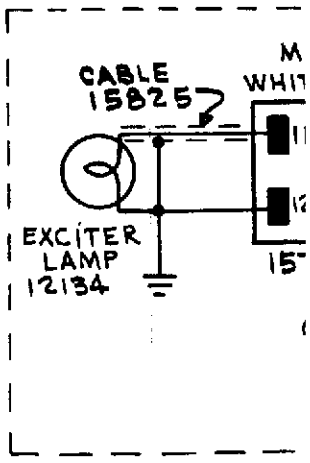


P.E.C. CABLE & MOUNT



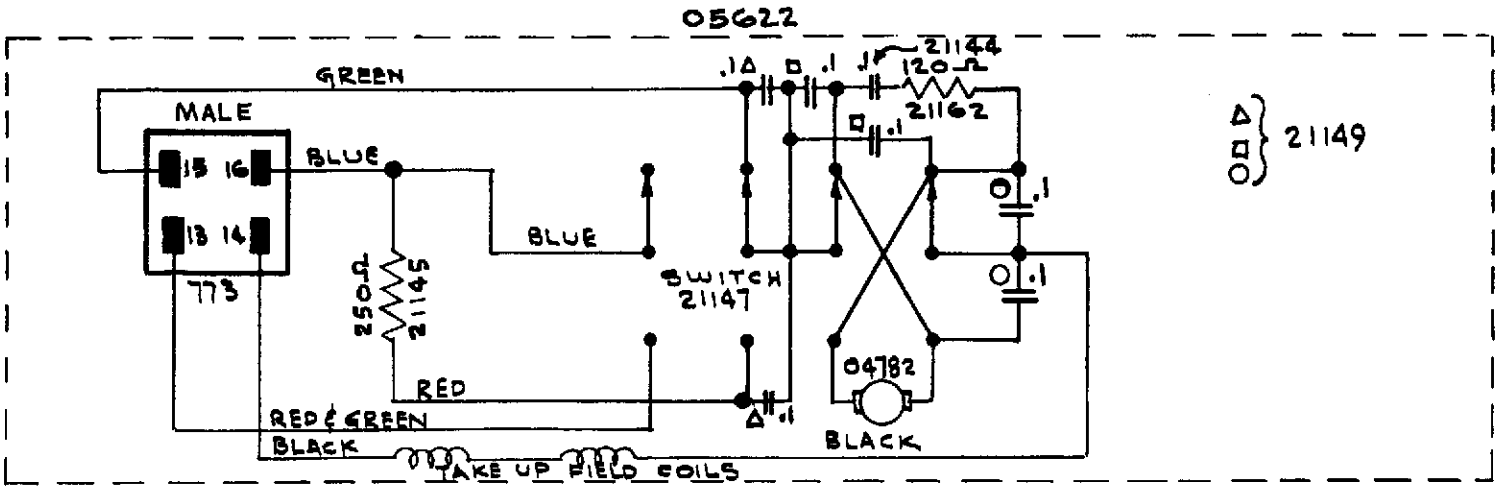
POWER CABLE TO PROJECTOR



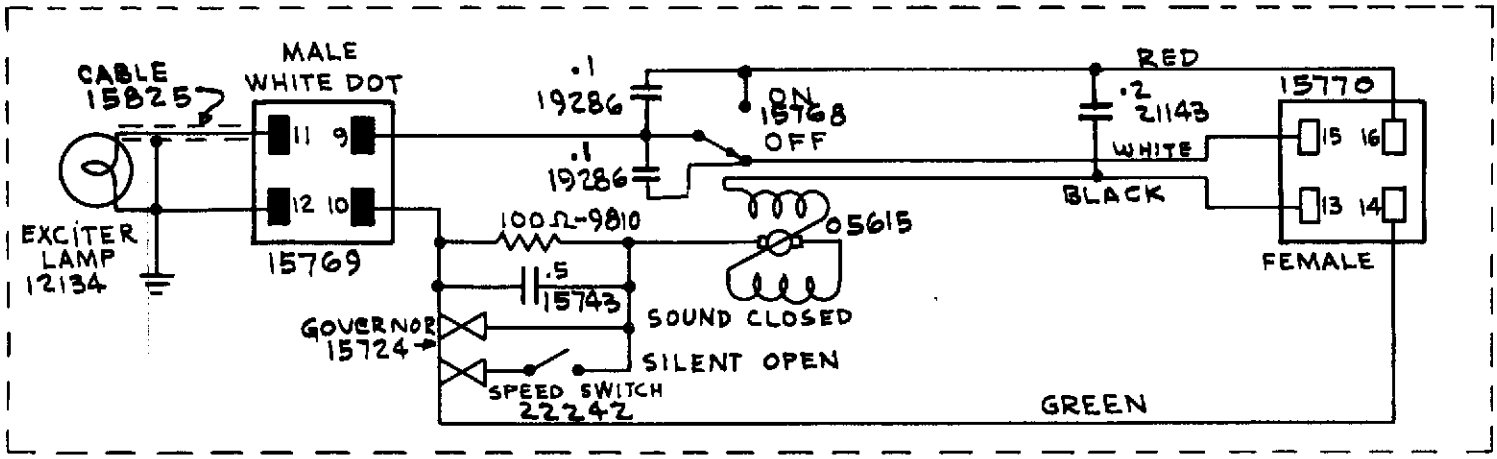


PARTS ON THIS SHEET NOT INCLUDED IN AMPLIFIER CHASSIS

F-6 SHEET B



TAKE UP MOTOR WIRING



PROJECTOR WIRING

ASSIS

Bell & Howell Co. Chicago U. S. A.		
PROJECTOR & TAKE-UP MOTOR WIRING DIAGRAM & CABLES FOR DESIGNS 140 S,T,U		
DATE 3-12-52	SERVICE DATA	DRAWN acl APVD. RK

SECTION G

DESIGN 142, MODEL A

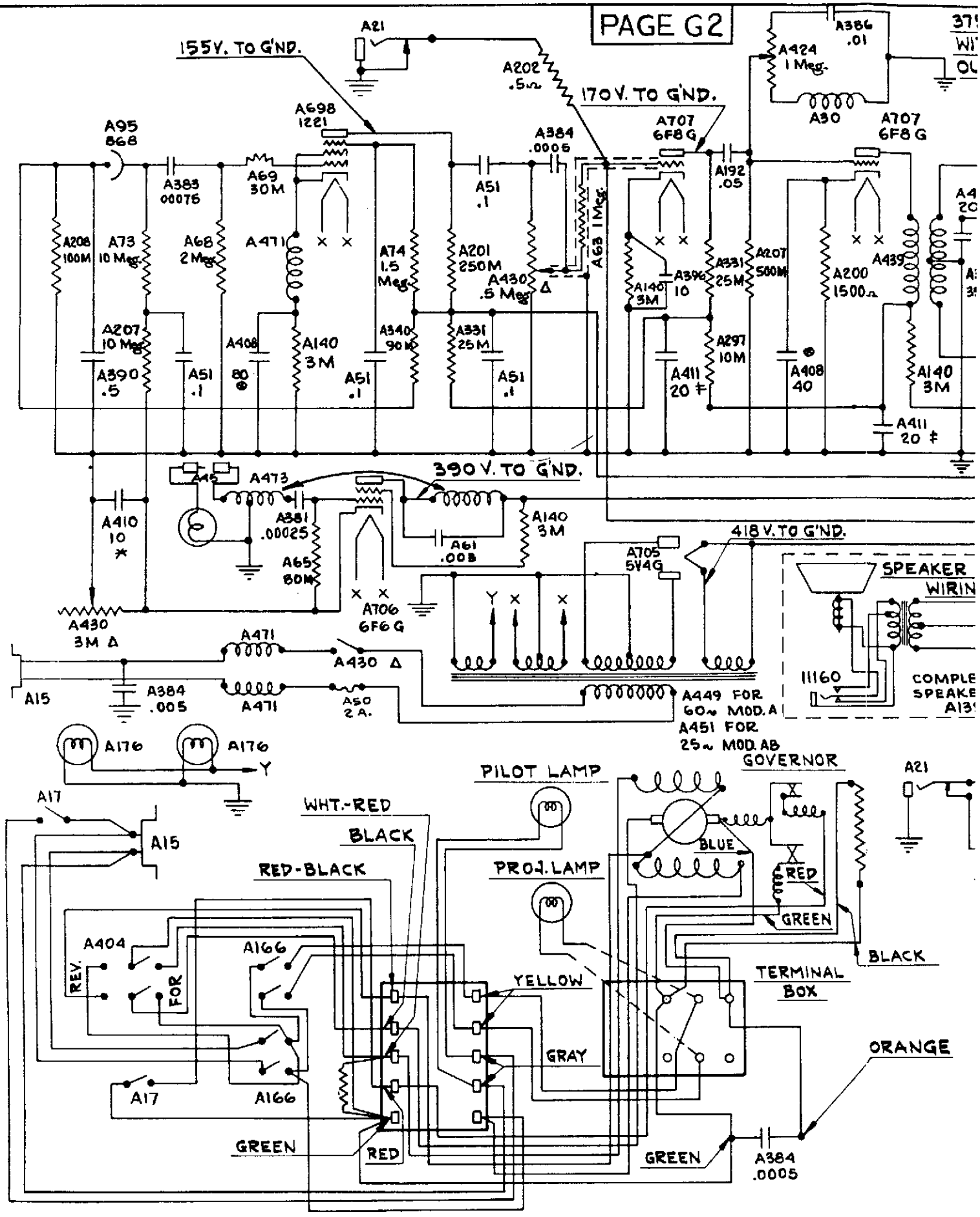
GENERAL INFORMATION.

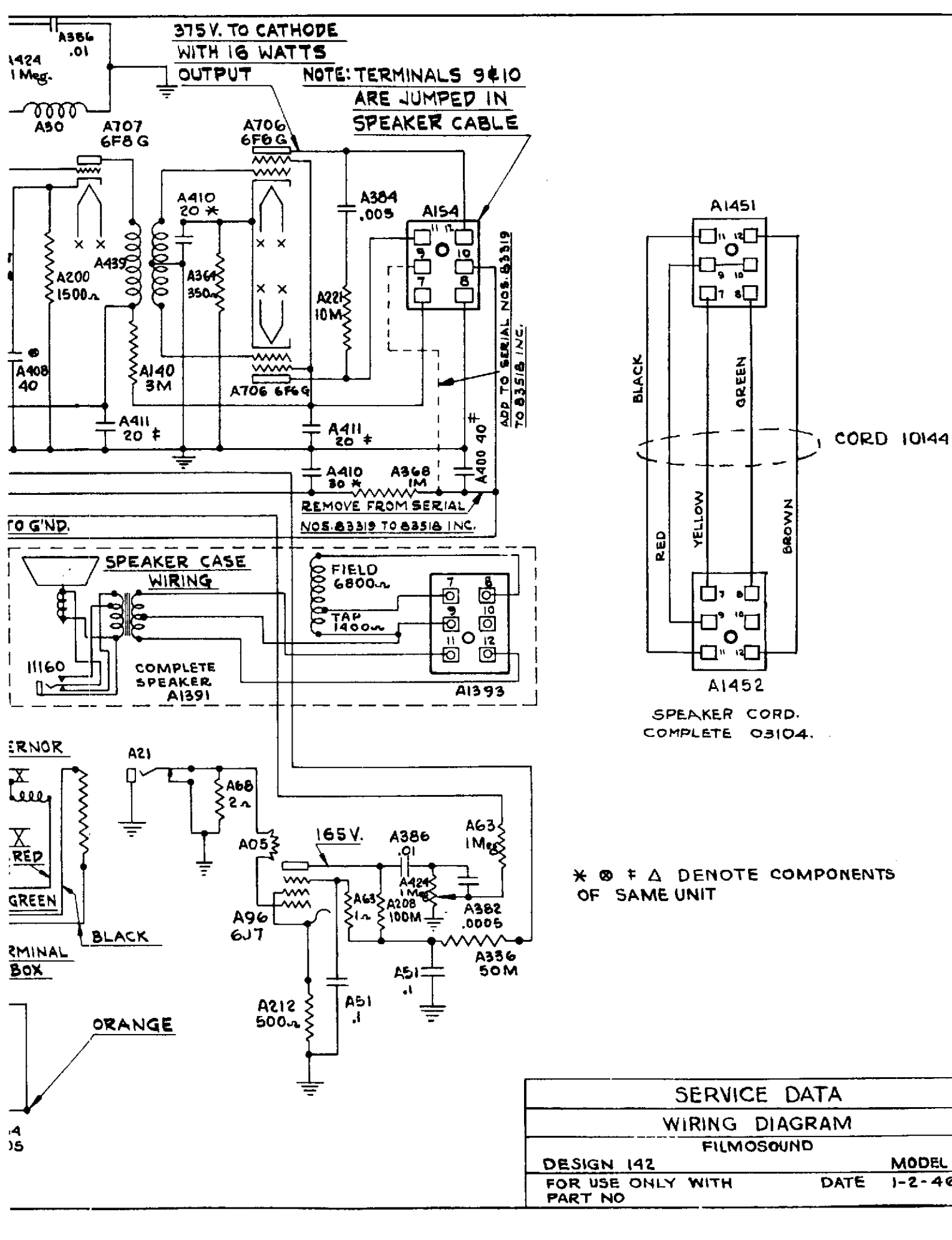
This amplifier used 6F6G tubes in the output. Note that the 6F8G tube is cascade operated, and not phase inverted. The power output is approximately 15 watts. Do not substitute metal for glass 6F6G tubes. Use only 2-ampere fuses.

If the exciter lamp life is short and if the line voltage is not over 117 volts, a change should be made in the oscillator tube wiring. The .003 MFD mica condenser, A-61, which tunes the oscillator is changed to a .001 MFD mica condenser, A604. The 3000-ohms screen resistor A140 is changed to a 5000-ohms, 1-watt resistor A293; the 1000-ohms resistor A368 is changed to a 5000-ohm, 1-watt resistor A293; and the 1000-ohm resistor A368 is changed to a 4000-ohm, 10-watt resistor A373. Resistor A368 is usually found mounted on the oscillator coil terminal on the end plates. Lay resistor A-293 against the oscillator tube socket terminals and connect it to terminals 4 and 6. Resistor A604 is then laid beside resistor A-293 and is connected to terminals 3 & 6.

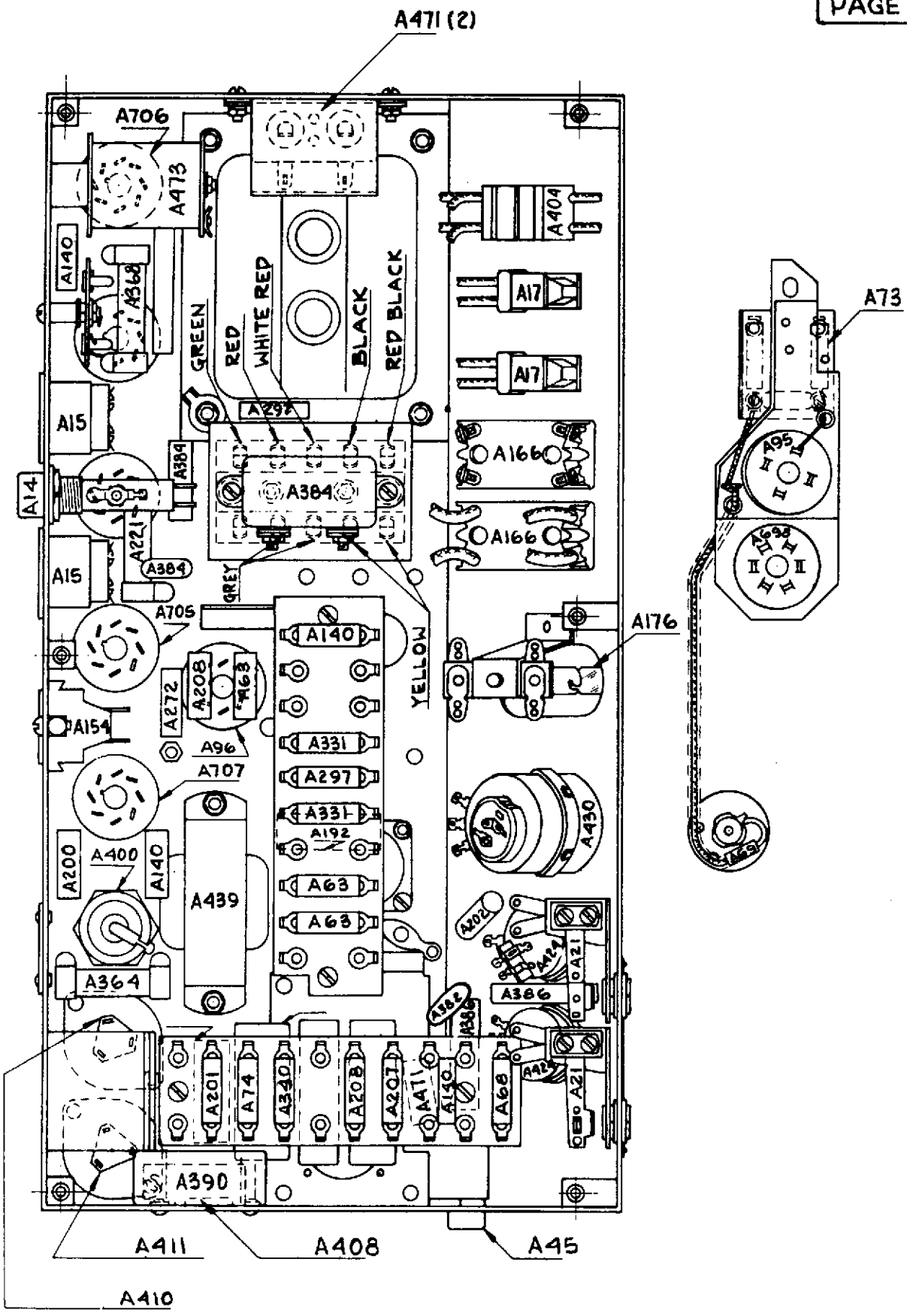
In cases of high line voltage and where the rectifier tube arcs over and results in fuse blowing, a 150-ohm, 10-watt resistor can be connected in series with the output of the rectifier. Be sure it is connected between the rectifier and first filter condenser. A convenient location for the resistor is in back of the speaker receptacle.

All speaker cables do not have terminals 9 and 10 strapped together in the male plugs. Be sure to do this.


PAGE G2
155V. TO G'ND.
170 V. TO G'ND.
390 V. TO G'ND.
418 V. TO G'ND.
A95 868
A698 1221
A202 .5Ω
A424 1 Meg.
A386 .01
A30
A707 6F8 G
A707 6F8 G
A384 .0005
A192 .05
A383 .00075
A69 30M
A51 .1
A208 100M
A73 10 Meg.
A68 2 Meg.
A471
A74 1.5 Meg.
A201 250M
A430 .5 Meg Δ
A63 1 Meg.
A140 3M
A396 10
A331 25M
A207 500M
A200 1500Ω
A439
A207 10 Meg.
A390 .5
A51 .1
A408 80
A140 3M
A340 90K
A51 .1
A331 25M
A51 .1
A297 10M
A411 20 ∓
A408 40
A140 3M
A411 20 ∓
A445
A473
A381 .00025
A65 80M
A61 .008
A140 3M
A410 10 *
A706 6F6 G
A705 5Y4G
A430 3M Δ
A471
A430 Δ
A15
A384 .005
A471
A50 2A.
A449 FOR 60~ MOD. A
A451 FOR 25~ MOD. AB
SPEAKER
WIRIN
11160
COMPLE
SPEAKE
A176
A176
Y
A17
A15
WHT.-RED
BLACK
RED-BLACK
PILOT LAMP
PROJ. LAMP
GOVERNOR
BLUE
RED
GREEN
BLACK
A21
A404
REV.
FOR
A166
A17
A166
YELLOW
GRAY
TERMINAL BOX
ORANGE
GREEN
RED
GREEN
A384 .0005



SERVICE DATA	
WIRING DIAGRAM	
FILMOSOUND	
DESIGN 142	MODEL A
FOR USE ONLY WITH PART NO	DATE 1-2-46



SERVICE DATA	
PLACEMENT OF PARTS	
FILMOSOUND	
DESIGN 142	MODEL A
FOR USE ONLY WITH PART NO.	DATE 1-3-46

DESIGN 142, MODEL B

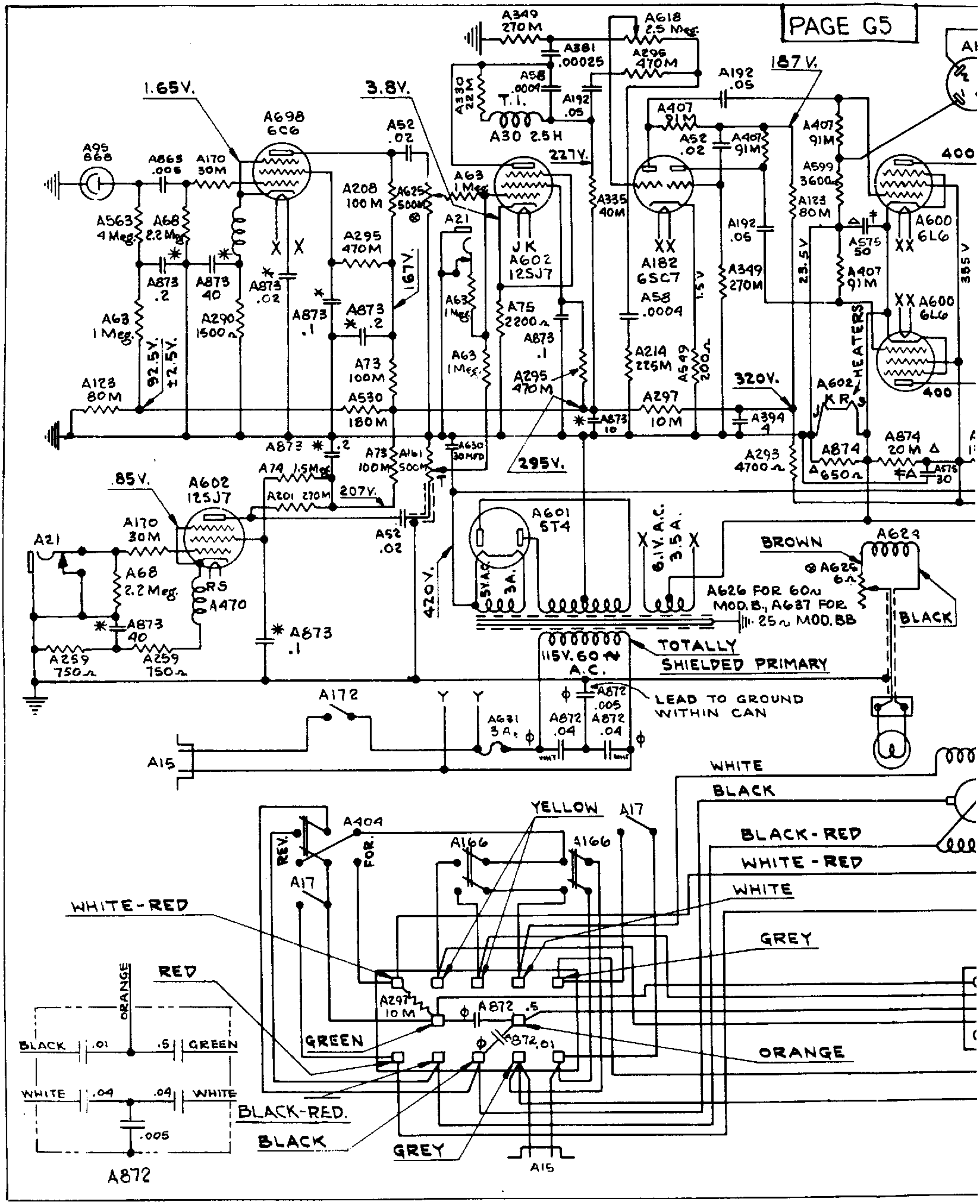
GENERAL INFORMATION.

This amplifier as well as the Model C and D amplifiers differs from all other Filmosound amplifiers in that two of the tubes have their filaments energized by some of the current flowing in the 6L6 output tubes bias circuit. Consequently, if one of the output tubes is bad it will upset the entire circuit.

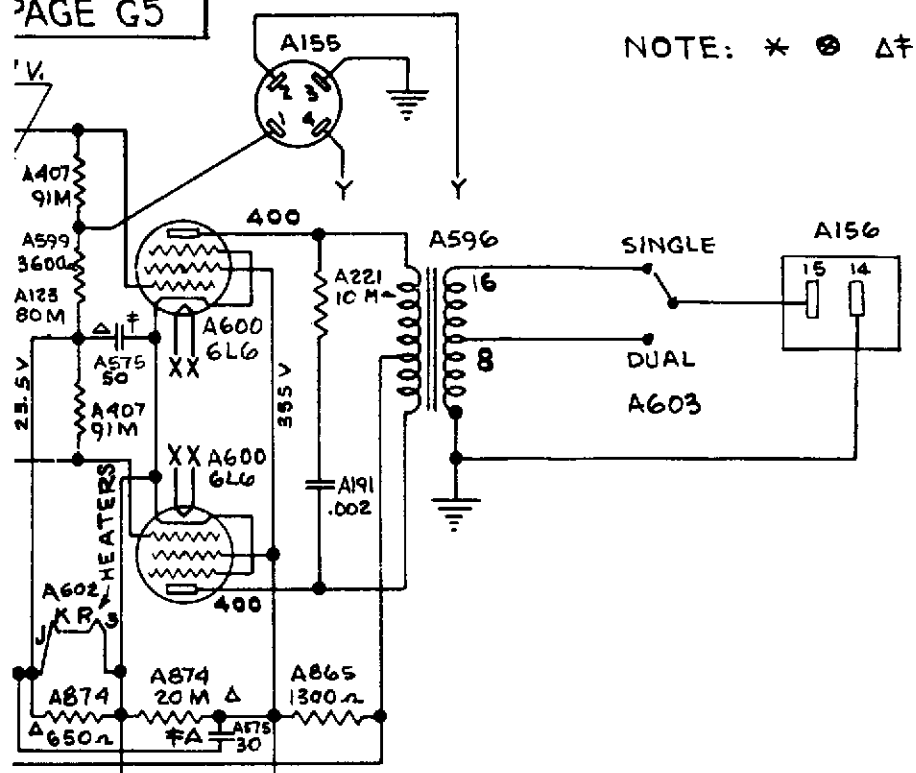
The fuse used is a 3-ampere, type 3AG.

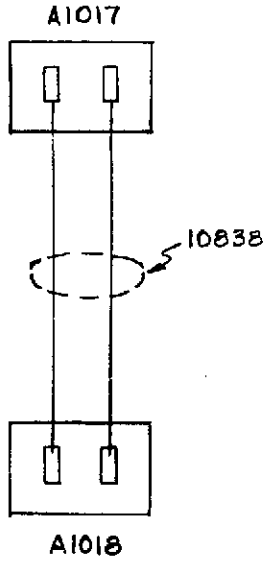
The 142B & BB (25-cycle) amplifiers were made in two series. The difference was in the tone control circuit.

The power output is 25 watts.

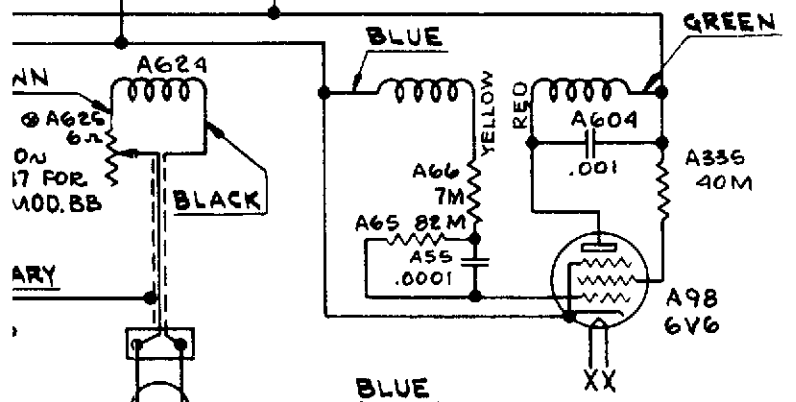

1.65V.
3.8V.
187V.
227V.
167V.
92.5V.
±2.5V.
320V.
295V.
207V.
.85V.
420V.
A698
6C6
A602
12SJ7
A182
6SC7
A600
6L6
A601
5T4
A95
868
A21
A30 2.5H
T.I.
HEATERS
5V.A.C.
3A.
6.1V.A.C.
3.5A.
115V.60 ~
A.C.
TOTALLY
SHIELDED PRIMARY
LEAD TO GROUND
WITHIN CAN
A626 FOR 60~
MOD.B., A637 FOR
25~ MOD.BB
BROWN
BLACK
A624
A172
A631
3A.
A15
A404
REV.
FOR.
A166
A17
YELLOW
WHITE
BLACK
BLACK-RED
WHITE-RED
GREY
ORANGE
GREEN
RED
BLACK-RED.
A872

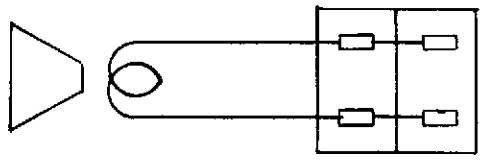
NOTE: * ⊗ Δ‡ Δ ϕ DENOTE COMPONENTS OF SAME UNIT



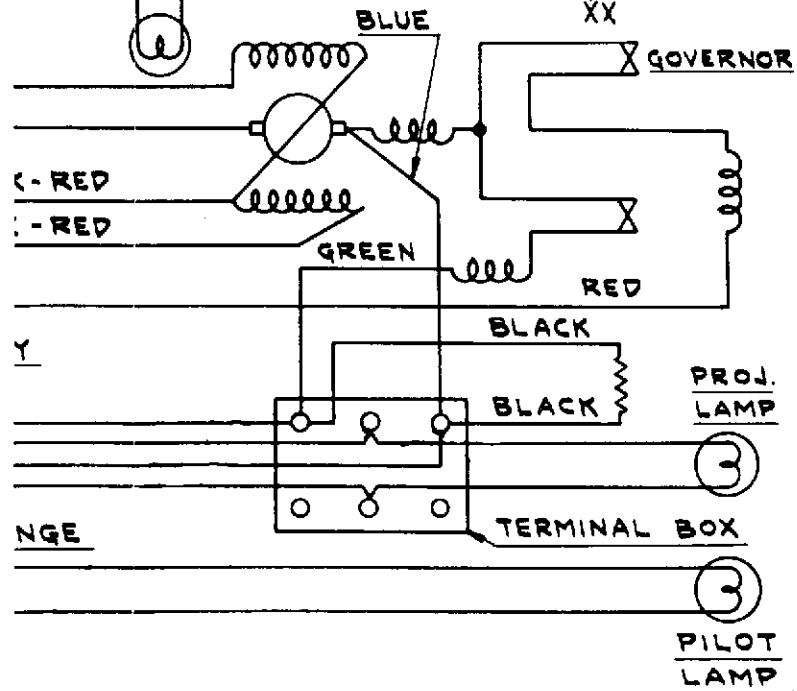


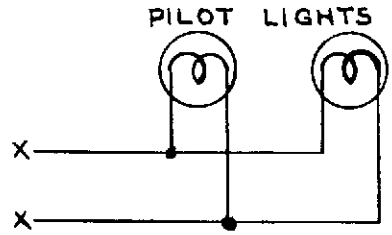
SPEAKER CORD COMPLETE 02937



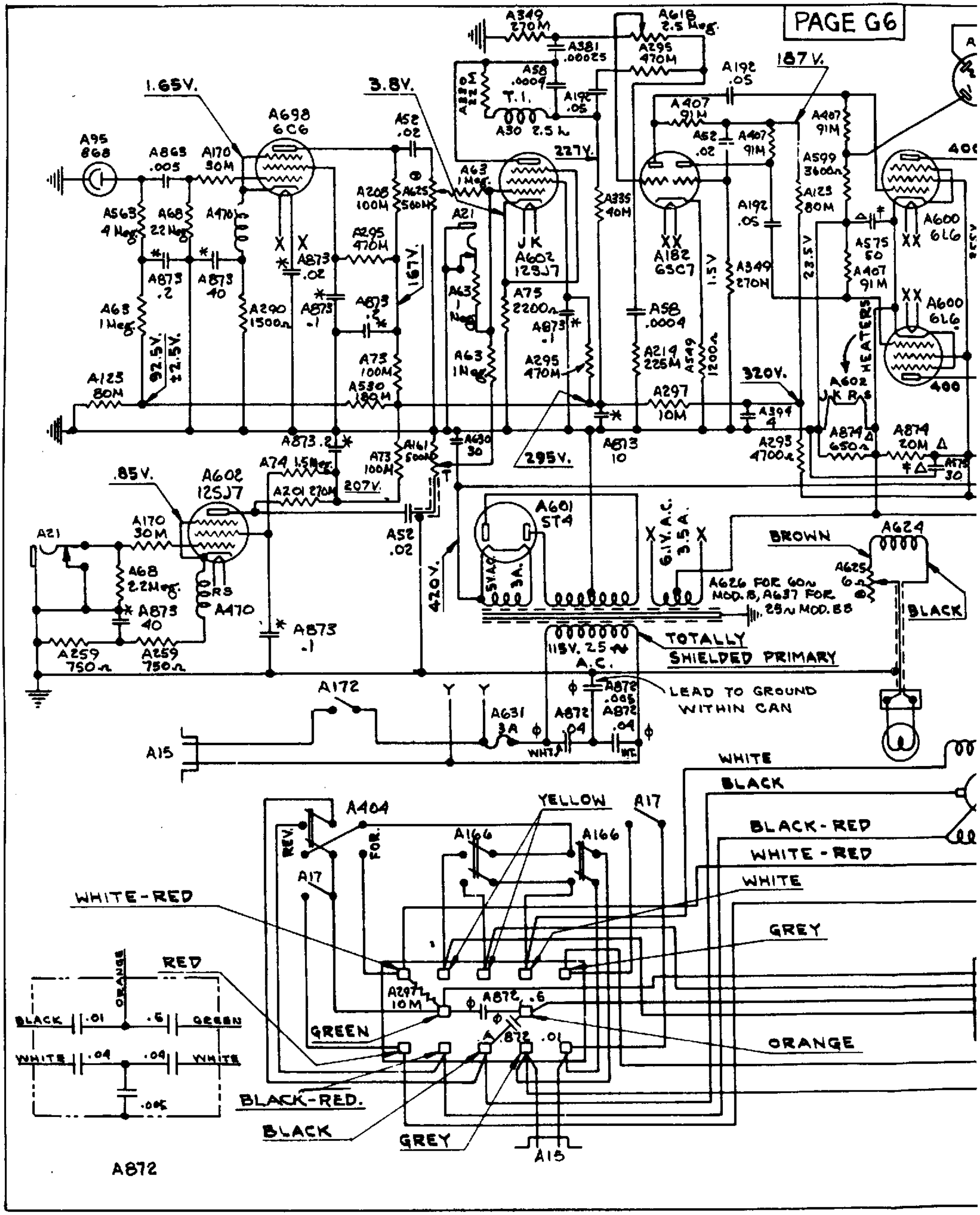


SPEAKER A1392 A994



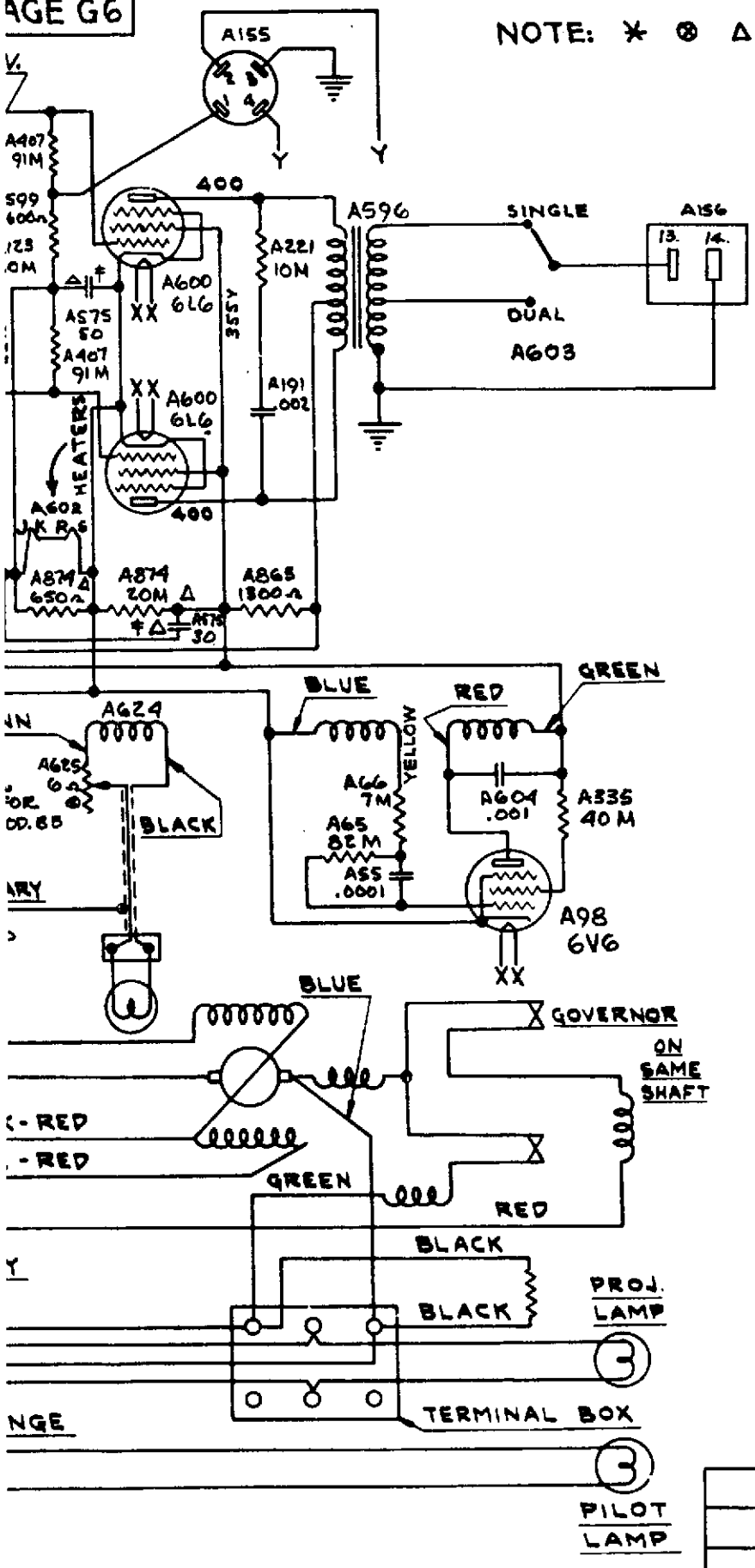


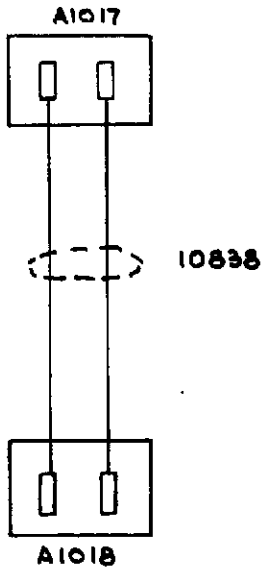
SERVICE DATA	
WIRING DIAGRAM	
FILMOSOUND	
DESIGN 142	MODEL B
FOR USE WITH AMPLIFIER #03304	DATE: 1-4-46
SERIAL NO'S 88521 TO 88670 INCL.	


1.65V.
3.8V.
187 V.
227V.
A95
868
A698
6C6
A602
12SJ7
A182
6SC7
A600
6L6
A601
5T4
A863
.005
A170
30M
A563
4 Meg.
A68
22 Meg.
A290
1500Ω
A208
100M
A625
500M
A63
1 Meg.
A75
2200Ω
A335
40M
A349
270M
A618
2.5 Meg.
A295
470M
A381
.00025
A58
.0004
T.1.
A30 2.5 h.
A192
.05
A407
91M
A52
.02
A599
3600Ω
A125
80M
A575
50
A214
225M
1200Ω
A297
10M
320V.
A394
4
A293
4700Ω
A874
650Ω
20M
A875
30
A602
J K R S
HEATERS
A873
.2
40
.1
10
A530
180M
A73
100M
A161
500M
A630
30
295V.
.85V.
A74 1.5 Meg.
A201 270M
207V.
A21
A68
2.2 Meg.
A470
A259
750Ω
420V.
5 V. A.C.
3A.
6.3 V. A.C.
3.5 A.
A624
BROWN
A625
6Ω
BLACK
A626 FOR 60~ MOD. B, A637 FOR 25~ MOD. BB
TOTALLY SHIELDED PRIMARY
115V. 25~
A.C.
A872
.005
.04
LEAD TO GROUND WITHIN CAN
A172
A631
3A
WHT.
A15
WHITE
BLACK
BLACK-RED
WHITE-RED
WHITE
GREY
A404
REV.
FOR.
A17
A166
YELLOW
WHITE-RED
A297
10M
A872 .6
A872 .01
GREEN
ORANGE
BLACK-RED.
BLACK
GREY
RED
ORANGE
BLACK .01 .5 GREEN
WHITE .04 .04 WHITE
.005
A872

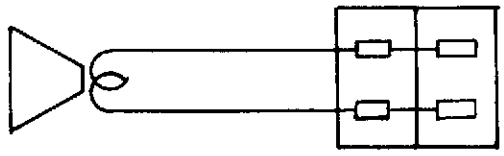
AGE G6

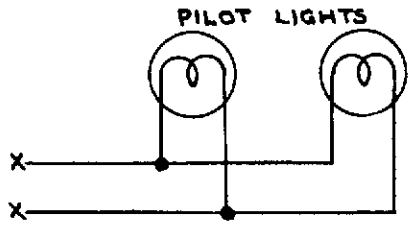
NOTE: * ⊗ Δ Δ† ϕ DENOTE COMPONENTS OF SAME UNIT.



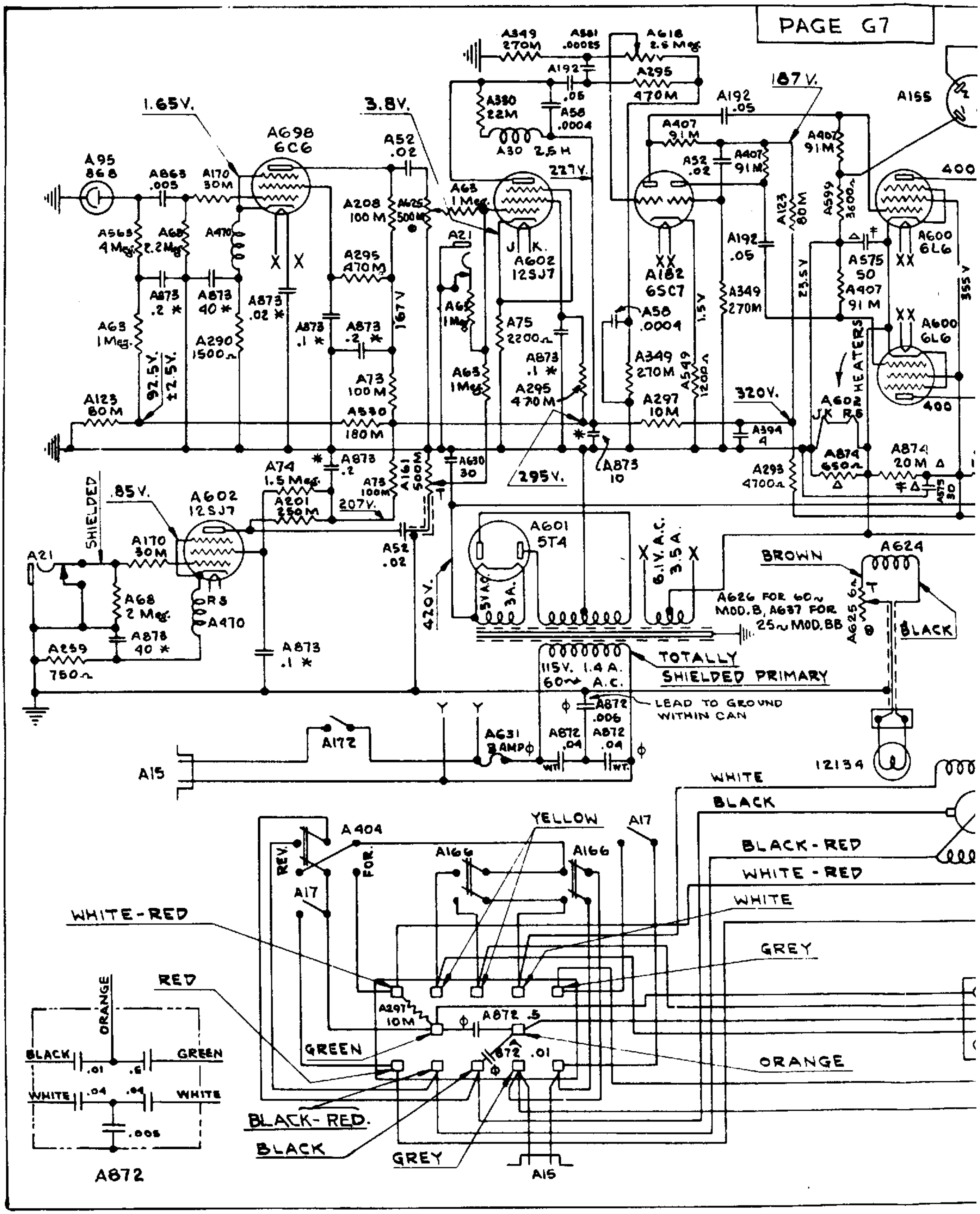


SPEAKER CORD COMPLETE 02937





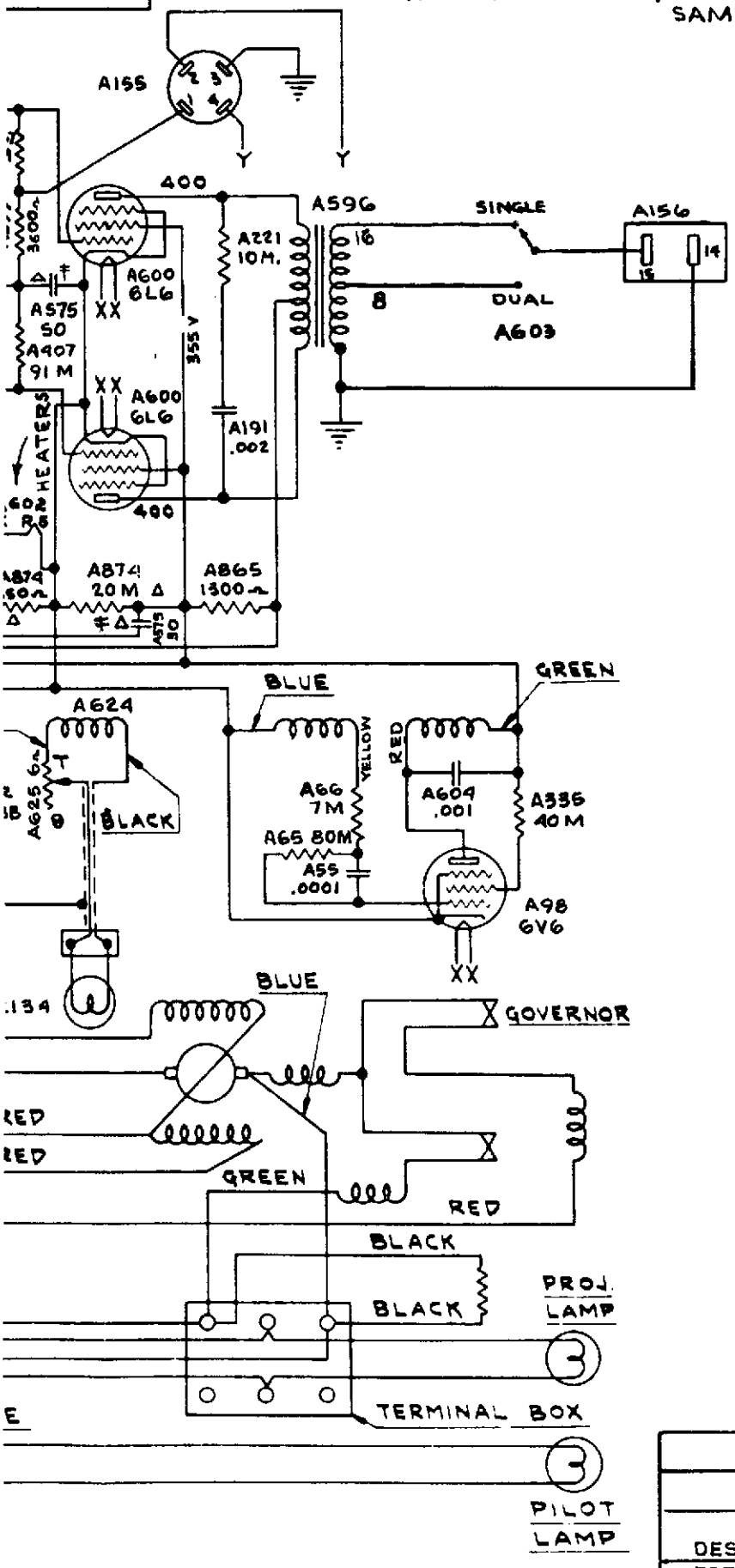
SERVICE DATA	
WIRING DIAGRAM	
FILMOSOUND	
DESIGN 142-25~	MODEL BB
FOR USE WITH AMPLIFIER #03312 SERIAL NO'S 88671-88770 INCL.	DATE: 1-4-46

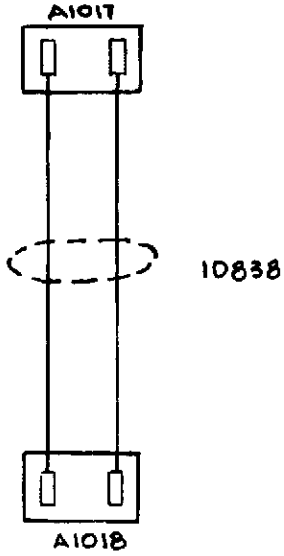


1.65V.
3.8V.
A698
6C6
A95
868
A863
.005
A170
30M
A565
4 Meg.
A68
2.2 Meg.
A470
A873
.2 *
A873
40 *
A873
.02 *
A68
1 Meg.
A290
1500Ω
92.5V.
12.5V.
A123
80M
A52
.02
A208
100 M
A625
500M
A295
470M
A873
.1 *
A873
.2 *
167V
A73
100 M
A530
180M
A349
270M
A581
.00025
A618
2.5 Meg.
A192
.05
A295
470M
A330
22M
A58
.0004
A30 2.5 H
227V.
A65
1 Meg.
A21
A602
12SJ7
A75
2200Ω
A873
.1 *
A295
470M
295V.
A875
10
187V.
A192
.05
A407
91M
A52
.02
A182
6SC7
A123
80M
A58
.0004
A349
270M
A549
1200Ω
1.5V
A297
10M
A394
4
320V.
23.5V
A155
A599
3600Ω
A575
50
A600
6L6
400
355V
HEATERS
A602
JK R6
A874
650Ω
A874
20M Δ
A293
4700Ω
A873
30
.85V.
SHIELDED
A74
1.5 Meg.
A201
250M
207V.
A75
100M
A161
500M
A630
30
A52
.02
A601
5T4
5V.A.C.
3A.
6.1V.A.C.
3.5A
420V.
A624
BROWN
A626 FOR 60~ MOD.B, A637 FOR 25~ MOD.BB
A625 6Ω
BLACK
A68
2 Meg.
A878
40 *
A470
A259
750Ω
A873
.1 *
115V. 1.4A.
60~ A.C.
TOTALLY
SHIELDED PRIMARY
A872
.006
LEAD TO GROUND WITHIN CAN
A872
.04
A872
.04
A172
A631
3 AMP
A15
12134
WHITE
BLACK
BLACK - RED
WHITE - RED
WHITE
GREY
YELLOW
A404
REV.
FOR.
A17
A166
A166
WHITE-RED
RED
A297
10M
A872 .5
GREEN
A872 .01
ORANGE
BLACK-RED.
BLACK
GREY
A15
ORANGE
BLACK
GREEN
.01
.5
WHITE
.04
.04
WHITE
.005
A872

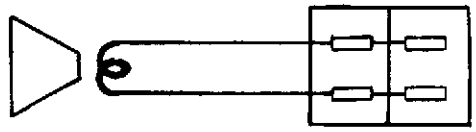
E G7

NOTE: ✱ ● Δ‡ ▲ ϕ DENOTE COMPONENTS OF SAME UNIT.

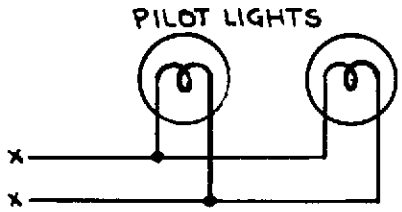




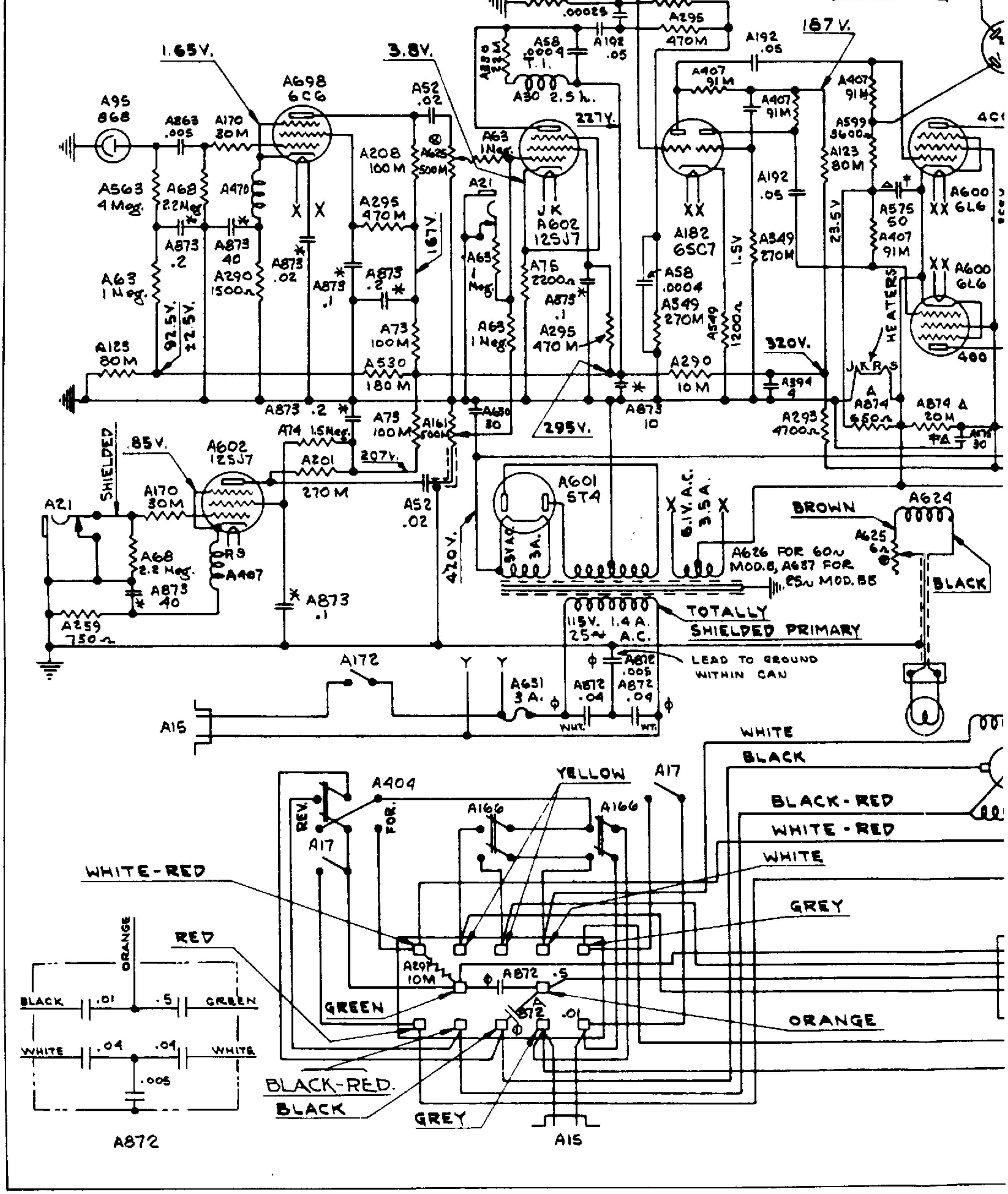
SPEAKER CORD COMPLETE 02937



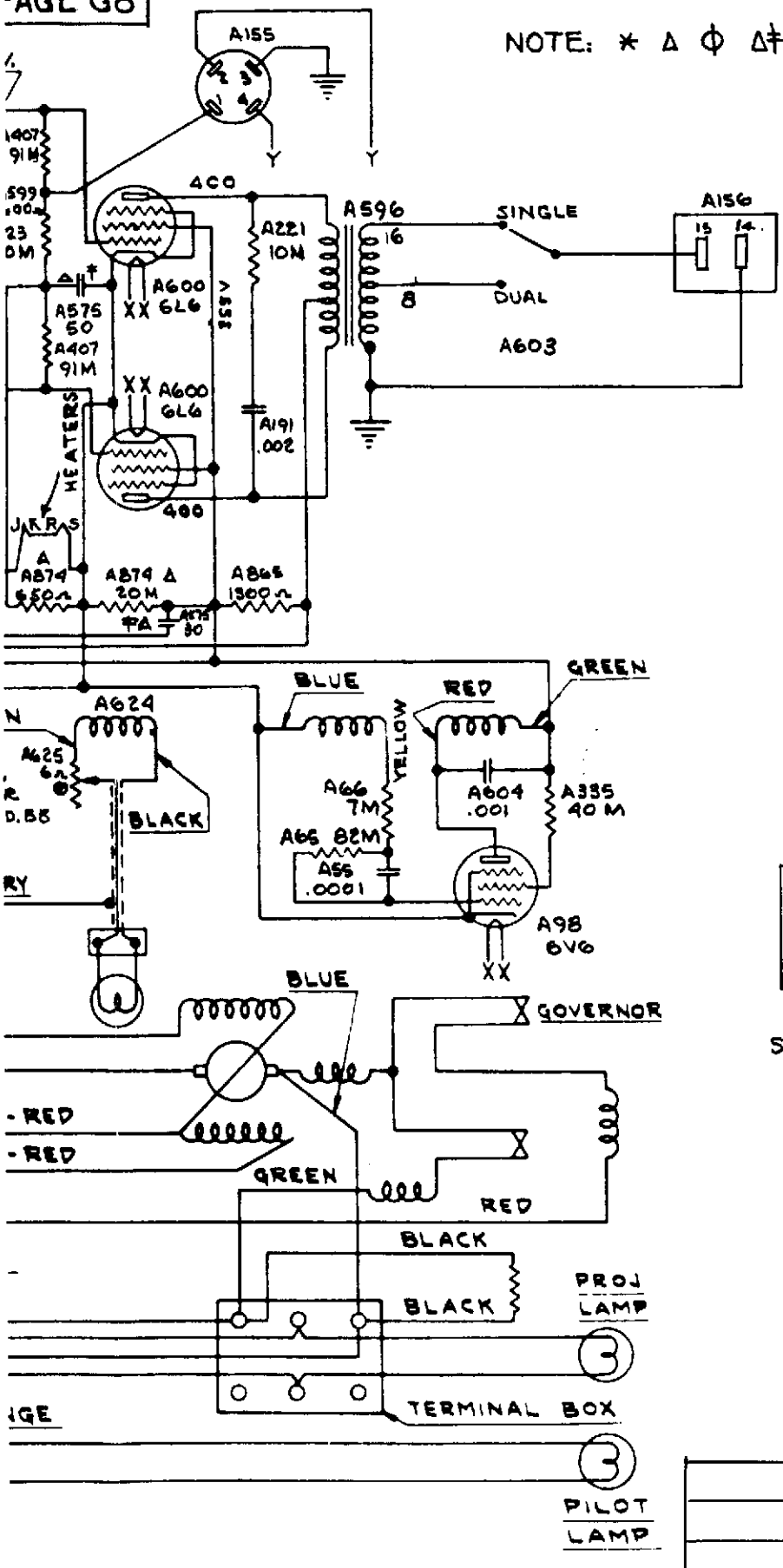
SPEAKER A1392 A994

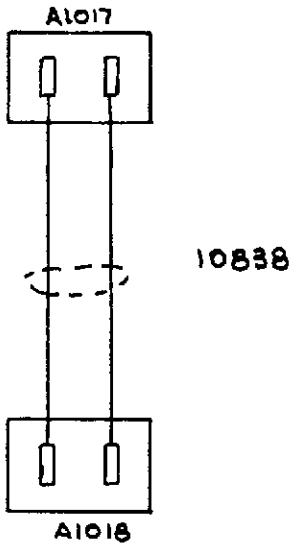


SERVICE DATA	
WIRING DIAGRAM	
FILMOSOUND	
DESIGN 142	MODEL B
FOR USE WITH AMPLIFIER *03304	DATE: 1-4-46
SERIAL NO'S 90427-90651, 93711-93960 INCL.	

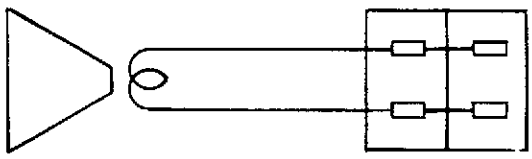

1.65V.
3.8V.
187V.
A95
868
A698
6C6
A602
12SJ7
A182
6SC7
A600
6L6
A601
5T4
A624
A30 2.5 h.
T.I.
227V.
167V.
320V.
295V.
207V.
420V.
.85V.
SHIELDED
92.5V.
12.5V.
1.5V
23.5V
HEATERS
6.1V. A.C.
3.5 A.
A626 FOR 60~
MOD.8, A637 FOR
25~ MOD.8B
BROWN
BLACK
TOTALLY
SHIELDED PRIMARY
115V. 1.4 A.
25~ A.C.
LEAD TO GROUND
WITHIN CAN
A172
A631
3 A.
A15
WHITE
BLACK
BLACK-RED
WHITE-RED
WHITE
GREY
ORANGE
YELLOW
A404
REV.
FOR.
A17
A166
WHITE-RED
RED
GREEN
BLACK-RED
BLACK
GREY
ORANGE
BLACK
GREEN
WHITE
WHITE
A872

NOTE: * Δ Φ Δ‡ ⊗ DENOTE COMPONENTS OF SAME UNIT.

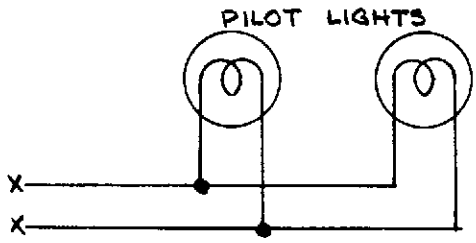




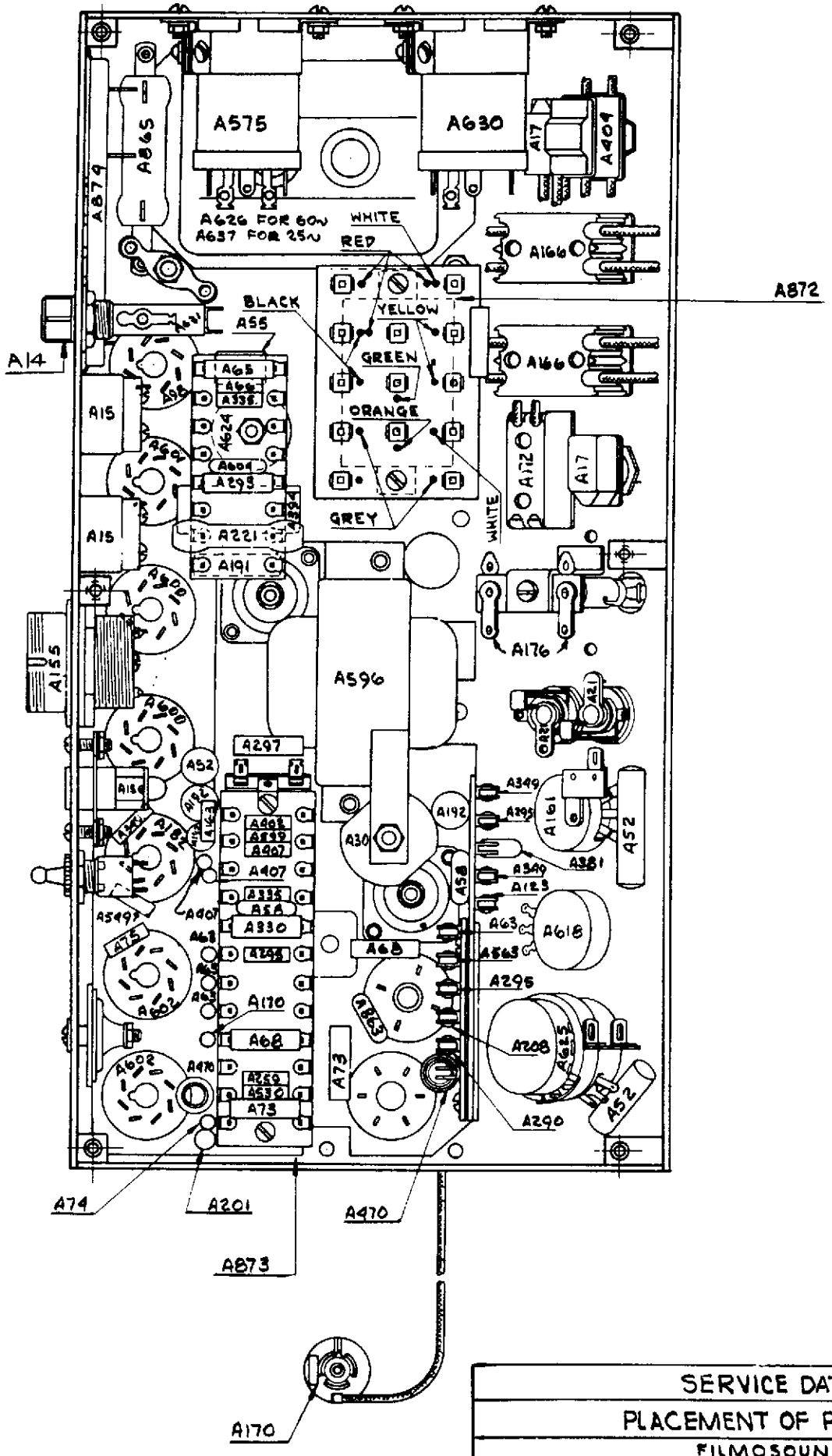
SPEAKER CORD COMPLETE 02937



SPEAKER A1392 A994



SERVICE DATA	
WIRING DIAGRAM	
FILMOSOUND	
DESIGN 142	MODEL 88
FOR USE WITH AMPLIFIER #03312	DATE: 1-5-46
SERIAL NO. 90652 - 90676 INCL.	



SERVICE DATA	
PLACEMENT OF PARTS	
FILMOSOUND	
DESIGN 142	MODEL 8
FOR USE ONLY WITH PART NO.	DATE: 1-5-46

DESIGN 142, MODEL C

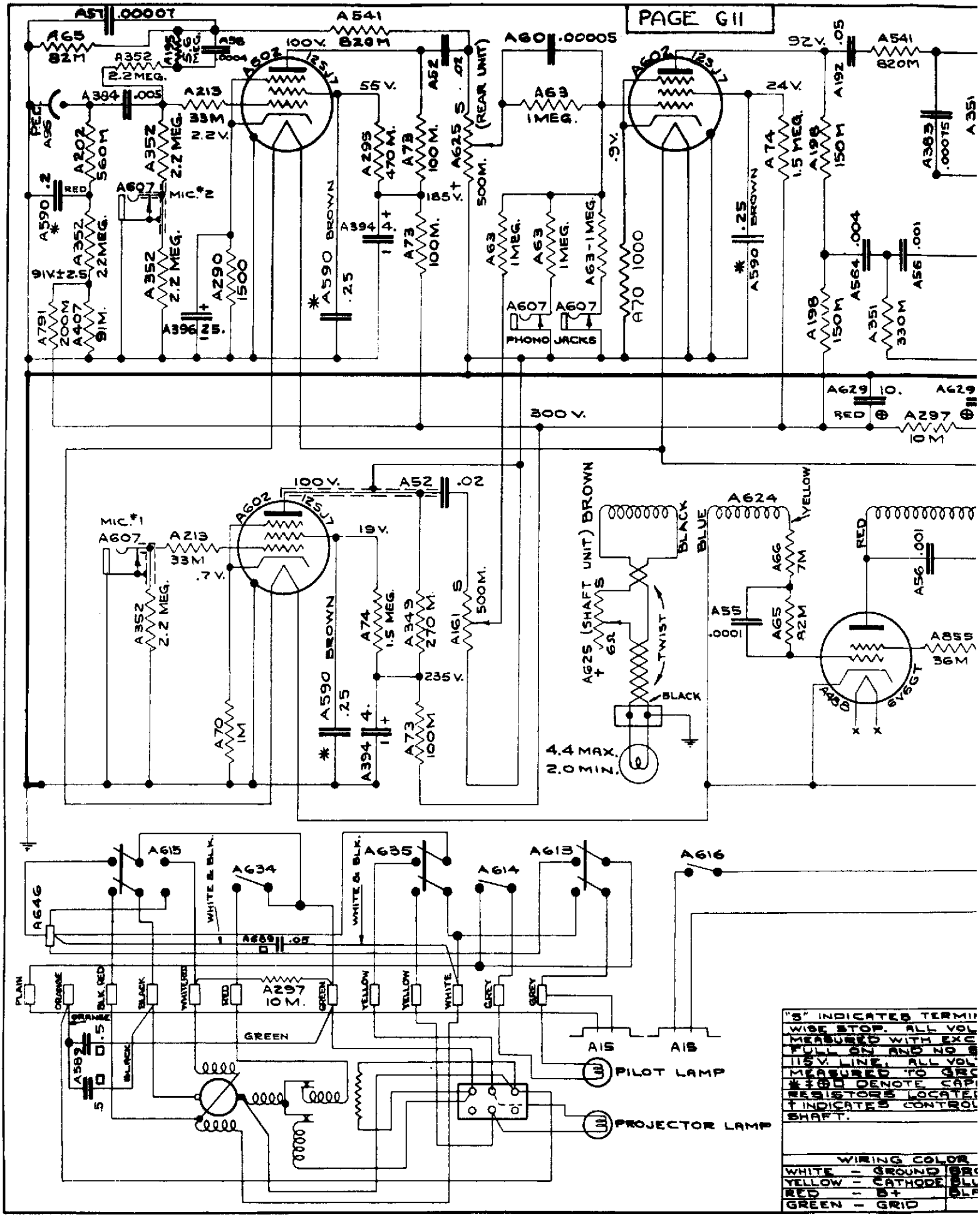
GENERAL INFORMATION.

Amplifiers beginning with serial number 100901 do not have provisions for connecting a booster amplifier.

The three 12-volt tube filaments are series operated from the 6L6 tubes' cathode circuit.

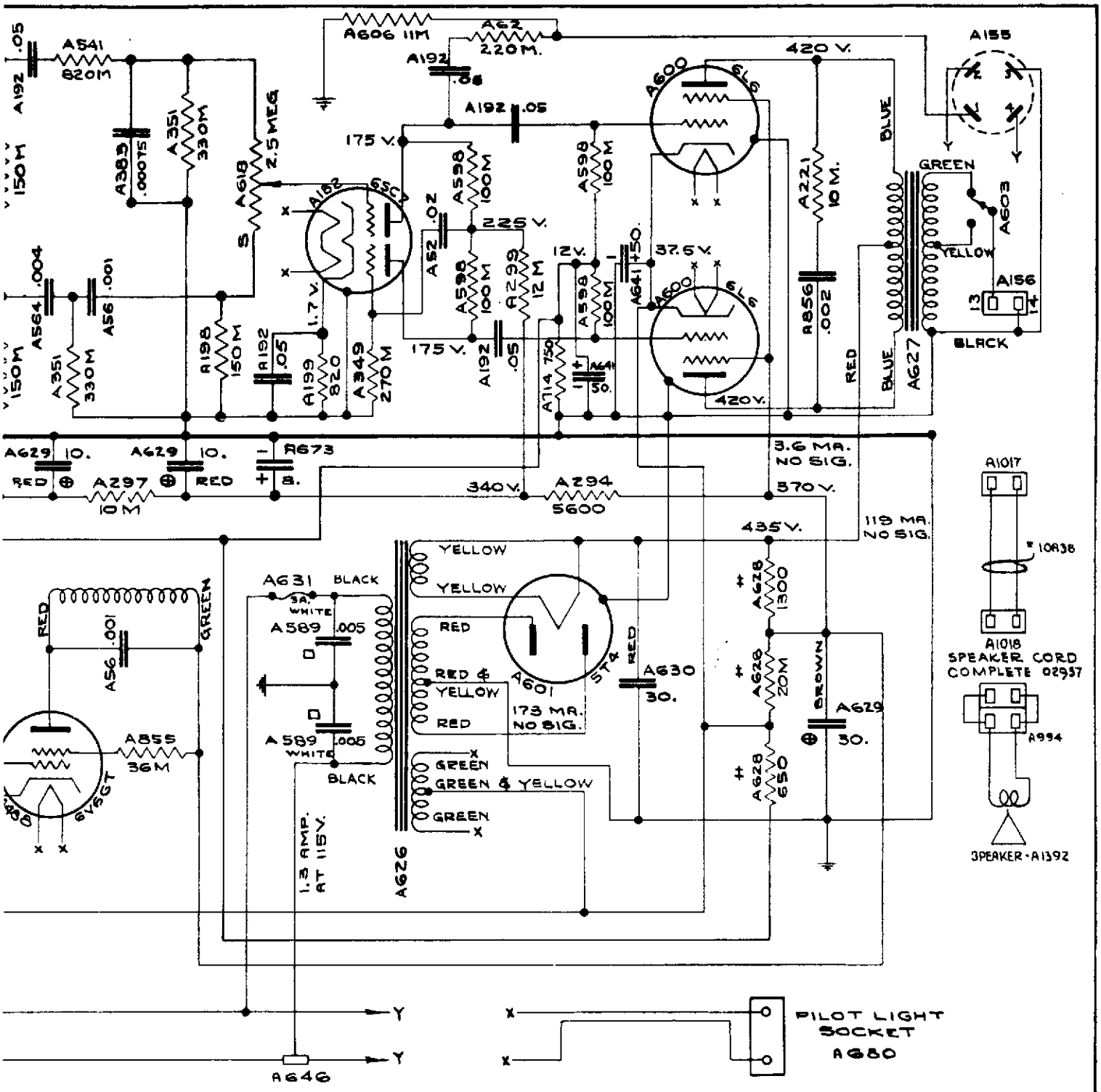
The fuse used is a 3-ampere, type 3AG.

The power output is 25 watts.



"S" INDICATES TERMI
WISE STOP. ALL VOL
MEASURED WITH EXC
FULL ON AND NO
115V. LINE. ALL VOL
MEASURED TO GRO
*±10% DENOTE CAP
RESISTORS LOCATE
† INDICATES CONTRO
SHAFT.

WIRING COLOR	
WHITE - GROUND	GRO
YELLOW - CATHODE	BLU
RED - B+	BLA
GREEN - GRID	



INDICATES TERMINAL AT CLOCK-
STOP. ALL VOLTAGES
SURED WITH EXCITER LAMP
ON AND NO SIGNAL AT
LINE. ALL VOLTAGES
SURED TO GROUND.
DENOTE CAPACITORS OR
ISTORS LOCATED IN BANK.
ICATES CONTROLS ON SAME
T.

WIRING COLOR CODE	
E - GROUND	BROWN - SCREEN
W - CATHODE	BLUE - PLATE
- B+	BLACK - HEATER
N - GRID	

FOR USE WITH AMPLIFIERS BEARING SERIAL NO'S. 100,001 TO 100,900 INCLUSIVE.

AS 6

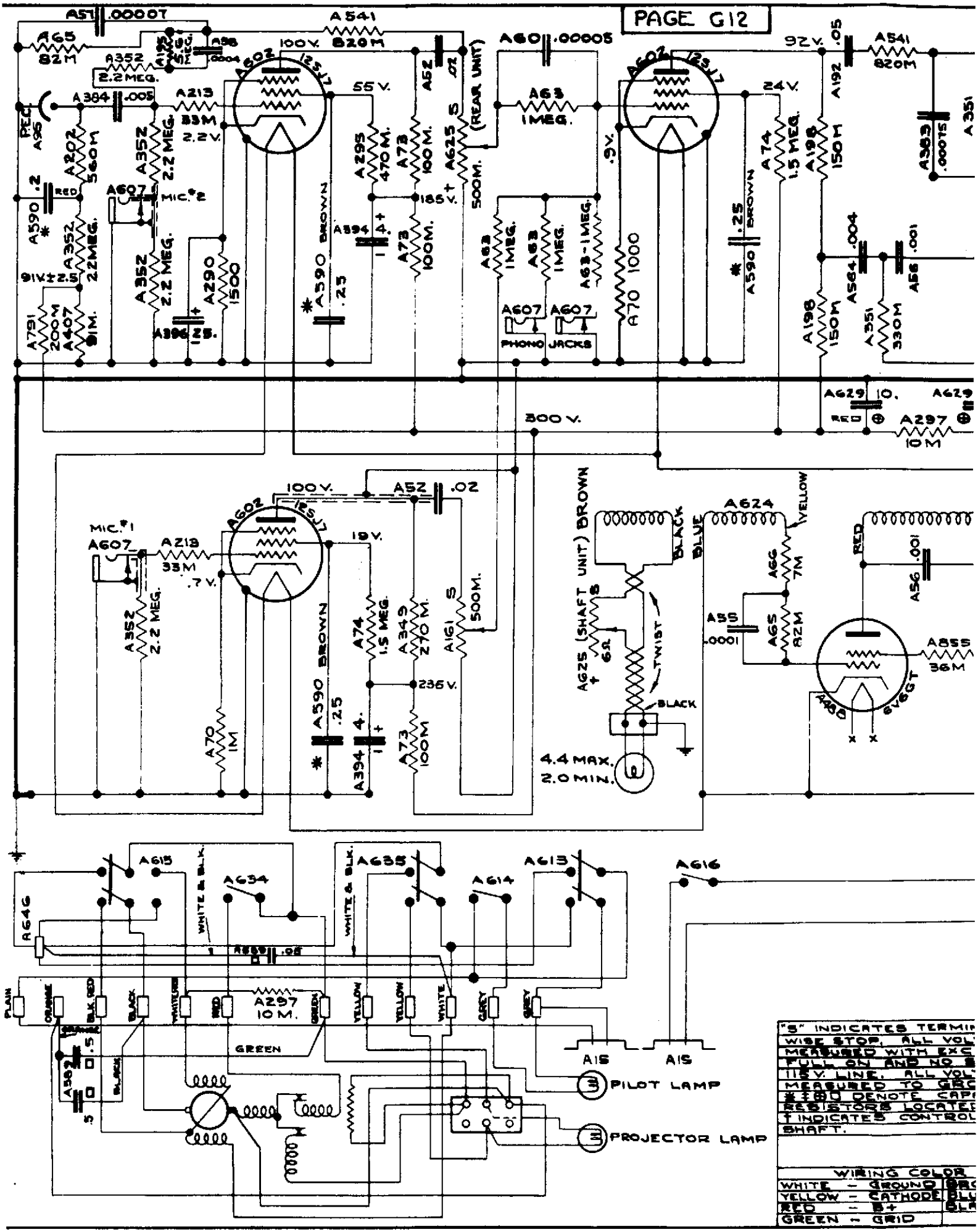
SERVICE DATA

AMPLIFIER WIRING DIAGRAM

MASTER 142 C
60 CYCLE FILMOSOUND

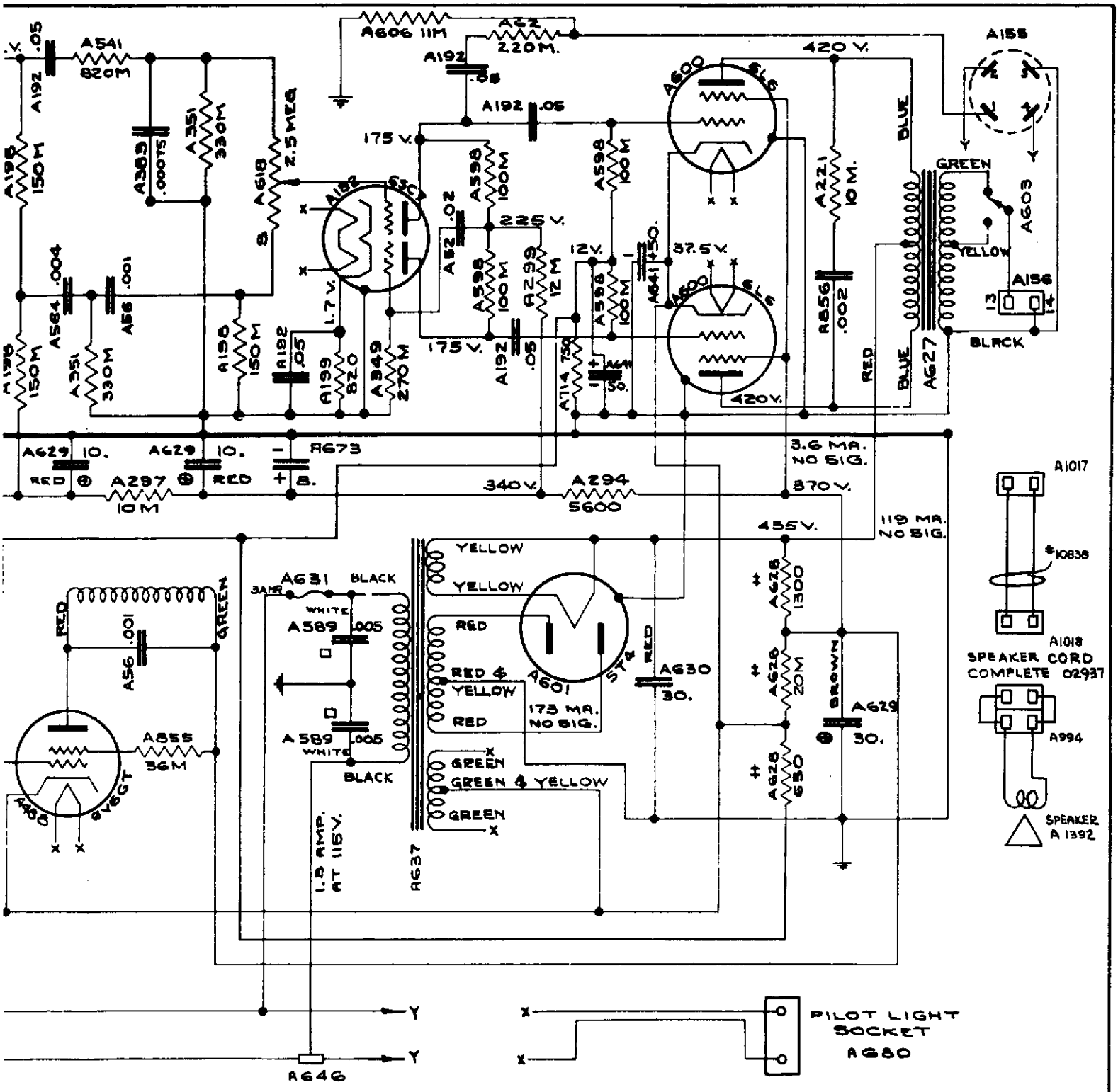
FOR USE ONLY WITH AMPLIFIER PART NO. 12218

DATE 6-14-40



"S" INDICATES TERMIN
WISE STOP. ALL VOL
MEASURED WITH EXC
FULL ON AND NO
115 V. LINE. ALL VOL
MEASURED TO GRO
#□□ DENOTE CAP
RESISTORS LOCATE
† INDICATES CONTROL
SHAFT.

WIRING COLOR	
WHITE	– GROUND
YELLOW	– CATHODE
RED	– B+
GREEN	– GRID



INDICATES TERMINAL AT CLOCK-
E STOP. ALL VOLTAGES
ASURED WITH EXCITER LAMP
L ON AND NO SIGNAL AT
V. LINE. ALL VOLTAGES
ASURED TO GROUND.
DENOTE CAPACITORS OR
SISTORS LOCATED IN BANK.
DICATES CONTROLS ON SAME
AFT.

WIRING COLOR CODE

TE - GROUND	BROWN - SCREEN
LOW - CATHODE	BLUE - PLATE
- B+	BLACK - HEATER
EEN - GRID	

FOR AMPLIFIERS BEARING SERIAL NO'S 100,001 TO 100,125 INCLUSIVE.

AS 12

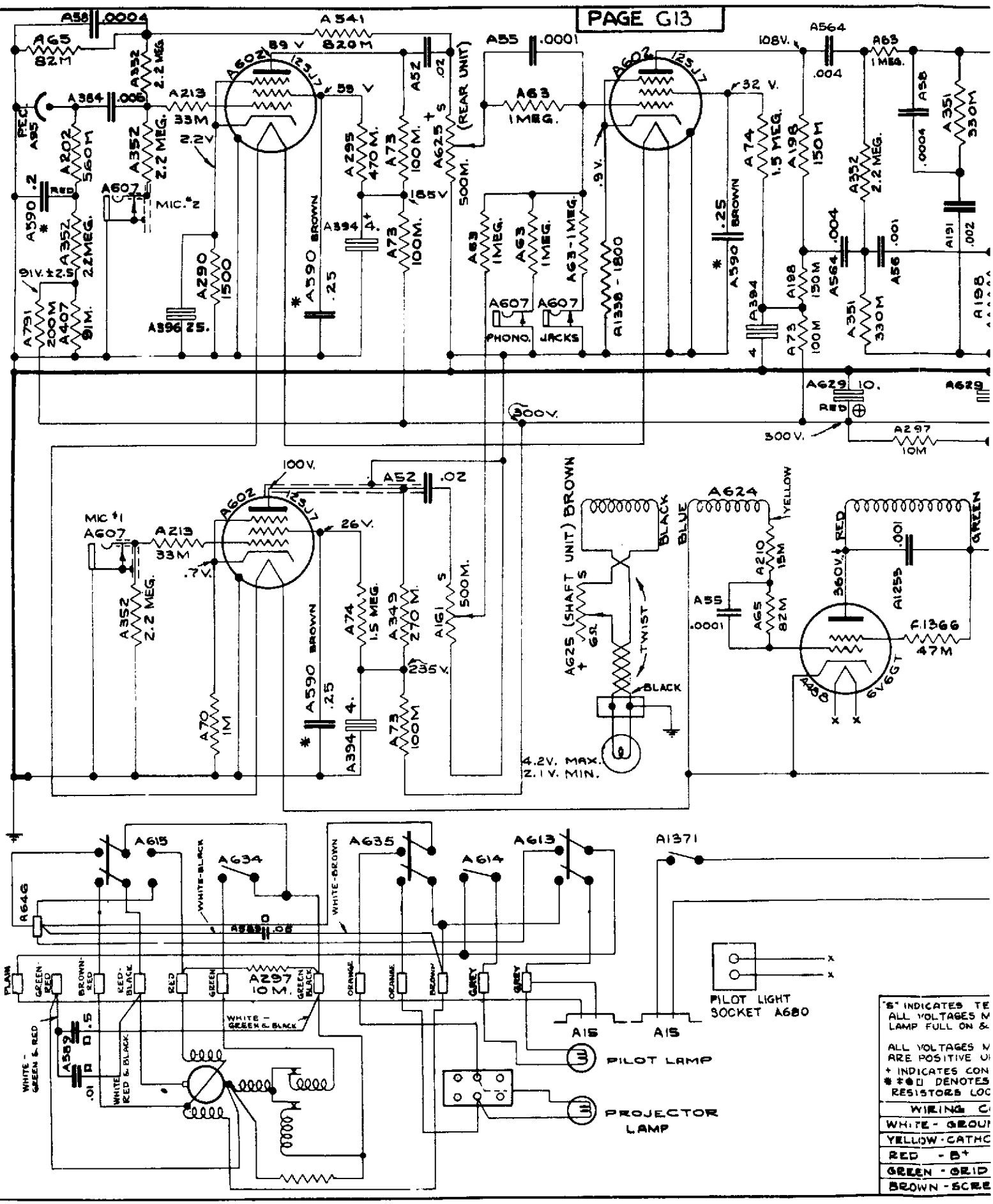
SERVICE DATA

AMPLIFIER WIRING DIAGRAM

MASTER 142 CB
25 CYCLE FILMOSOUND

FOR USE ONLY WITH AMPLIFIER PART NO. 12219

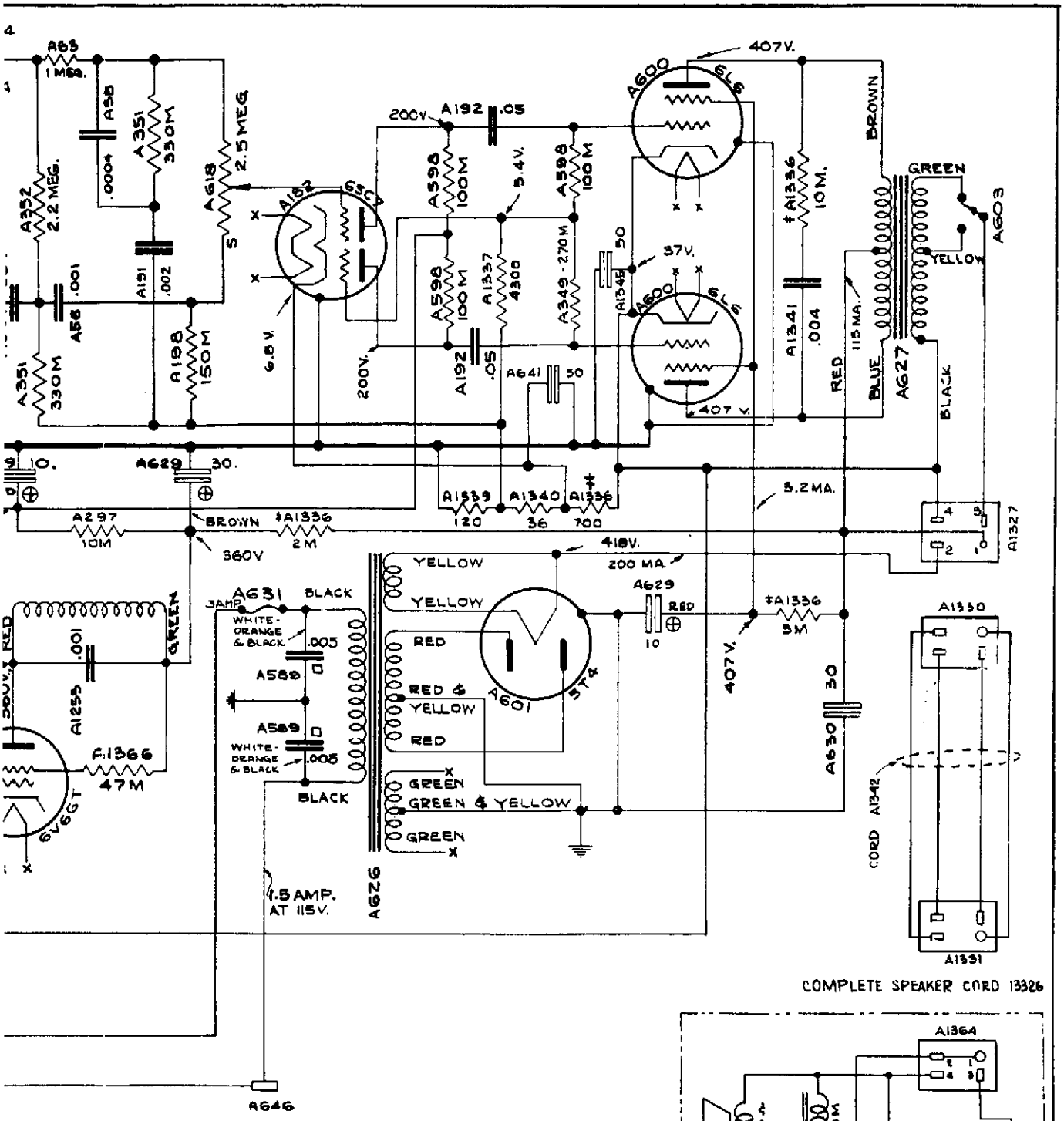
DATE 8-7-40



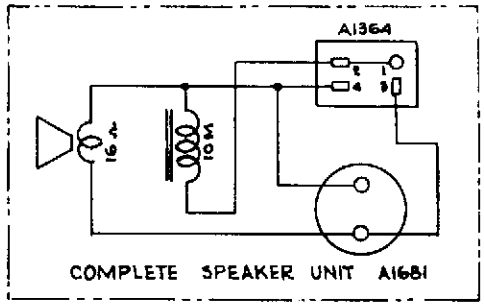
"S" INDICATES TE
ALL VOLTAGES M
LAMP FULL ON &

ALL VOLTAGES M
ARE POSITIVE U
+ INDICATES CON
* # ◻ DENOTES
RESISTORS LOC

WIRING C
WHITE - GROU
YELLOW - CATHO
RED - B+
GREEN - GRID
BROWN - SCRE



COMPLETE SPEAKER CORD 13326



COMPLETE SPEAKER UNIT A1681

"B" INDICATES TERMINAL AT CLOCKWISE STOP.
ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON & NO SIGNAL AT 115 V. LINE.

ALL VOLTAGES MEASURED TO GROUND AND ARE POSITIVE UNLESS OTHERWISE MARKED.

+ INDICATES CONTROLS ON SAME SHAFT.
* ⊕ □ DENOTES CAPACITORS OR RESISTORS LOCATED IN BANK.

WIRING COLOR CODE	
WHITE - GROUND	BLUE - PLATE
YELLOW - CATHODE	BLACK - HEATER
RED - B+	
GREEN - GRID	
BROWN - SCREEN	

A547

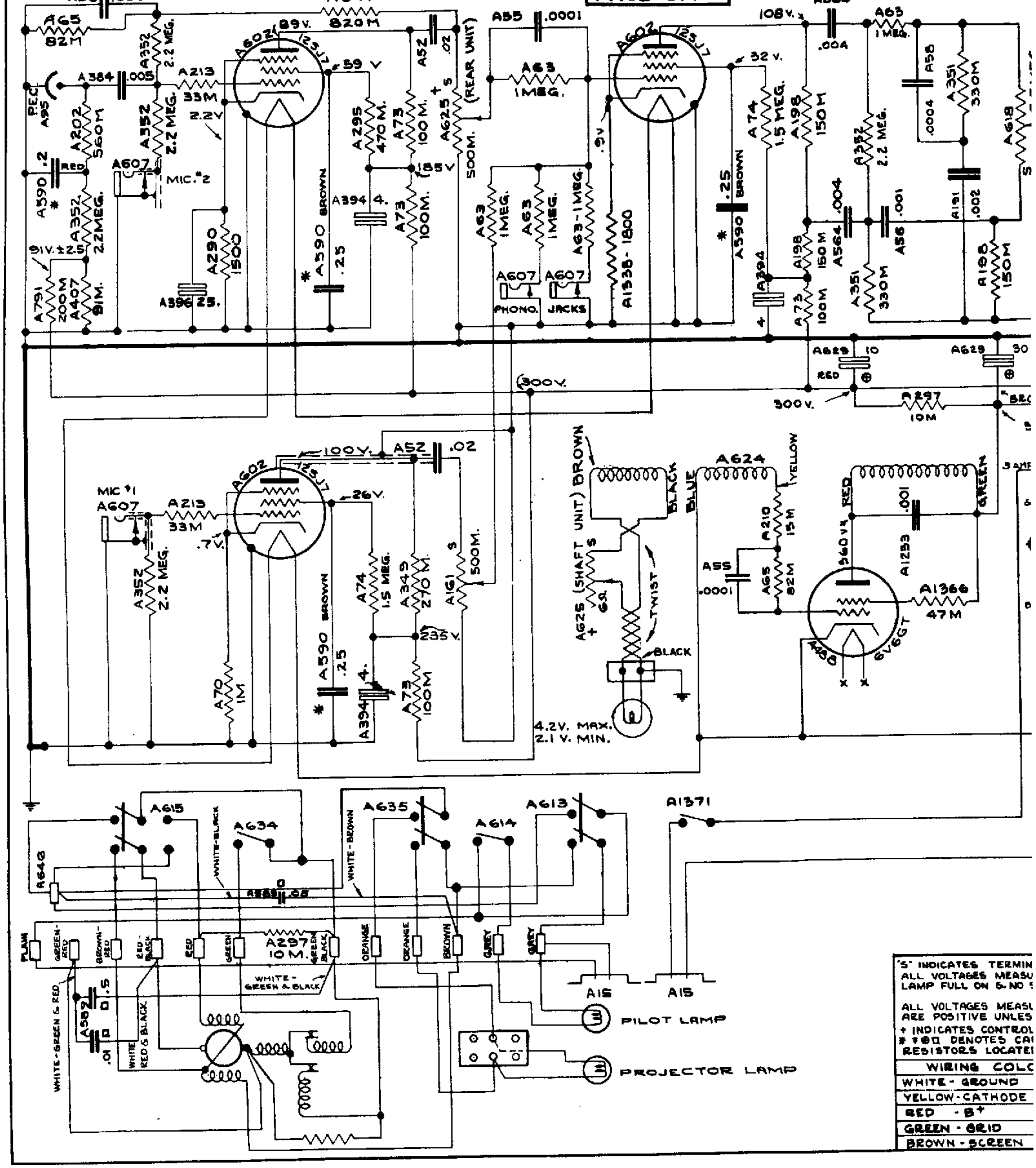
SERVICE DATA

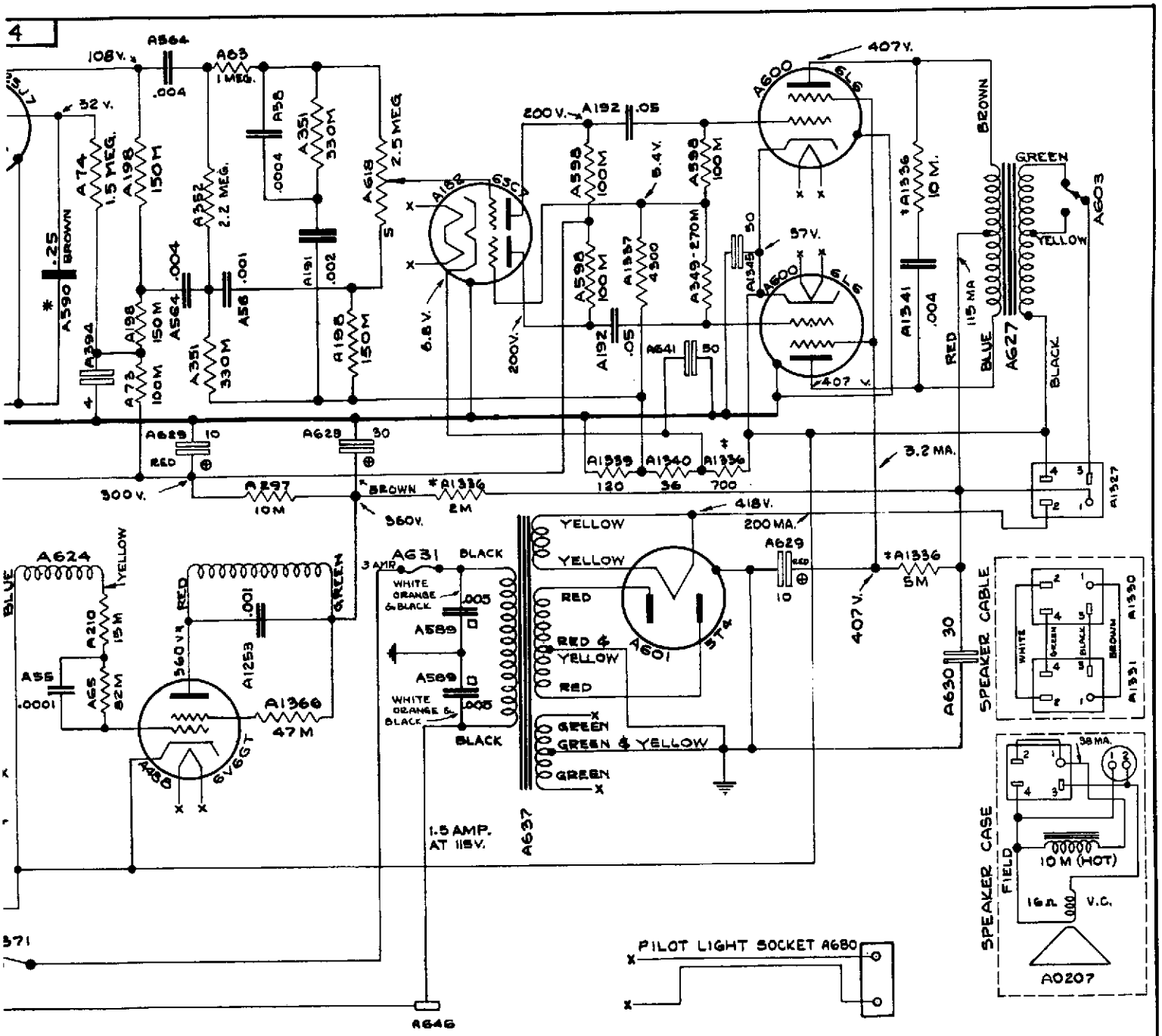
AMPLIFIER WIRING DIAGRAM

MASTER 142 D
60 CYCLE FILMOSOUND

FOR USE ONLY WITH AMPLIFIER PART NO. 13324

DATE 6-4-41


A58 .0004
A65 82M
A541 820M
A352 2.2 MEG.
A602 12SJ7
89V.
59 V
A55 .0001
A63 1MEG.
32 V.
108V.
A564 .004
A63 1MEG.
A58 .0004
A351 330M
A618
PEC A95
A384 .005
A213 33M
2.2V
A202 560M
A590 .2 RED
A607 MIC.#2
A352 2.2MEG.
91V.±2.5
A791 200M
A407 91M
A396 25.
A290 1500
A590 BROWN .25
A295 470M.
A73 100M.
A52 .02
A625 S (REAR UNIT) 500M.
185V
A394 4.
A63 1MEG.
A63-1MEG.
A607 PHONO.
A607 JACKS
A1338-1800
.9V
A590 .25 BROWN
A74 1.5 MEG.
A198 150M
A394 4
A73 100M
A352 2.2 MEG.
A564 .004
A56 .001
A191 .002
A198 150M
A351 330M
A629 10 RED
A629 30
300V.
A297 10M
MIC #1 A607
A213 33M
.7V.
100V.
A52 .02
26V.
A352 2.2 MEG.
A70 1M
A590 .25 BROWN
A74 1.5 MEG.
A349 270M.
A161 S 500M.
235V.
A394 4.
A73 100M
4.2V. MAX.
2.1 V. MIN.
BROWN
A625 (SHAFT UNIT) S 6Ω
BLACK
TWIST
BLACK
A624
BLUE
YELLOW
A55 .0001
A210 15M
A65 82M
560V.
RED
.001
GREEN
A1253
A1366 47M
A438 6V6GT
A615
A634
A635
A614
A613
A1371
A646
WHITE-BLACK
WHITE-BROWN
A588 .05
PLAIN
GREEN-RED
BROWN-RED
RED-BLACK
RED
GREEN
A297 10M.
GREEN BLACK
WHITE-GREEN & BLACK
ORANGE
ORANGE
BROWN
GREY
GREY
A15
A15
PILOT LAMP
PROJECTOR LAMP
WHITE-GREEN & RED
A582 0.5
.01
WHITE RED & BLACK
"S" INDICATES TERMIN
ALL VOLTAGES MEASU
LAMP FULL ON & NO S
ALL VOLTAGES MEASU
ARE POSITIVE UNLES
+ INDICATES CONTROL
* #80 DENOTES CA
RESISTORS LOCATE
WIRING COLO
WHITE - GROUND
YELLOW-CATHODE
RED - B+
GREEN - GRID
BROWN - SCREEN



"S" INDICATES TERMINAL AT CLOCKWISE STOP ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON & NO SIGNAL AT 115 V. LINE.

ALL VOLTAGES MEASURED TO GROUND AND ARE POSITIVE UNLESS OTHERWISE MARKED.
+ INDICATES CONTROLS ON SAME SHAFT.
* †ØD DENOTES CAPACITORS OR RESISTORS LOCATED IN BANK.

WIRING COLOR CODE	
WHITE - GROUND	BLUE - PLATE
YELLOW - CATHODE	BLACK - HEATER
RED - B+	
GREEN - GRID	
BROWN - SCREEN	

A549

SERVICE DATA

AMPLIFIER WIRING DIAGRAM

MASTER 142 DB
25 CYCLE FILMOSOUND

FOR USE ONLY WITH AMPLIFIER #13325

DATE 6-16-41

DESIGN 156, ALL MODELS

GENERAL INFORMATION.

Amplifiers part #12814, 12815, 13728, and 13817 use an electrodynamic speaker. The field consists of two windings. The 19000-ohm winding is across the B Power supply and the 4000-ohm winding feeds the oscillator. Should the latter winding short out it will cause excessive exciter lamp voltage. Should the 19000-ohm winding open up the field will not be properly energized, causing the volume to be low.

While the base pins and connection are alike, the 5Z4 and 5Y3GT rectifiers are not interchangeable in these amplifiers. Use the one indicated on the drawing.

All projectors using these amplifiers are equipped with a remote volume control jack. The control consists of a series rheostat connected into the exciter lamp circuit. The plug and jack are undersized phone type so that a microphone may not be accidentally connected to the circuit.

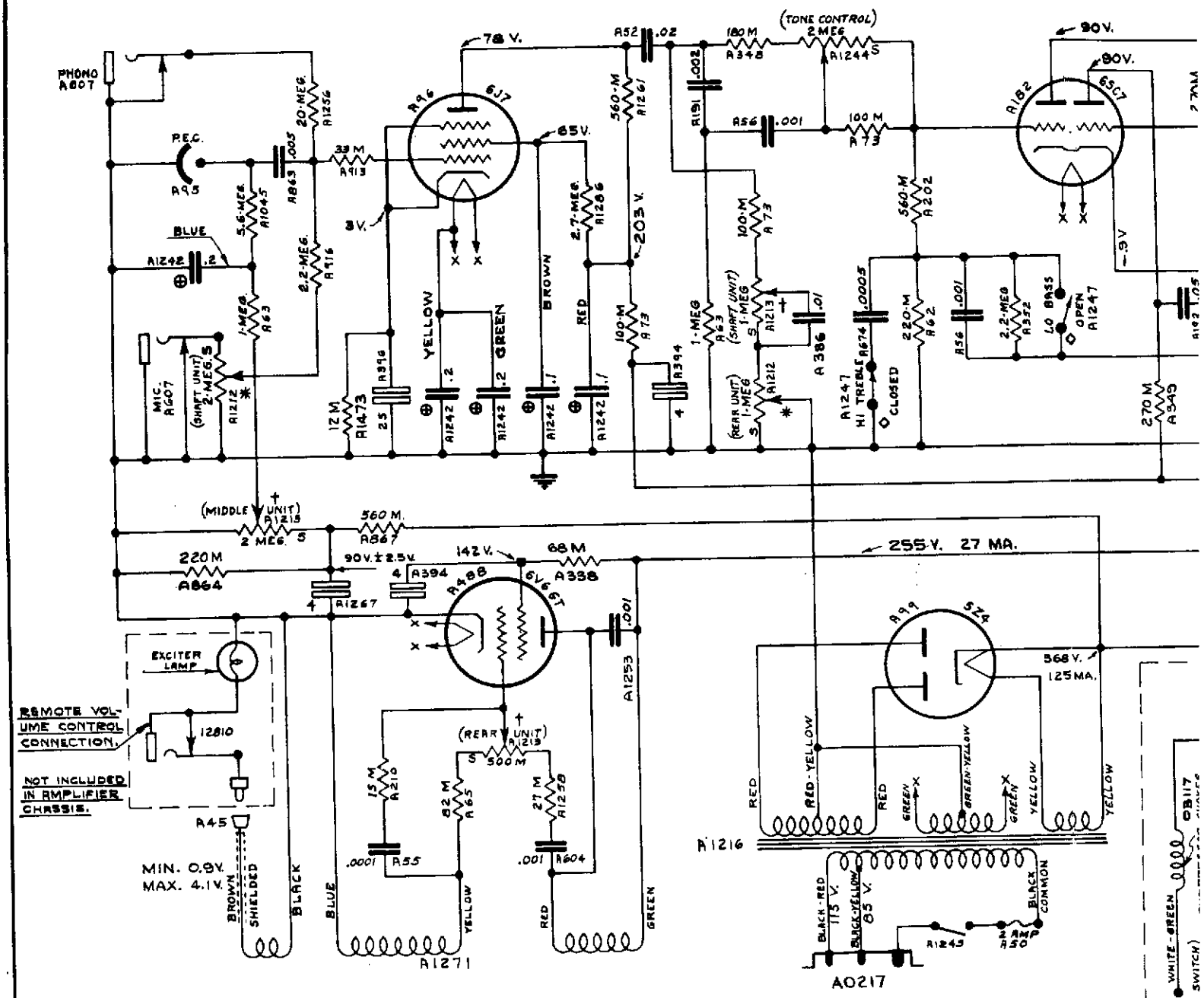
The special A. C. receptacle on the amplifiers is for connecting a polarity changer to a lower voltage tap on the power transformer in addition to making the regular line connection to the amplifier transformer.

Amplifiers part #12814, 12815, 13728 have two input circuits in addition to film. The microphone input has a volume control while the phonograph input does not.

All Design 156 amplifiers deliver 12 watts of power.

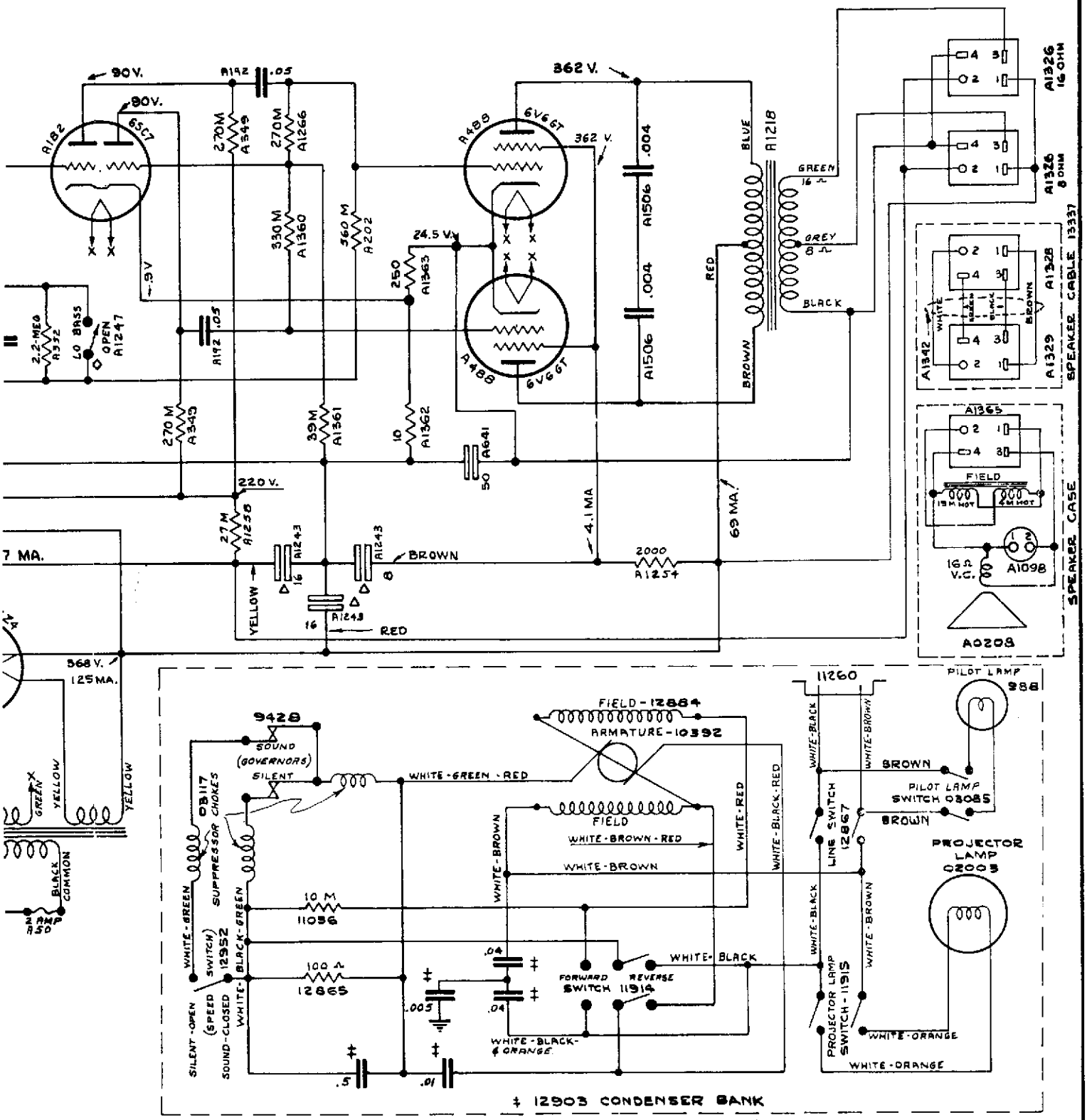
DESIGN 156, AMPLIFIER NO. 12814

Two series of these amplifiers were manufactured. The difference was in the tone control circuits. The first series used one variable control and two switches. These switches shifted the frequency characteristics of the variable control circuit. The second series had two separate variable controls.



'S' INDICATES TERMINAL AT CLOCKWISE STOP.
ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 115 VOLT LINE. ALL VOLTAGES MEASURED TO GROUND.
⊕ △ INDICATES CAPACITORS LOCATED IN BANK.
† ✱ INDICATES CONTROLS ON SAME SHAFT.
◇ SWITCHES SHOWN WITH SLIDE BUTTONS IN DOWN POSITION.

WIRING COLOR CODE			
WHITE	GROUND	BROWN	SCREEN
YELLOW	CATHODE	BLUE	PLATE
RED	B+	BLACK	HEATER
GREEN	GRID		

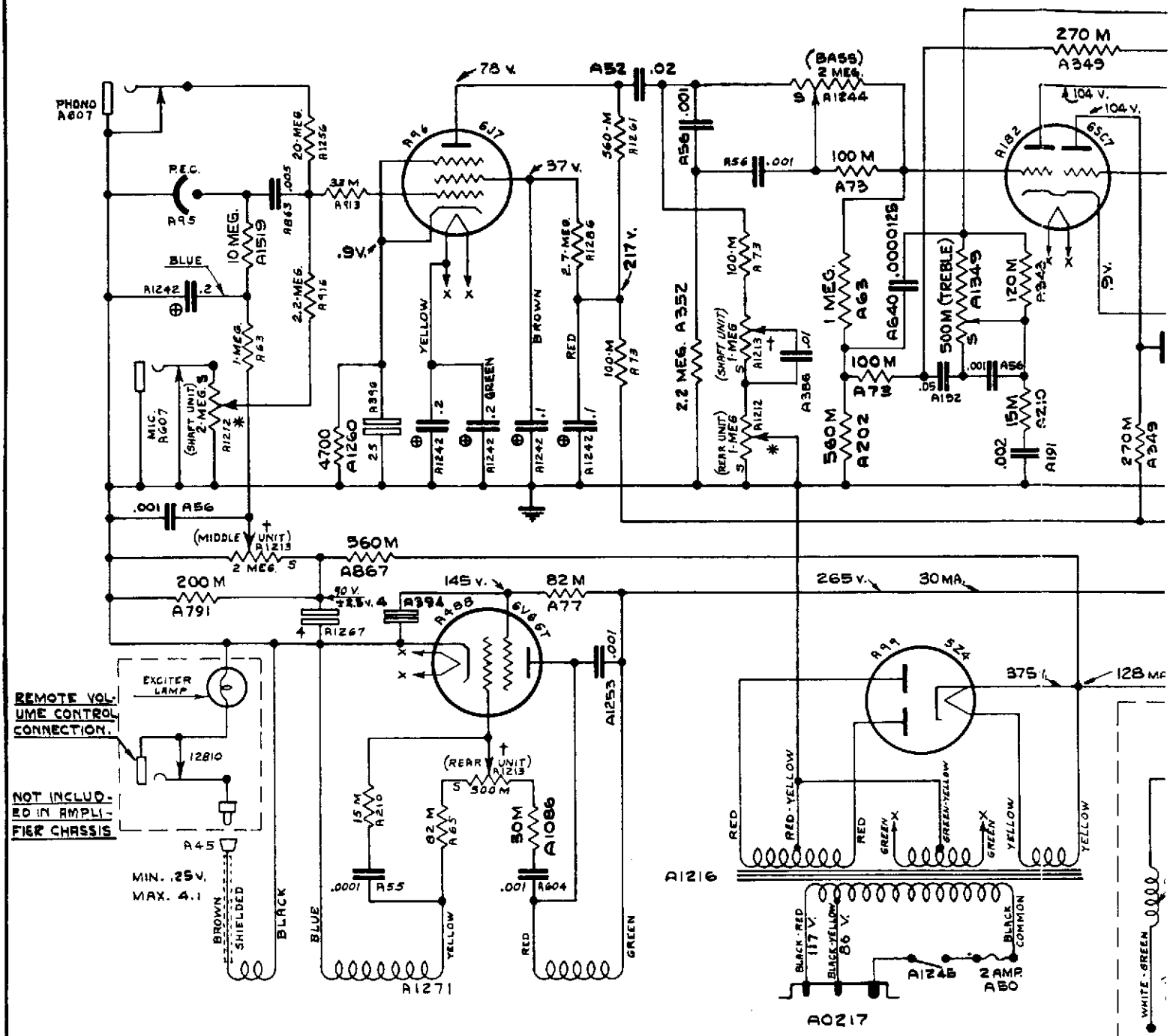


PROJECTOR WIRING DIAGRAM (156 "UTILITY")
NOT INCLUDED IN AMPLIFIER CHASSIS

RS 43

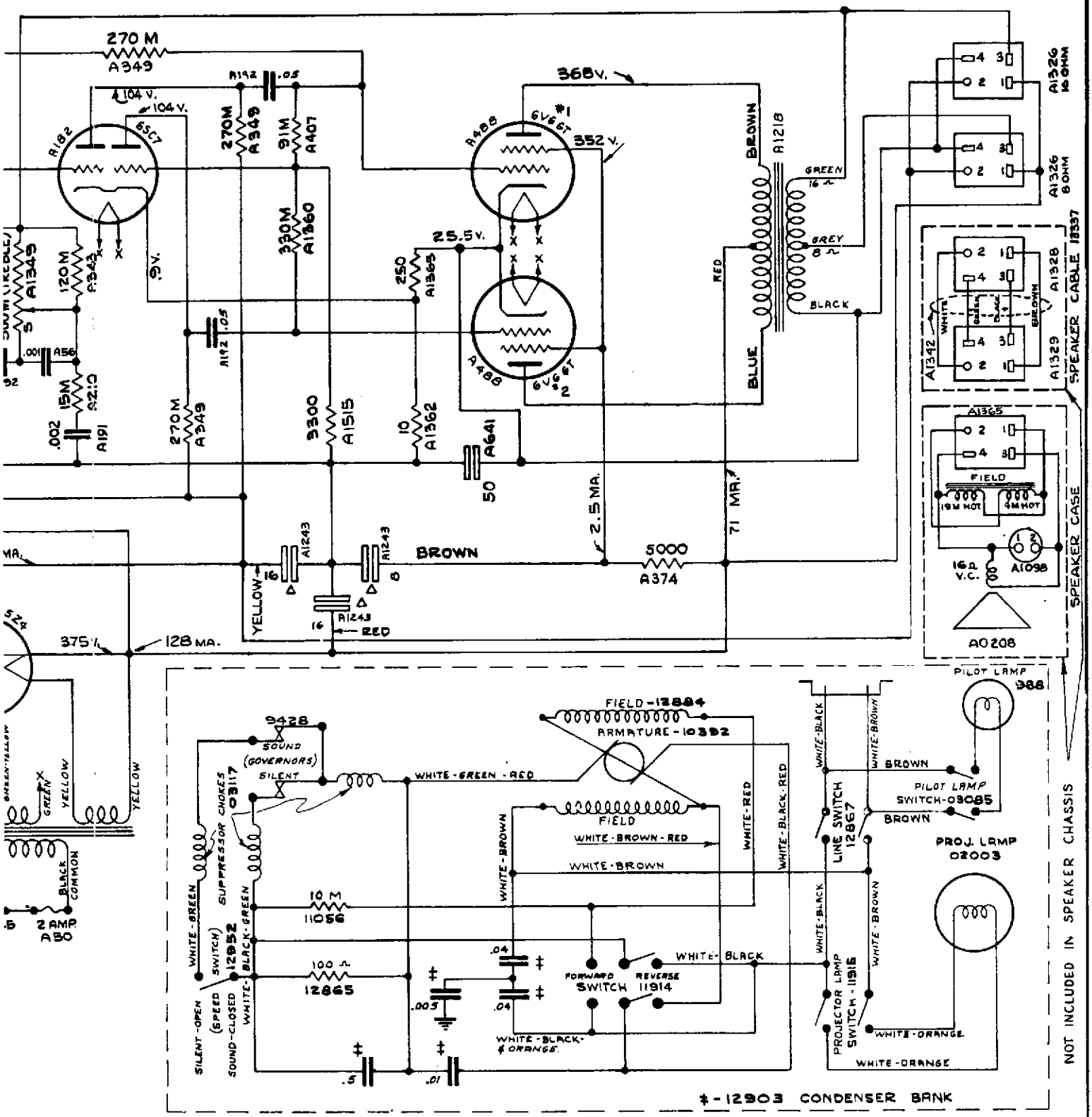
NOTE:-
FOR USE WITH AMPLIFIERS BEARING SERIAL NUMBERS UP TO #100,852 INCL.

SERVICE DATA	
AMPLIFIER WIRING DIAGRAM	
UTILITY, ACADEMY, & COMMERCIAL DESIGN 156 FILMOSOUND - 60 CYCLE	
FOR USE ONLY WITH AMPLIFIER PART NO. 12814	DATE 4-7-41



'S' INDICATES TERMINAL AT CLOCKWISE STOP.
ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 117 VOLT LINE. ALL VOLTAGES MEASURED TO GROUND.
@ Δ - INDICATES CAPACITORS LOCATED IN BANK.
† * - INDICATES CONTROLS ON SAME SHAFT.

WIRING COLOR CODE	
WHITE — GROUND	BROWN — SCREEN
YELLOW — CATHODE	BLUE — PLATE
RED — B+	BLACK — HEATER
GREEN — GRID	

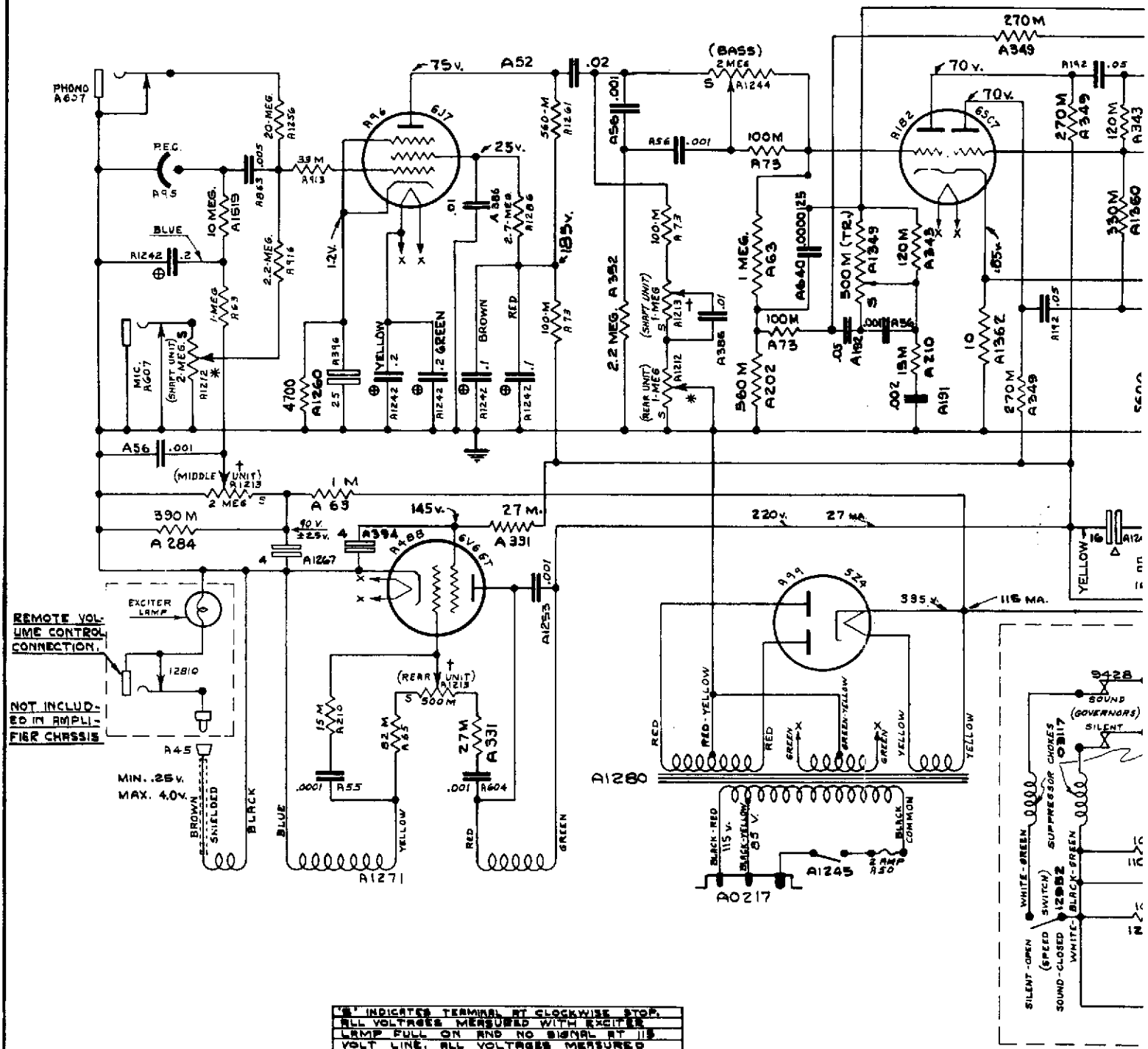


PROJECTOR WIRING DIAGRAM (156 UTILITY)
NOT INCLUDED IN AMPLIFIER CHASSIS

A557

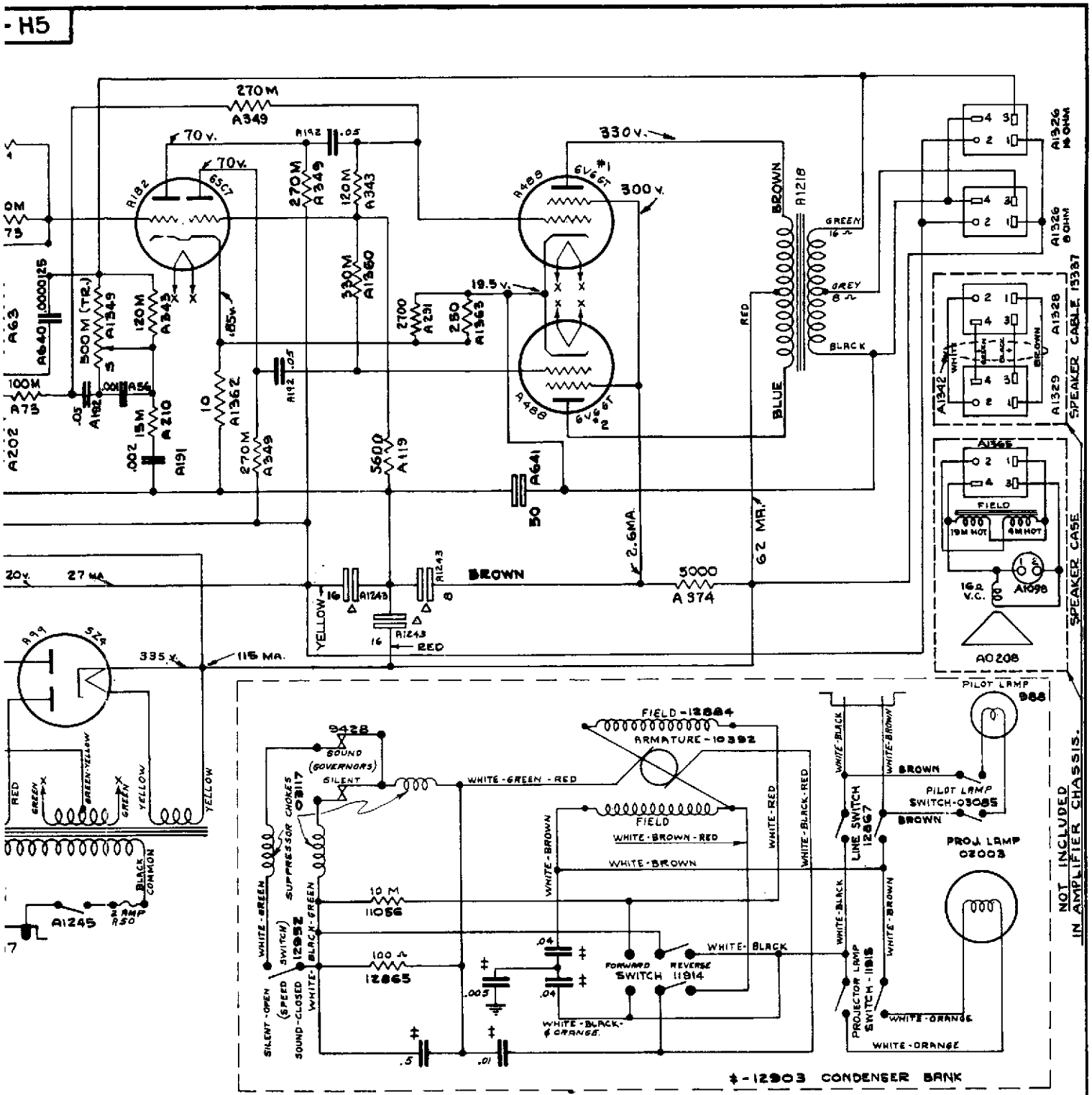
NOTE:
FOR USE WITH AMPLIFIERS BEARING
SERIAL NUMBER STARTING WITH #100,853

SERVICE DATA	
AMPLIFIER WIRING DIAGRAM	
UTILITY, ACADEMY, & COMMERCIAL DESIGN 156 FILMOSOUND 60 CYCLE	
FOR USE ONLY WITH AMPLIFIER PART NO. 12814	DATE 9-16-42



"S" INDICATES TERMINAL AT CLOCKWISE STOP.
ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 115 VOLT LINE. ALL VOLTAGES MEASURED TO GROUND.
@ A - INDICATES CAPACITORS LOCATED IN BANK.
+ # - INDICATES CONTROLS ON SAME SHAFT.

WIRING COLOR CODE	
WHITE — GROUND	BROWN — SCREEN
YELLOW — CATHODE	BLUE — PLATE
RED — B+	BLACK — HEATER
GREEN — GRID	



PROJECTOR WIRING DIAGRAM (156 UTILITY)
NOT INCLUDED IN AMPLIFIER CHASSIS

RS44

SERVICE DATA

AMPLIFIER WIRING DIAGRAM

UTILITY, ACADEMY, & COMMERCIAL
DESIGN 156 FILMOSOUND - 25 CYCLE

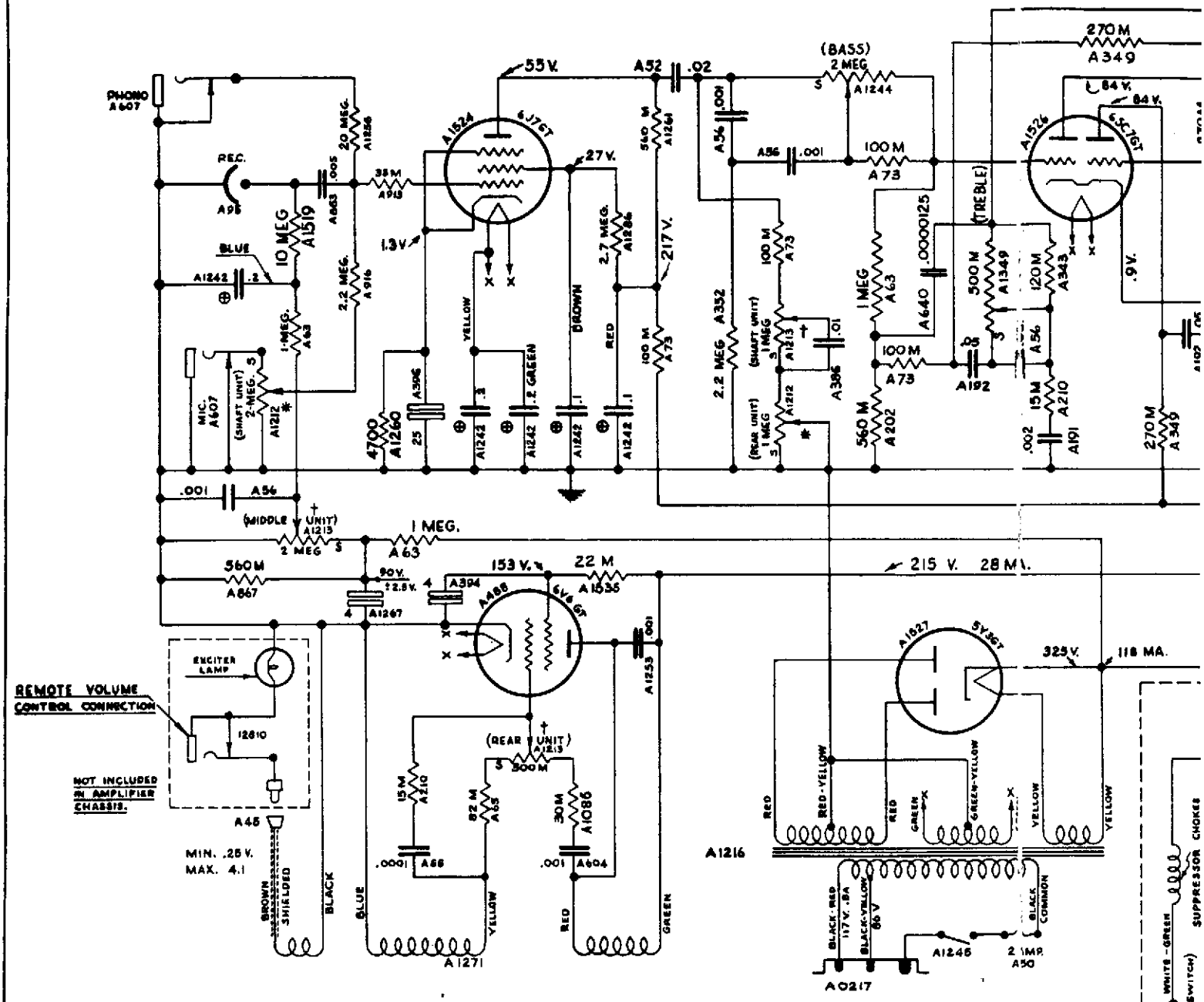
FOR USE ONLY WITH AMPLIFIER PART NO. 12815

DATE 3-6-42

DESIGN 156, AMPLIFIER NO. 13728

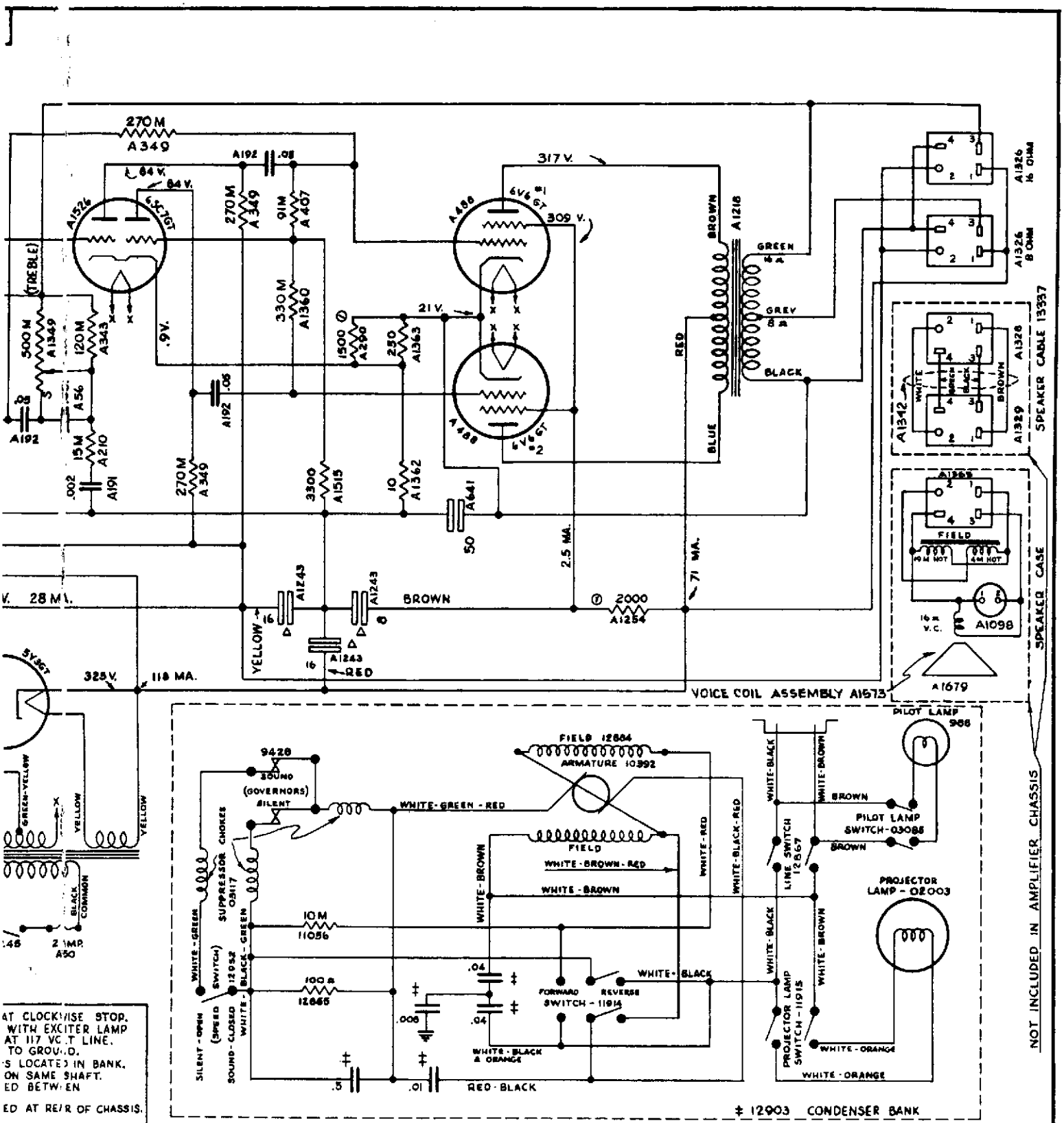
This amplifier is very similar to the 12814.

It uses a 5Y3 GT rectifier and the voltages are correspondingly lower on many of the tube elements. Glass-type tubes are used throughout but the equivalent metal type may be substituted.



'S'- INDICATES TERMINAL AT CLOCKWISE STOP.
ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 117 VOLT LINE.
ALL VOLTAGES MEASURED TO GROUND.
●Δ - INDICATES CAPACITORS LOCATED IN BANK.
+* INDICATES CONTROLS ON SAME SHAFT.
6V6GT *1 IS TUBE LOCATED BETWEEN 6V6GT *2 AND 6SC7.
6V6GT *2 IS TUBE LOCATED AT REAR OF CHASSIS.

WIRING COLOR CODE	
WHITE — GROUND	BROWN — SCREEN
YELLOW — CATHODE	BLUE — PLATE
RED — B+	BLACK — HEATER
GREEN — GRID	



PROJECTOR WIRING DIAGRAM (156 UTILITY)
NOT INCLUDED IN AMPLIFIER CHASSIS

AT CLOCKWISE STOP.
WITH EXCITER LAMP
AT 117 VOLT LINE.
TO GROUND.
S LOCATED IN BANK.
ON SAME SHAFT.
ED BETWEEN

ED AT REAR OF CHASSIS.

COLOR CODE	
BROWN	- SCREEN
BLUE	- PLATE
BLACK	- HEATER

① REVISED 11-28-42

AS 64

SERVICE DATA

AMPLIFIER WIRING DIAGRAM

UTILITY, ACADEMY, & COMMERCIAL
DESIGN 156 FILMOSOUND - 60 CYCLE

FOR USE ONLY WITH AMPLIFIER PART NO. 13728

DATE 9-22-42

DESIGN 156, AMPLIFIER NO. 13817

This amplifier is used in all Model 156-V Filmosounds.

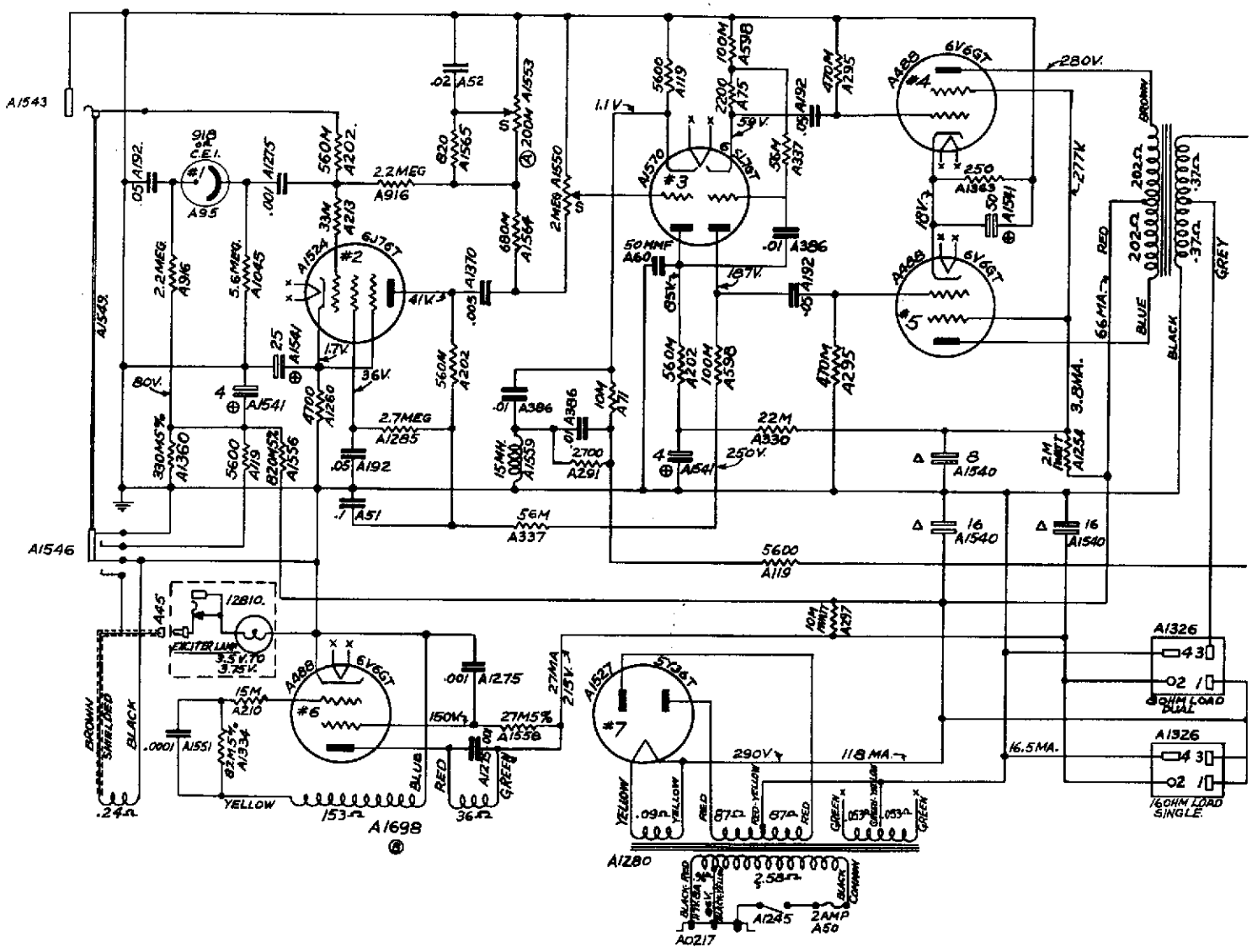
The circuits are considerably different from the preceding amplifiers of this design. Note that the gain control is in the second tube grid circuit. There is but one external input. Do not confuse jack A1546, which is a jack switch located within the amplifier, with an input jack. It is operated by means of an insulated rod A1549 when a microphone or phonograph is plugged into the input jack A1543. The purpose of the switch jack is to short out the exciter lamp. Contacts are normally open.

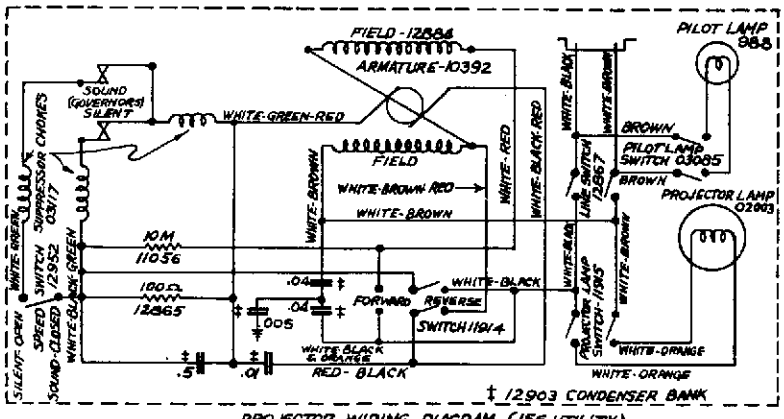
There is no control on the exciter lamp or P.E. voltage.

In cases of poor tone quality and instability, check choke, part number A1559. Part has the appearance of a metal-encased fixed condenser.

In the event that this amplifier lies idle for indefinite periods or is used under high humidity conditions, the photocell and associated circuits should be rewired as per amplifier, part number 14027, revised page H-16. See General Service Bulletin F-20.

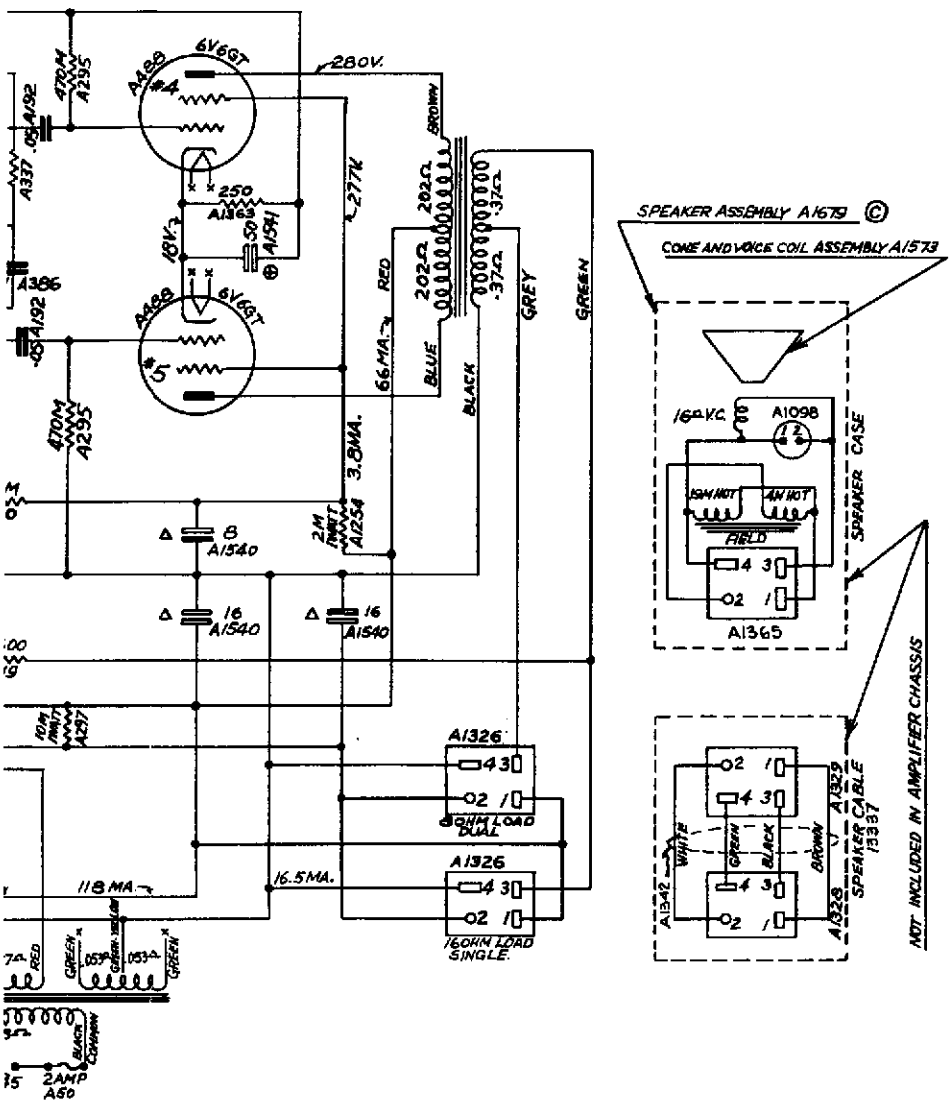
Note especially that new part A1911, 240M resistor does not connect to ground but runs to the output tube cathodes.

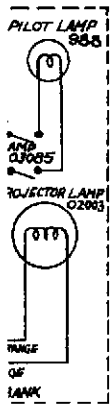




PROJECTOR WIRING DIAGRAM (156 UTILITY)
NOT INCLUDED IN AMPLIFIER CHASSIS

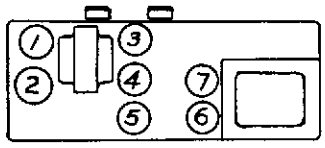
E H10





"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH RESPECT TO CHASSIS AT NO SIGNAL.

⊕ △ INDICATES CAPACITORS LOCATED IN BANK.



WIRING COLOR CODE	
WHITE — GROUND	BROWN — SCREEN
YELLOW — CATHODE	BLUE — PLATE
RED — B+	BLACK — HEATER
GREEN — GRID	

AS72

SERVICE DATA

AMPLIFIER WIRING DIAGRAM

DESIGN 156 MODEL V8 25 CYCLE

FOR USE ONLY WITH AMPLIFIER PART Nº 13865

DATE 3-30-44.

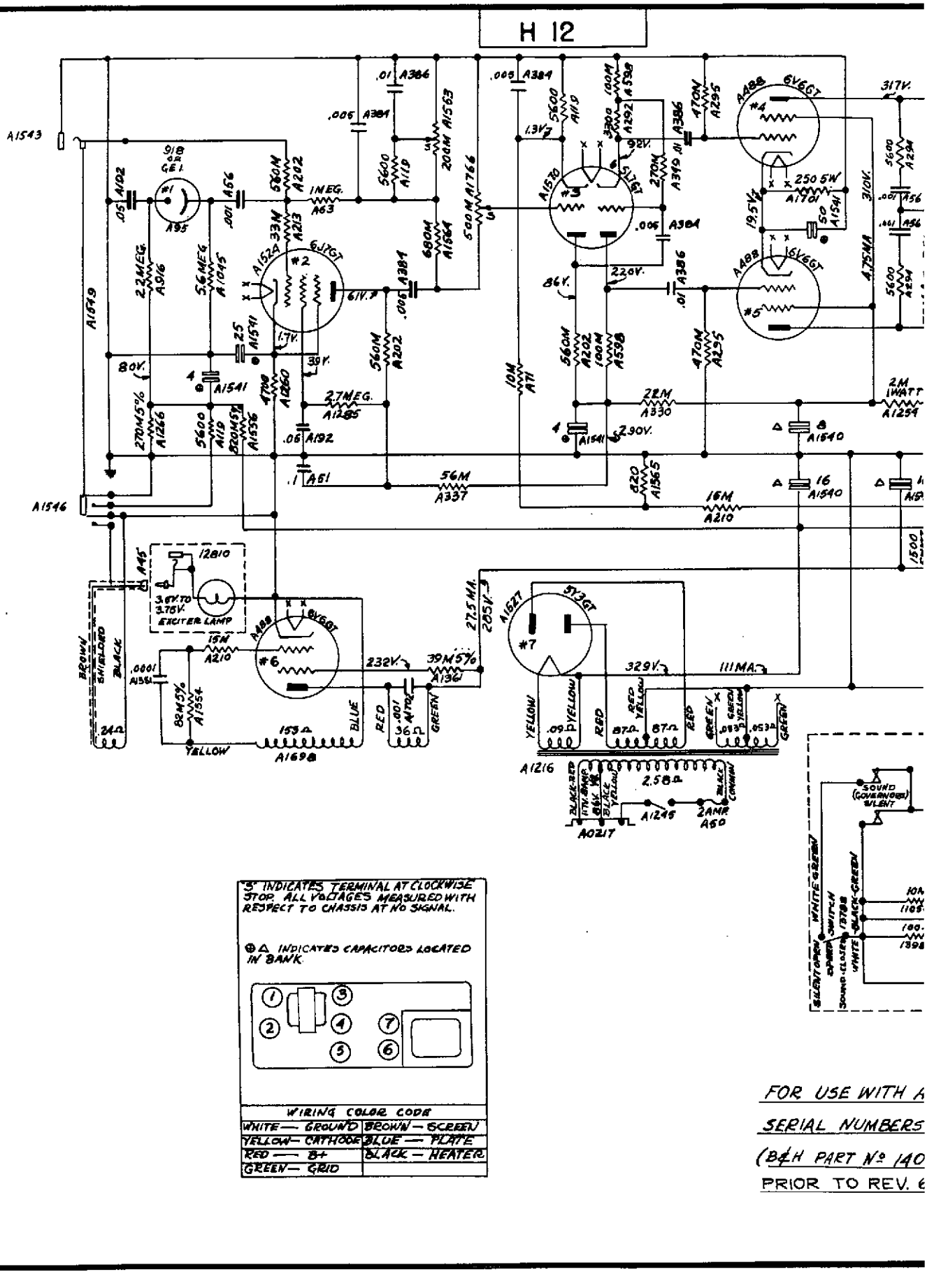
DESIGN 156 AND 179, AMPLIFIER NO. 14027
(Amplifier serial number 100000 to 109003)

These amplifiers are similar to amplifier No. 13817. They use a permanent-magnet type of dynamic speaker.

In the event that these amplifiers lie idle for indefinite periods, which may cause the volume to be low, the photocell and associated circuits should be rewired as per General Service Bulletin F-20.

These three amplifiers are very similar. Note that the plate filter on output tubes is used only on the first of the series.

Some of these amplifiers may have the filament center tap connected to the output tube cathodes instead of direct to ground. This is to reduce hum which may be encountered when using certain makes of tubes.



"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH RESPECT TO CHASSIS AT NO SIGNAL.

⊕ △ INDICATES CAPACITORS LOCATED IN BANK.

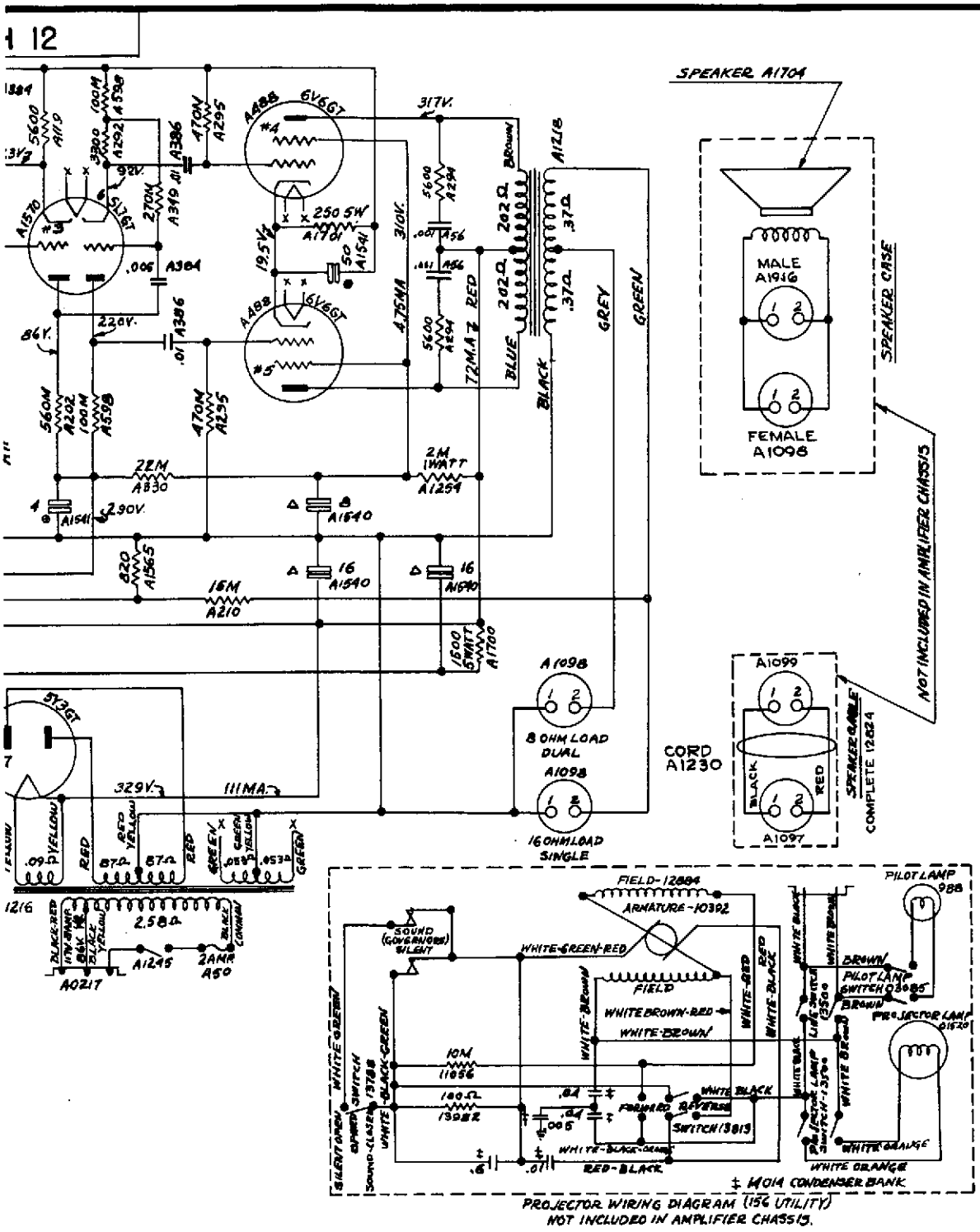
WIRING COLOR CODE	
WHITE — GROUND	BROWN — SCREEN
YELLOW — CATHODE	BLUE — PLATE
RED — B+	BLACK — HEATER
GREEN — GRID	

FOR USE WITH A

SERIAL NUMBERS

(B&H PART Nº 140

PRIOR TO REV. 6



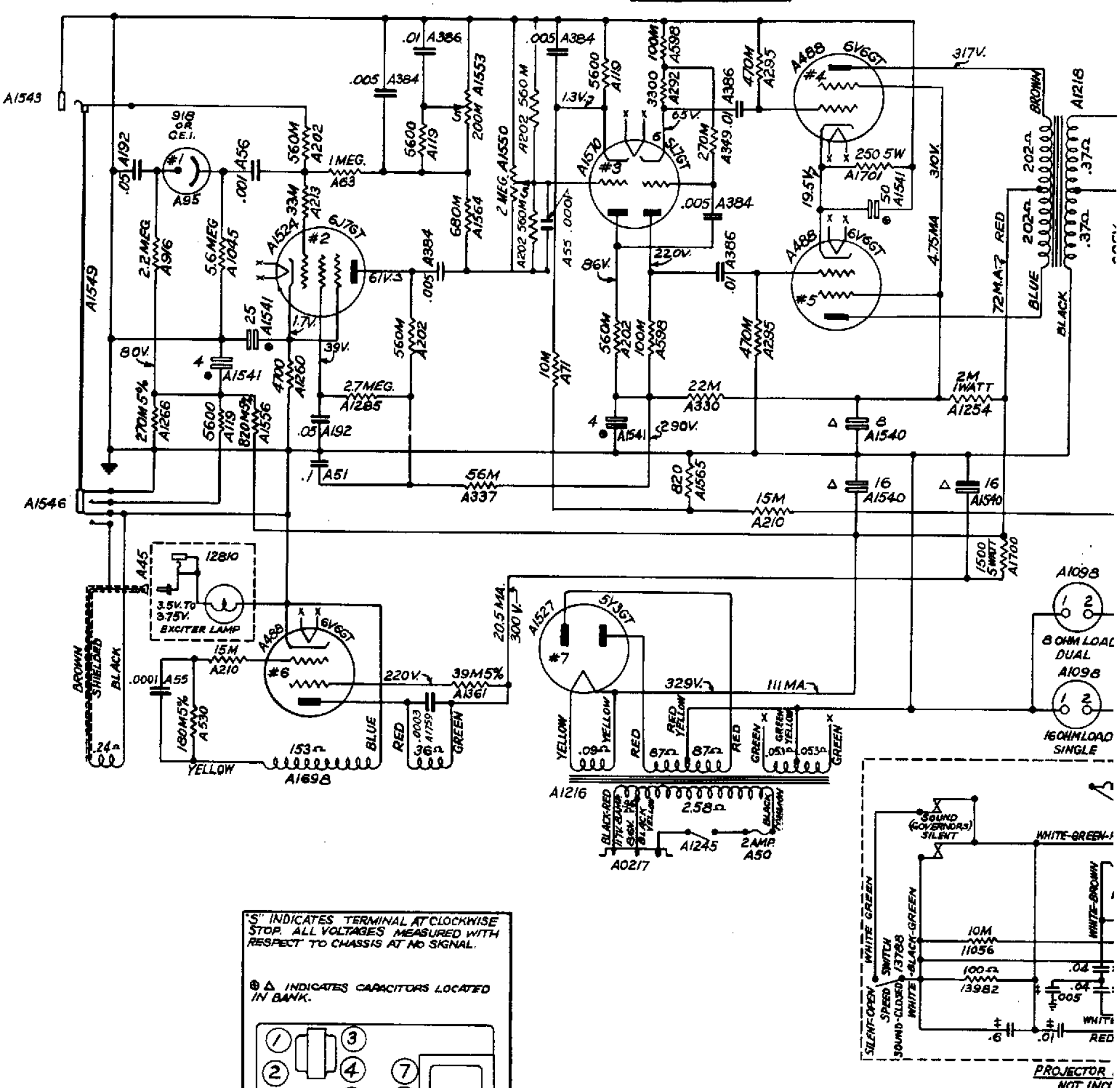
PROJECTOR WIRING DIAGRAM (156 UTILITY)
NOT INCLUDED IN AMPLIFIER CHASSIS.

FOR USE WITH AMPLIFIER BEARING
SERIAL NUMBERS 100,000 TO 100,600
(B&H PART Nº 14027)
PRIOR TO REV. 6-19-44

AS83

SERVICE DATA	
AMPLIFIER WIRING DIAGRAM	
DESIGN 156 MODELS G&H 60 CYCLES	
FOR USE ONLY WITH AMPLIFIER PART NO. 14027	DATE 4-2-46

H 13



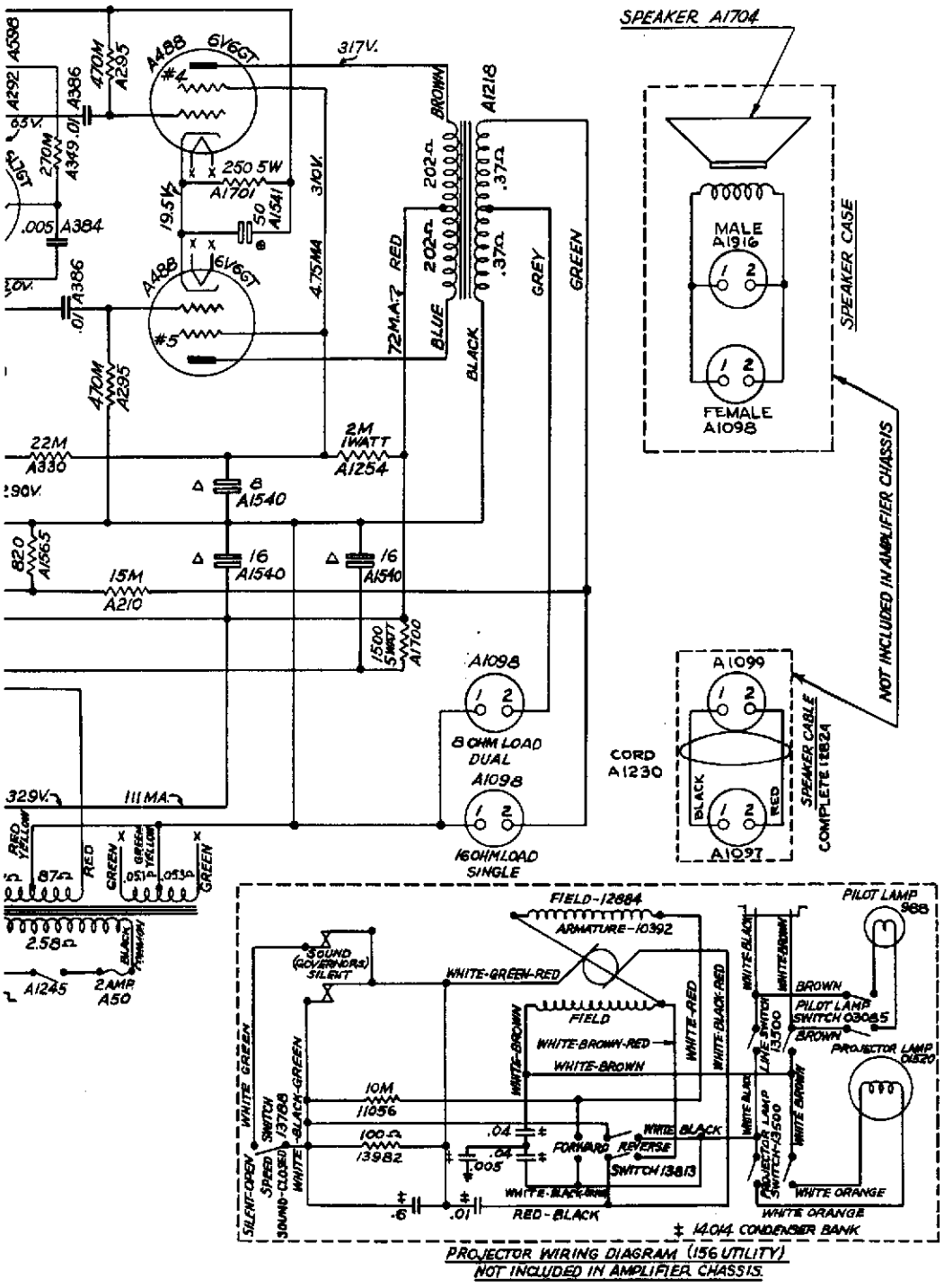
"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH RESPECT TO CHASSIS AT NO SIGNAL.

⊕ △ INDICATES CAPACITORS LOCATED IN BANK.

WIRING COLOR CODE	
WHITE — GROUND	BROWN — SCREEN
YELLOW — CATHODE	BLUE — PLATE
RED — B+	BLACK — HEATER
GREEN — GRID	

FOR USE WITH AN
SERIAL NUMBERS
PRIOR TO REV.
(B & H PART No

H 13



PROJECTOR WIRING DIAGRAM (156 UTILITY)
NOT INCLUDED IN AMPLIFIER CHASSIS

TO REPLACE VOLUME CONTROL, USE A1766-500M AND REMOVE TWO A202 RESISTORS.

FOR USE WITH AMPLIFIERS BEARING SERIAL NUMBERS 100,600 TO 105,000 PRIOR TO REV. 6-19-44
(B & H PART Nº 14027)

A583

SERVICE DATA

AMPLIFIER WIRING DIAGRAM

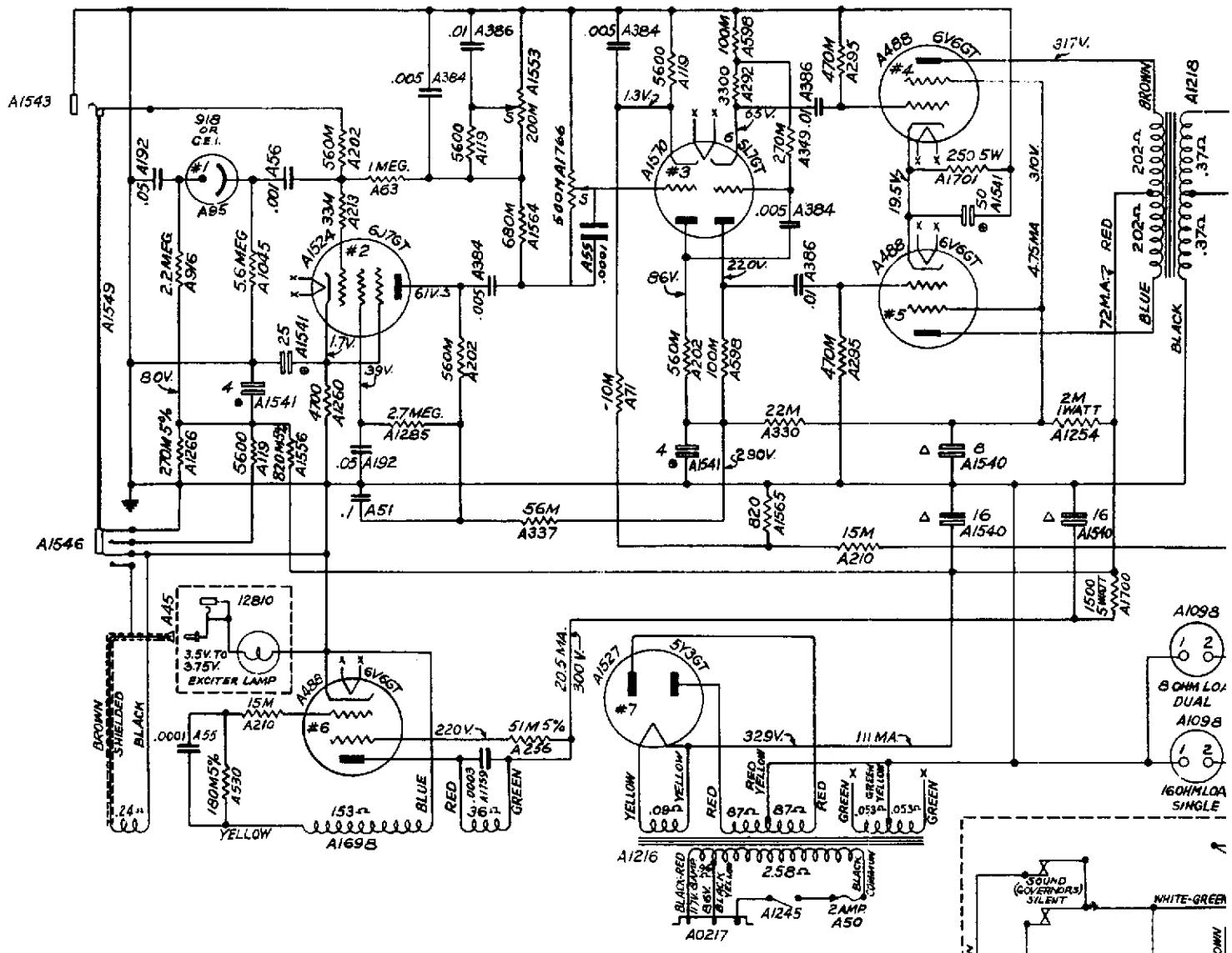
DESIGN 156 MODELS G&H 60 CYCLE

FOR USE ONLY WITH AMPLIFIER PART Nº 14027

DATE 6-5-44.

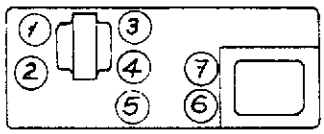
REVISED
10-11-44
8-28-44
6-19-44

H 14



"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH RESPECT TO CHASSIS AT NO SIGNAL.

⊕ △ INDICATES CAPACITORS LOCATED IN BANK.



WIRING COLOR CODE	
WHITE — GROUND	BROWN — SCREEN
YELLOW — CATHODE	BLUE — PLATE
RED — B+	BLACK — HEATER
GREEN — GRID	

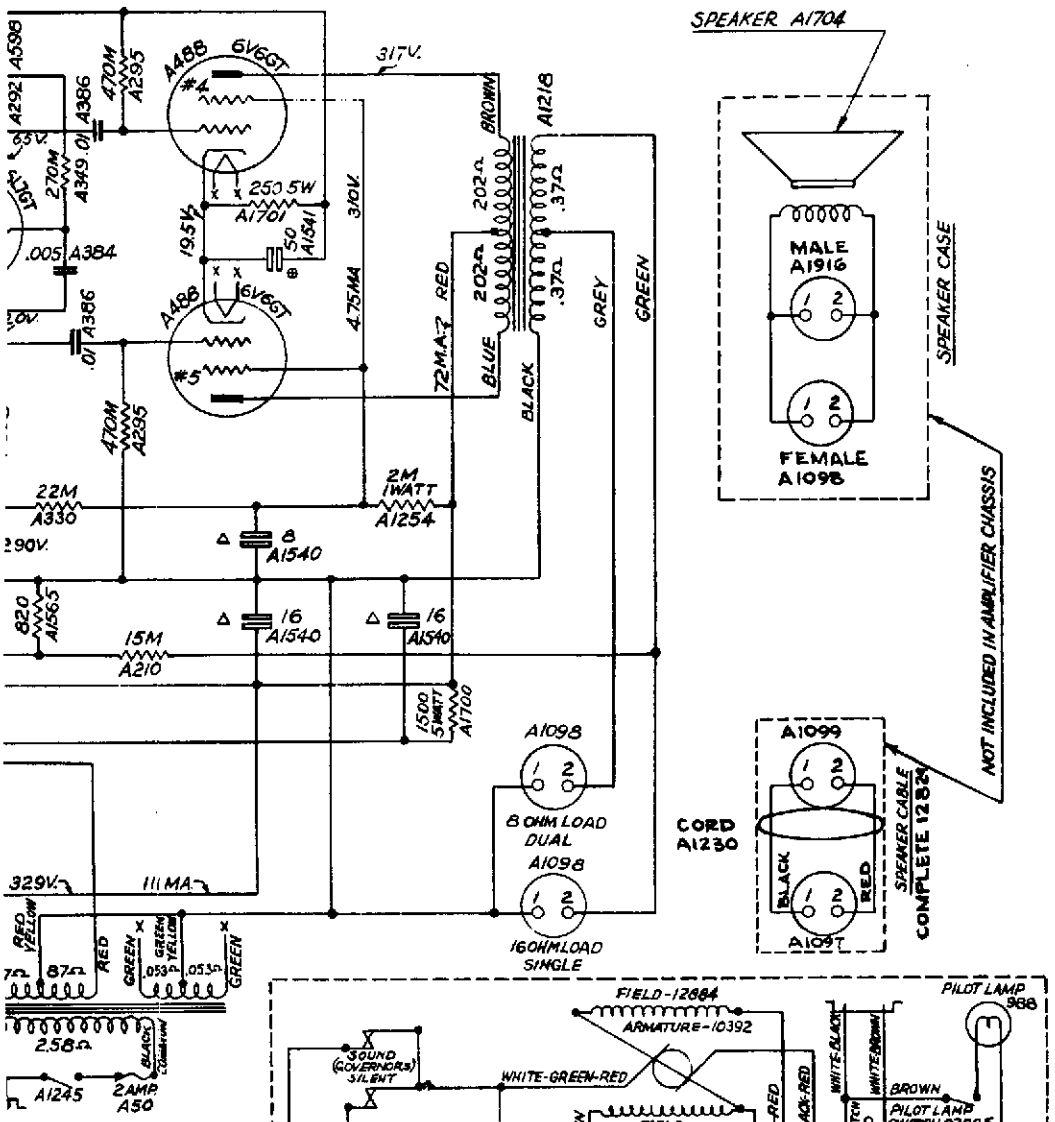
FOR USE WITH AMPLIFIER

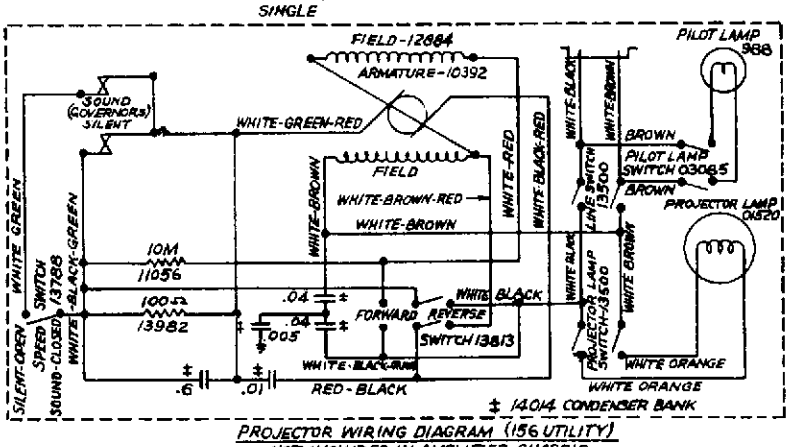
SERIAL NUMBERS 105,000 TO

(B&H PART Nº 14027)

PRIOR TO REV. 6-19-44

H 14





PROJECTOR WIRING DIAGRAM (156 UTILITY)
NOT INCLUDED IN AMPLIFIER CHASSIS.

FOR USE WITH AMPLIFIER BEARING
SERIAL NUMBERS 105,000 TO 109,003
(B&H PART Nº 14027)
PRIOR TO REV. 6-19-44

AS83

	SERVICE DATA	
REVISED 1-19-45	AMPLIFIER WIRING DIAGRAM	
REVISED 10-11-44	DESIGN 156 MODELS G&H 60 CYCLE	
REVISED 8-28-44	FOR USE ONLY WITH AMPLIFIER PART Nº 14027	DATE 6-5-44.
REVISED 6-19-44		

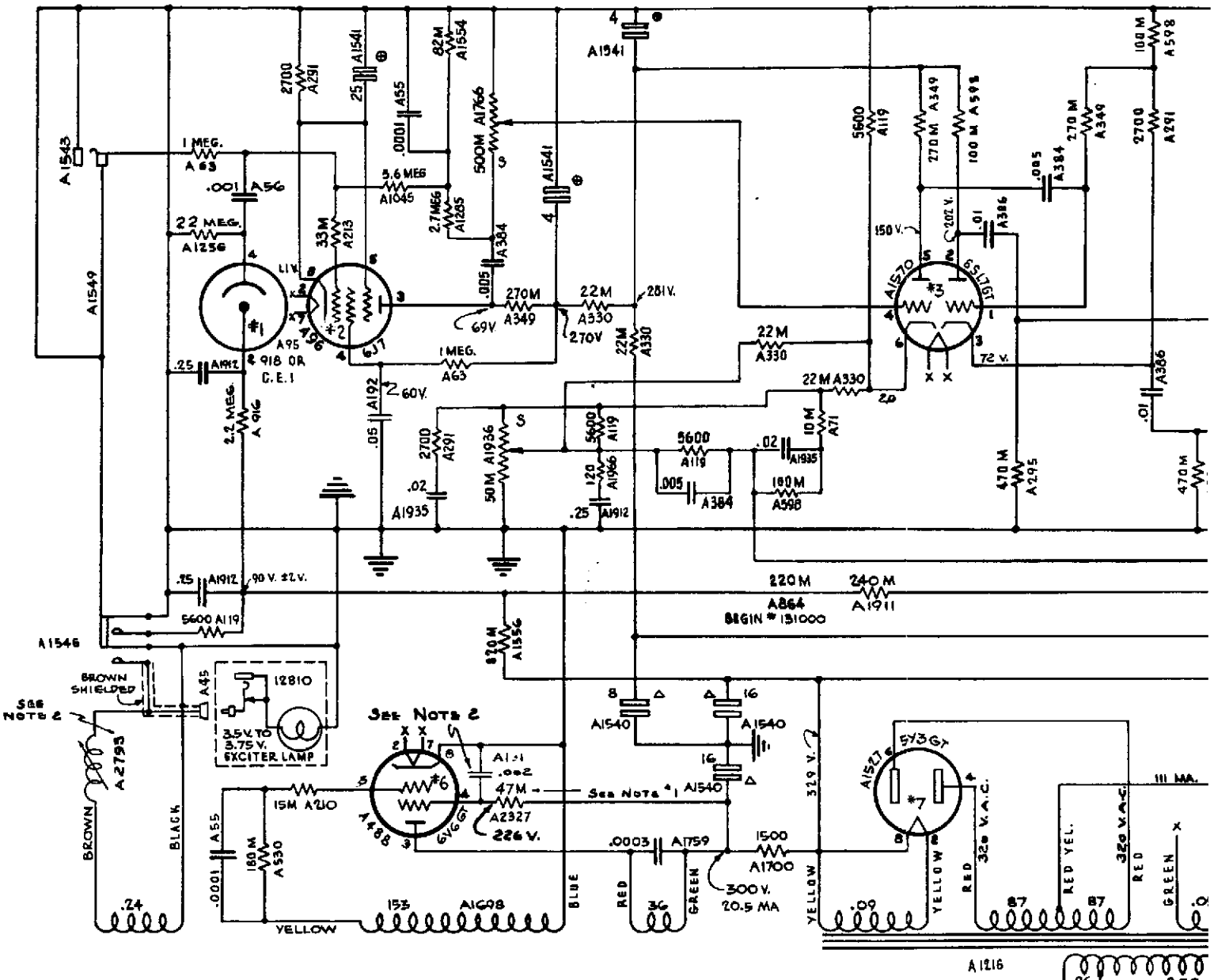
DESIGN 179, AMPLIFIER NO. 14027 (Revised)
(Amplifier serial numbers 109003 to 110002, and 114003 and up)

Several changes have been made in this amplifier as compared to other 14027 types. The volume control value is different. Most notable of all is the complete change in method of tone control. Note also that the filament winding center tap does not run to ground but is connected to the output tube cathodes. This brings all heaters above ground, the purpose of which is to reduce hum when certain makes of tubes are used.

CAUTION

Read all notes before starting work. Do not scale drawing.
Work to dimensions. All dimensions are given in inches.
Unless otherwise specified, capacitor values are in microfarads
Unless otherwise specified, fractional dimensions are ±
Unless otherwise specified, angular dimensions are ±
Substitutions must be approved by the Engineering Dept

H 16



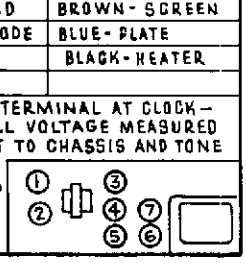
NOTES

1. Resistor May Be Modified To Allow For Output Voltage Variations In Transformer.
2. Variable Reactor A-2793 & Capacitor A-191 Noted Are Used In All Amplifiers After 146704.
3. Jack 12810 Has Been Removed.
4. D.C. Voltages Taken With 20000 Ohms Per Volt Meter & A.C. Voltages Taken With 1000 Ohms Per Volt Meter Readings Are Not Corrected For Shunting Effect.

WIRING COLOR CODE	
WHITE-GROUND	BROWN-SCREEN
YELLOW-CATHODE	BLUE-PLATE
RED-B+	BLACK-HEATER
GREEN-GRID	

"S" INDICATES TERMINAL AT CLOCK-WISE STOP ALL VOLTAGE MEASURED WITH RESPECT TO CHASSIS AND TONE CONTROL BASS

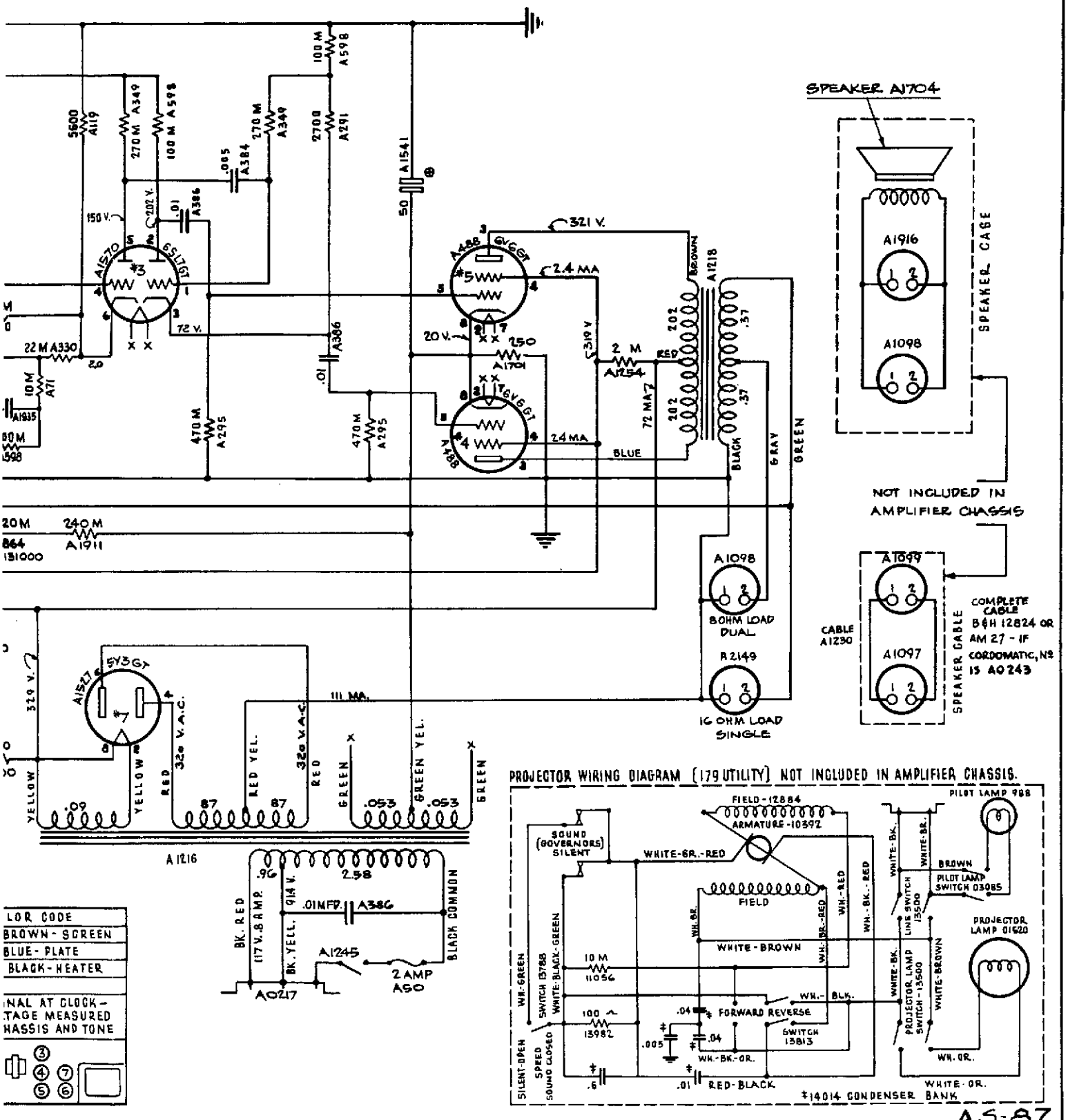
⊕Δ INDICATES CAPACITORS IN BANK.



FOR USE WITH AMPLIFIER NUMBERS 109003 TO 1100

H 16

AS-87



PROJECTOR WIRING DIAGRAM (179 UTILITY) NOT INCLUDED IN AMPLIFIER CHASSIS.

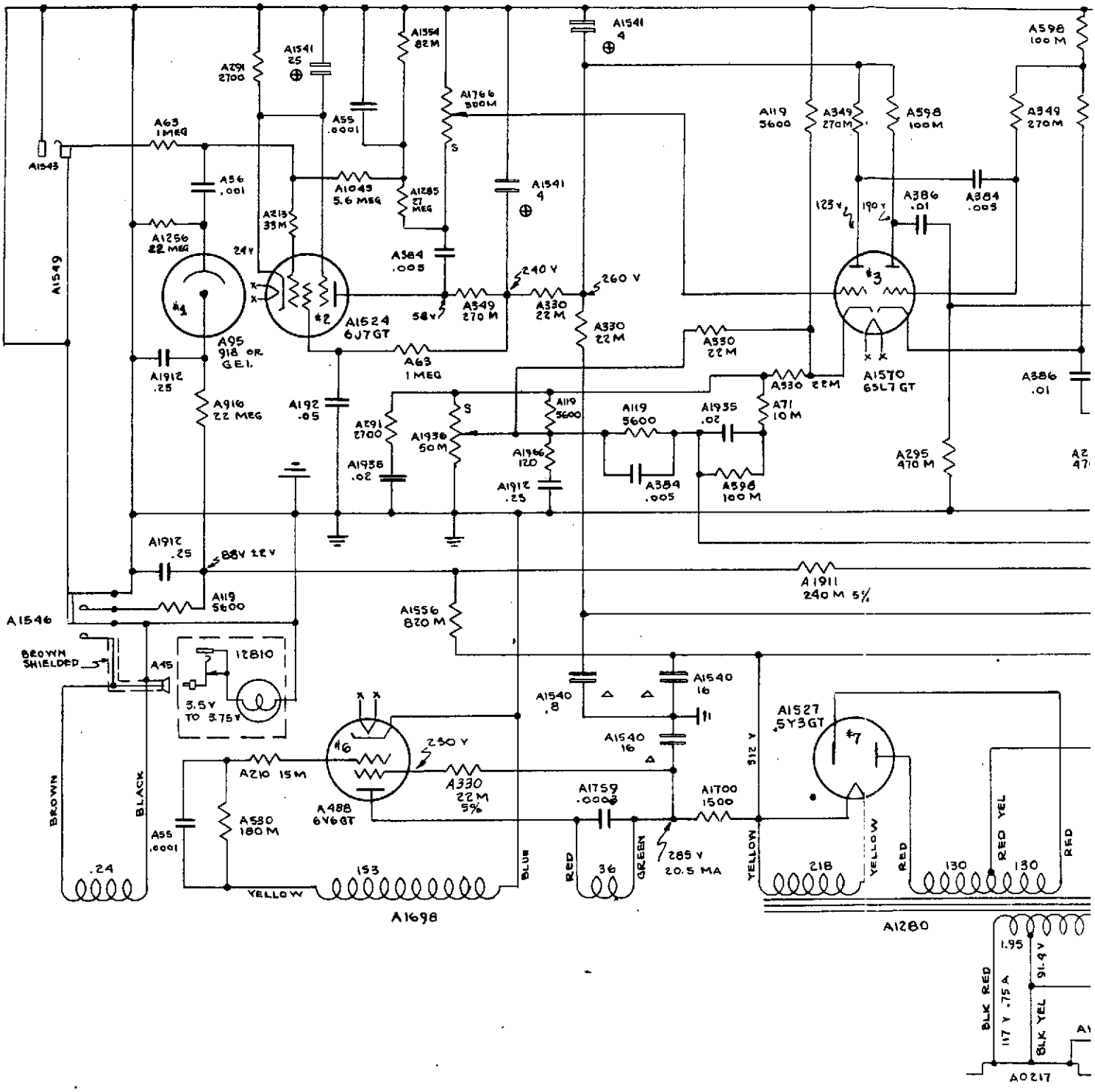
COLOR CODE
BROWN - SCREEN
BLUE - PLATE
BLACK - HEATER

SIGNAL AT CLOCK - VOLTAGE MEASURED CHASSIS AND TONE

AS-87

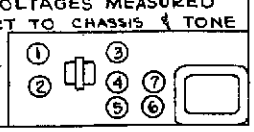
FOR USE WITH AMPLIFIERS BEARING SERIAL NUMBERS 109003 TO 110002 & 114003 UP

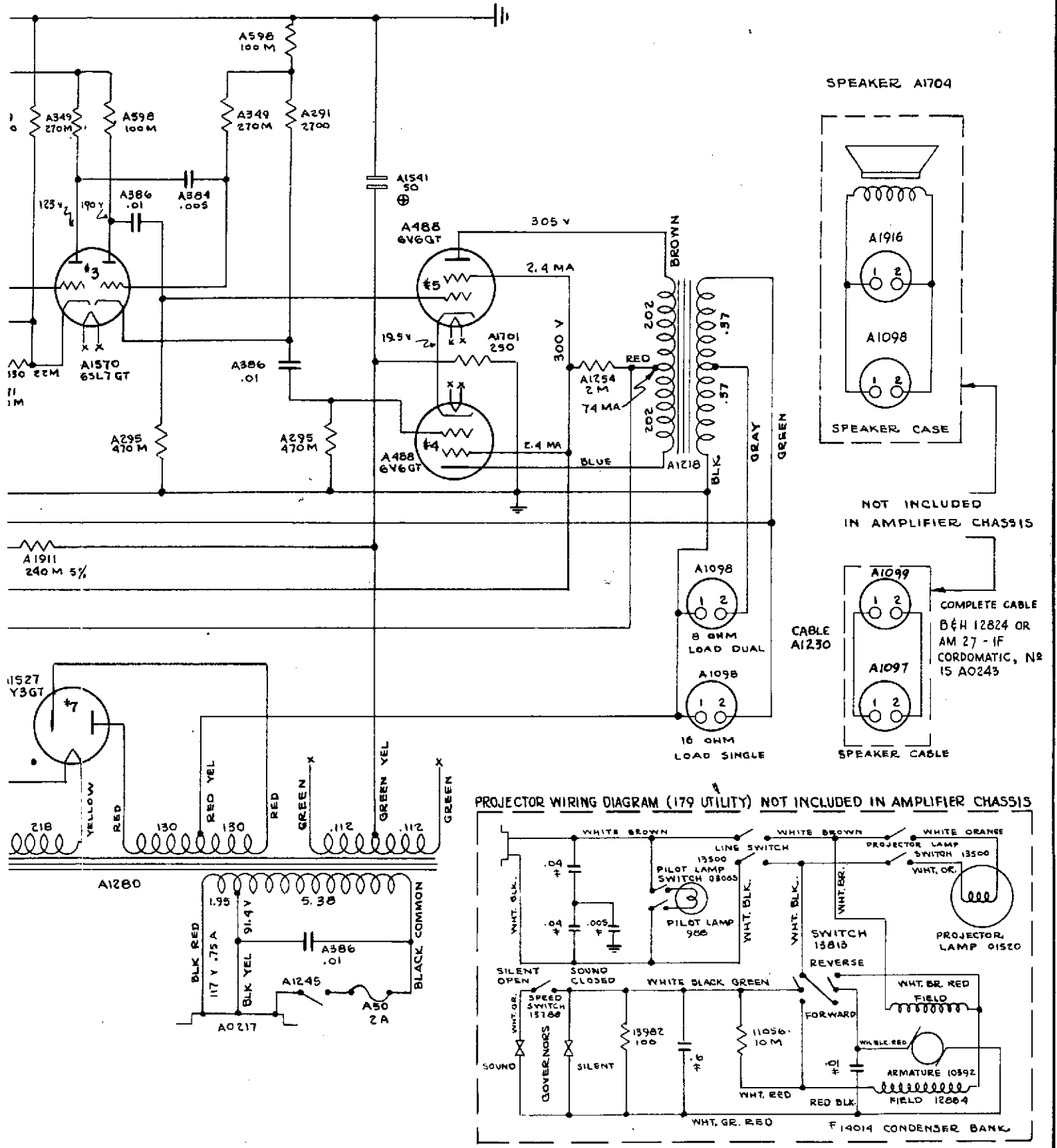
SERVICE DATA	
AMPLIFIER WIRING DIAGRAM	
DESIGN 179 MODEL A - 60 CYCLE	
FOR USE ONLY WITH AMPLIFIER PART Nº 14027	12-15-45



WIRING COLOR CODE	
WHITE - GROUND	BROWN - SCREEN
YELLOW - CATHODE	BLUE - PLATE
RED - B+	BLACK - HEATER
GREEN - GRID	

"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH RESPECT TO CHASSIS & TONE CONTROL BASS. ⊕ Δ INDICATE CAPACITORS IN BANK.





PROJECTOR WIRING DIAGRAM (179 UTILITY) NOT INCLUDED IN AMPLIFIER CHASSIS

SERVICE DATA	
AMPLIFIER WIRING DIAGRAM	
FILMOSOUND	
DESIGN 179 AB	MODEL AB
FOR USE ONLY WITH PART NO. 14100	DATE 10-19-45

DESIGN 179, AMPLIFIER NO. 05311

This amplifier is a rather radical departure from any past Bell & Howell amplifier. It is not an AC-DC amplifier.

The power output is 10 watts maximum - 8 watts minimum.

In order to reduce weight, the power transformer has been eliminated.

Two selenium dry disc rectifiers connected in a voltage doubler circuit supply the high voltage DC for the tubes.

Tube filaments are series connected across the line.

The sound-silent projector switch partially shorts the exciter lamp when operating projector at silent speed.

An isolation transformer is used in the phono-microphone input circuit.

A .1 mfd condenser, part #17030, is connected from line to chassis to reduce motor crackle. In the event of shock complaint, the condenser should be changed to .03. It may, however, reduce the amplifier sensitivity. This condenser must be moulded plastic or metal encased. Aerovox Duranite 600 Volt .033 MFD may be used.

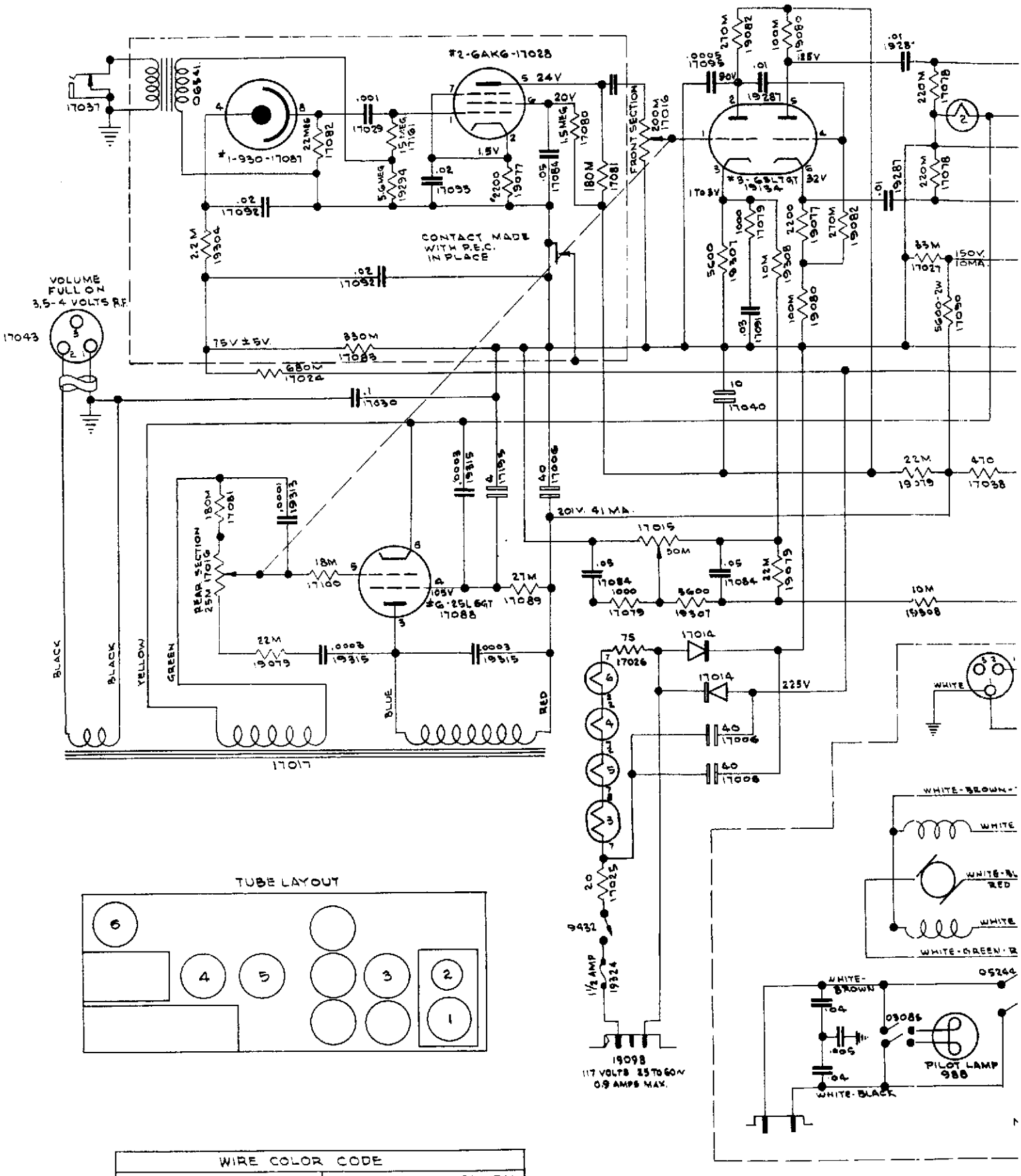
Complaints of noise, static, etc. are usually caused by a damaged photocell cover, part #08543. A sharp blow against the cover will loosen the angle bracket bond to cover. They cannot be repaired except at the factory. It is suggested that each Service Station have two covers in stock. The damaged cover may be returned for repair.

A loose PEC socket will also cause noise. Tighten by soldering locking ring to chassis.

Loss of volume (sudden) and sometimes noise are usually caused by electrolytic condenser (rear) having been hit, so that grounding ring on condenser is loose. Change condenser to repair.

Low volume is usually corrected by changing or interchanging 25L6G tubes.

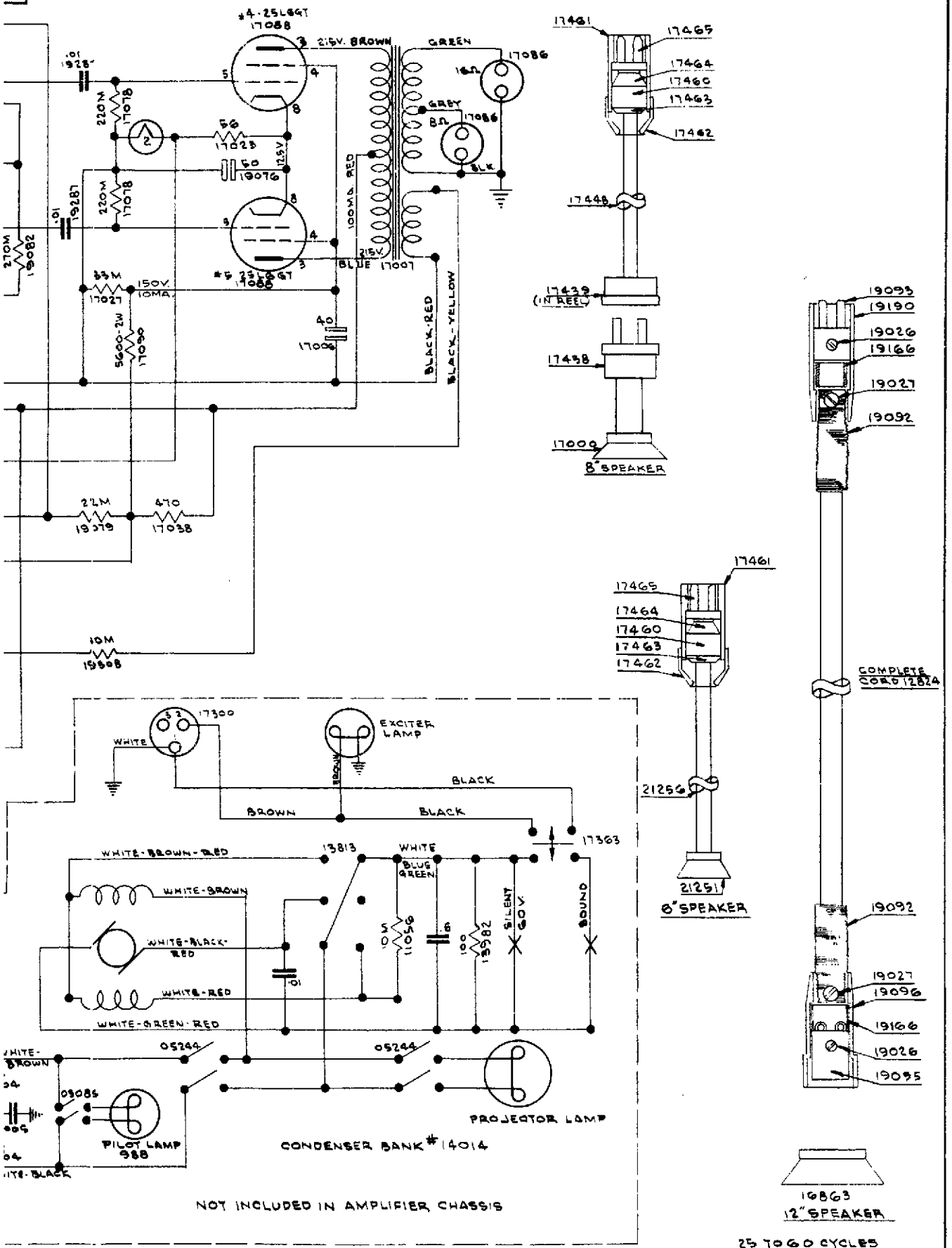
H 19



TUBE LAYOUT

WIRE COLOR CODE			
WHITE	GROUND	BROWN	SCREEN
YELLOW	CATHODE	BLACK	AC
RED	B+	WHITE & BLACK	B-
GREEN	GRID		
BLUE	PLATE		

ALL VOLTAGES MEASURED WITH 11 MEGOHM INPUT.

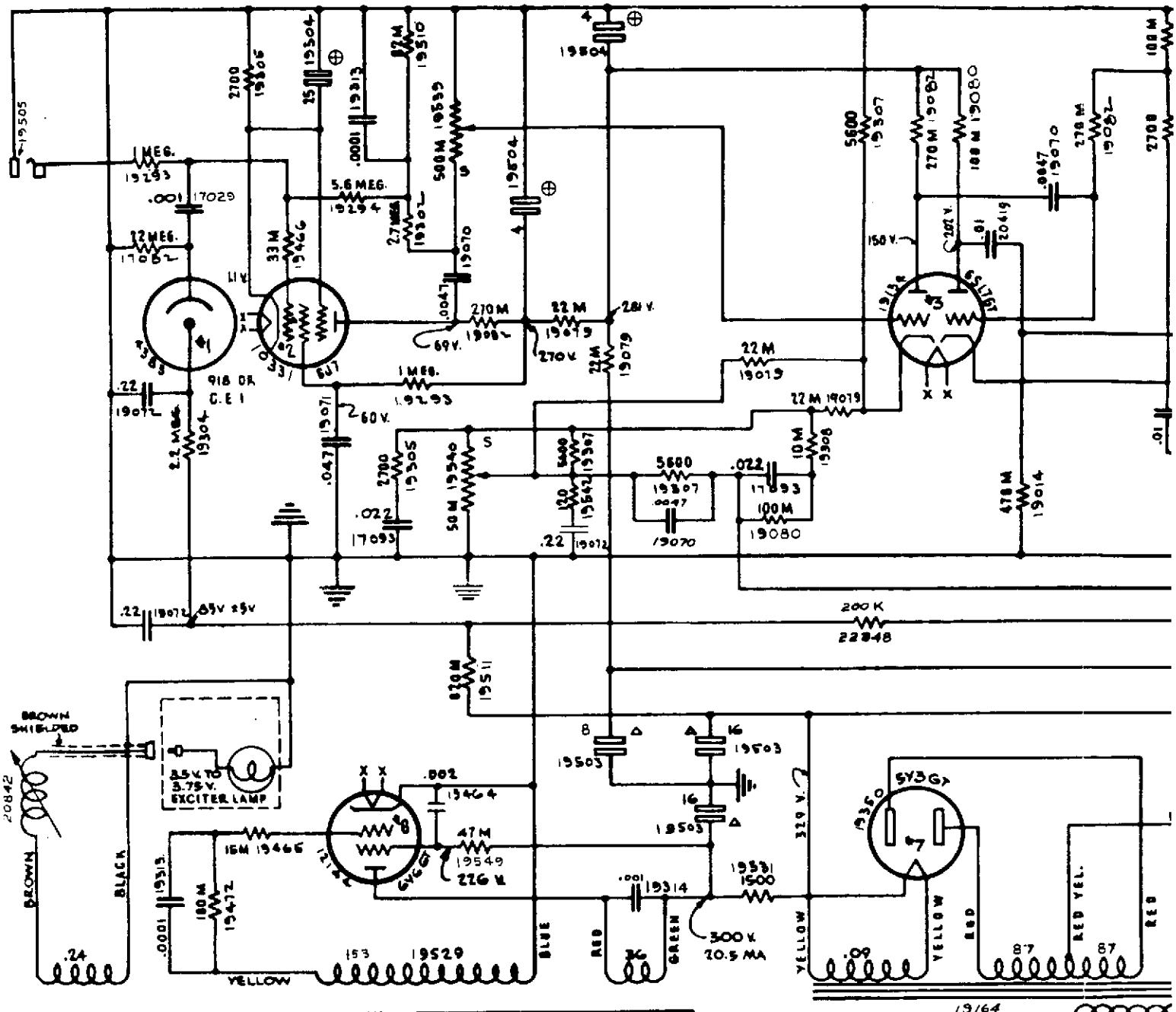


ALL VOLTAGES MEASURED WITH METER WITH 11 MEGOHM INPUT.

Bell & Howell Co. Chicago U.S.A.

AMPLIFIER WIRING DIAGRAM 05311
FOR DESIGNS 179 H, J, K-

DATE 1-27-49	SERVICE DATA	DRAWN EG APVD. E.C.



FREQUENCY RESPONSE (DB ± 1)			
INPUT SIGNAL APPLIED THRU 20 MEGS TO P.E.C. CATHODE VOL. CONTROL ON FULL			
TONE CONTROL POSITION	⊘	⊕	⊘
INPUT VOLTAGE	.050	.050	.050
FREQUENCY	DB	DB	DB
50	-16.0	-12.0	-1.0
100	-15.0	-11.5	-0.0
500	-7.5	-7.5	-3.5
1000	-4.5	-6.0	-4.0
3000	-1.5	-5.0	-3.5
5000	-2.6	-5.0	-4.0
7000	-4.5	-6.0	-5.0
10,000	-7.0	-8.5	-7.0

SENSITIVITY

MEASURED AT 6 WATT OUTPUT AT 1000 CYCLES. TONE CONTROL BASS. VOLUME CONTROL SET AT MAXIMUM

MICROPHONE INPUT: 0.013 VOLTS APPLIED DIRECTLY TO MIKE JACK

FILM INPUT CHANNEL: 0.120 VOLTS APPLIED THRU 20 MEGS TO P.E.C. CATHODE

POWER OUTPUT AT 5% DISTORTION

LINE VOLTS	FREQUENCY	WATTS	TOLERANCE
117	400	12.0	± 12%

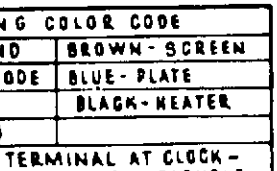
MEASURED WITH VOLUME CONTROL AT MAXIMUM AND TONE CONTROL BASS RESISTANCE OUTPUT LOAD.

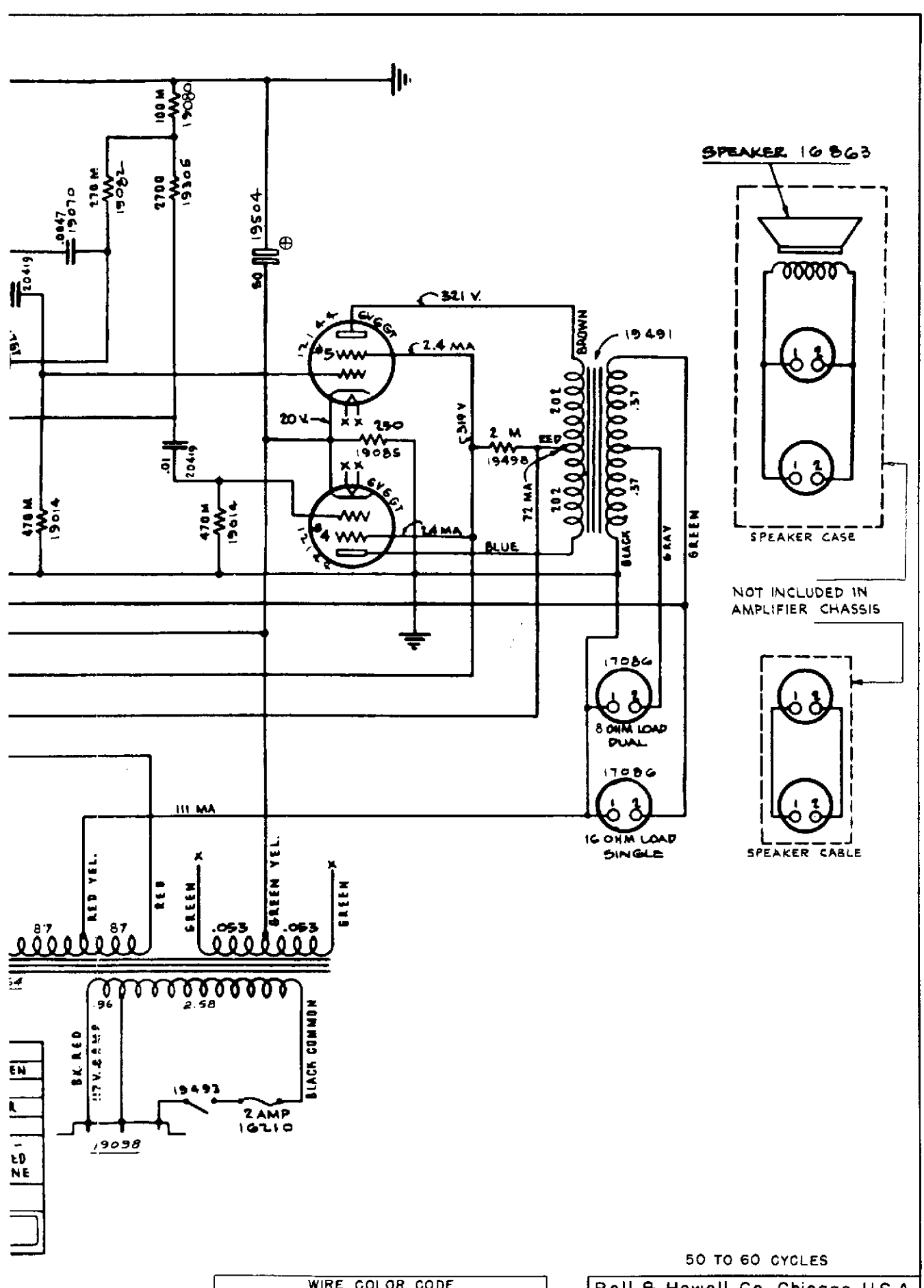
ALL MEASUREMENTS MADE WITH 117 VOLT A.C. 60 CYCLE LINE.

WIRING COLOR CODE	
WHITE - GROUND	BROWN - SCREEN
YELLOW - CATHODE	BLUE - PLATE
RED - B+	BLACK - HEATER
GREEN - GRID	

"S" INDICATES TERMINAL AT CLOCK-WISE STOP. ALL VOLTAGES MEASURED WITH RESPECT TO CHASSIS AND TONE CONTROL BASS.

⊕ Δ INDICATES CAPACITORS IN BANK.





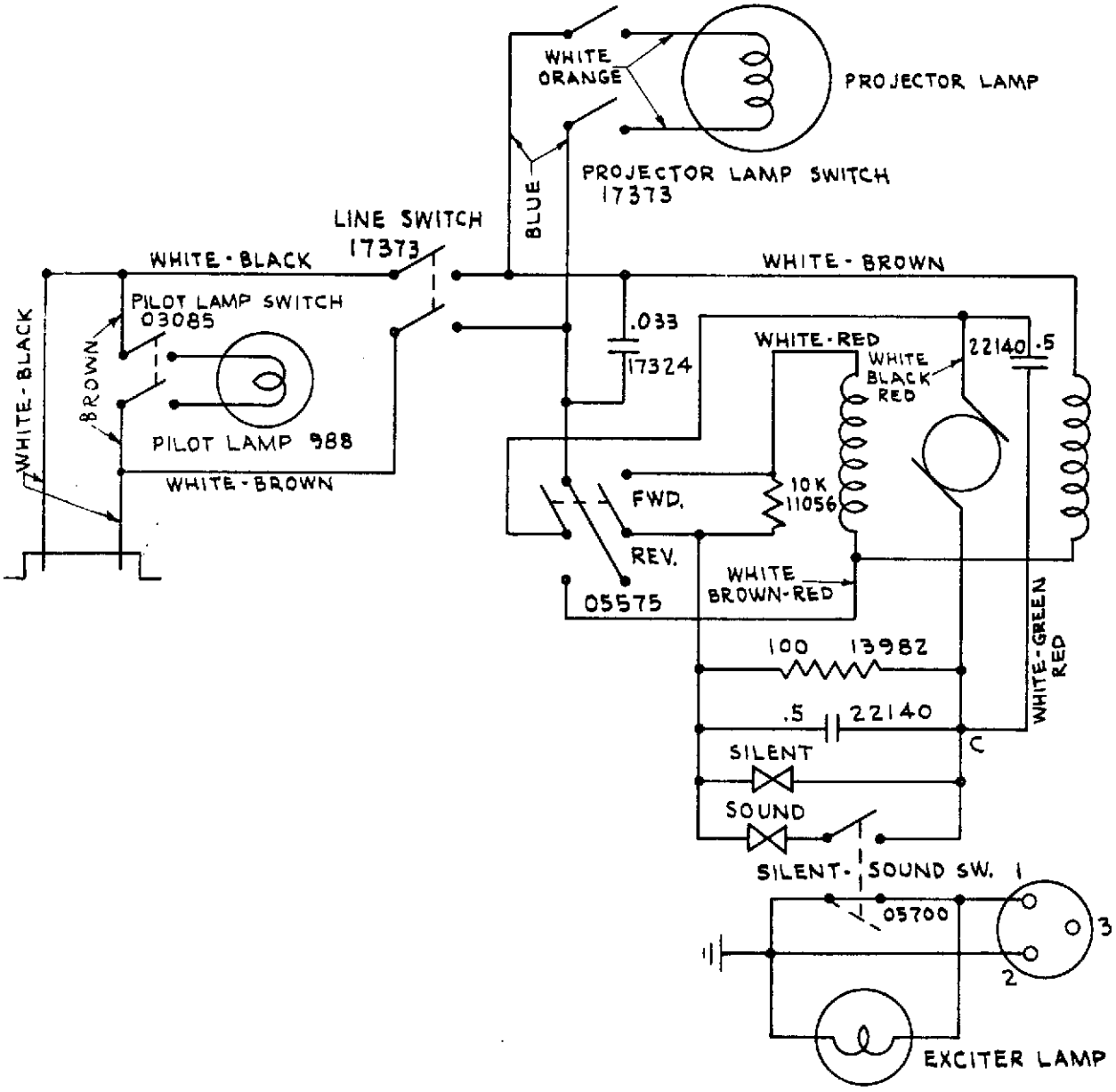
50 TO 60 CYCLES

WIRE COLOR CODE			
WHITE	GROUND	BLUE	PLATE
YELLOW	CATHODE	BROWN	SCREEN
RED	B+	BLACK	AC
GREEN	GRID	BLACK & WHITE	B-

Bell & Howell Co. Chicago U.S.A.

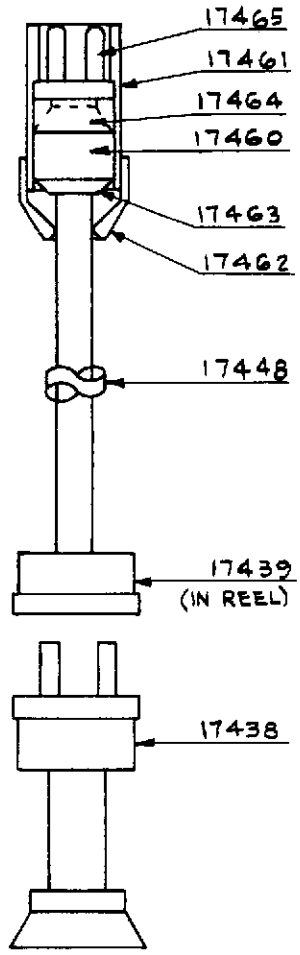
14W AMPLIFIER WIRING DIAGRAM FOR DESIGNS 185 (ALL) (06580)

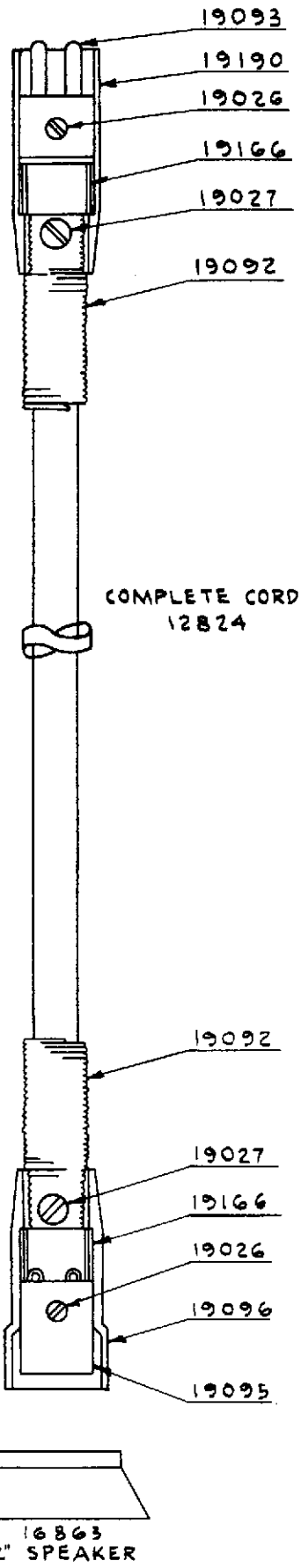
DATE 3-6-52	SERVICE DATA	DRAWN acl APVD.

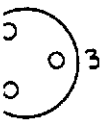


PARTS ON THIS SHEET NOT INCLUDED IN AMPLIFIER CHA

H-23 SHEET-B

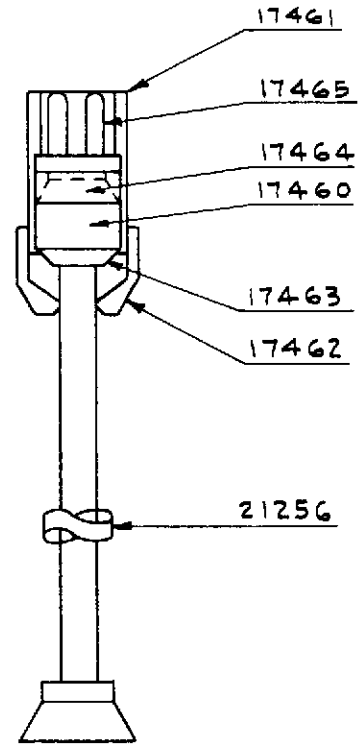




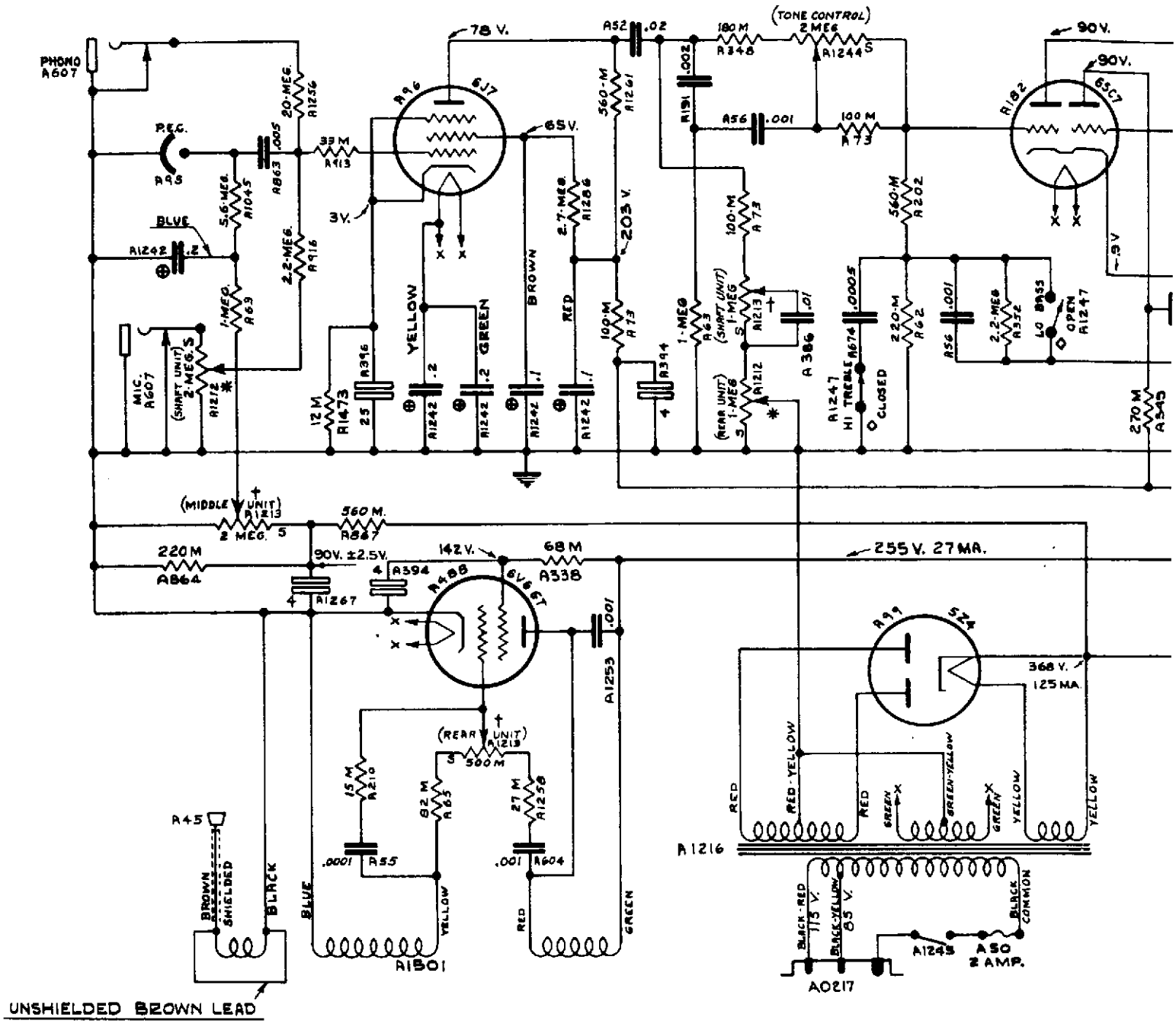


LAMP

N AMPLIFIER CHASSIS

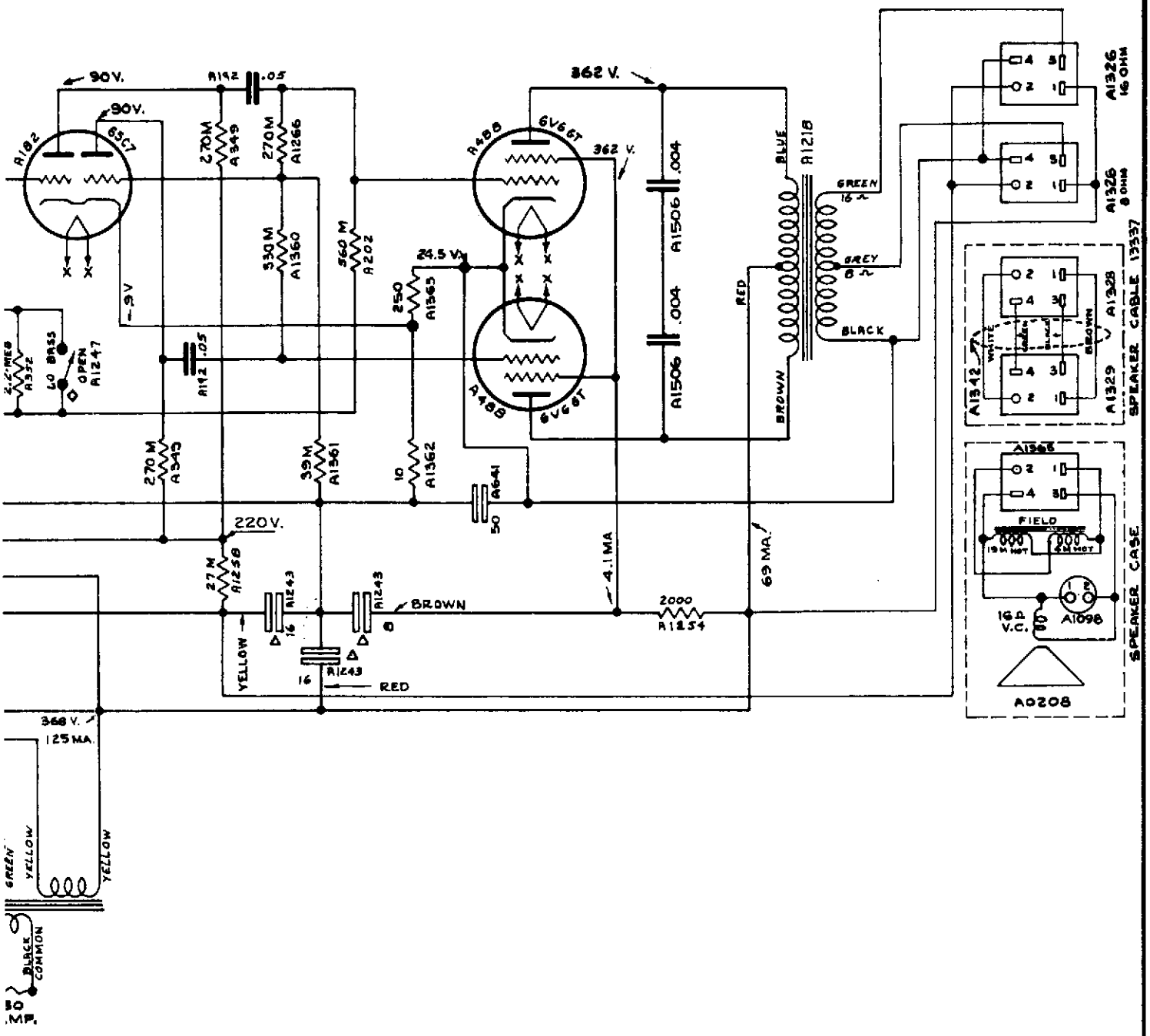


Bell & Howell Co. Chicago U.S.A.		
PROJECTOR WIRING DIAGRAM & CABLES FOR DESIGNS 185 (ALL)		
DATE 3-3-52	SERVICE DATA	DRAWN acl APVD.



"S" INDICATES TERMINAL AT CLOCKWISE STOP.
ALL VOLTAGES MEASURED WITH EXCITER LAMP FULL ON AND NO SIGNAL AT 115 VOLT LINE. ALL VOLTAGES MEASURED TO GROUND.
● △ INDICATES CAPACITORS LOCATED IN BANK.
† * INDICATES CONTROLS ON SAME SHAFT.
◇ SWITCHES SHOWN WITH SLIDE BUTTONS IN DOWN POSITION.

WIRING COLOR CODE			
WHITE	GROUND	BROWN	SCREEN
YELLOW	CATHODE	BLUE	PLATE
RED	B+	BLACK	HEATER
GREEN	GRID		



A555

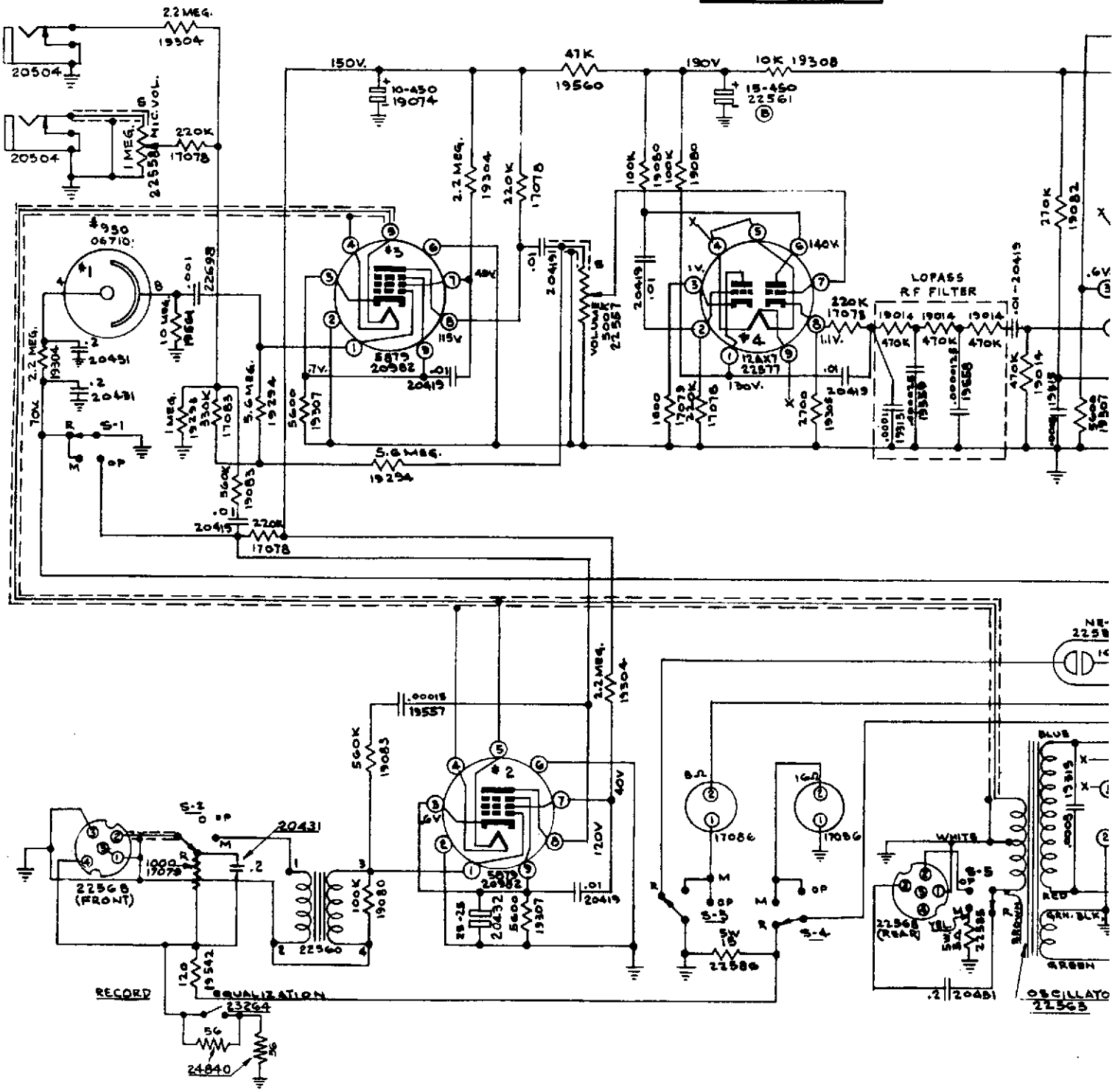
SERVICE DATA

AMPLIFIER WIRING DIAGRAM

B. & H. PORTABLE SOUND SYSTEM
DESIGN #159 MODEL A

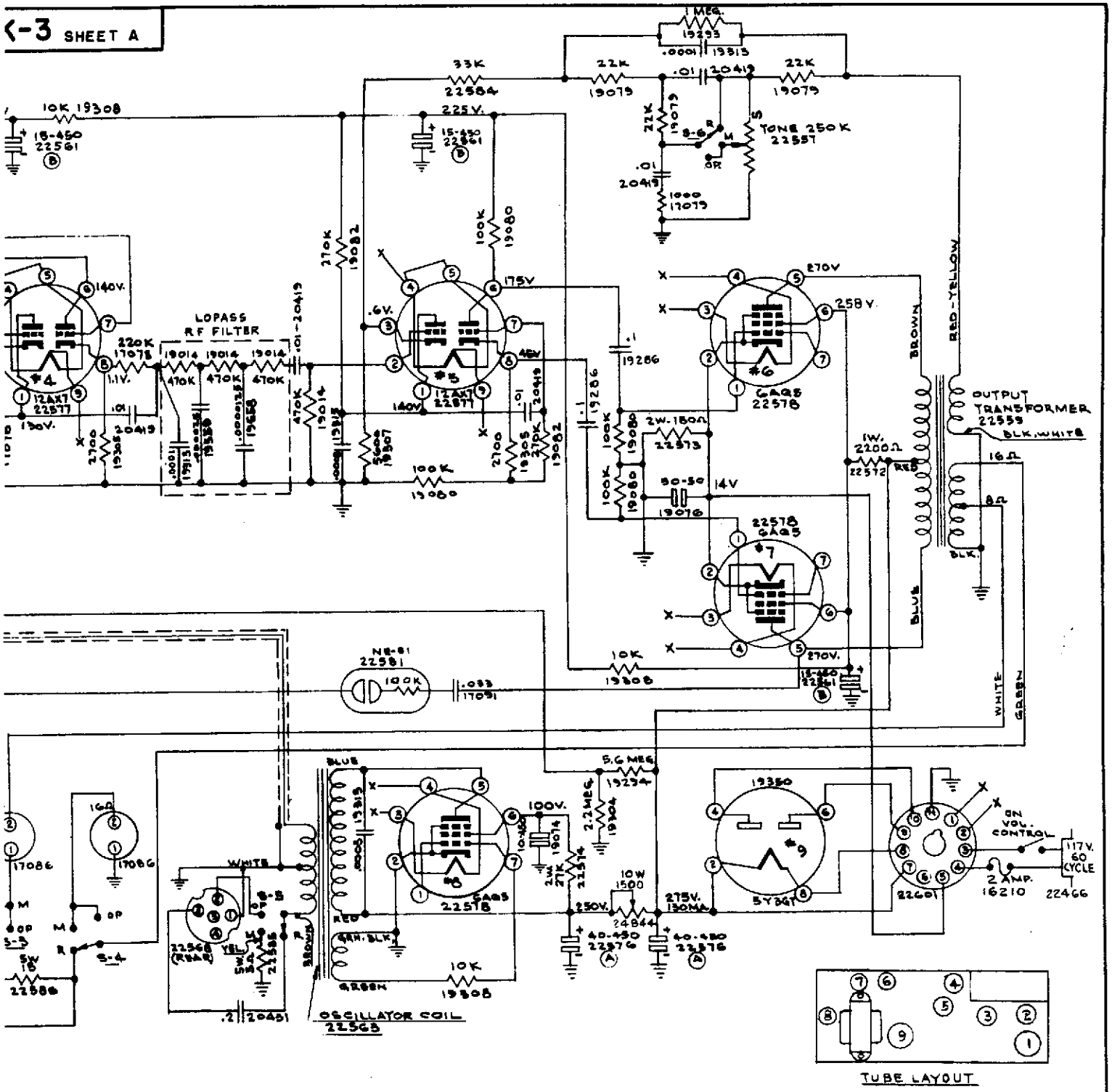
FOR USE ONLY WITH AMPLIFIER PART NO #2814 SUPPLIED WITH ABOVE. 12-8-41

K-3 SHEET A



NOTE: VOLTAGES POINT TO POINT ARE BASED ON 117 VOLT A.C. LINE INPUT.

WHITE
YELLOW
RED
GREEN
BLUE



TUBE LAYOUT

NOTE: VOLTAGES POINT TO POINT ARE BASED ON 117 VOLT A.C. LINE INPUT.

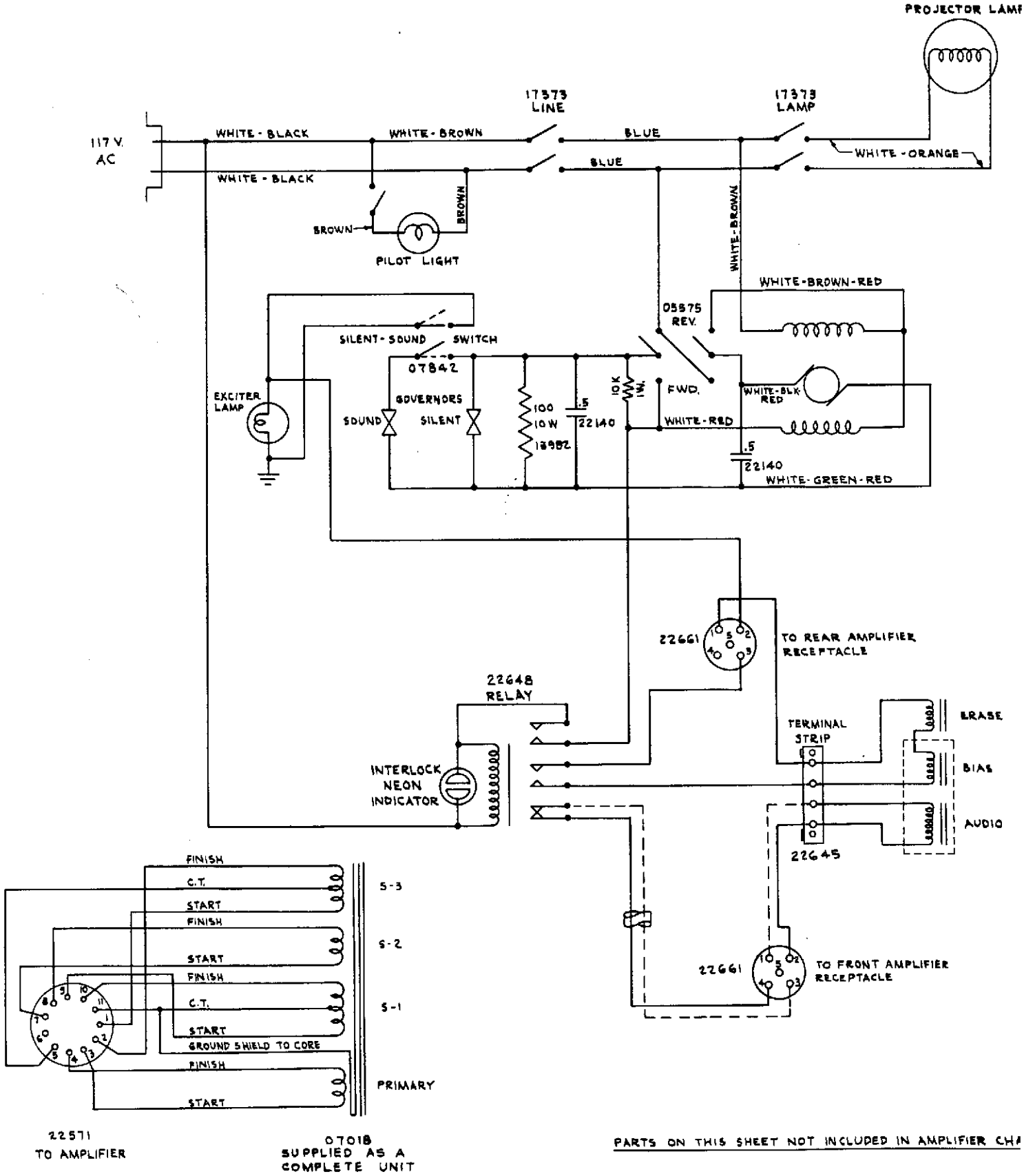
(A)-INDICATES CAPACITORS IN SAME CAN (22576)
(B)-INDICATES CAPACITORS IN SAME CAN (22561)
S-INDICATES TERMINAL AT CLOCKWISE STOP.
VOLTAGES INDICATED MEASURED TO CHASSIS GROUND.
(FUNCTION SWITCH IN MAG. OR OPT. PLAY BACK POSITION)
ALL RESISTORS 1/2 WATT UNLESS INDICATED OTHERWISE
S-1 TO S-6 (INCL.) INDICATE SECTIONS OF SELECTOR SWITCH (22558)

WIRE COLOR CODE			
WHITE	GROUND	BROWN	SCREEN
YELLOW	CATHODE	BLACK	AC
RED	B+	WHITE & BLACK	B-
GREEN	GRID		
BLUE	PLATE		

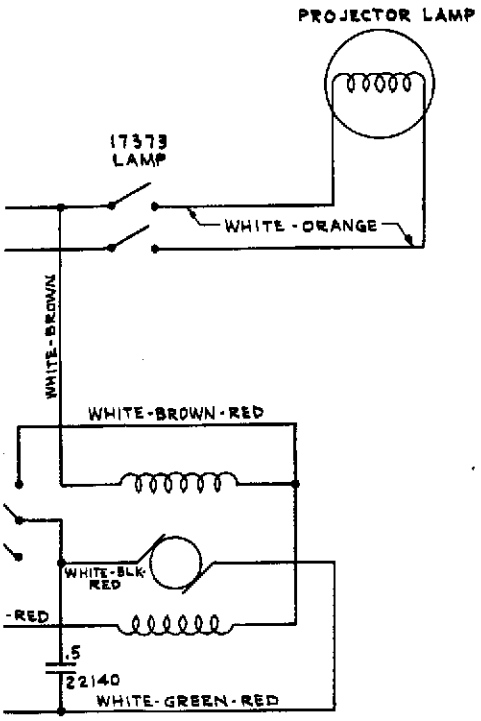
Bell & Howell Co. Chicago U.S.A.

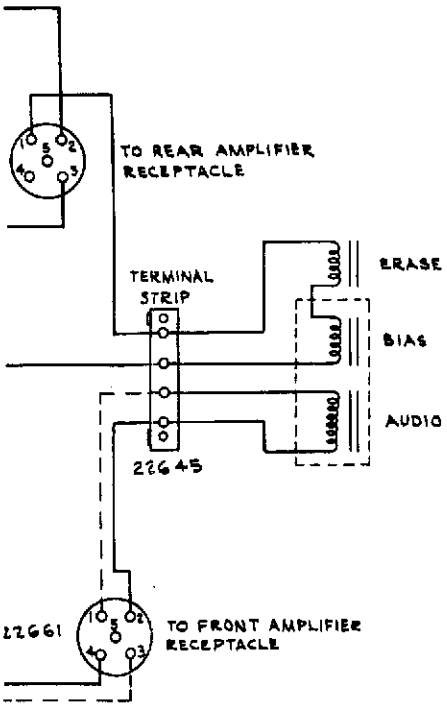
AMPLIFIER WIRING DIAGRAM FOR DESIGNS 202 (ALL)

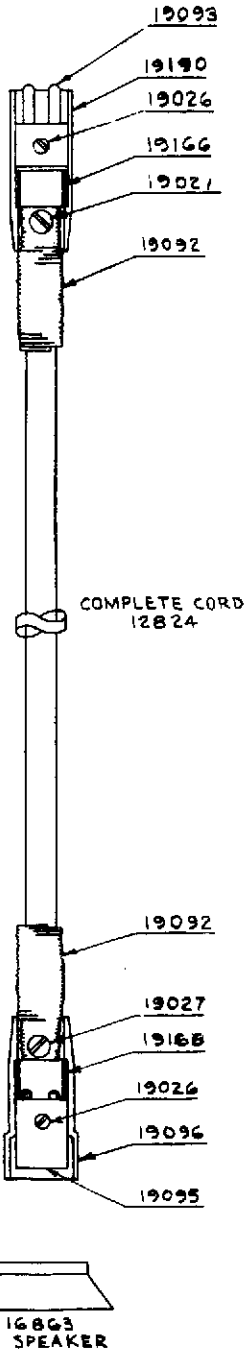
DATE 3-3-52 REVISED- 4-25-52	SERVICE DATA	DRAWN acl APVD.

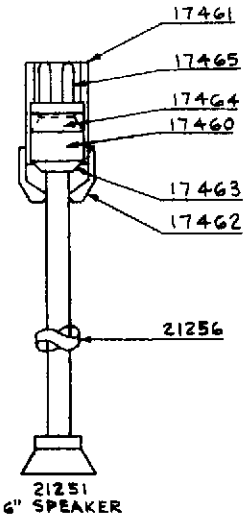


PARTS ON THIS SHEET NOT INCLUDED IN AMPLIFIER CH



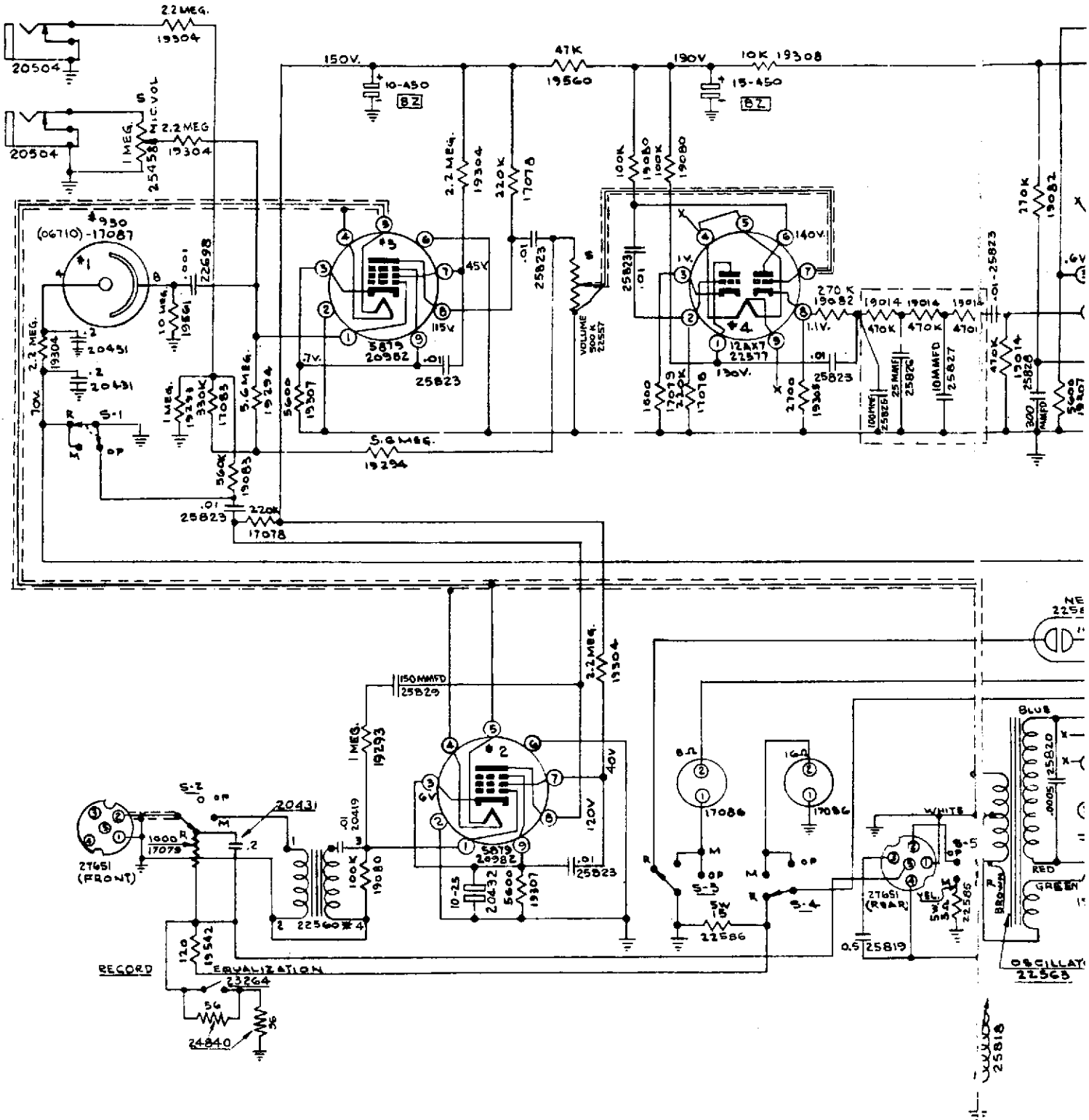






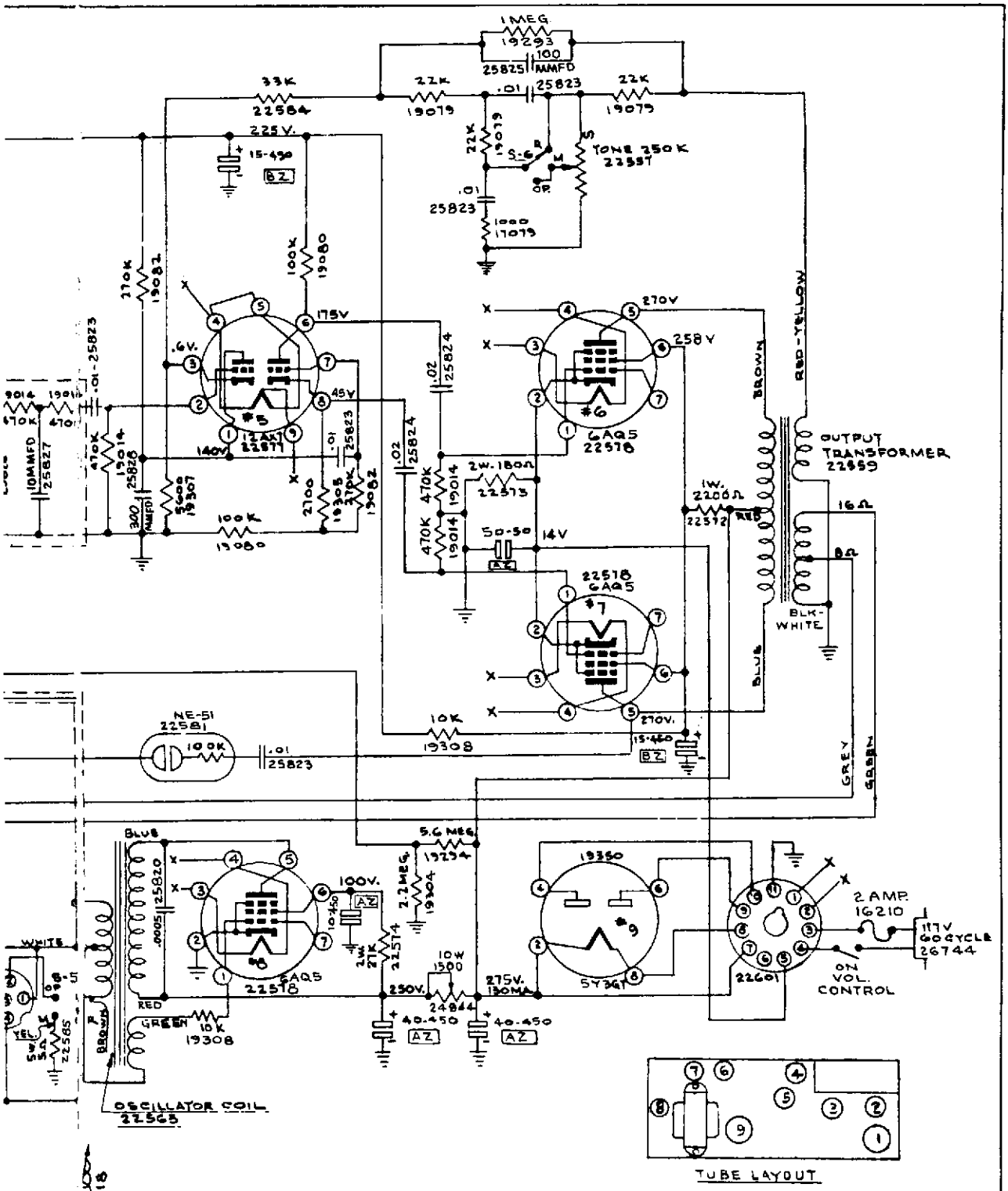
THIS SHEET NOT INCLUDED IN AMPLIFIER CHASSIS

Bell & Howell Co. Chicago U.S.A.		
AMPLIFIER WIRING DIAGRAM FOR DESIGNS 202 (ALL)		
DATE 3-5-52 REVISED-4-25-52	SERVICE DATA	DRAWN acl APVD.



NOTE: VOLTAGES POINT TO POINT ARE BASED ON 117 VOLT A.C. LINE INPUT.

WHITE
YELLOW
RED
GREEN



TUBE LAYOUT

AZ - INDICATES CAPACITORS IN SAME CAN (25821)
BZ - INDICATES CAPACITORS IN SAME CAN (25822)
S - INDICATES TERMINAL AT CLOCKWISE STOP.
VOLTAGES INDICATED MEASURED TO CHASSIS GROUND.
(FUNCTION SWITCH IN MAG. OR OPT. PLAY BACK POSITION)
ALL RESISTORS ½ WATT UNLESS INDICATED OTHERWISE.
S-1 TO S-6 (INCL.) INDICATE SECTIONS OF SELECTOR SWITCH (25458)

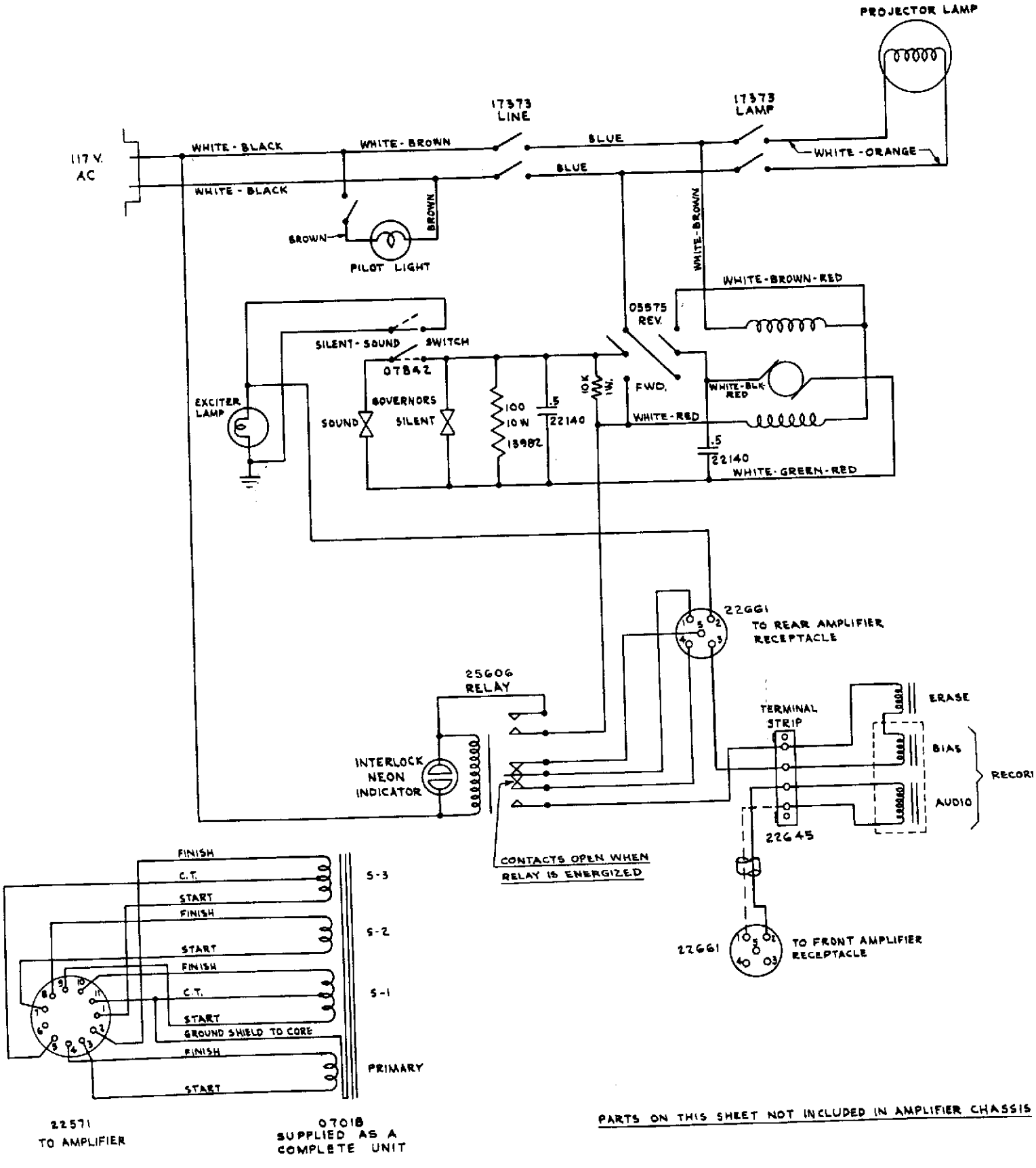
WIRE COLOR CODE			
WHITE	GROUND	BLUE	PLATE
YELLOW	CATHODE	BROWN	SCREEN
RED	B+	BLACK	AC
GREEN	GRID	WHITE & BLACK	B-

G	EFFECTIVE WITH AMPLIFIERS MARKED "G"	11-17-54

Bell & Howell Co. Chicago U.S.A.

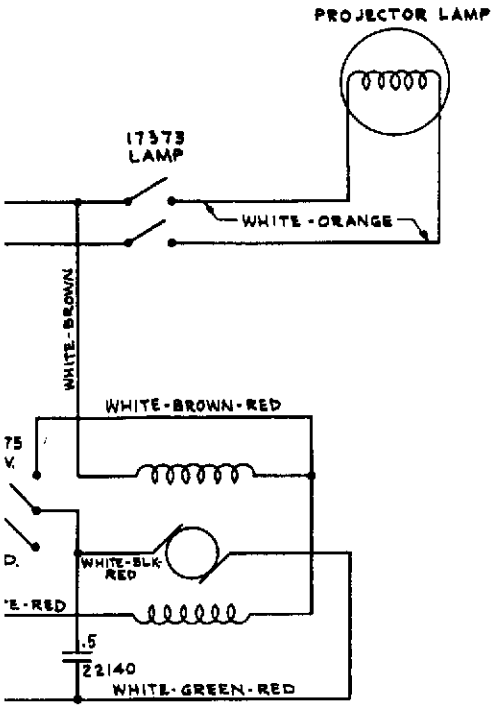
AMPLIFIER WIRING DIAGRAM
FOR DESIGNS 202 (ALL) (08256)

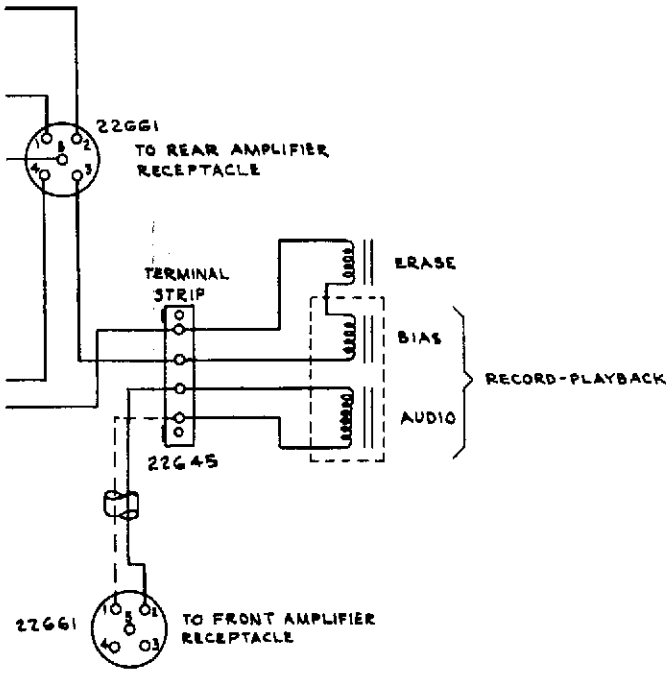
DATE 11-6-53	SERVICE DATA	DRAWN acl
		APVD.

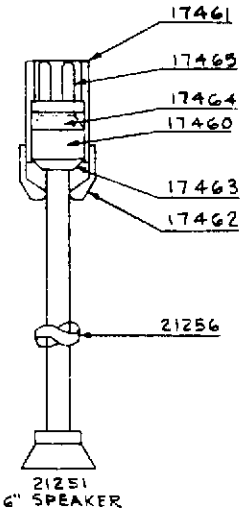


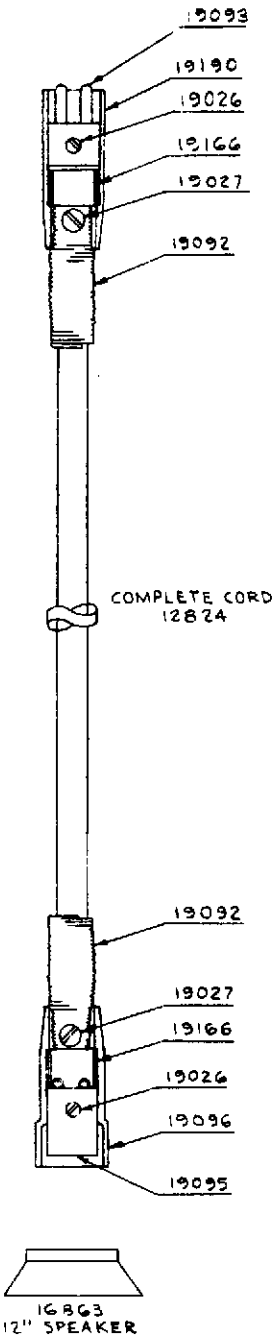
PARTS ON THIS SHEET NOT INCLUDED IN AMPLIFIER CHASSIS

K-4 SHEET 8





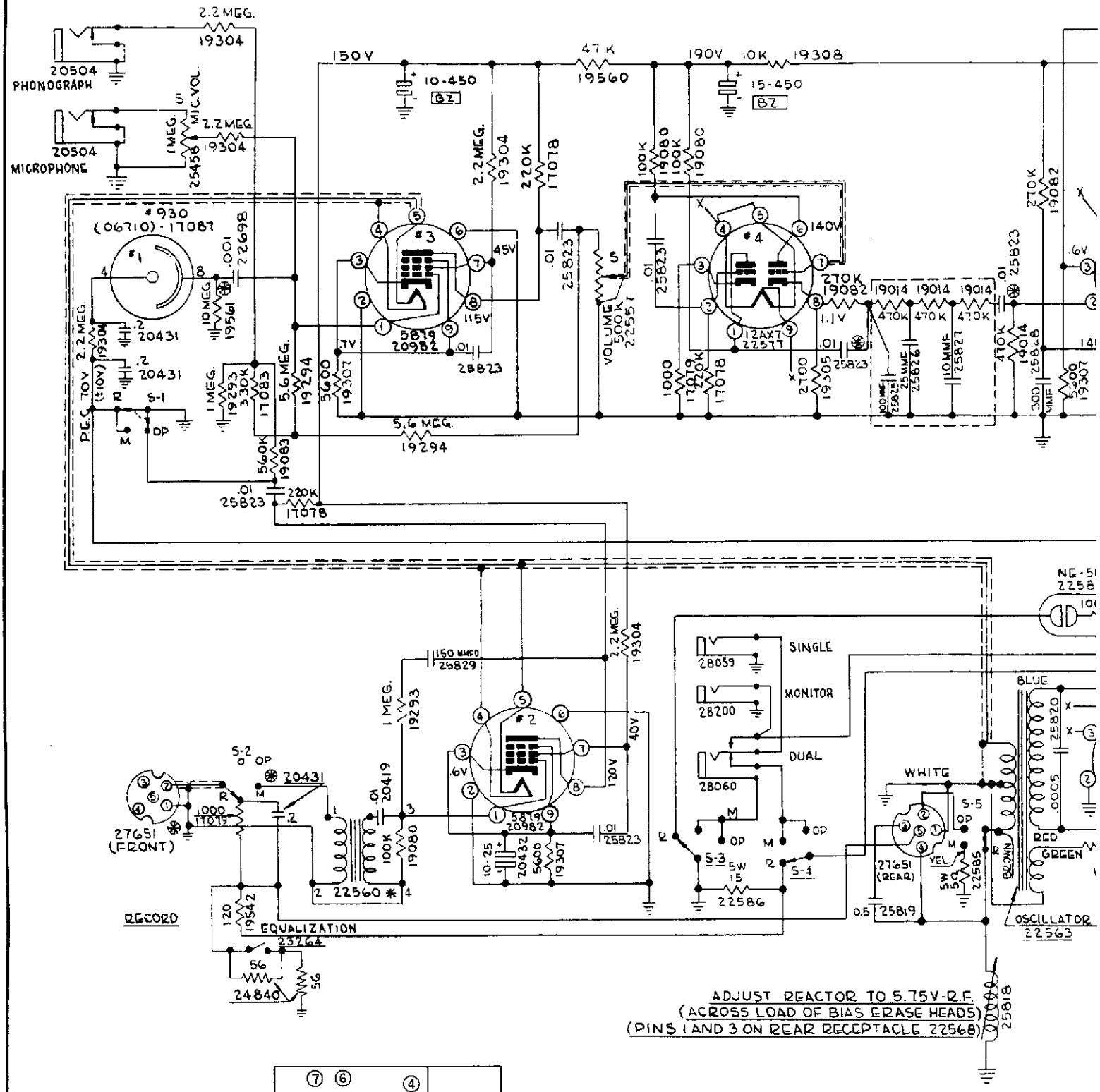


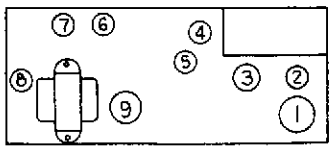


THIS SHEET NOT INCLUDED IN AMPLIFIER CHASSIS

Bell & Howell Co. Chicago U.S.A.		
AMPLIFIER WIRING DIAGRAM FOR DESIGNS 202 (ALL)		
DATE 11-6-53	SERVICE DATA	DRAWN ael APVD.

K-6 SHEET A

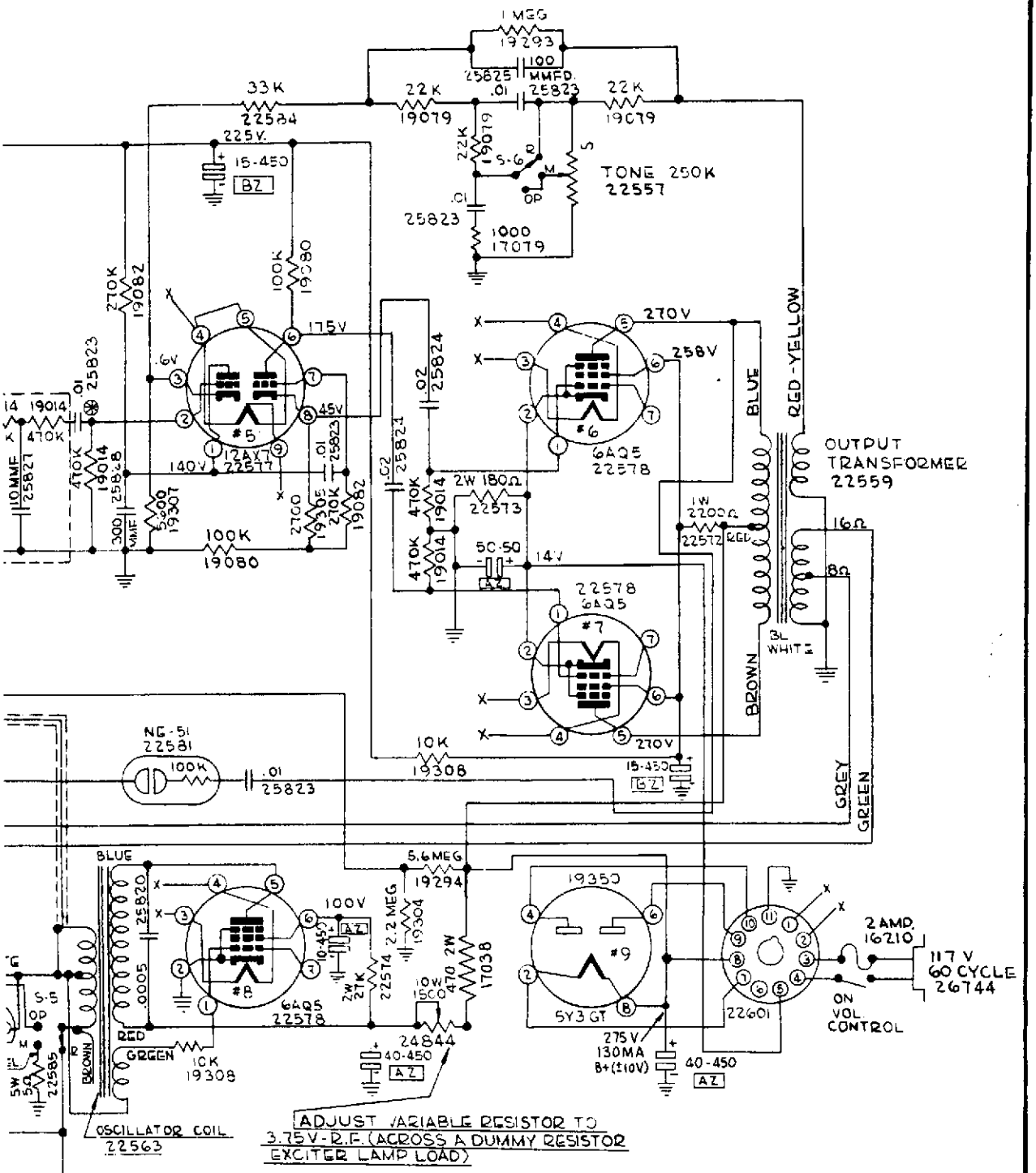




TUBE LAYOUT

NOTE: VOLTAGES POINT TO POINT ARE BASED ON 117 VOLT A.C. LINE INPUT.

WIRE COLOR CODE			
WHITE	GROUND	BLUE	PLATE
YELLOW	CATHODE	BROWN	SCREEN
RED	B+	BLACK	AC
GREEN	GRID	WHITE & BLACK	B-



AZ - INDICATES CAPACITORS IN SAME CAN (25821)
BZ - INDICATES CAPACITORS IN SAME CAN (25822)
S - INDICATES TERMINAL AT CLOCKWISE STOP.
VOLTAGES INDICATED MEASURED TO CHASSIS GROUND.
(FUNCTION SWITCH IN MAG. OR OPT. PLAYBACK POSITION)
ALL RESISTORS ½ WATT UNLESS OTHERWISE INDICATED.
S-1 TO S-6 (INCL.) INDICATE SECTIONS OF SELECTOR SWITCH (25458).
⊛ - FOR CRITICAL POSITIONING OF COMPONENTS AT THESE LOCATIONS SEE MODEL.

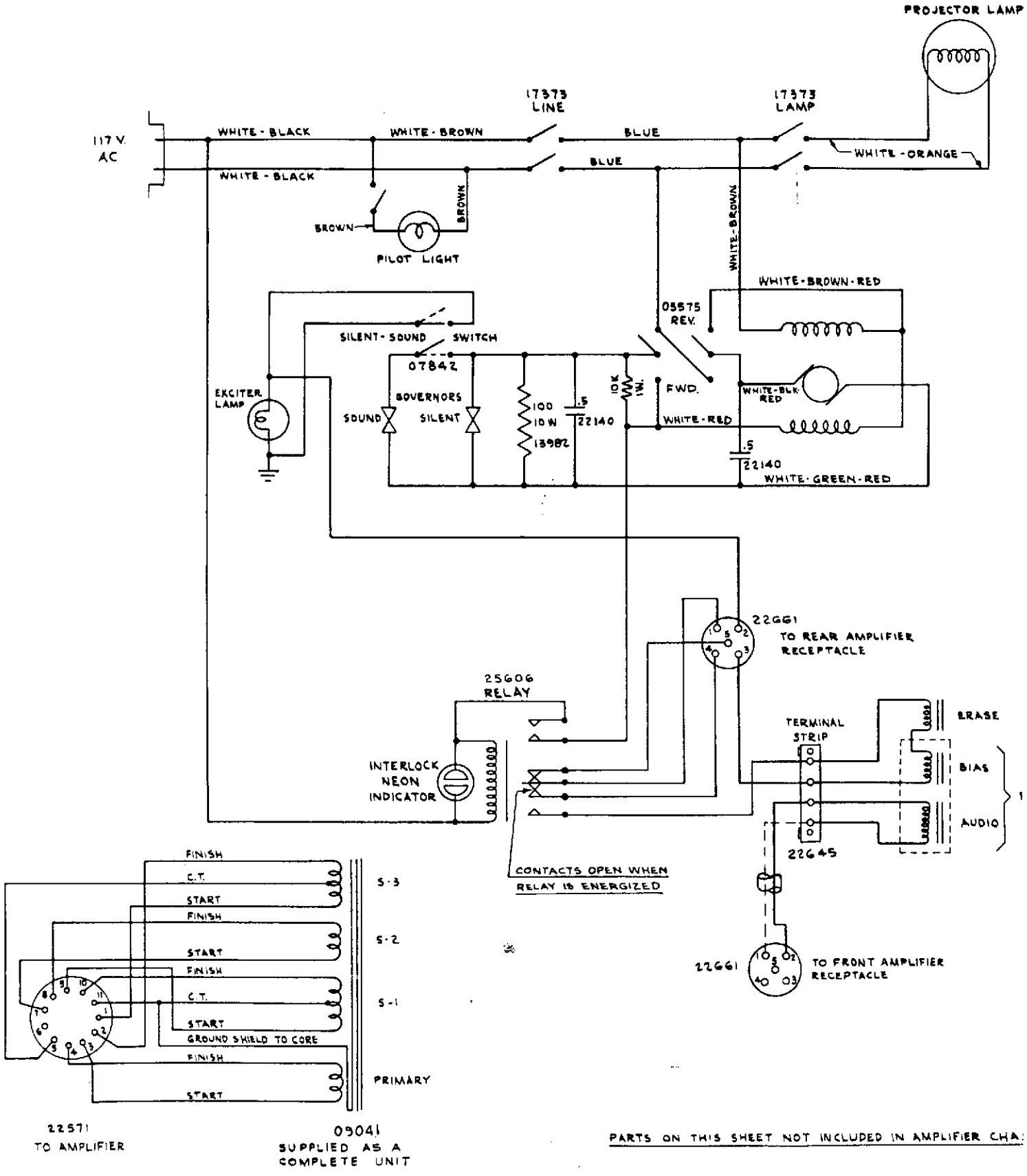
PLATE	
SCREEN	
AC	
BLACK	B-

Bell & Howell Co. Chicago U.S.A.

AMPLIFIER WIRING DIAGRAM
FOR DESIGNS 302 (ALL) (09046)

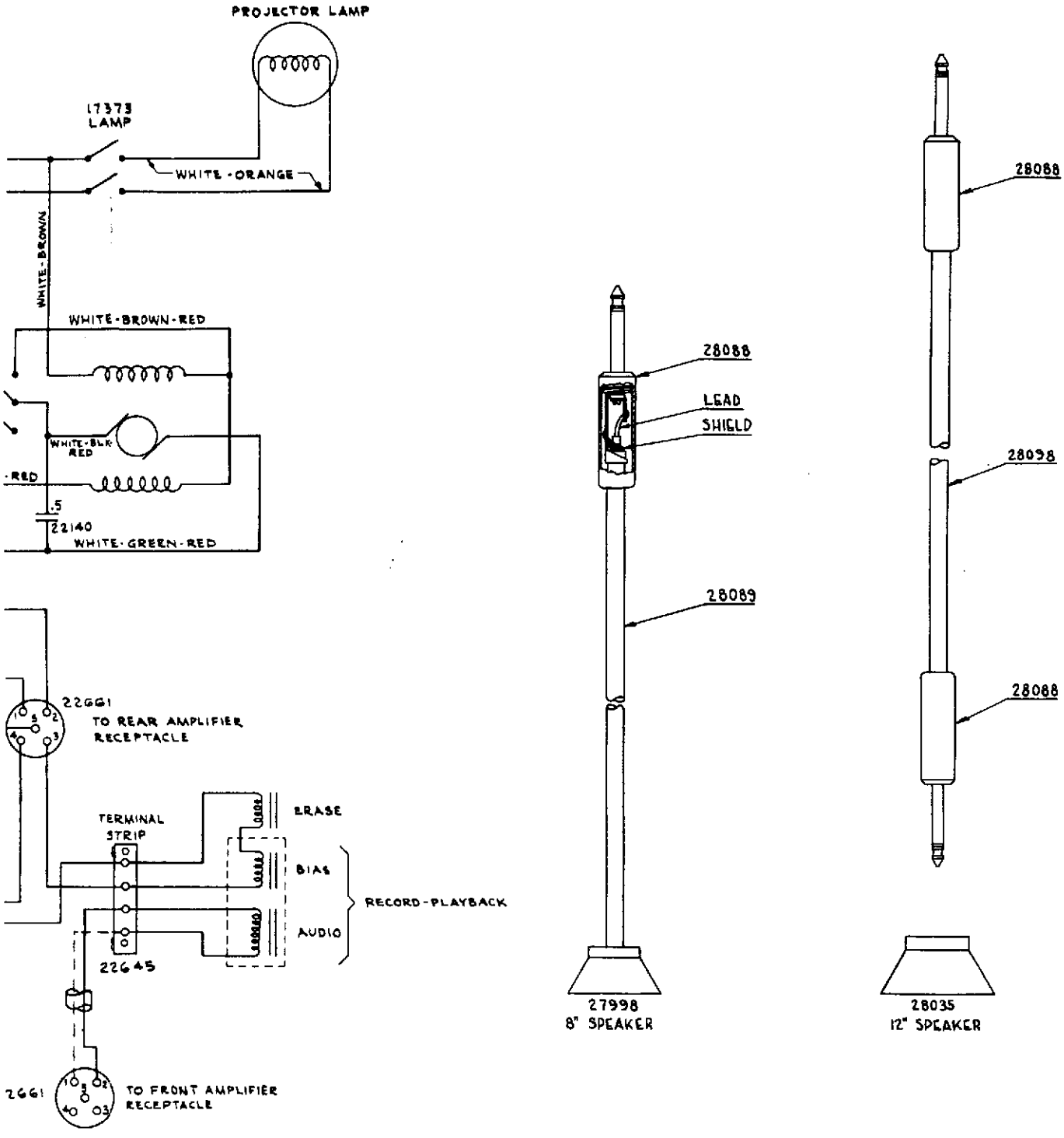
DATE 11-25-55	SERVICE DATA	DRAWN acl APVD. LL

K-6 SHEET B



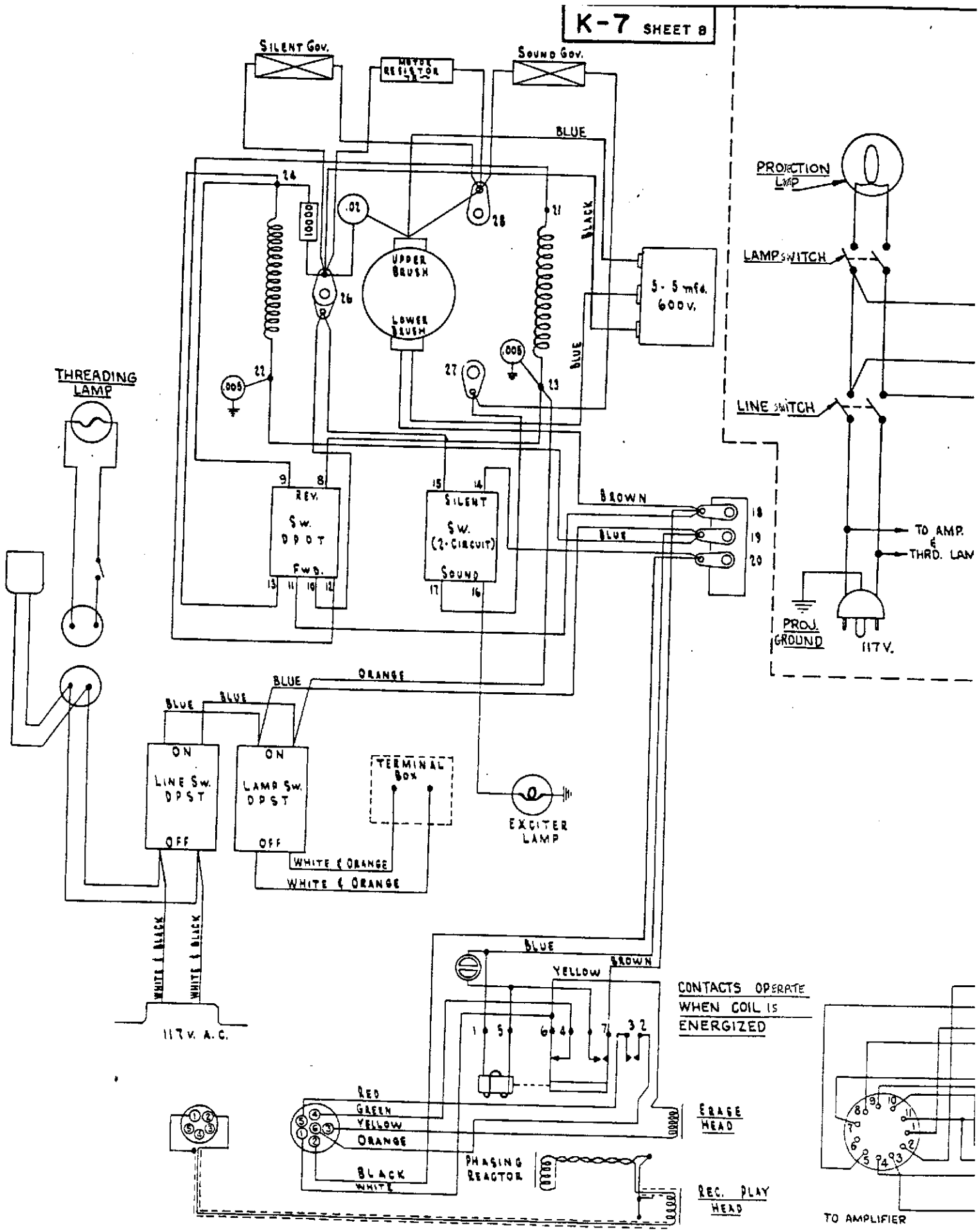
PARTS ON THIS SHEET NOT INCLUDED IN AMPLIFIER CHA

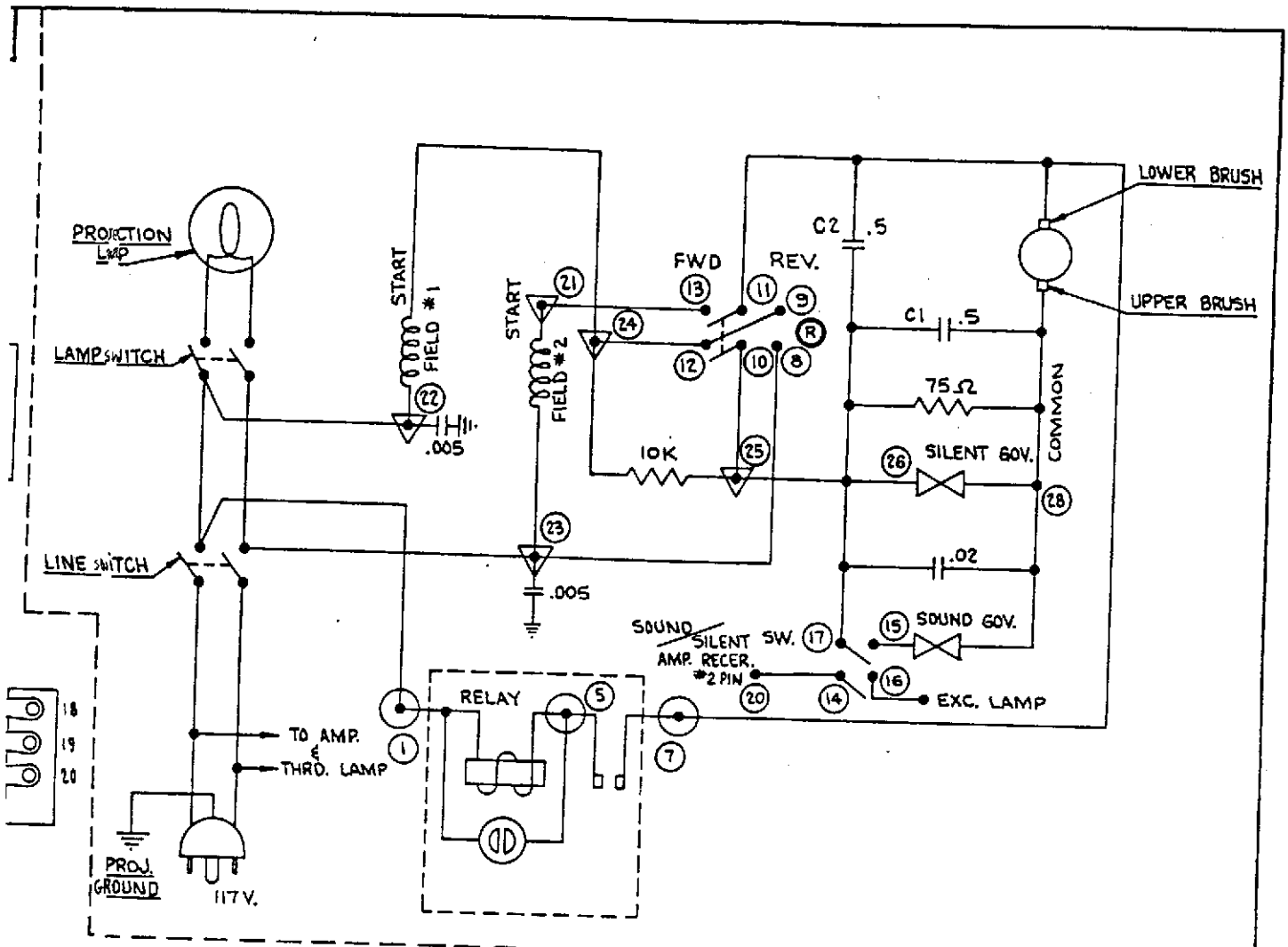
K-6 SHEET B

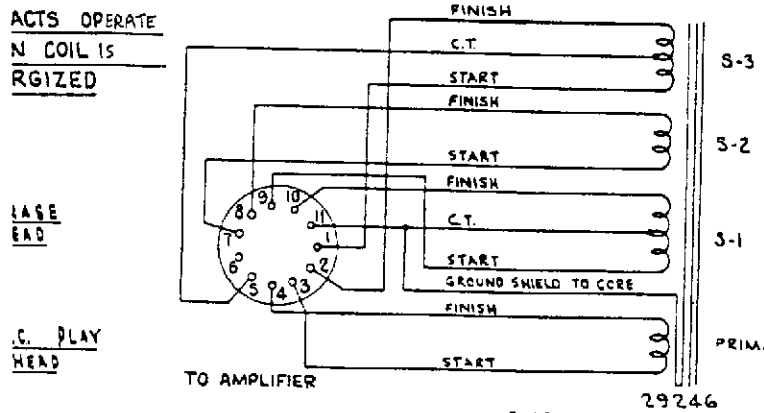


THIS SHEET NOT INCLUDED IN AMPLIFIER CHASSIS

Bell & Howell Co. Chicago U.S.A.		
AMPLIFIER WIRING DIAGRAM FOR DESIGNS 302 (ALL)		
DATE 11-25-55	SERVICE DATA	DRAWN acl APVD. L.L.


SILENT GOV.
MOTOR RESISTOR
SOUND GOV.
BLUE
24
10000
.02
28
21
BLACK
UPPER BRUSH
LOWER BRUSH
26
5 - 5 mfd. 600 V.
.005
22
27
.005
23
BLUE
PROJECTION LAMP
LAMP SWITCH
LINE SWITCH
THREADING LAMP
9
8
REV. SW. DPDT
FWD.
13
11
10
12
15
14
SILENT SW. (2-CIRCUIT)
SOUND
17
16
BROWN
BLUE
18
19
20
TO AMP. & THRD. LAMP
PROJ. GROUND
117 V.
BLUE
ORANGE
BLUE
BLUE
ON
LINE SW. DPST
OFF
ON
LAMP SW. DPST
OFF
TERMINAL BOX
EXCITER LAMP
WHITE & ORANGE
WHITE & ORANGE
WHITE & BLACK
WHITE & BLACK
117 V. A.C.
BLUE
BROWN
YELLOW
1
5
6
4
7
3
2
CONTACTS OPERATE WHEN COIL IS ENERGIZED
RED
GREEN
YELLOW
ORANGE
BLACK
WHITE
PHASING REACTOR
ERASE HEAD
REC. PLAY HEAD
TO AMPLIFIER

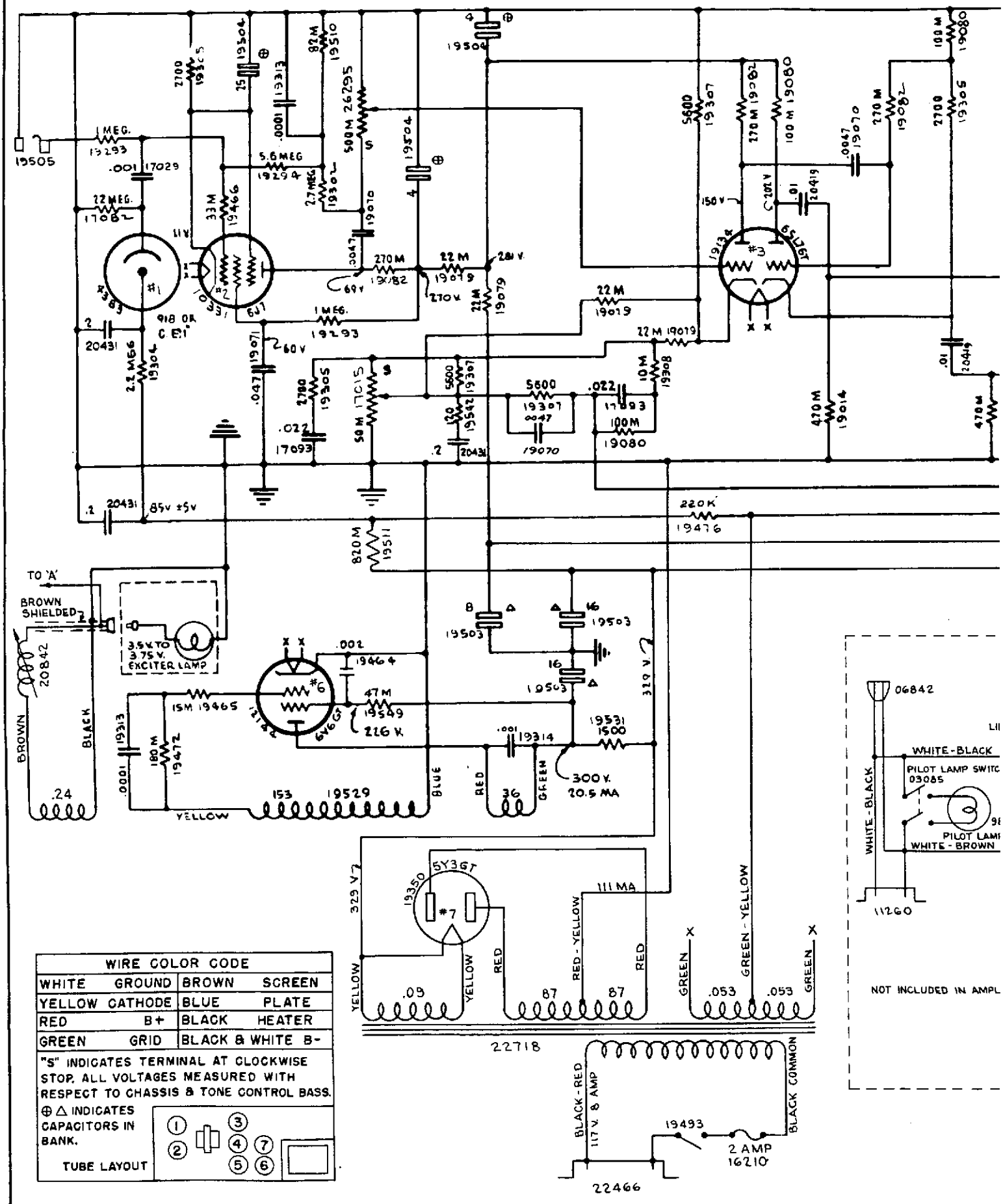




PARTS ON THIS SHEET NOT INCLUDED IN AMPLIFIER CHASSIS.

Bell & Howell Co. Chicago U.S.A.		
AMPLIFIER WIRING DIAGRAM FOR DESIGN 302 (MOD. D & E) (09431)		
DATE 2-14-57	SERVICE DATA	DRAWN acl APVD. LL

L-1



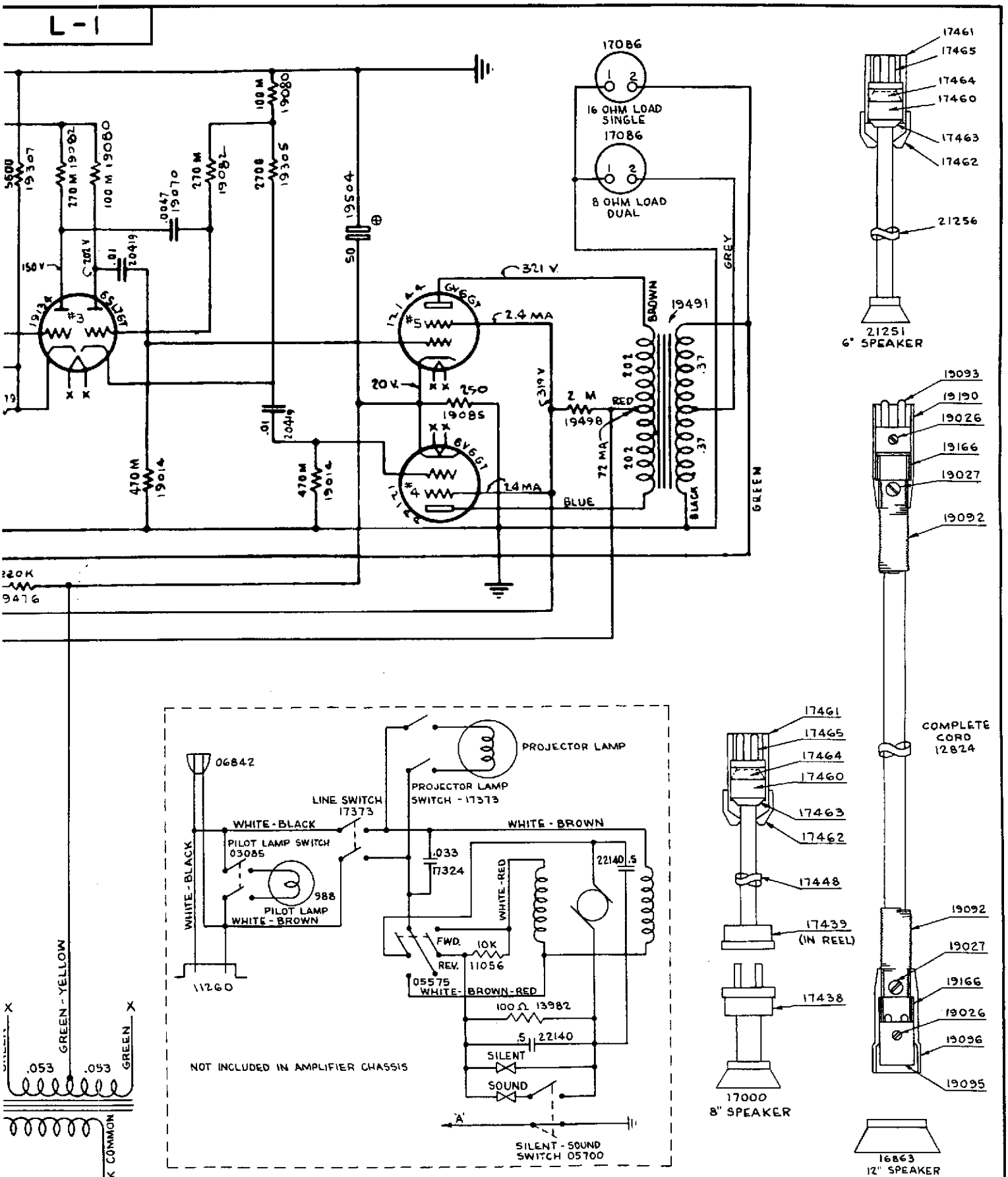
WIRE COLOR CODE			
WHITE	GROUND	BROWN	SCREEN
YELLOW	CATHODE	BLUE	PLATE
RED	B+	BLACK	HEATER
GREEN	GRID	BLACK & WHITE	B-

"S" INDICATES TERMINAL AT CLOCKWISE STOP. ALL VOLTAGES MEASURED WITH RESPECT TO CHASSIS & TONE CONTROL BASS.

⊕ △ INDICATES CAPACITORS IN BANK.

TUBE LAYOUT

L-1



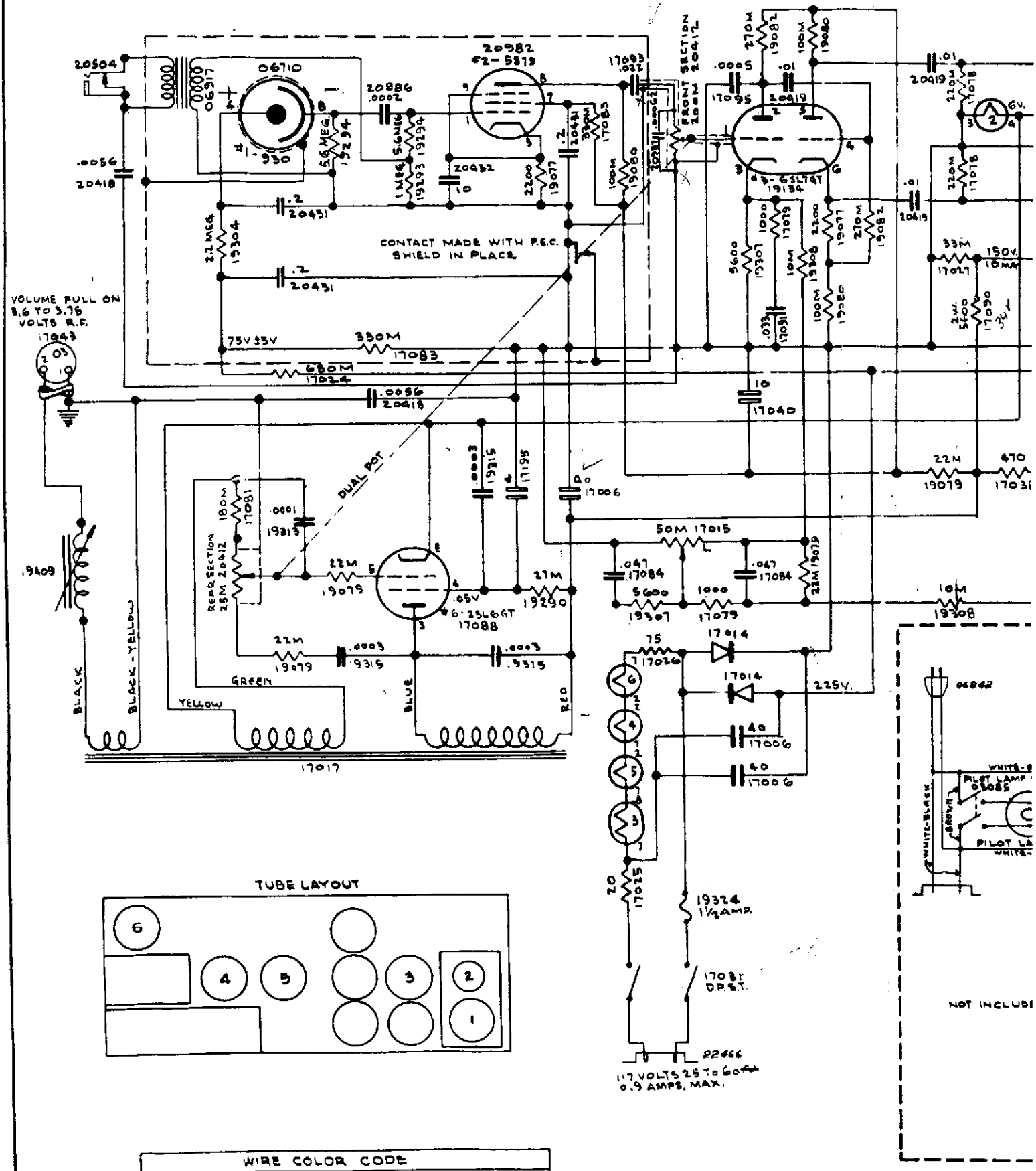
50 TO 60 CYCLES

Bell & Howell Co. Chicago U.S.A.

14 W. AMPLIFIER WIRING DIAGRAM FOR DESIGNS 285 (ALL) (07137)

DATE 11-29-55	SERVICE DATA	DRAWN acl APVD. LL

L-2

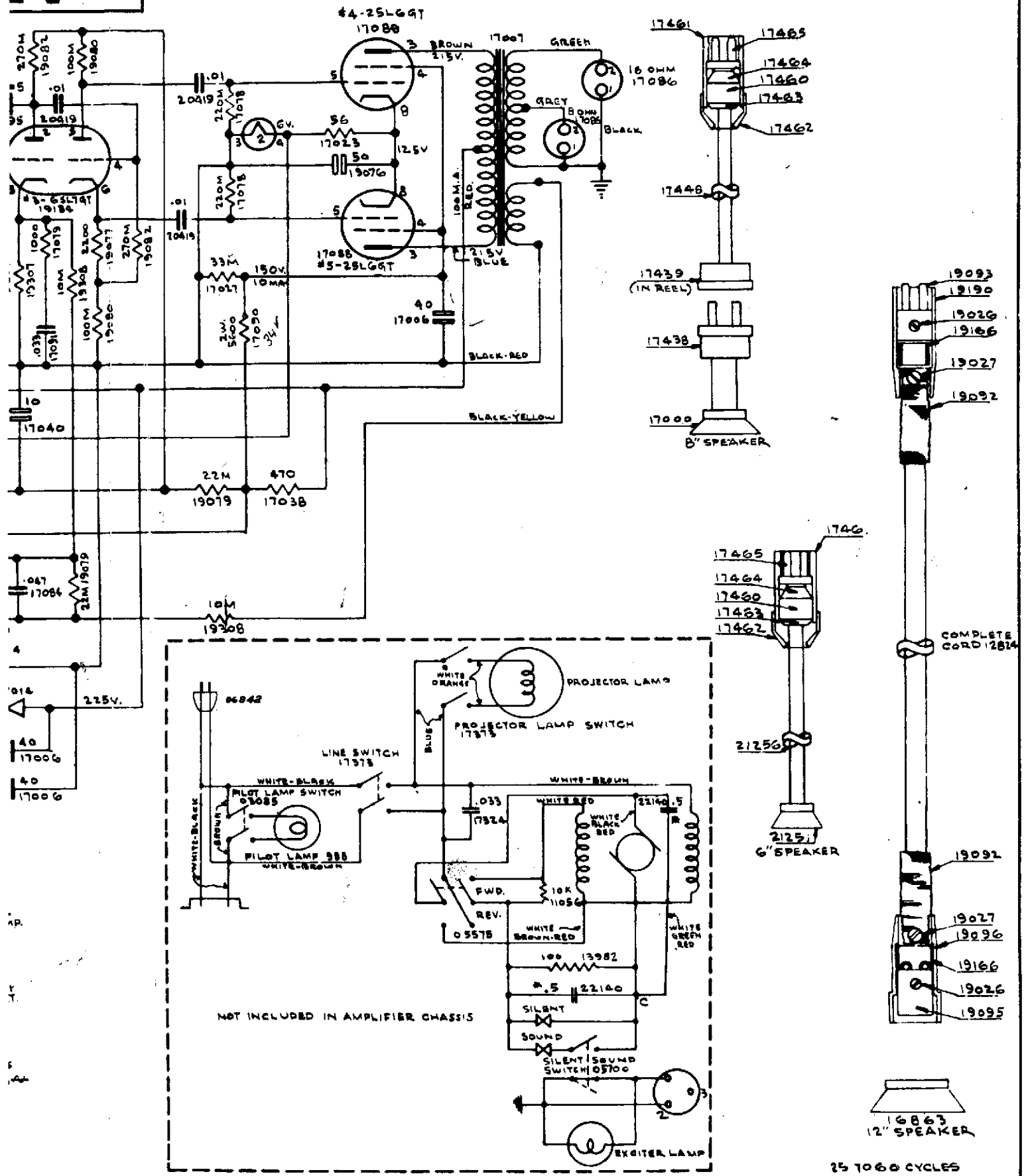


TUBE LAYOUT

WIRE COLOR CODE			
WHITE	GROUND	BROWN	SCREEN
YELLOW	CATHODE	BLACK	AC
RED	B+	WHITE & BLACK	B-
GREEN	GRID		
BLUE	PLATE		

ALL VOLTAGES MEASURED WITH METER WITH 11 MEGOHM INPUT.

L-2

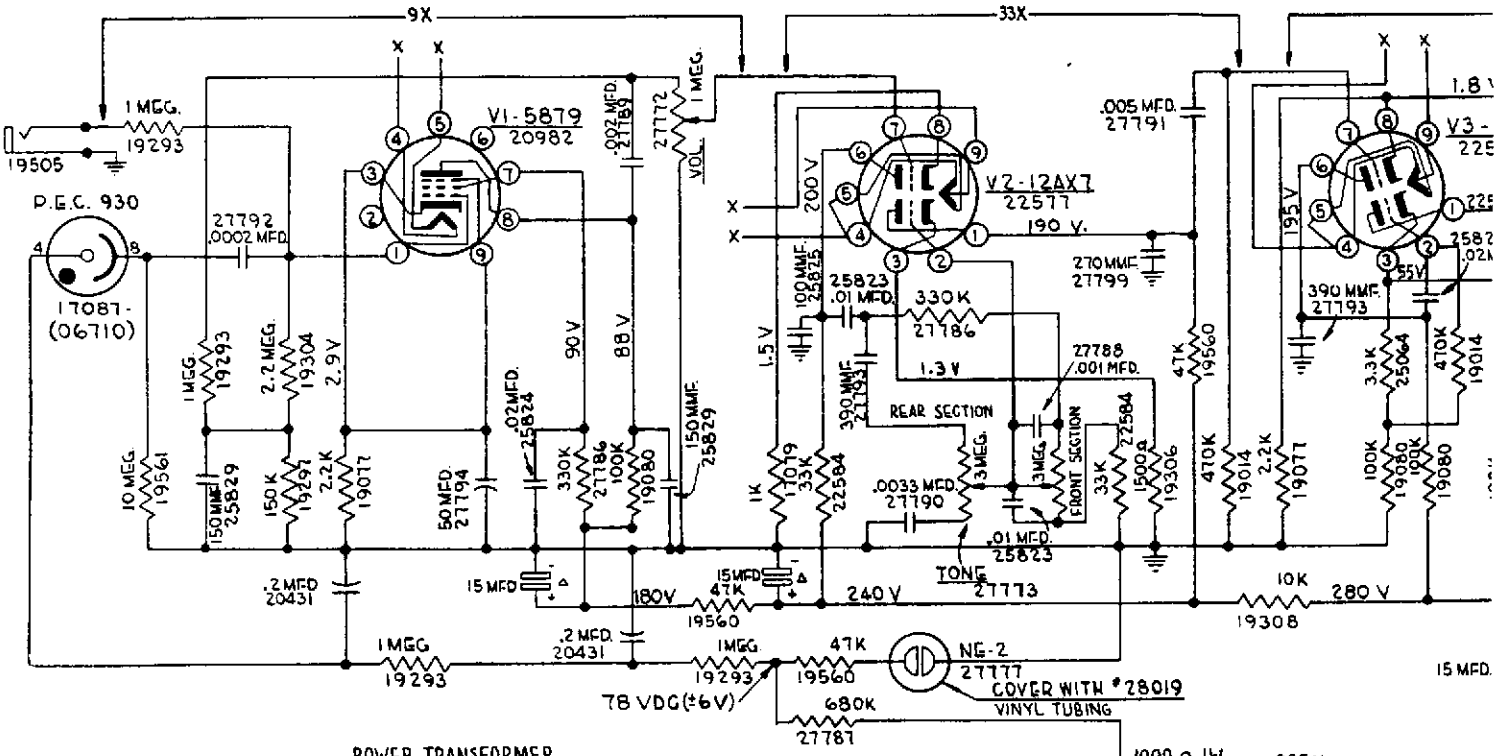


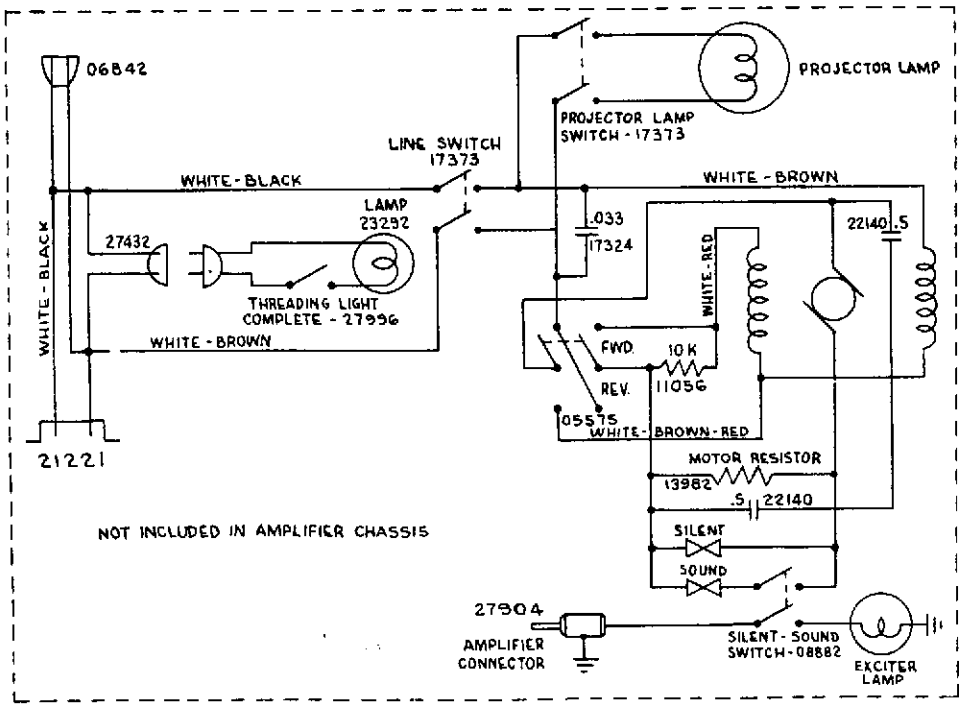
EASURED WITH METER
INPUT.

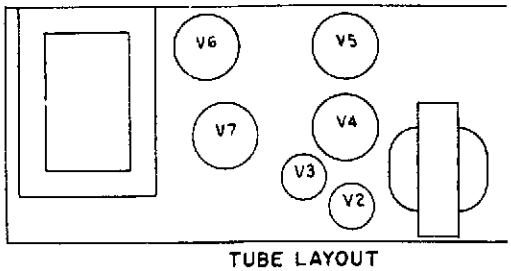
Bell & Howell Co. Chicago U.S.A.		
10W. AMPLIFIER WIRING DIAGRAM FOR DESIGNS 285 (ALL) (07138)		
DATE 5-28-61	SERVICE DATA	DRAWN WK APVD.

M - 1

STAGE GAINS





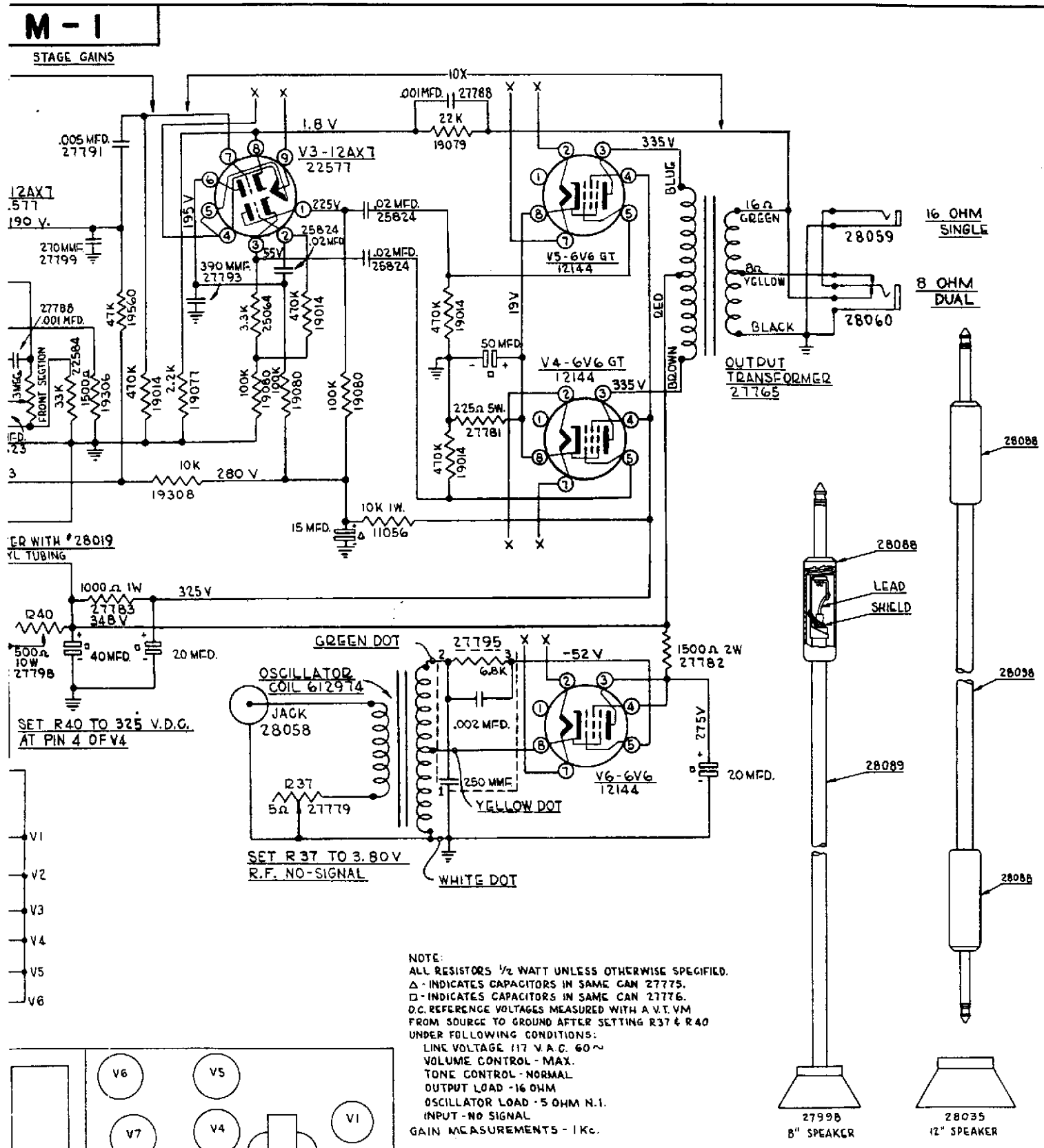


TUBE LAYOUT

WIRE COLOR CODE		
GROUND	BLACK	CATHODE
FILAMENTS	BROWN	CONTROL GRIDS
B+	RED	PLATE
SCREEN GRIDS	ORANGE	AC

M - 1

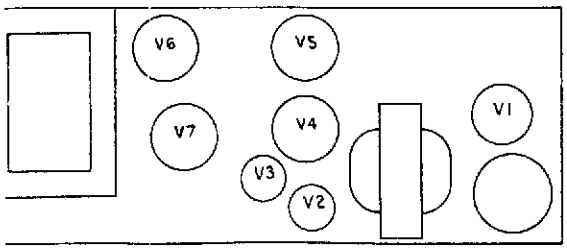
STAGE GAINS



NOTE:
ALL RESISTORS ½ WATT UNLESS OTHERWISE SPECIFIED.
△ - INDICATES CAPACITORS IN SAME CAN 27775.
□ - INDICATES CAPACITORS IN SAME CAN 27776.
D.C. REFERENCE VOLTAGES MEASURED WITH A V.T. VM FROM SOURCE TO GROUND AFTER SETTING R37 & R40 UNDER FOLLOWING CONDITIONS:
LINE VOLTAGE 117 V.A.C. 60~
VOLUME CONTROL - MAX.
TONE CONTROL - NORMAL
OUTPUT LOAD - 16 OHM
OSCILLATOR LOAD - 5 OHM N.I.
INPUT - NO SIGNAL
GAIN MEASUREMENTS - 1 Kc.

27998
8" SPEAKER

28035
12" SPEAKER



TUBE LAYOUT

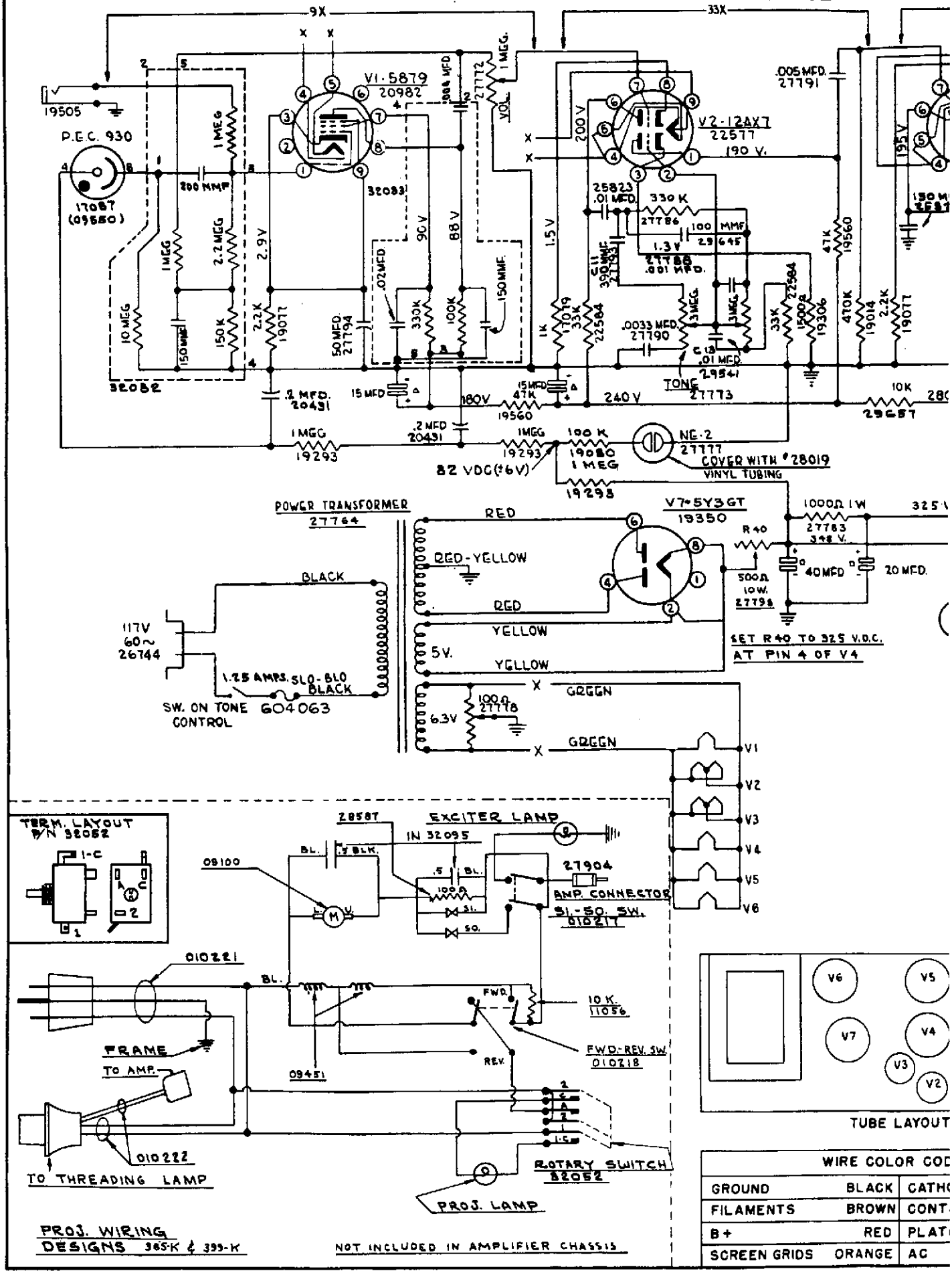
WIRE COLOR CODE			
ROUND	BLACK	CATHODE	YELLOW
LAMENTS	BROWN	CONTROL GRIDS	GREEN
+	RED	PLATE	BLUE
GREEN GRIDS	ORANGE	AC	GRAY

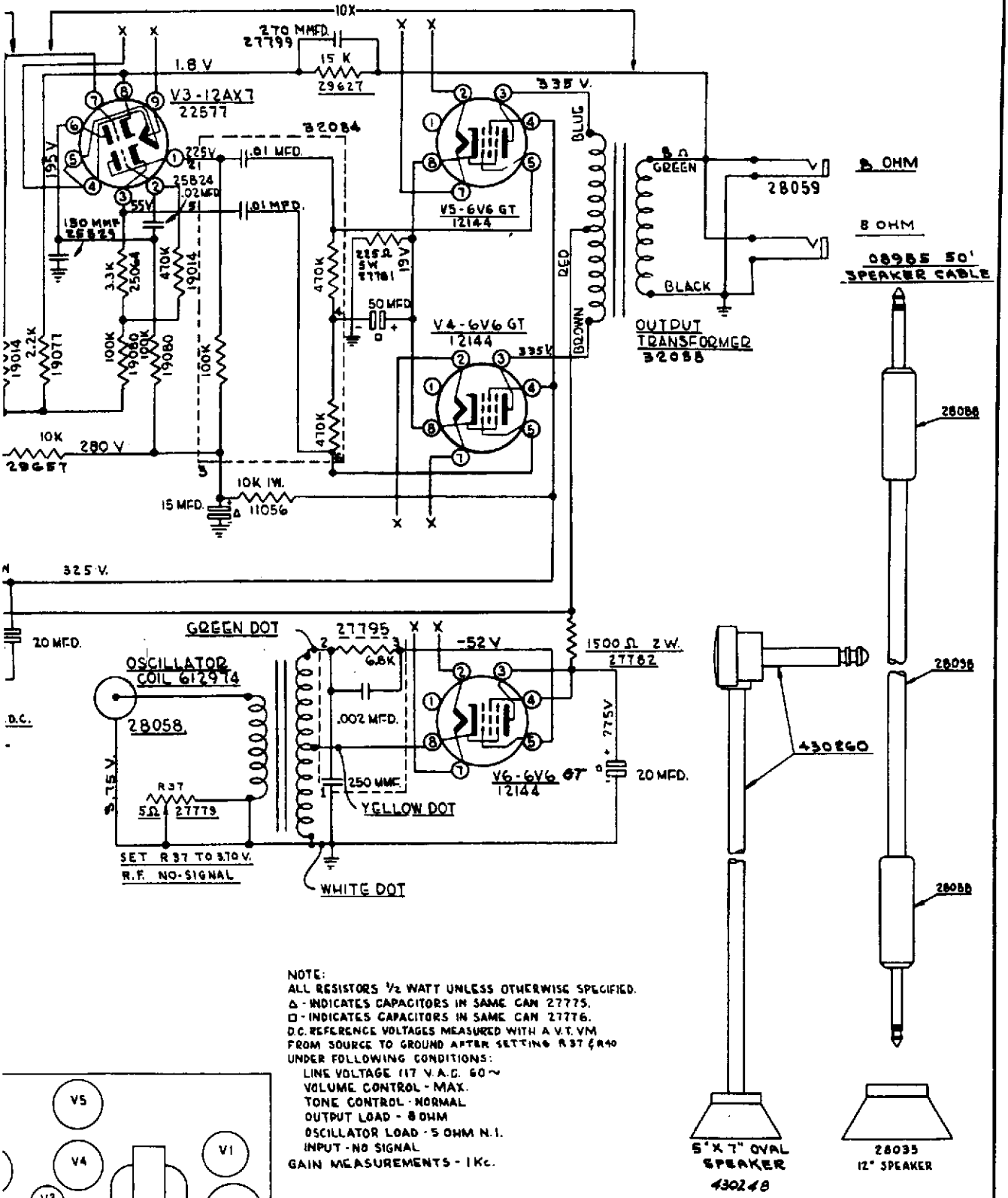
60 CYCLES

Bell & Howell Co. Chicago U.S.A.		
15 W. AMPLIFIER WIRING DIAGRAM FOR DESIGNS 385 (08855)		
DATE 11-10-55	SERVICE DATA	DRAWN acl APVD.

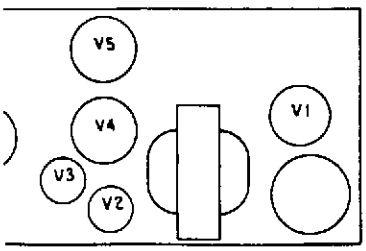
M-2

STAGE GAINS





NOTE:
ALL RESISTORS ½ WATT UNLESS OTHERWISE SPECIFIED.
Δ - INDICATES CAPACITORS IN SAME CAN 27775.
□ - INDICATES CAPACITORS IN SAME CAN 27776.
D.C. REFERENCE VOLTAGES MEASURED WITH A V.T. VM FROM SOURCE TO GROUND AFTER SETTING R37 & R40 UNDER FOLLOWING CONDITIONS:
LINE VOLTAGE 117 V.A.C. 60~
VOLUME CONTROL - MAX.
TONE CONTROL - NORMAL
OUTPUT LOAD - 8 OHM
OSCILLATOR LOAD - 5 OHM N.I.
INPUT - NO SIGNAL
GAIN MEASUREMENTS - 1Kc.



UBE LAYOUT

COLOR CODE		
.ACK	CATHODE	YELLOW
ROWN	CONTROL GRIDS	GREEN
RED	PLATE	BLUE
NGE	AC	GRAY

60 CYCLES

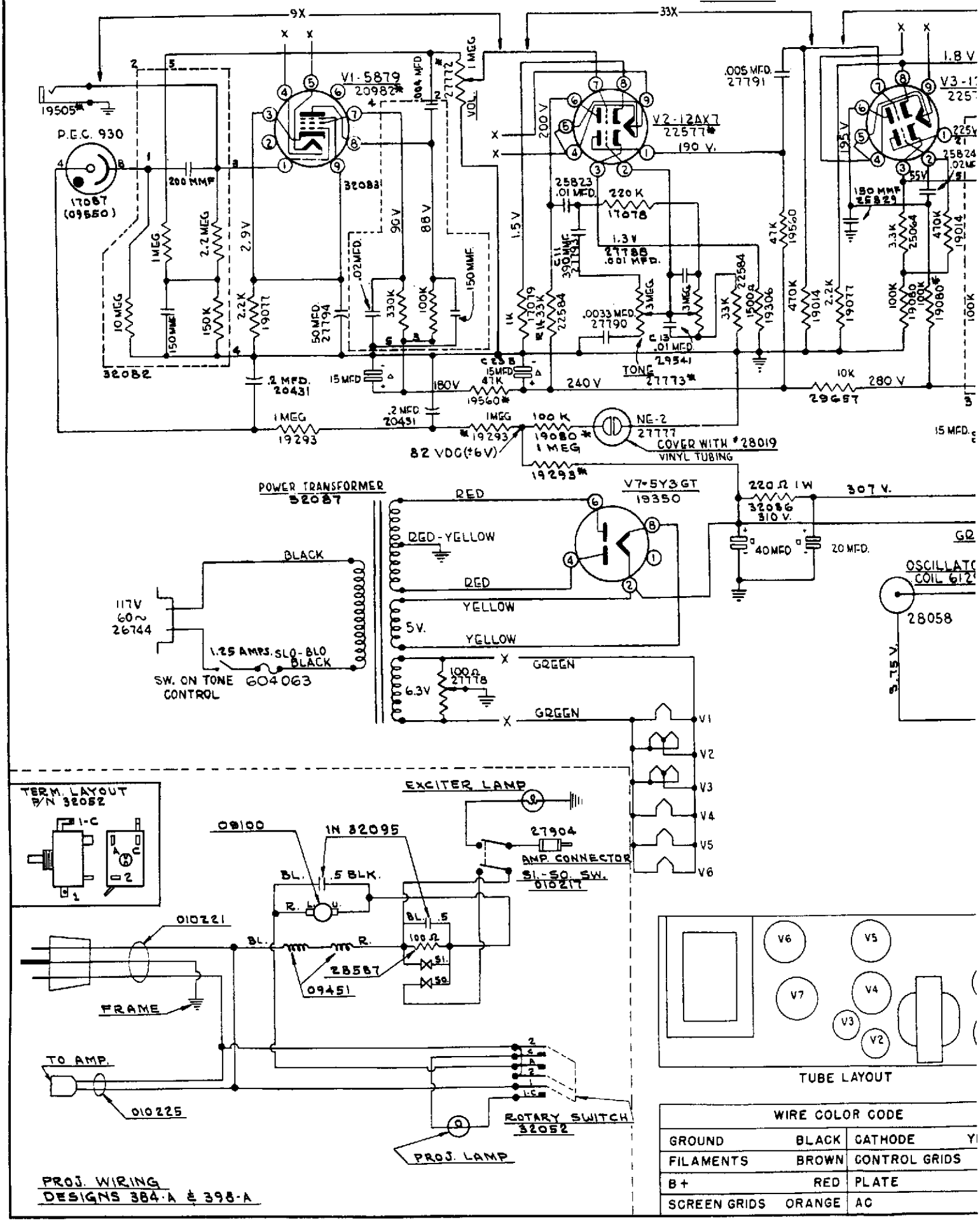
Bell & Howell Co. Chicago U.S.A.

15 W. AMPLIFIER WIRING DIAGRAM FOR DESIGNS 385-K & 399-K (08855-AA)

DATE 3-26-59	SERVICE DATA	DRAWN R.V.B. APVD. KS

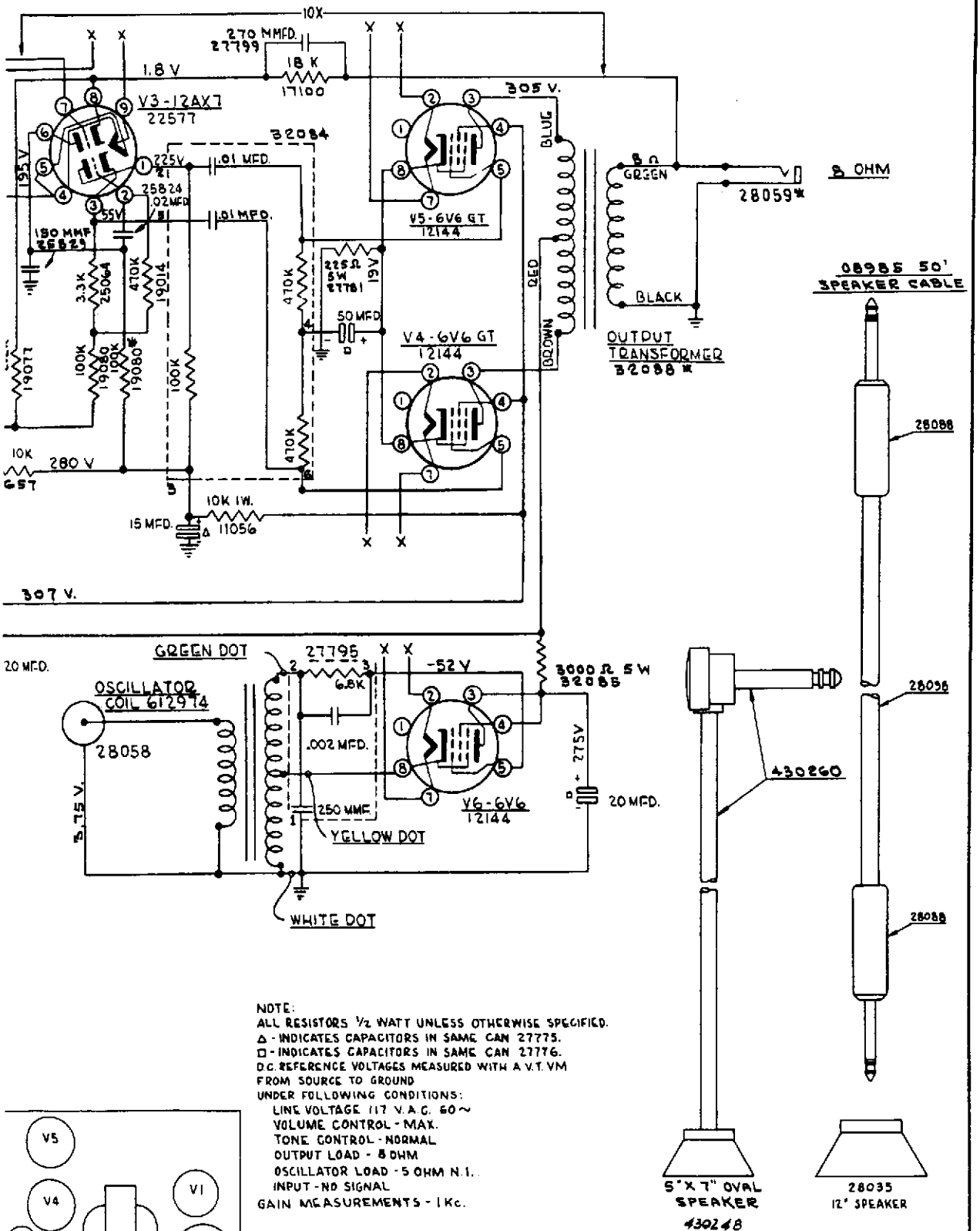
N-1

STAGE GAINS

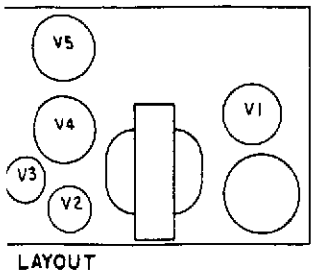


WIRE COLOR CODE			
GROUND	BLACK	CATHODE	Y
FILAMENTS	BROWN	CONTROL GRIDS	
B+	RED	PLATE	
SCREEN GRIDS	ORANGE	AC	

PROJ. WIRING
DESIGNS 384-A & 398-A



NOTE:
ALL RESISTORS ½ WATT UNLESS OTHERWISE SPECIFIED.
Δ - INDICATES CAPACITORS IN SAME CAN 27775.
□ - INDICATES CAPACITORS IN SAME CAN 27776.
D.C. REFERENCE VOLTAGES MEASURED WITH A V.T. VM
FROM SOURCE TO GROUND
UNDER FOLLOWING CONDITIONS:
LINE VOLTAGE 117 V. A.C. 60~
VOLUME CONTROL - MAX.
TONE CONTROL - NORMAL
OUTPUT LOAD - 8 OHM
OSCILLATOR LOAD - 5 OHM N.I.
INPUT - NO SIGNAL
GAIN MEASUREMENTS - 1 Kc.



LAYOUT

LOR CODE		
K	CATHODE	YELLOW
N	CONTROL GRIDS	GREEN
P	PLATE	BLUE
E	AC	GRAY

60 CYCLES

Bell & Howell Co. Chicago U.S.A.		
10 W. AMPLIFIER WIRING DIAGRAM FOR DESIGNS 384-A & 398-A (01021 4)		
DATE 1-26-59	SERVICE DATA	DRAWN K.V.B. APVD. KO