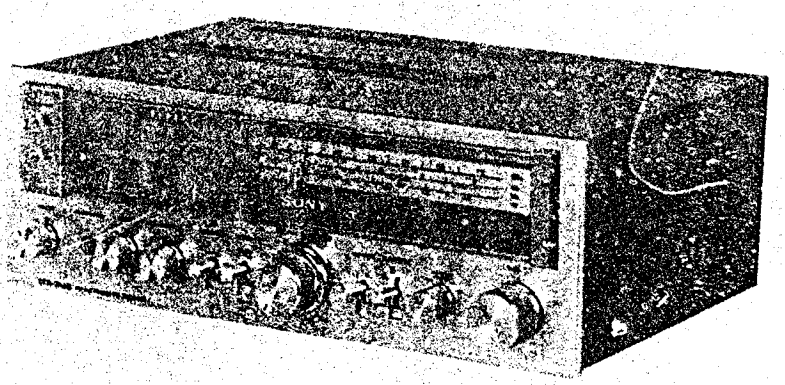
STR-313S

P 36354 *E Model*



FM-AM PROGRAM RECEIVER

SPECIFICATIONS

GENERAL

Power Requirements: 120V, 220V or 240V ac adjustable, 50/60Hz

Power Consumption: 180W

Dimensions: Approx. 410(w)x145(h)x295(d)mm 16 1/8 (w)x5 3/4(h)x11 5/8 (d) inches including projecting parts and controls

Weight: Approx. 7.6kg, 16 lb 13 oz (net)
Approx. 8.8kg, 19 lb 7 oz (in shipping carton)

FM SECTION

Frequency Range: 87.5–108MHz

Antenna: 300 Ω balanced
75 Ω unbalanced

Intermediate Frequency: 10.7MHz

Sensitivity

at 50dB Quieting: 3.5μV (10.7dB) (MONO)
45μV (33dB) (STEREO)

Usable Sensitivity: 1.8μV (5dB), IHF

S/N Ratio: 75dB (MONO)
70dB (STEREO)

Harmonic Distortion: At 100Hz
0.2% (MONO)
0.3% (STEREO)
At 1 kHz
0.2% (MONO)
0.3% (STEREO)
At 10kHz
0.3% (MONO)
0.5% (STEREO)

IM Distortion: 0.2% (MONO)
0.3% (STEREO)

Separation: 30dB at 100Hz
45dB at 1 kHz
35dB at 10 kHz

Frequency Response: 30–15,000Hz $^{+0.5}_{-2.0}$ dB

Selectivity: 60dB (400kHz)

Capture Ratio: 1.0dB

– Continued on page 2 –

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS

SONY

SERVICE MANUAL

STR-313S

AM Suppression Ratio:	54dB
Image Response Ratio:	45dB
IF Response Ratio:	90dB
Spurious Response Ratio:	75dB
RF Intermodulation:	60dB
Muting Threshold:	Approx. 5μV

SW/MW SECTION

Frequency Range:	SW 1: 2.3–6.2MHz SW 2: 7–17.9MHz MW: 530–1,605kHz
Antenna:	External antenna terminal Attached antenna wire
Intermediate Frequency:	455kHz
Usable Sensitivity:	SW 1: 30 μV (29.5dB), external antenna (4MHz) SW 2: 30 μV (29.5dB), external antenna (12MHz) MW: 100 μV (40dB), external antenna (1,000kHz)
S/N Ratio:	52dB (5mV)
Harmonic Distortion:	0.3% (5mV, 400Hz)
Selectivity:	28dB (9kHz) 30dB (10kHz)

AUDIO AMPLIFIER SECTION

Continuous RMS

Power Output:	Less than 0.5% THD, both channels driven simultaneously At 20–20,000Hz 25W+25W (8 Ω) At 1kHz 27W+27W (8 Ω) According to DIN 45500 25W+25W (8 Ω) 25W+25W (4 Ω, less than 0.7% THD)
Dynamic Power Output:	IHF constant power supply method 90W (8 Ω)
Power Bandwidth:	10–40,000Hz, IHF
Damping Factor:	20 at 1kHz (8 Ω)

Harmonic Distortion:	Less than 0.5% at rated output (8 Ω) Less than 0.7% at rated output (4 Ω) Less than 0.2% at 1W output (8 Ω) Less than 0.3% at 1W output (4 Ω)
IM Distortion:	Less than 0.5% at rated output
(60Hz: 7kHz=4:1)	Less than 0.2% at 1W output
Residual Noise:	Less than 0.08μW (8 Ω)
Frequency Response:	PHONO: RIAA equalization curve ±1dB TAPE: 10–50,000Hz $^{+1dB}_{-3dB}$

Inputs:

	Sensitivity	Impedance	S/N	Weighting network
PHONO	2.5mV (−50dB)	50kΩ	70 dB	A
TAPE	150mV (−14.5dB)	100kΩ	90 dB	A

Measured with rated output power into 8 Ω loads (both channels driven simultaneously) at 1kHz.

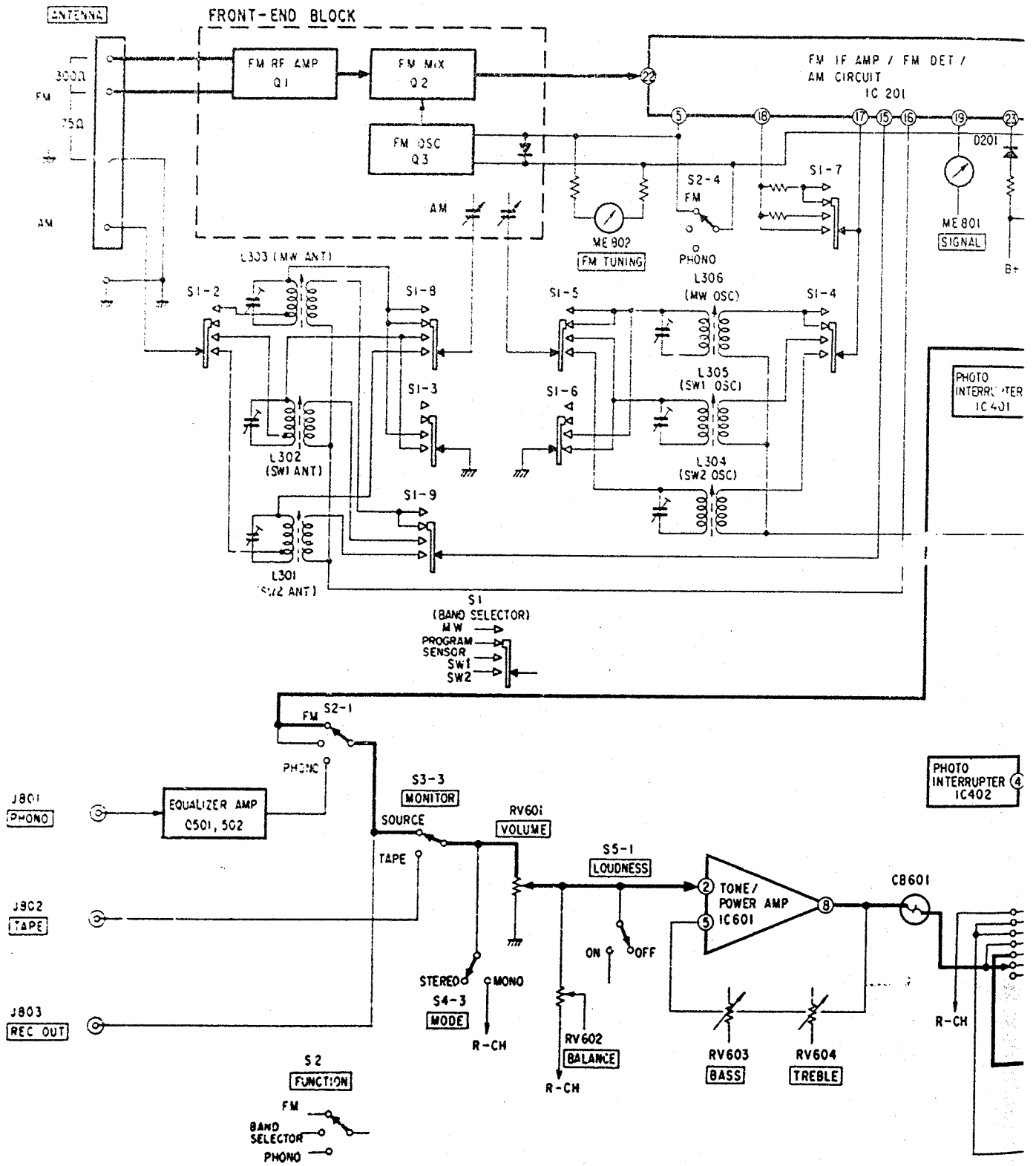
Outputs:
(with rated input)

	Voltage	Impedance
REC OUT	150mV (14.5dB)	10kΩ

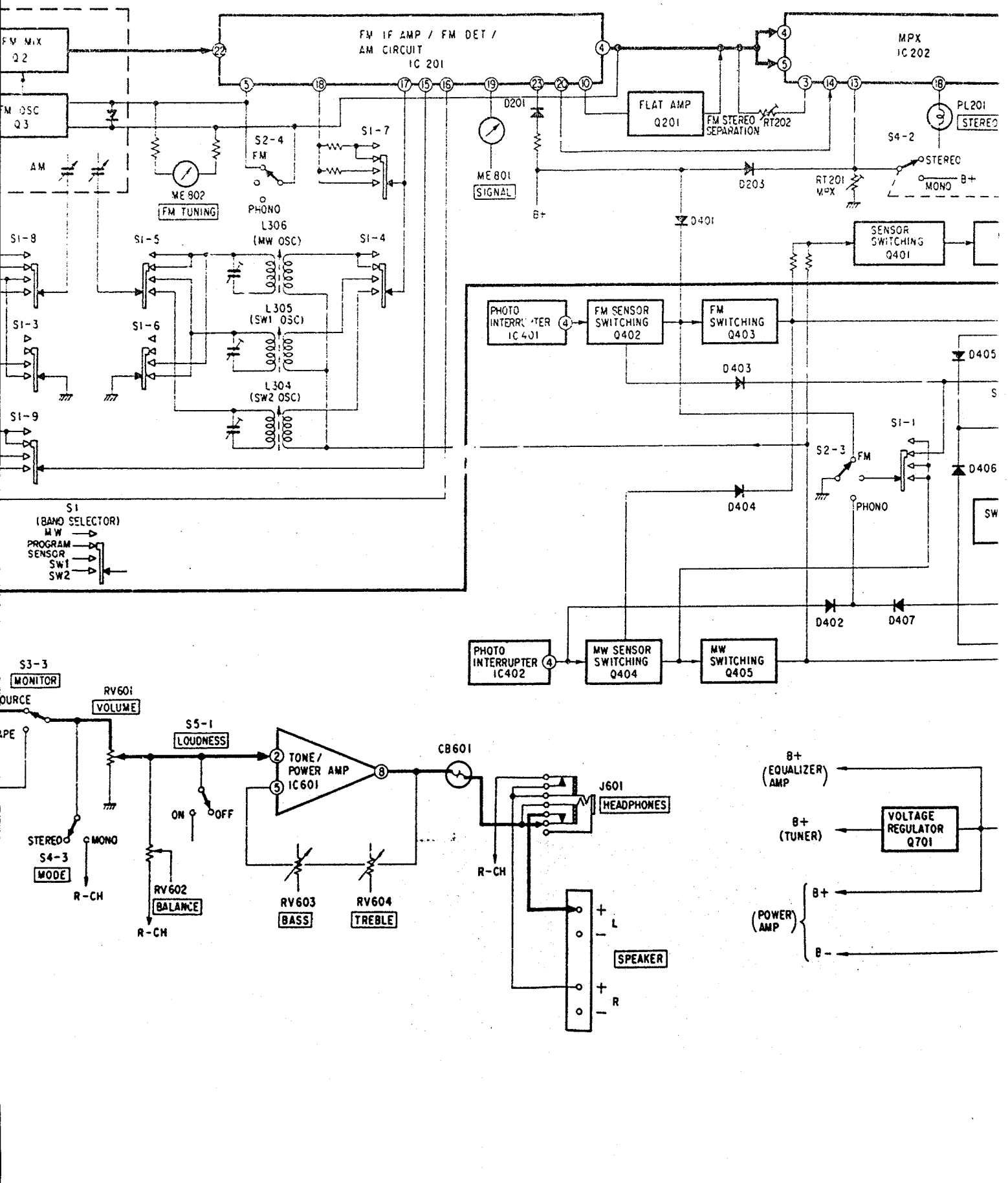
Headphones:	Accepts all low or high impedance headphones
Speaker:	4–16 Ω speakers are suitable.
Tone Controls:	BASS ±8dB at 100Hz TREBLE ±8dB at 10kHz
Loudness Control:	+8dB at 100Hz
(att. 30dB)	+3dB at 10kHz

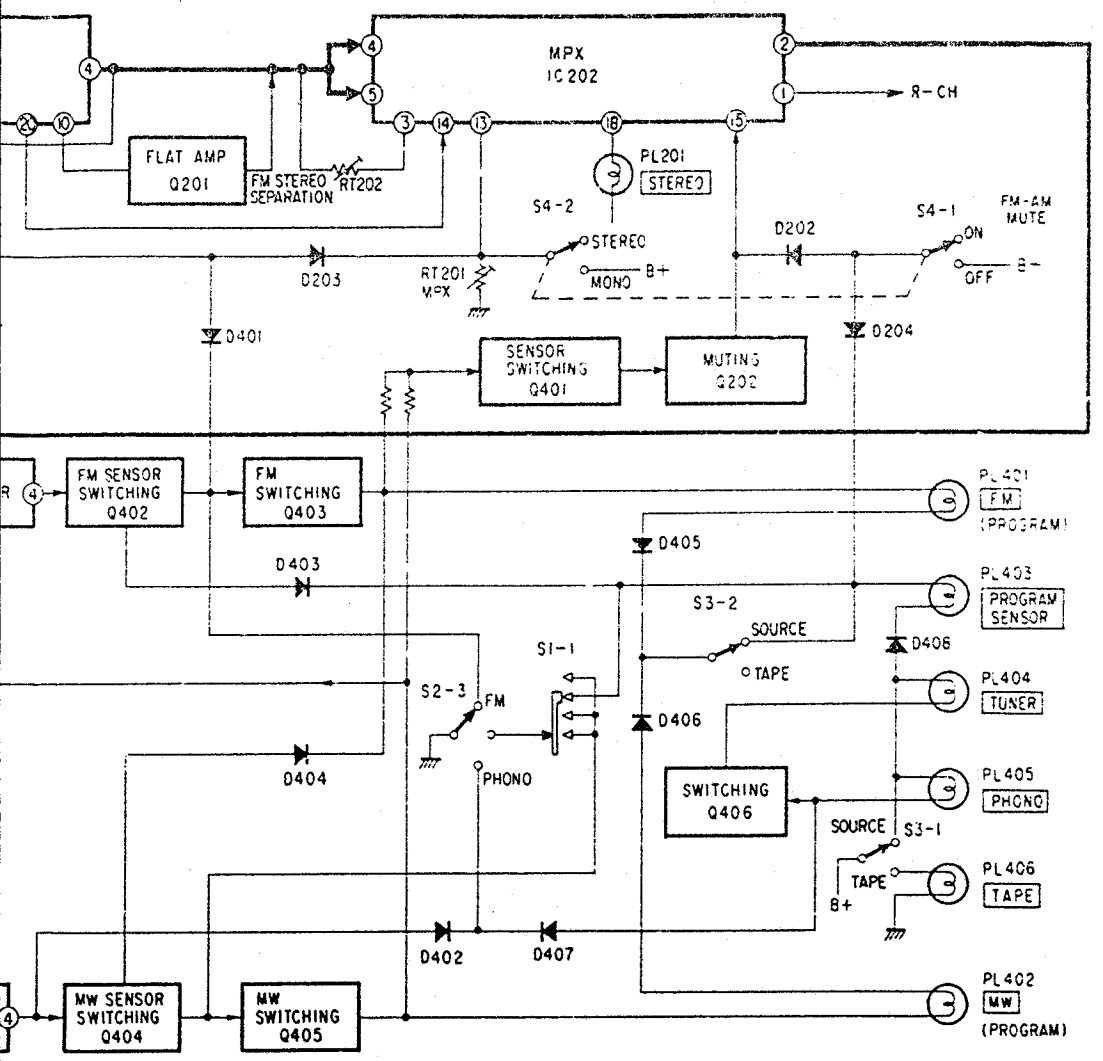
SECTION 1
OUTLINE

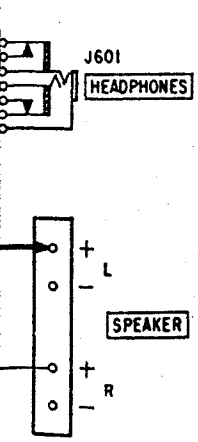
1-1. BLOCK DIAGRAM

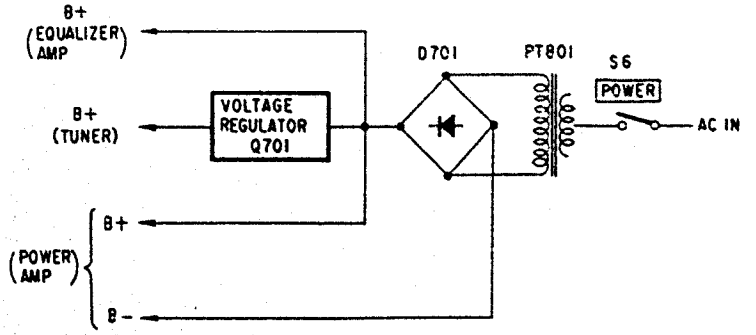


ION 1
LINE


FM IF AMP / FM DET / AM CIRCUIT IC 201
MPX IC202
FLAT AMP Q201
FM STEREO SEPARATION RT202
PL201 STEREO
S4-2
STEREO
MONO
B+
D201
D203
RT201 MPX
D401
SENSOR SWITCHING Q401
ME 801 SIGNAL
ME 802 FM TUNING
S2-4 FM PHONO
S1-7
S1-8
S1-5
S1-4
L306 (MW OSC)
L305 (SW1 OSC)
L304 (SW2 OSC)
S1-3
S1-6
S1-9
S1 (BAND SELECTOR) MW PROGRAM SENSOR SW1 SW2
PHOTO INTERRUPTER IC401
FM SENSOR SWITCHING Q402
FM SWITCHING Q403
D403
D404
D405
D406
S1-1
S2-3 FM PHONO
D402
D407
PHOTO INTERRUPTER IC402
MW SENSOR SWITCHING Q404
MW SWITCHING Q405
S3-3 MONITOR
RV601 VOLUME
S5-1 LOUDNESS
TONE / POWER AMP IC601
CB601
J601 HEADPHONES
ON OFF
STEREO MONO
S4-3 MODE
R-CH
RV602 BALANCE
RV603 BASS
RV604 TREBLE
SPEAKER
L
R
B+ (EQUALIZER AMP)
B+ (TUNER)
VOLTAGE REGULATOR Q701
(POWER AMP) B+
B-


MPX
IC202
R-CH
FLAT AMP
Q201
FM STEREO SEPARATION
RT202
PL201
STEREO
S4-2
STEREO
MONO
B+
D202
S4-1
FM-AM MUTE
ON
OFF
B-
D203
RT201 MPX
D401
D204
SENSOR SWITCHING Q401
MUTING Q202
FM SENSOR SWITCHING Q402
FM SWITCHING Q403
PL401 FM (PROGRAM)
D405
D403
PL403 PROGRAM SENSOR
S3-2
SOURCE
TAPE
D406
S1-1
S2-3
FM
PHONO
PL404 TUNER
D406
D404
SWITCHING Q406
PL405 PHONO
SOURCE
S3-1
TAPE
B+
PL406 TAPE
D402
D407
MW SENSOR SWITCHING Q404
MW SWITCHING Q405
PL402 MW (PROGRAM)


J601
HEADPHONES
L
SPEAKER
R


B+ (EQUALIZER AMP)
B+ (TUNER)
VOLTAGE REGULATOR Q701
D701
PT801
S6
POWER
AC IN
(POWER AMP)
B+
B-

1-2. CIRCUIT DESCRIPTION (See Fig. 1)

Program Sensor

When the band selector switch (S1) and FUNCTION switch (S2) are set to PROGRAM SENSOR position and band selector position respectively and the pointer matches with a station marker, FM or MW station is automatically selected through optical detection. (Fig. 2)

1) When the pointer matches only with the FM station marker:
   a) The light of IC401 (Photo Interrupter) is intercepted by the marker, the bias voltage is applied to the base of Q402 through R405, and Q402 is turned on.
   b) The collecter voltage of Q402 reduces and D401 is turned on.
   c) The terminal (23) of IC201 is grounded through D201, R204, D401, Q402 and D403.
   d) FM circuit operates (The terminal (23) of IC201 serves as a switch).

   Note: When B + voltage is applied to the terminal (23) of IC201 through R401, R204 and D201, the receiver is in AM mode.

   e) At the same time, as Q403 is on, PL401 (FM indicator lamp) lights.

2) When the pointer matches only with the MW station marker:
   a) As the light of IC401 is not intercepted, Q402 and D401 are turned off. As a result, B + voltage is applied to the terminal (23) of IC201 through R401, R204 and D201. On the other hand, the light of IC402 is intercepted by the MW station marker.
   b) Q404 and Q405 are turned on.
   c) B + voltage is applied to L306 (MW oscillator coil).
   d) MW circuit operates. When Q405 is on, PL402 (MW indicator lamp) simultaneously lights.

3) When the pointer matches simultaneously with both the FM and MW station markers:
   a) Q402 and Q403 are turned on by intercepting the light of IC401. On the other hand, the light of IC402 is also intercepted and the bias voltage is applied to the base of Q404, but because the collector voltage of Q403 is high, D404 is turned off. The emitter voltage of Q404 rises and B + voltage is not applied to L306 (MW oscillator coil) and PL402. Consequently, only the FM station signal is received.

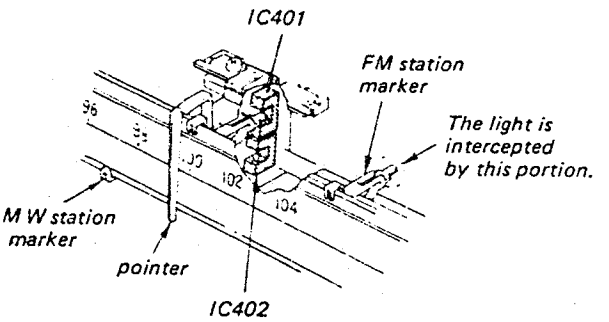


Fig. 2

Q202 and 401

Q401 operates to improve the rise time of PL401 (FM indicator lamp) or PL402 (MW indicator lamp) when tuning the receiver, and at the same time Q401 switches Q202. Q202 serves as a high-speed-muting switch which is turned on or off as soon as the station signal is tuned or detuned.

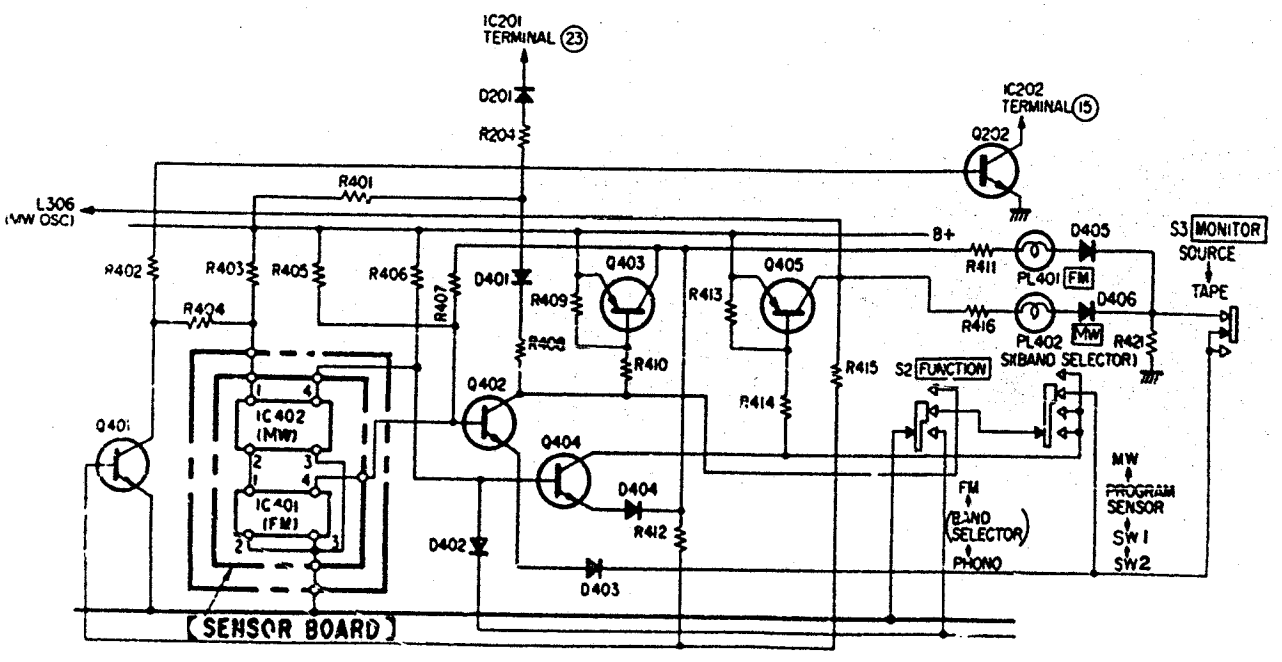


Fig. 1

IC201 (CX168), IC202 (CX178)

These two ICs form a system. Both of them are bipolar-linear-ICs. CX168 integrates 343 elements and CX178 integrates 260 elements. They include many functions and are improved upon the degree of integration now available as a linear-ICs for tuner use. They have high performance in FM reception and form a muting system having an FM muting attenuation of 90dB. In addition, because a muting circuit is newly employed in the AM circuit not only is there high performance in FM reception but AM station signal can be received with fine tone quality and sensitivity as with FM broadcasting station. As an additional function, they operate for FM/AM continuous station selection, FM/AM signal-strength meter output, FM/AM muting output switching and enforced AGC at FM reception.

CX168 Main Function

<FM>
- IF Amplifier
- Quadrature detector
- Signal-strength Meter Output
- Muting Signal Output
- AFC Output for Converter
- Multipath Signal Output
- Bandpass Control Circuit

<AM>
- RF Attenuator
- Mixer
- Oscillator
- IF Amplifier and AGC
- AM Detector
- Signal-Strength Meter Output
- Signal Generator for AM Muting

<General>
- Regulator
- FM/AM Switching
- Regulator Output

CX178 Main Function

<FM Stereo Demodulator>
- FM Stereo Demodulator
- Phase Detector
- Stereo Indicating Circuit
- VCO
- VCO ON/OFF Circuit

<General>
- Muting Gate
- Regulator
- Muting Canceler Circuit
- Pop-noise Canceler
- Hysteresis Circuit

Photo Interrupter (IC401, 402)

The terminals (1) and (2) of the photo interrupter operates as the light emitting diode. On the other hand, the terminals (3) and (4) operates as the photo detector. When the photo detector receives the light as shown in Fig. 3, the terminal between terminals (3) and (4) is a low-impedance. When light is intercepted by the marker, as shown in Fig. 4, it becomes high-impedance.

When the photo detector receives the light

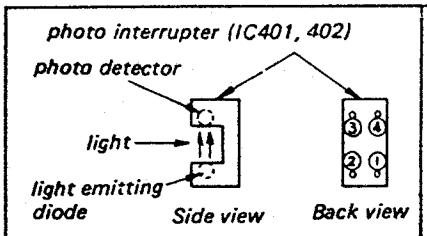


Fig. 3

When light is intercepted

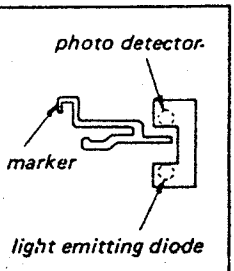
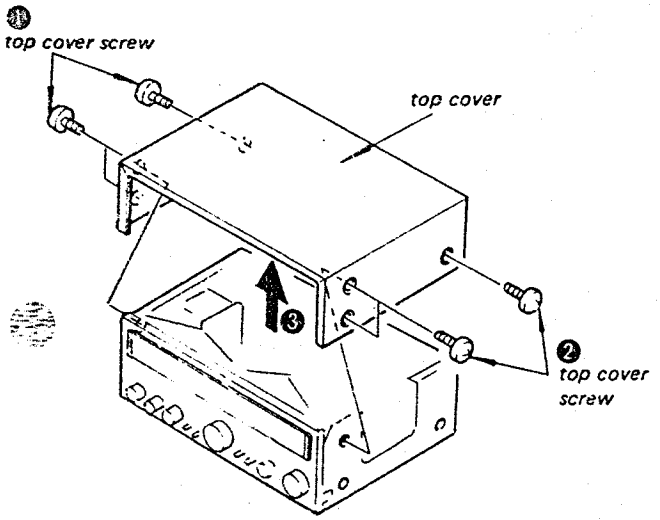


Fig. 4

SECTION 2
DISASSEMBLY

- Follow the disassembly procedure in the numerical order given.

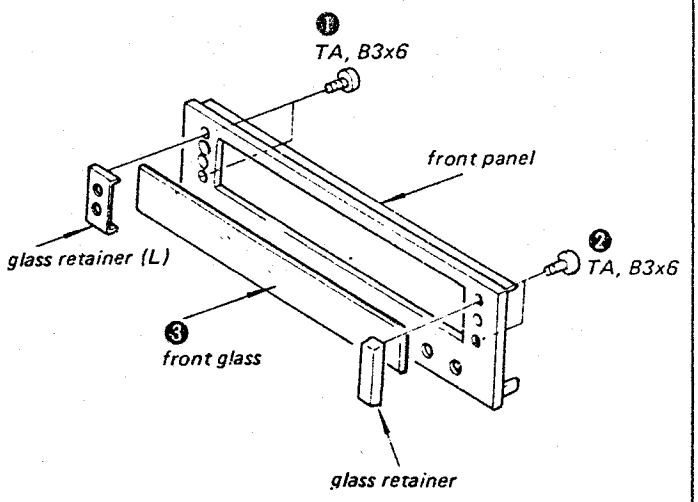
TOP COVER REMOVAL



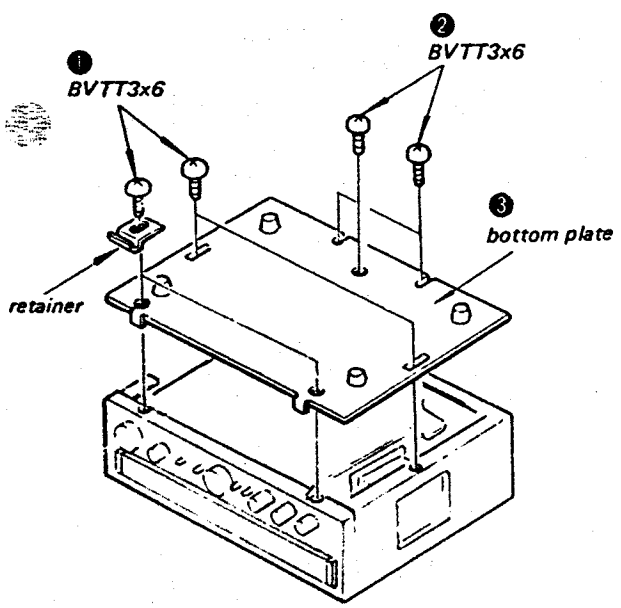
DIAL CORD STRINGING

• See page 9.

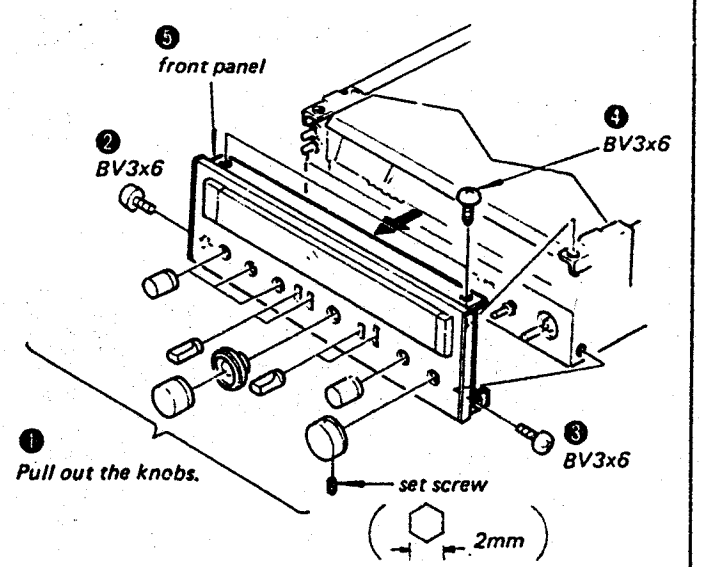
FRONT GLASS REMOVAL



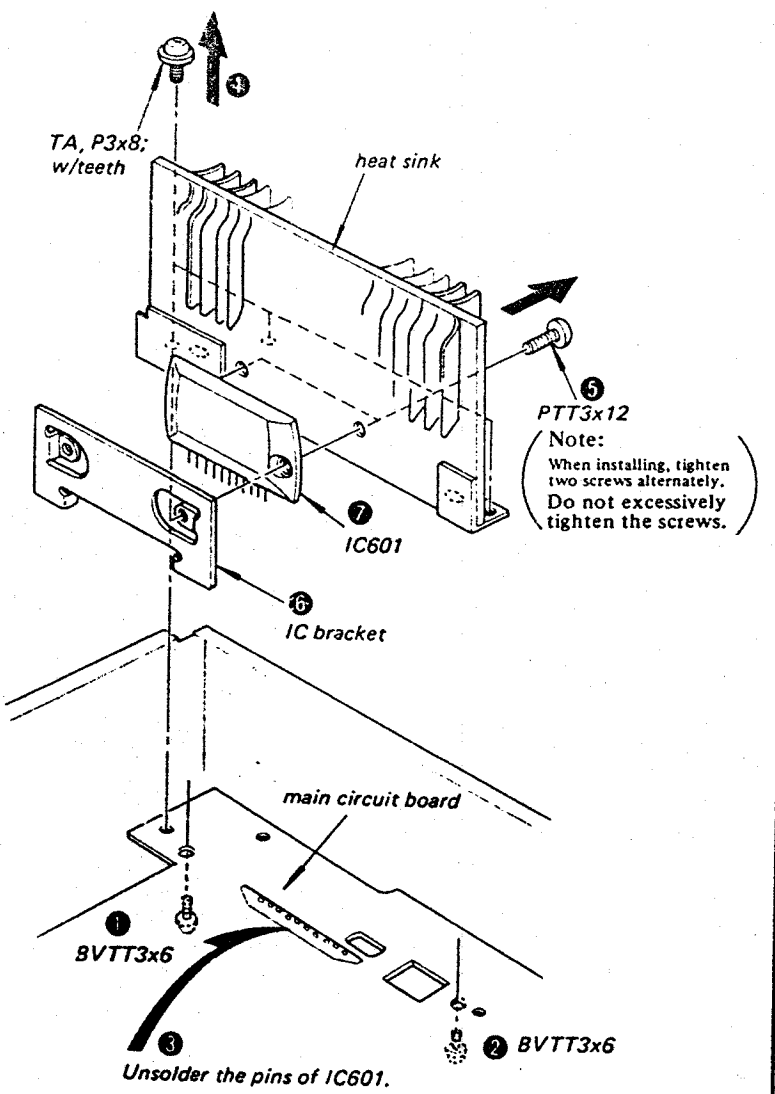
BOTTOM PLATE REMOVAL



FRONT PANEL REMOVAL

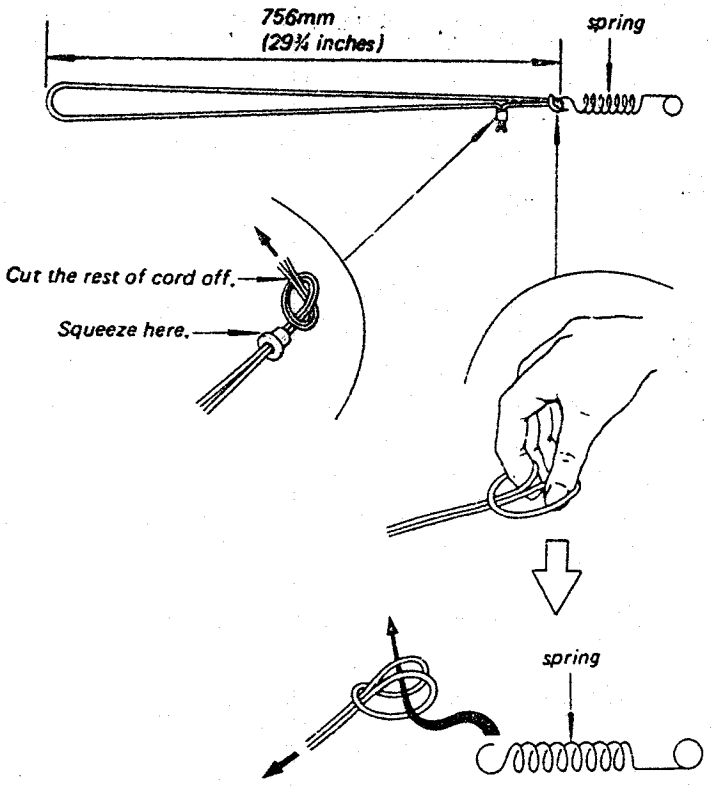


IC REPLACEMENT



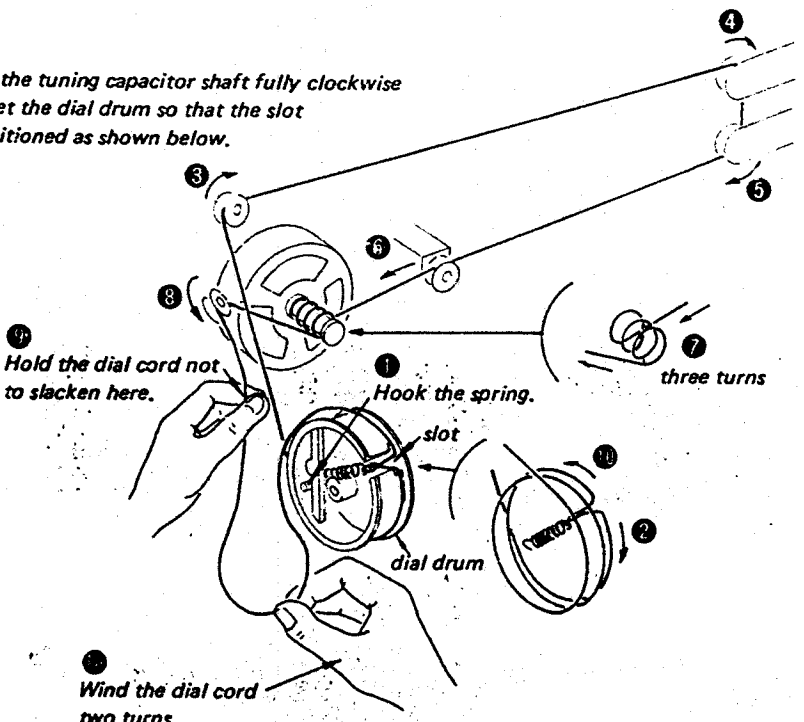
DIAL CORD STRINGING

1) Preparation



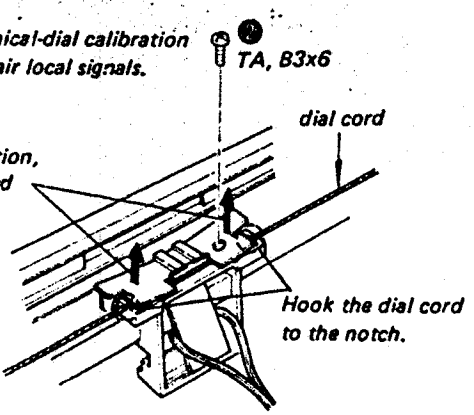
2) Stringing

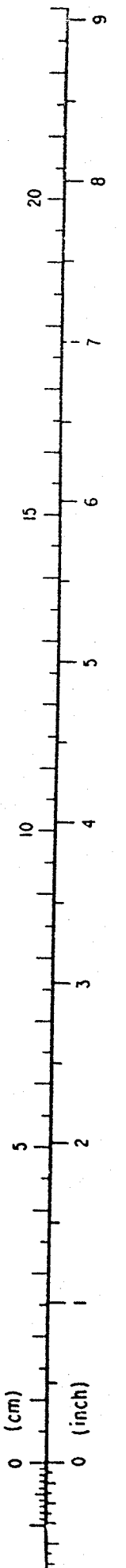
Turn the tuning capacitor shaft fully clockwise and set the dial drum so that the slot is positioned as shown below.



3) Dial Pointer Installation

Perform the mechanical-dial calibration by utilizing off-the-air local signals.

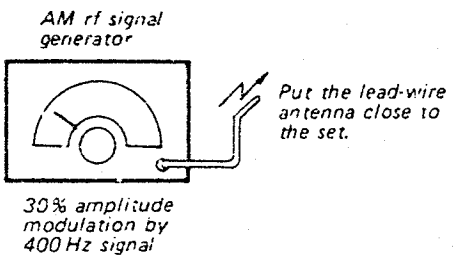


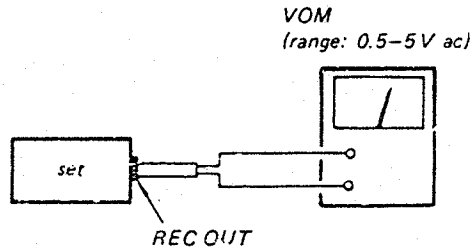


SECTION 3
ADJUSTMENTS

3-1. MW SECTION

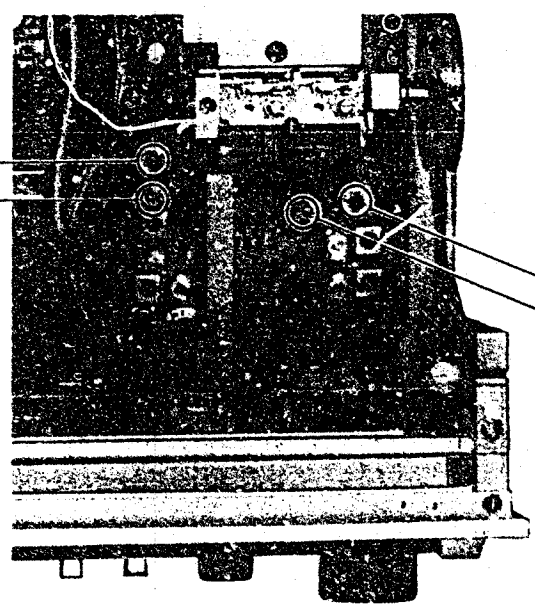
Setting: FUNCTION switch: (Band Selector)
(Band Selector): MW





- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.

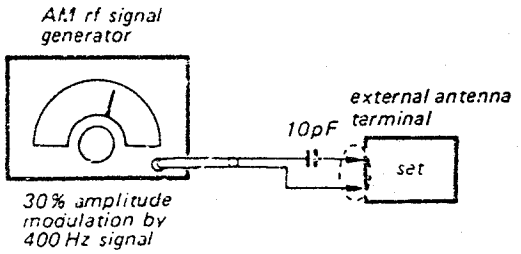
MW FREQUENCY COVERAGE ADJUSTMENT	
Adjust for a maximum reading on VOM.	
520kHz	L306
1680kHz	CT306

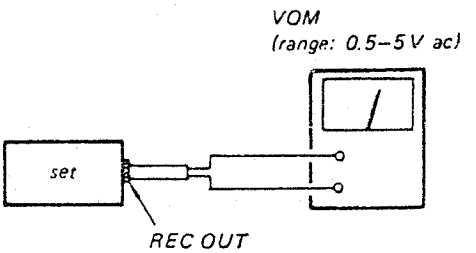


MW TRACKING ADJUSTMENT	
Adjust for a maximum reading on VOM.	
L303	600kHz
CT303	1,400kHz

3-2. SW SECTION

Setting: FUNCTION switch: (Band Selector)
(Band Selector): SW1, SW2

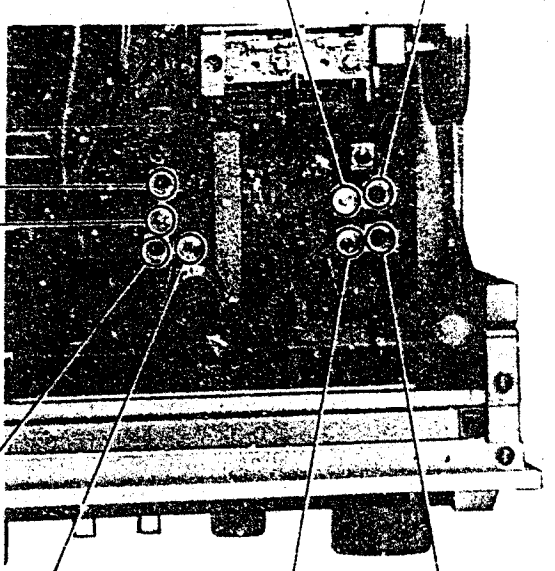




- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.

SW1 TRACKING ADJUSTMENT	
Adjust for a maximum reading on VOM.	
6MHz	3MHz
CT302	L302

SW1 FREQUENCY COVERAGE ADJUSTMENT	
Adjust for a maxium reading on VOM.	
2.1MHz	L305
6.5MHz	CT305

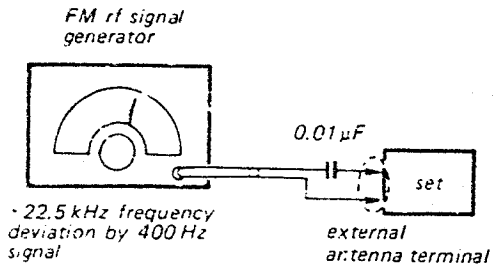


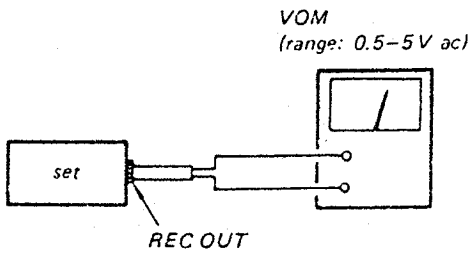
L304	CT304
6.8MHz	18.4MHz
Adjust for a maximum reading on VOM.	
SW2 FREQUENCY COVERAGE ADJUSTMENT	

CT301	L301
15MHz	8MHz
Adjust for a maximum reading on VOM.	
SW2 TRACKING ADJUSTMENT	

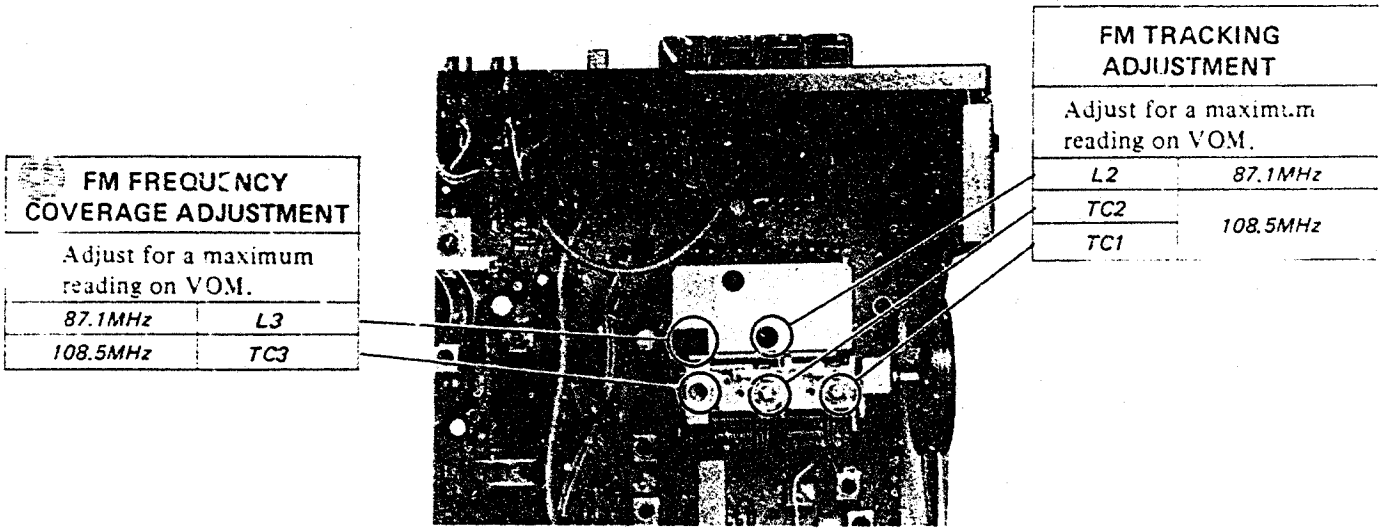
3-3. FM SECTION

Setting: FUNCTION switch: FM





- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.

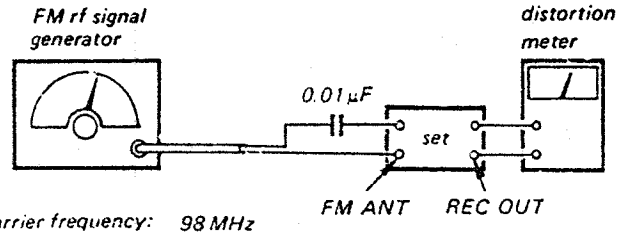


FM FREQUENCY COVERAGE ADJUSTMENT	
Adjust for a maximum reading on VOM.	
87.1MHz	L3
108.5MHz	TC3

FM TRACKING ADJUSTMENT	
Adjust for a maximum reading on VOM.	
L2	87.1MHz
TC2	108.5MHz
TC1	

FM DISCRIMINATOR ALIGNMENT 2

Procedure:



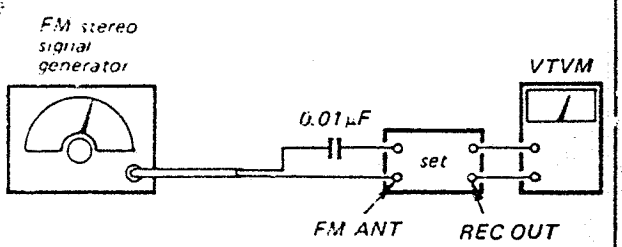
Carrier frequency: 98 MHz
Output level: 1mV (60 dB)
Modulation: 400 Hz, 75 kHz deviation (100%)

1. Set MODE switch to MONO.
2. Turn the core (secondary side) of IFT201 for a minimum distortion reading on the distortion meter.

IFT201 (secondary side: black)

FM STEREO SEPARATION ADJUSTMENT

Procedure:

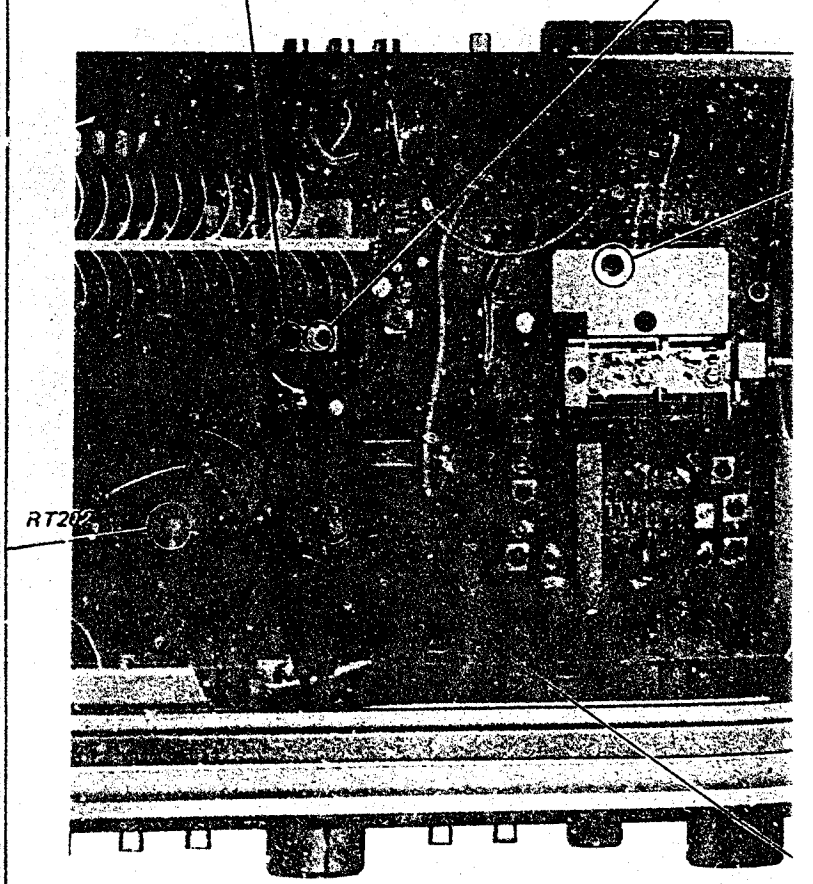


Carrier frequency: 98 MHz
Output level: 1 mV (60 dB)
Mode: Stereo
Modulation:
Audio (400 Hz): 67.5 kHz deviation (90%)
Pilot (19 kHz): 7.5 kHz deviation (10%)
MODE switch: STEREO

FM stereo signal generator output channel	VTVM connection	VTVM reading
L-CH	L-CH	Ⓐ
R-CH	L-CH	Ⓑ Adjust RT202 for minimum reading.
R-CH	R-CH	Ⓒ
L-CH	R-CH	Ⓓ Adjust RT202 for minimum reading.

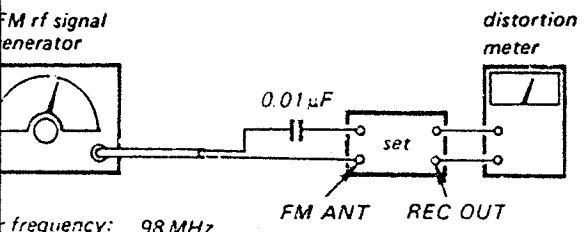
Stereo separation: Ⓐ − Ⓑ, Ⓒ − Ⓓ

The difference between separations Ⓐ − Ⓑ and Ⓒ − Ⓓ are to be equal.



DISCRIMINATOR ALIGNMENT 2

Procedure:



frequency: 98 MHz
t level: 1mV (60 dB)
ation: 400 Hz, 75 kHz deviation (100%)

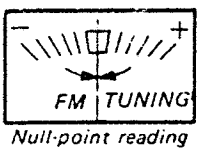
Set MODE switch to MONO.

Turn the core (secondary side) of IFT201 for a minimum distortion reading on the distortion meter.

FM DISCRIMINATOR ALIGNMENT 1

Procedure:

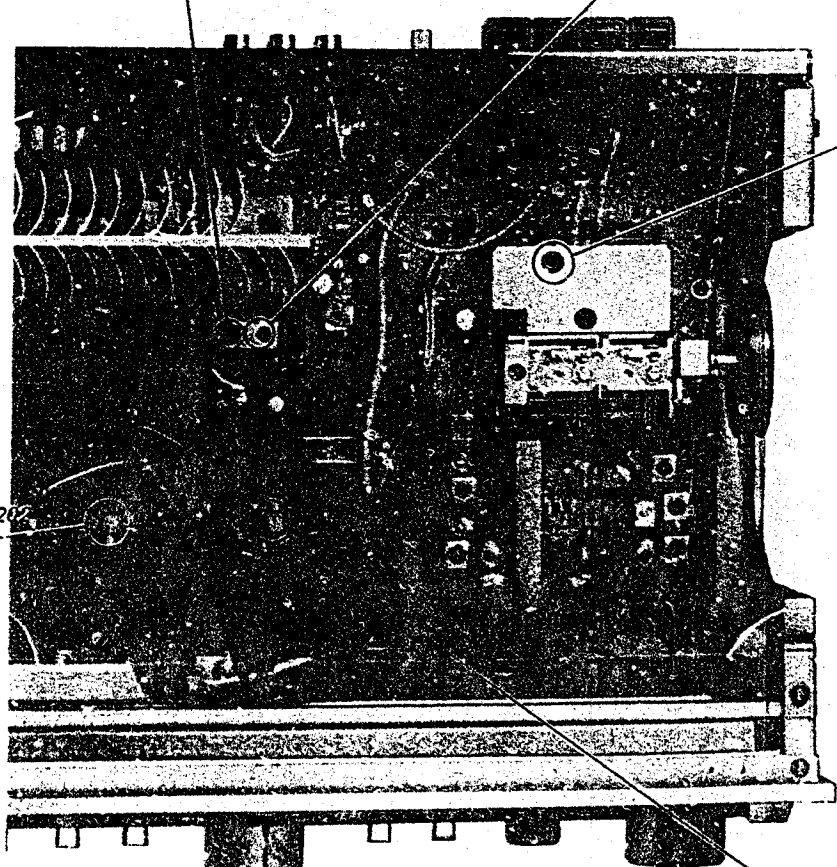
1. Detune the set.
2. Turn the core (primary side) of IFT201 for null-point reading on the FM TUNING meter.



Null-point reading

IFT201 (primary side: blue)

IFT201 (secondary side: black)

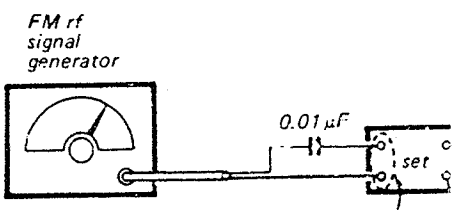


RT202

RT201

IFT1

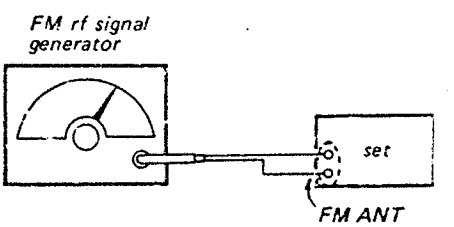
FM IF ALIGNMENT



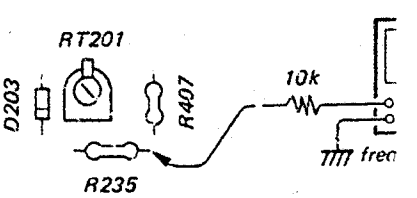
MPX ADJUSTMENT

A) Regular Method

Procedure:



Carrier frequency: 98 MHz
Modulation: no modulation
Output level: 1 mV (60 dB)



1. Tune the set to 98 MHz.
2. Adjust RT201 for 76 kHz ±100Hz or

VTVM

OUT

VM
lirg

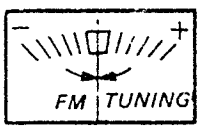
RT202
imum

RT202
imum

(3)

MINATOR ALIGNMENT 1

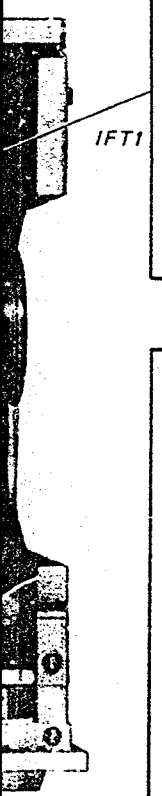
e set.
core (primary side) of IFT201 for null-
ding on the FM TUNING meter.

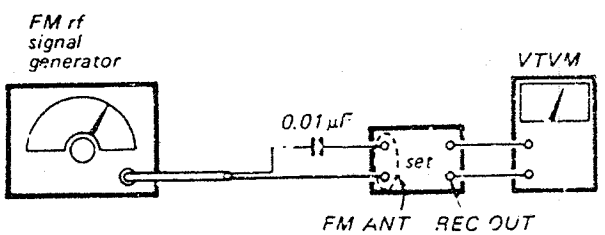


Null-point reading

IFT201 (primary side: blue)

FM IF ALIGNMENT





FM Signal Generator Setting:

Carrier frequency:	*98 MHz*
Modulation:	*400 Hz, 75 kHz deviation (100%)*
Output level:	*12 uV (21.5 dB)*

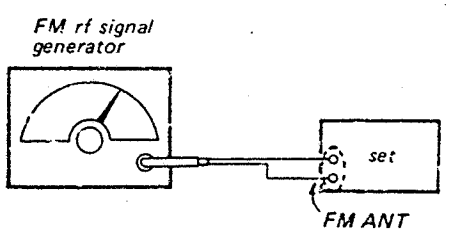
Procedure:

Tune the set to 98 MHz and adjust IFT1 for a maximum reading on the VTVM.

MPX ADJUSTMENT

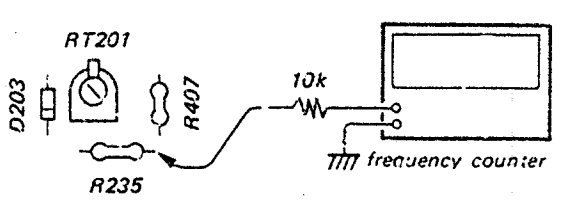
A) Regular Method

Procedure:



Carrier frequency:	*98 MHz*
Modulation:	*no modulation*
Output level:	*1 mV (60 dB)*

RT201

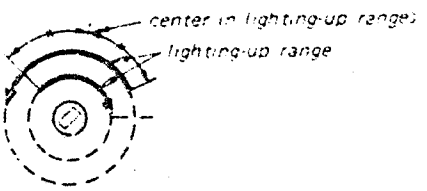


1. Tune the set to 98 MHz.
2. Adjust RT201 for 76 kHz ±100Hz on the counter.

B) Simple Method

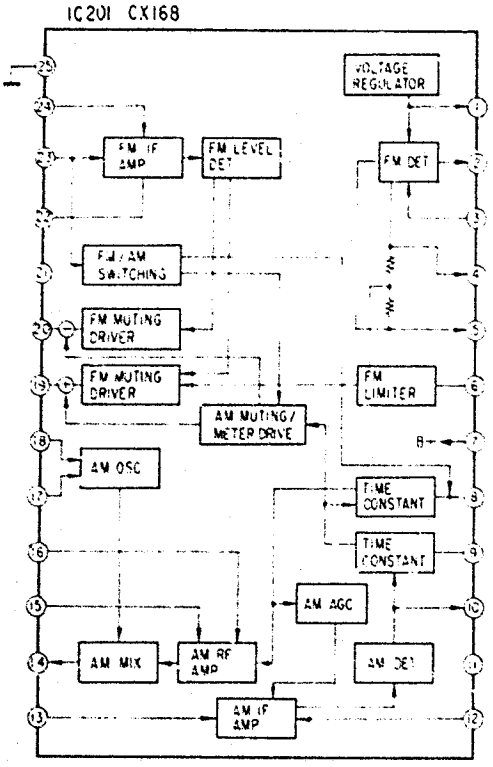
Procedure:

1. Tune the set to the FM stereo broadcasting signal.
2. Turn RT201 clockwise or counterclockwise and memorize the lighting-up range of STEREO lamp.
3. Secure RT201 at the center in lighting-up range of both turns as shown below.

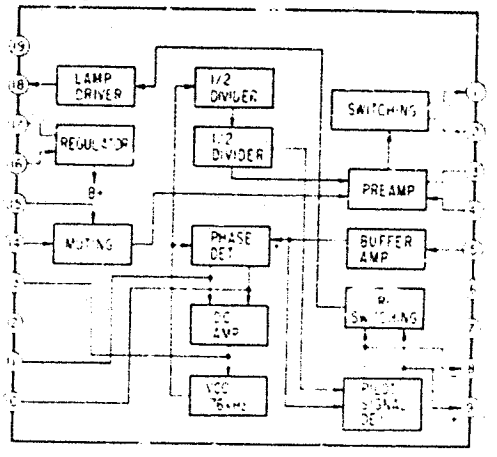


- **IC Block Diagram**

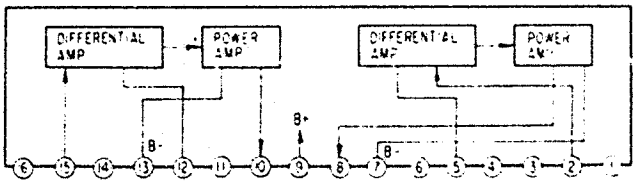
IC201 CX168



IC202 CX178



IC601 SI1125HD



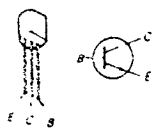
SECTION 4
DIAGRAMS

4-1. MOUNTING DIAGRAM

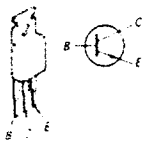
– Conductor Side –

- IC Block Diagram: See page 15.
- **Replacement Semiconductors**
  For replacement, use semiconductors except in ( ).

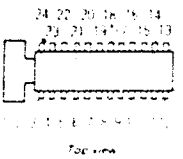
Q201
Q501, 502: 2SC1345
Q551, 552



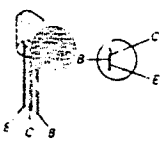
Q701: 2SC1173



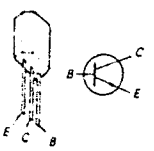
IC201: CX168



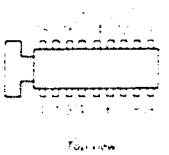
Q202
Q401, 402: 2SC1364
Q404, 406



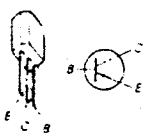
(2SC1633)



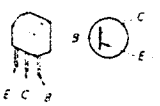
IC202: CX178



Q403, 405: 2SA678



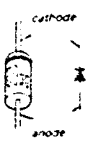
(2SA844)



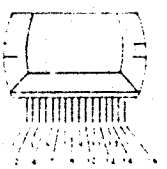
IC401, 402: SPI 201

D201–204,
D401–408: 1S1555

D601: EQB01–07
(EQA01–07R)
D702: EQB01–15
(EQA01–15R)



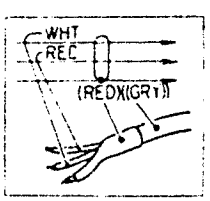
IC601: SI1125HD



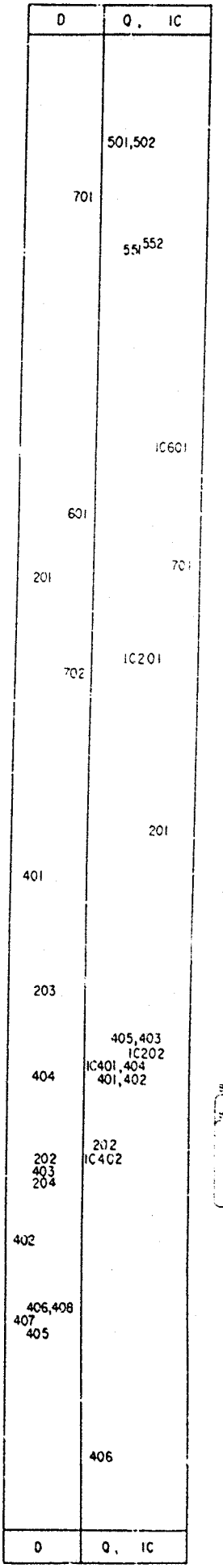
D701: S2VB20

Note

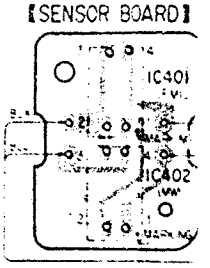
- [ ]+ : indicates side identified with part number.
- ■ : part mounted on the conductor side.
- Color code of sleeving over the end of the jacket.

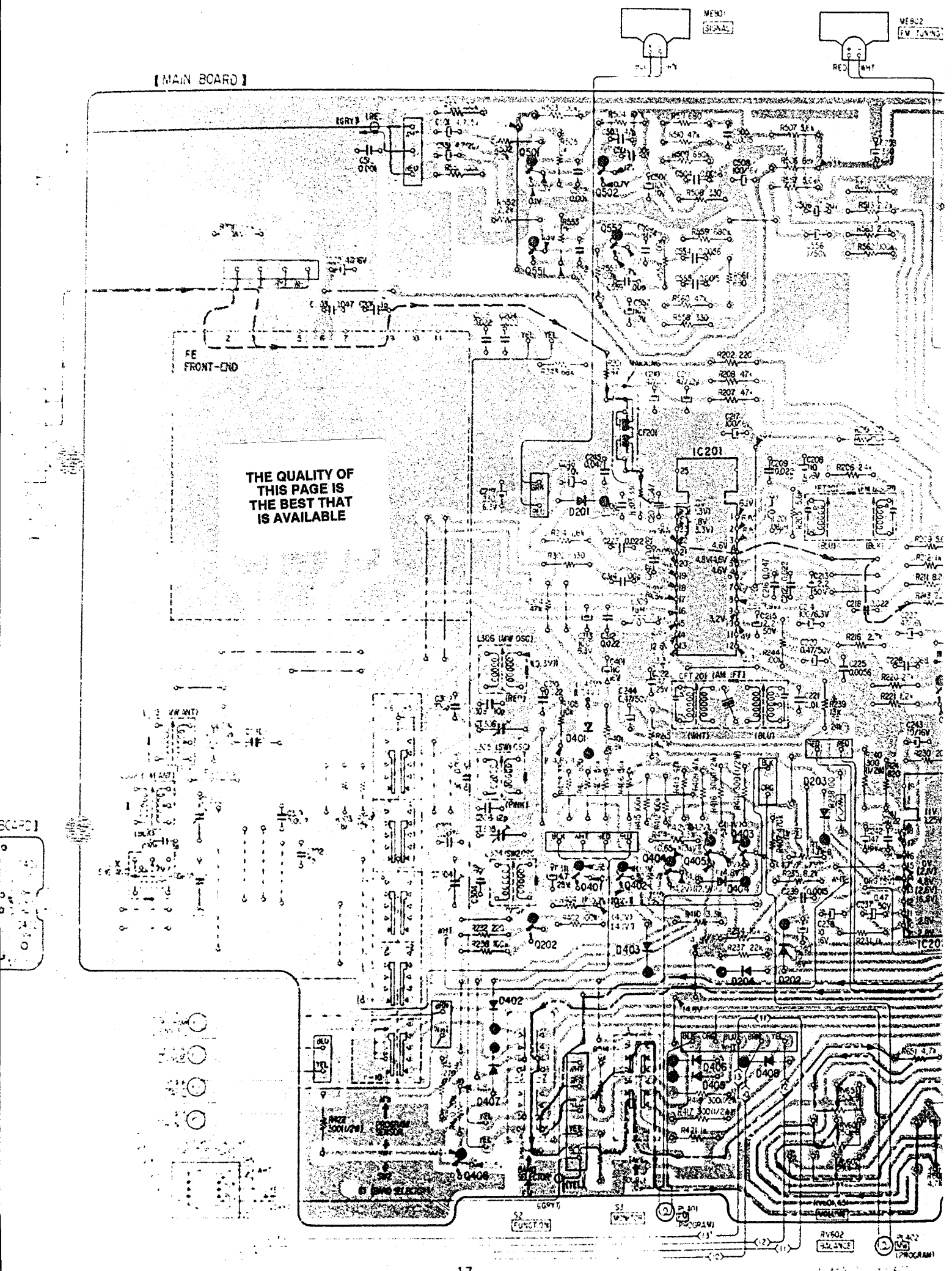


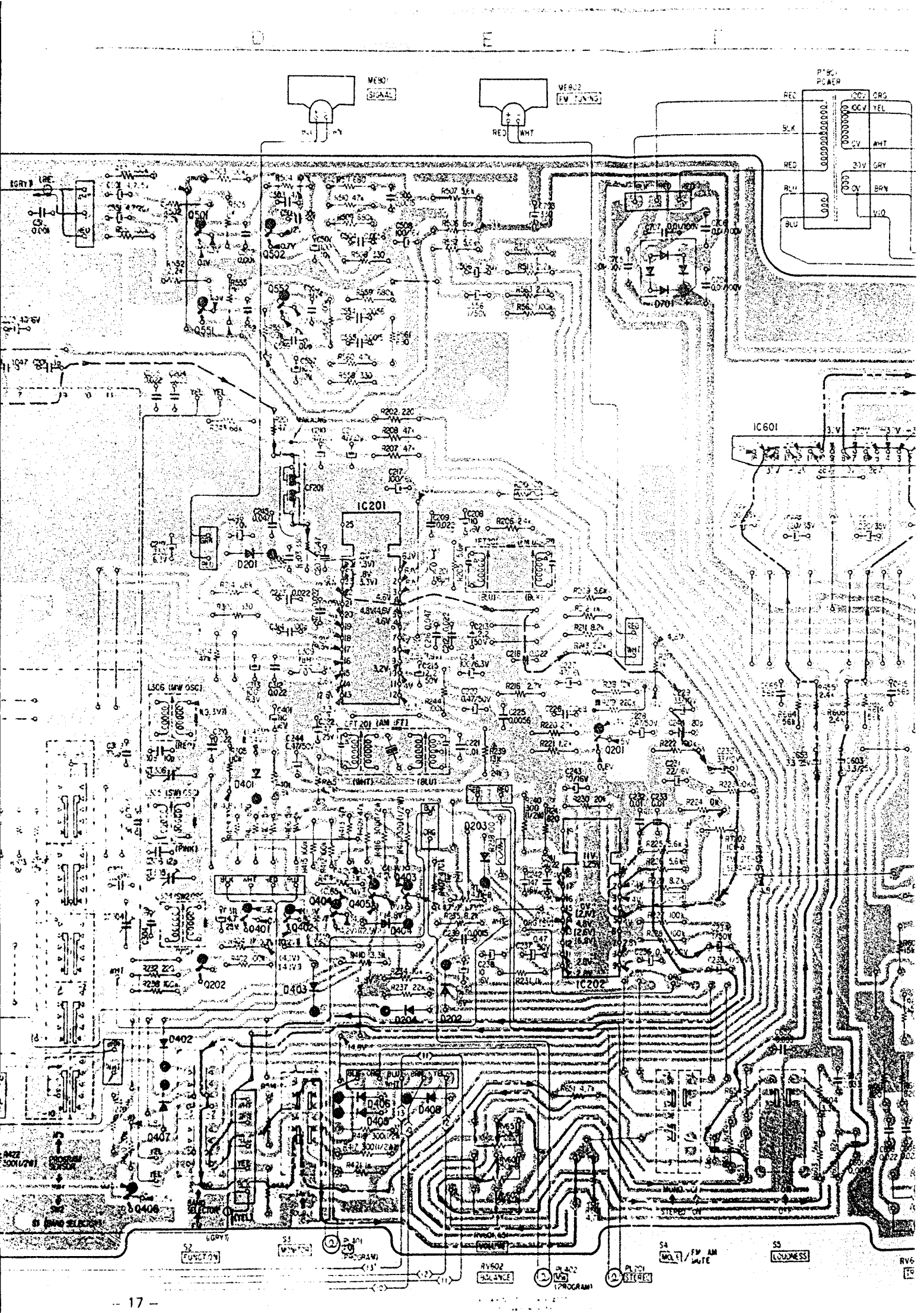
- B + pattern
  B - pattern
- Signal Path
  ——→ : L-CH
  - - → : R-CH
- Readings are taken under no signal (detuned) conditions with a VOM (20 kΩ/V).
  AM
  FM STEREO
  PROGRAM FM
  PROGRAM MW
  FM

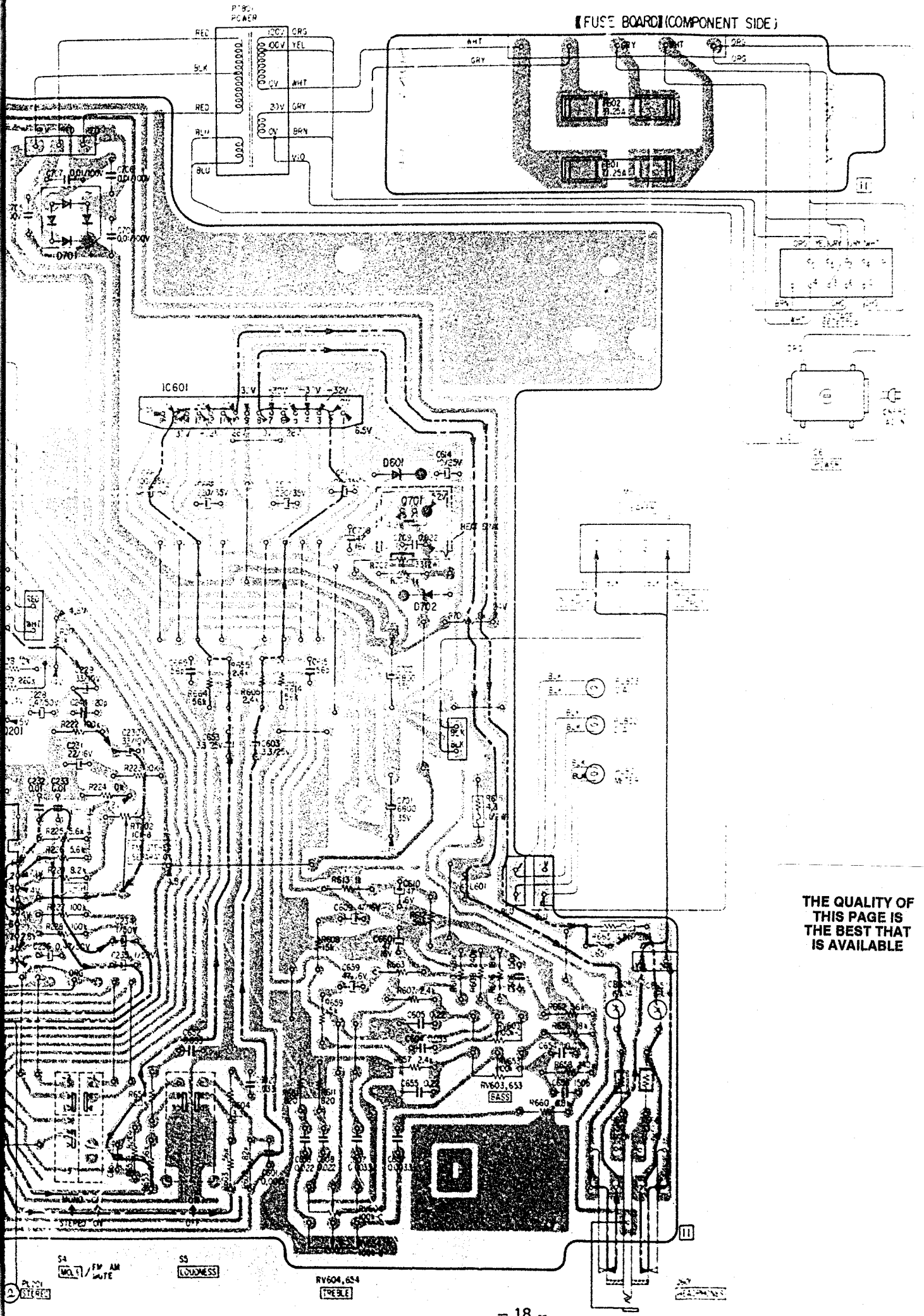


【SENSOR BOARD】



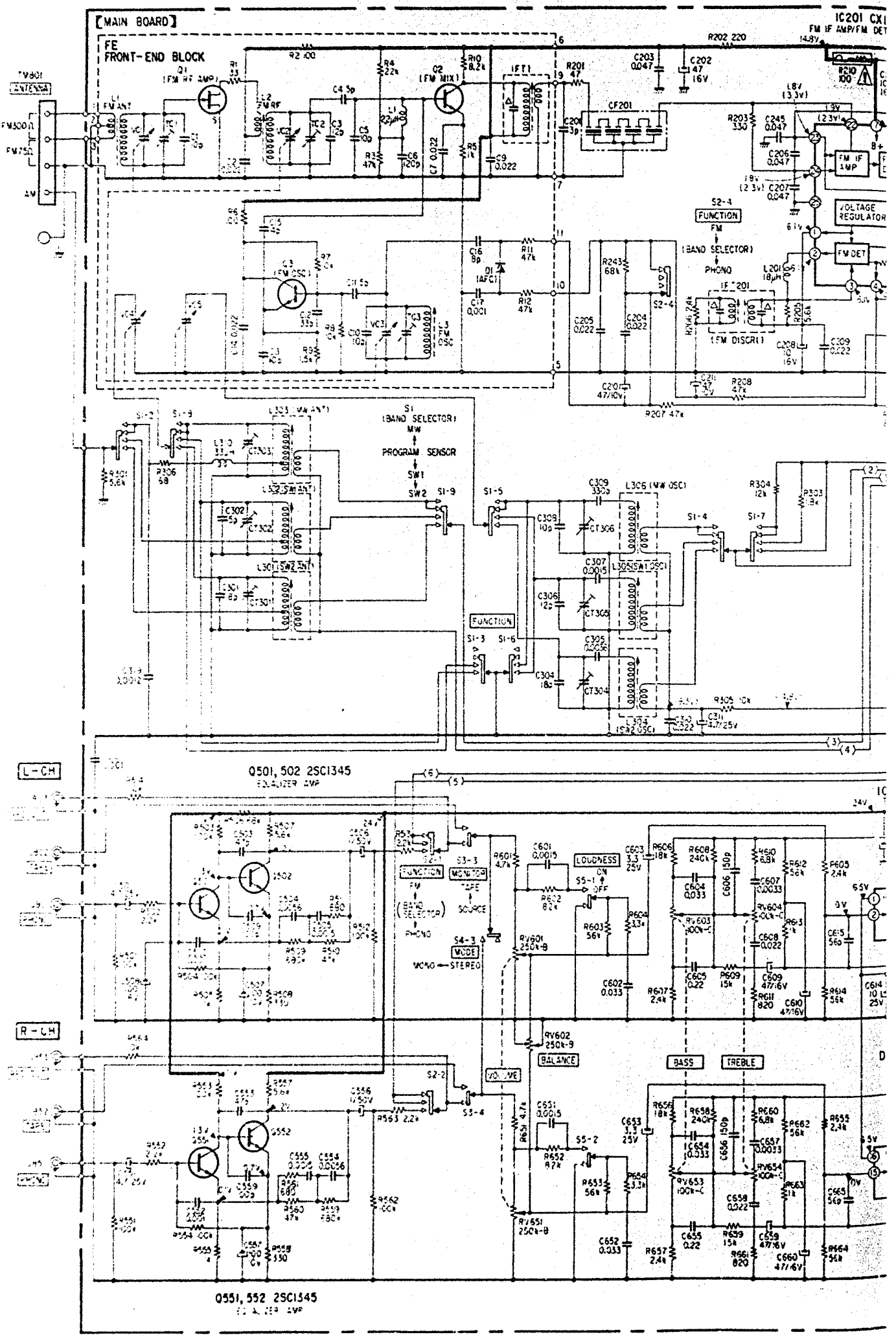

[MAIN BOARD]
FE
FRONT-END
THE QUALITY OF THIS PAGE IS THE BEST THAT IS AVAILABLE
IC201
CF201
CFT201 (AM IFT)
L305 (MW OSC)
Q401
Q402
Q403
Q404
Q405
Q406
Q407
Q408
Q501
Q502
Q551
Q552
D201
D202
D203
D204
D401
D402
D403
D404
D405
D406
D407
D408
RV602
BALANCE
TUNING
SIGNAL
FM TUNING

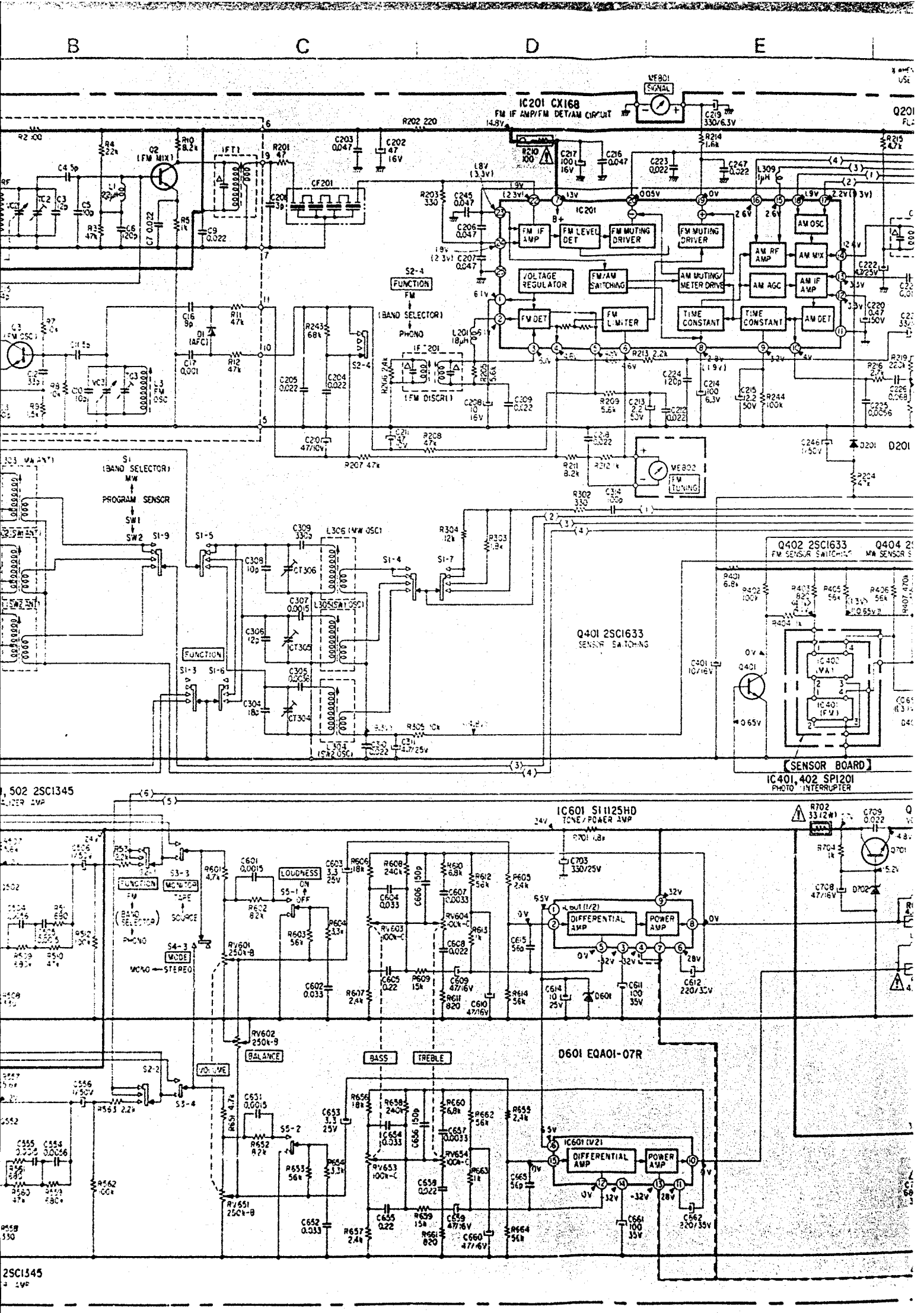

IC201
IC202
IC601
Q501
Q502
Q503
Q201
Q202
Q203
Q204
Q205
Q206
D201
D401
D402
D403
D404
D405
D406
D407
D408
D701
CF201
CFT201 (AM IFT)
L306 (MW OSC)
MB01 SIGNAL
MB02 FM TUNING
PTC POWER
RED
BLK
BLU
WHT
YEL
GRY
ORG
BRN
GRN
VIO
S1 (BAND SELECTION)
S2 FUNCTION
S3 MUTING
S4 VOL / FM AM MUTE
S5 LOUDNESS
PL201 STEREO
PL402 MB (PROGRAM)
RV602 BALANCE
STEREO ON
PROGRAM SENSOR

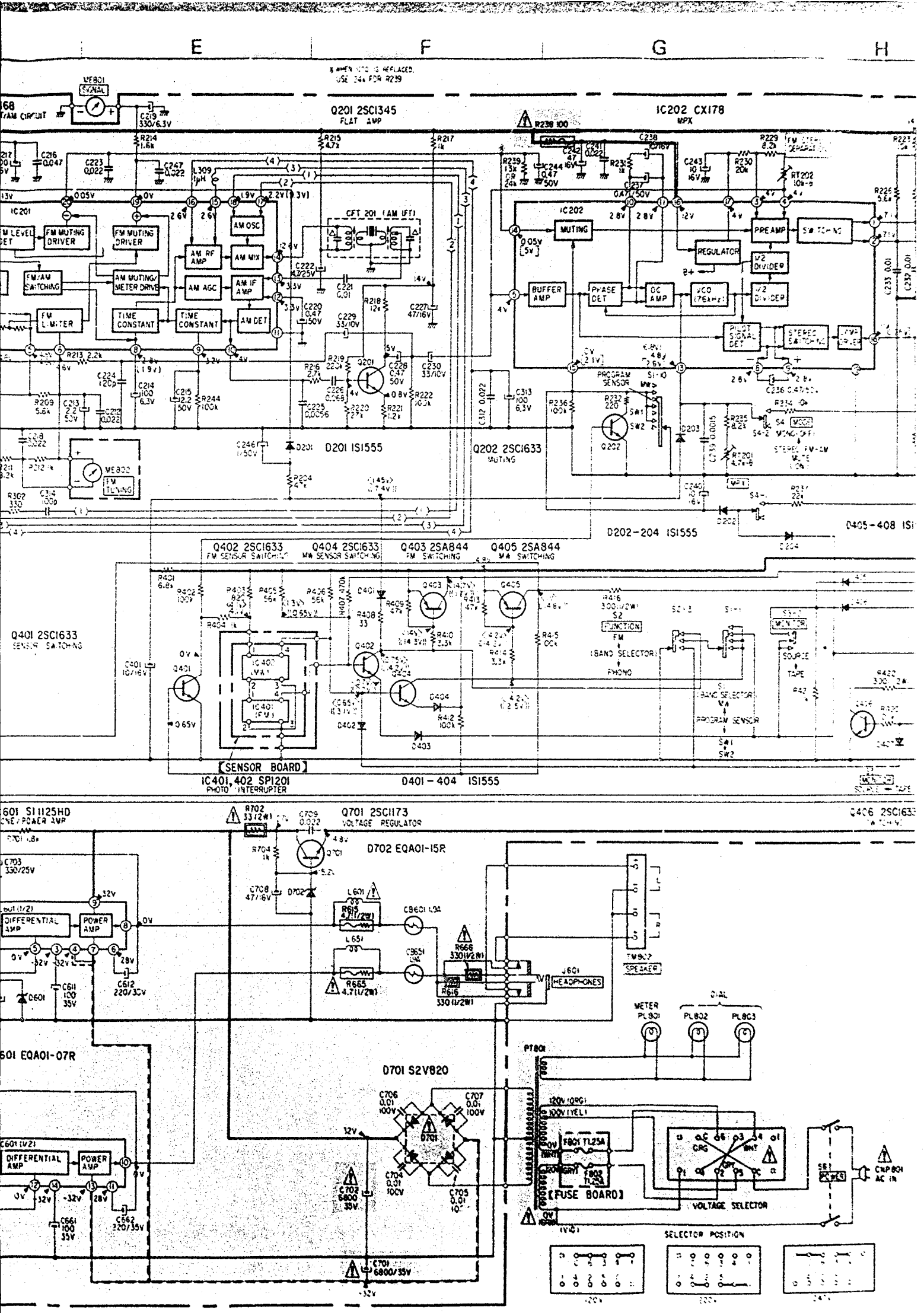


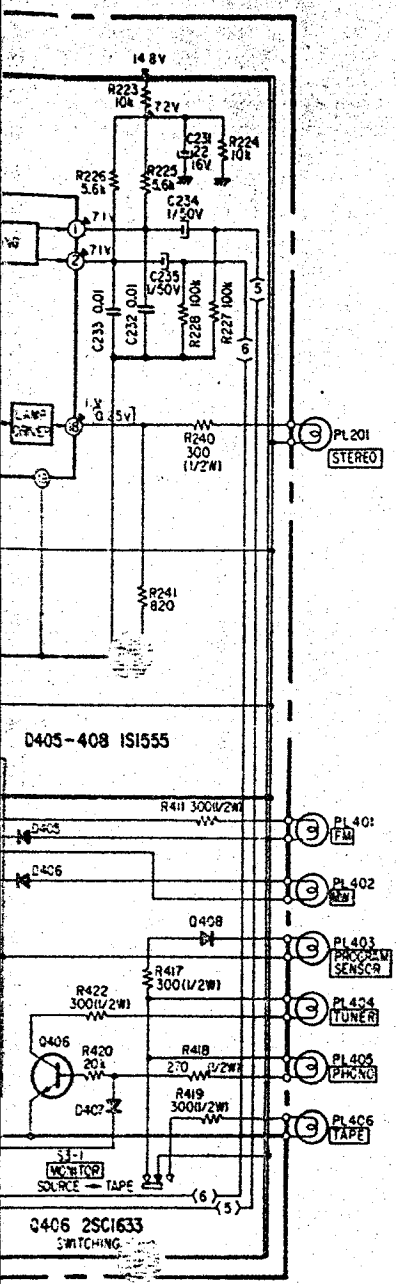
THE QUALITY OF THIS PAGE IS THE BEST THAT IS AVAILABLE

4-2. SCHEMATIC DIAGRAM




B
C
D
E
IC201 CX168
FM IF AMP/FM DET/AM CIRCUIT
FM IF AMP
FM LEVEL DET
FM MUTING DRIVER
FM MUTING DRIVER
AM OSC
AM RF AMP
AM MIX
AM IF AMP
AM AGC
AM DET
VOLTAGE REGULATOR
FM/AM SWITCHING
AM MUTING/ METER DRIVE
FM DET
FM LIMITER
TIME CONSTANT
TIME CONSTANT
FUNCTION
FM
(BAND SELECTOR)
PHONO
S1
(BAND SELECTOR)
MW
PROGRAM SENSOR
SW1
SW2
FUNCTION
Q401 2SC1633
SENSOR SWITCHING
Q402 2SC1633
FM SENSOR SWITCHING
IC401,402 SPI201
PHOTO INTERRUPTER
SENSOR BOARD
IC601 SI1125HD
TONE/POWER AMP
D601 EQA01-07R
DIFFERENTIAL AMP
POWER AMP
LOUDNESS
BALANCE
BASS
TREBLE
VOLUME
FUNCTION
MONITOR
TAPE
SOURCE
MODE
MONO
STEREO
2SC1345


E
F
G
H
Q201 2SC1345
FLAT AMP
IC202 CX178
MPX
Q202 2SC1633
MUTING
D201 1S1555
D202-204 1S1555
Q401 2SC1633
SENSOR SWITCHING
Q402 2SC1633
FM SENSOR SWITCHING
Q404 2SC1633
Q403 2SA844
FM SWITCHING
Q405 2SA844
IC401,402 SPI201
PHOTO INTERRUPTER
D401-404 1S1555
SENSOR BOARD
Q701 2SC1173
VOLTAGE REGULATOR
D702 EQA01-15R
D701 S2V820
FUSE BOARD
VOLTAGE SELECTOR
SELECTOR POSITION
SPEAKER
HEADPHONES
METER
DIAL
POWER AMP
DIFFERENTIAL AMP
MUTING
PRE AMP
REGULATOR
BUFFER AMP
PHASE DET
OSC AMP
VCO
PILOT SIGNAL DET
STEREO SWITCHING
AM OSC
AM MIX
AM IF AMP
AM DET
AM AGC
AM RF AMP
AM MUTING/METER DRIVE
TIME CONSTANT
FM LIMITER
FM MUTING DRIVER
FM/AM SWITCHING
PROGRAM SENSOR
FUNCTION
BAND SELECTOR
SOURCE
TAPE
PHONO
MONITOR
CFT 201 (AM IFT)



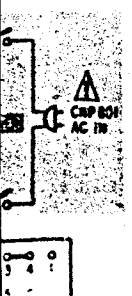
- All capacitors are in μF unless otherwise noted. pF = μμF 50 WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000 Ω; MΩ = 1000 kΩ
- : fusible resistor.
- : nonflammable resistor.
- ——: B+ bus.
- — — —: B— bus.
- : panel designation.
- : adjustment for repair.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal (detuned) conditions with a VOM (20 kΩ/V).

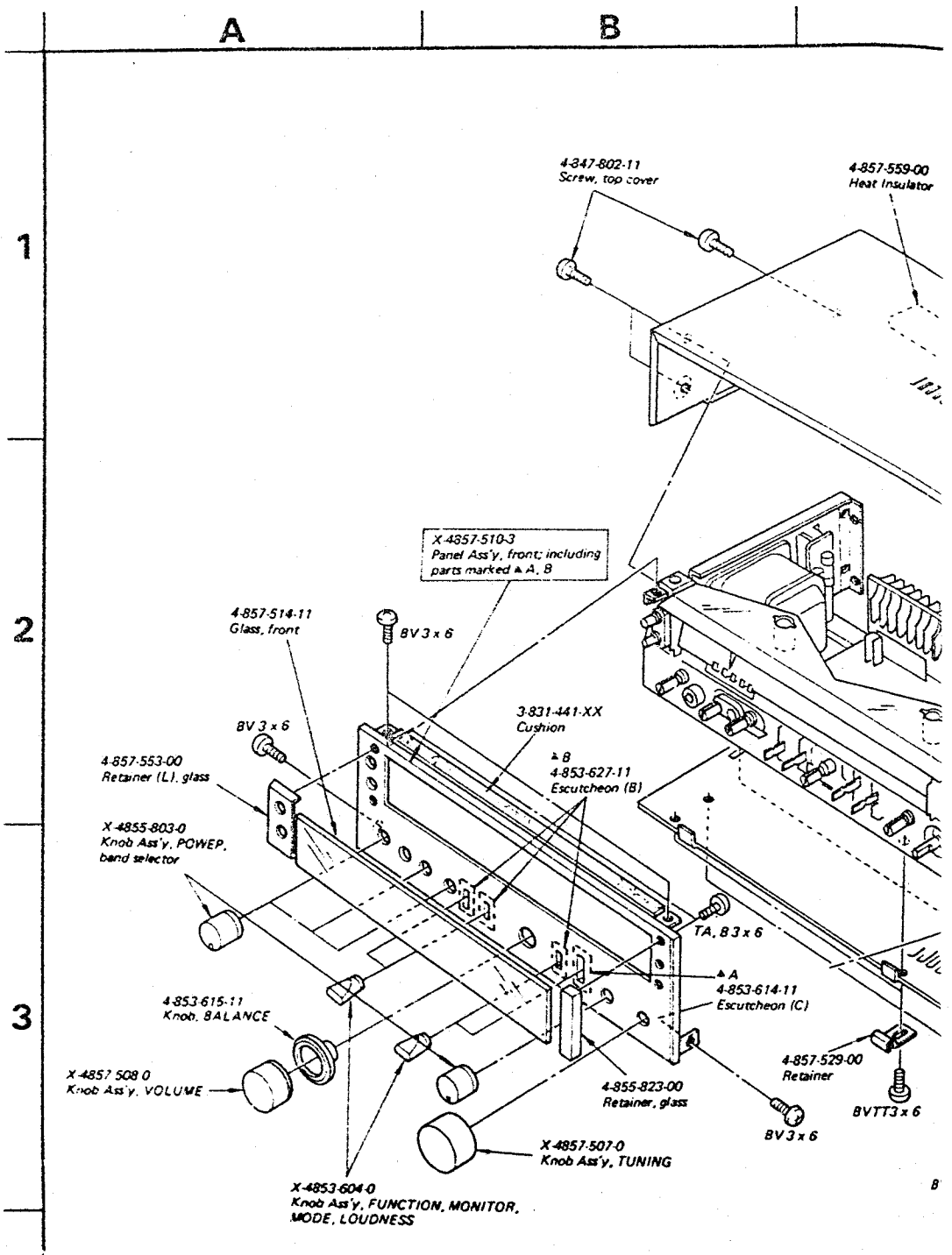
  ( ) : AM
  [ ] : FM STEREO
  < > : PROGRAM FM
  (( )) : PROGRAM MW

  no mark : FM
- Voltage variations may be noted due to normal production tolerances.
- Switch

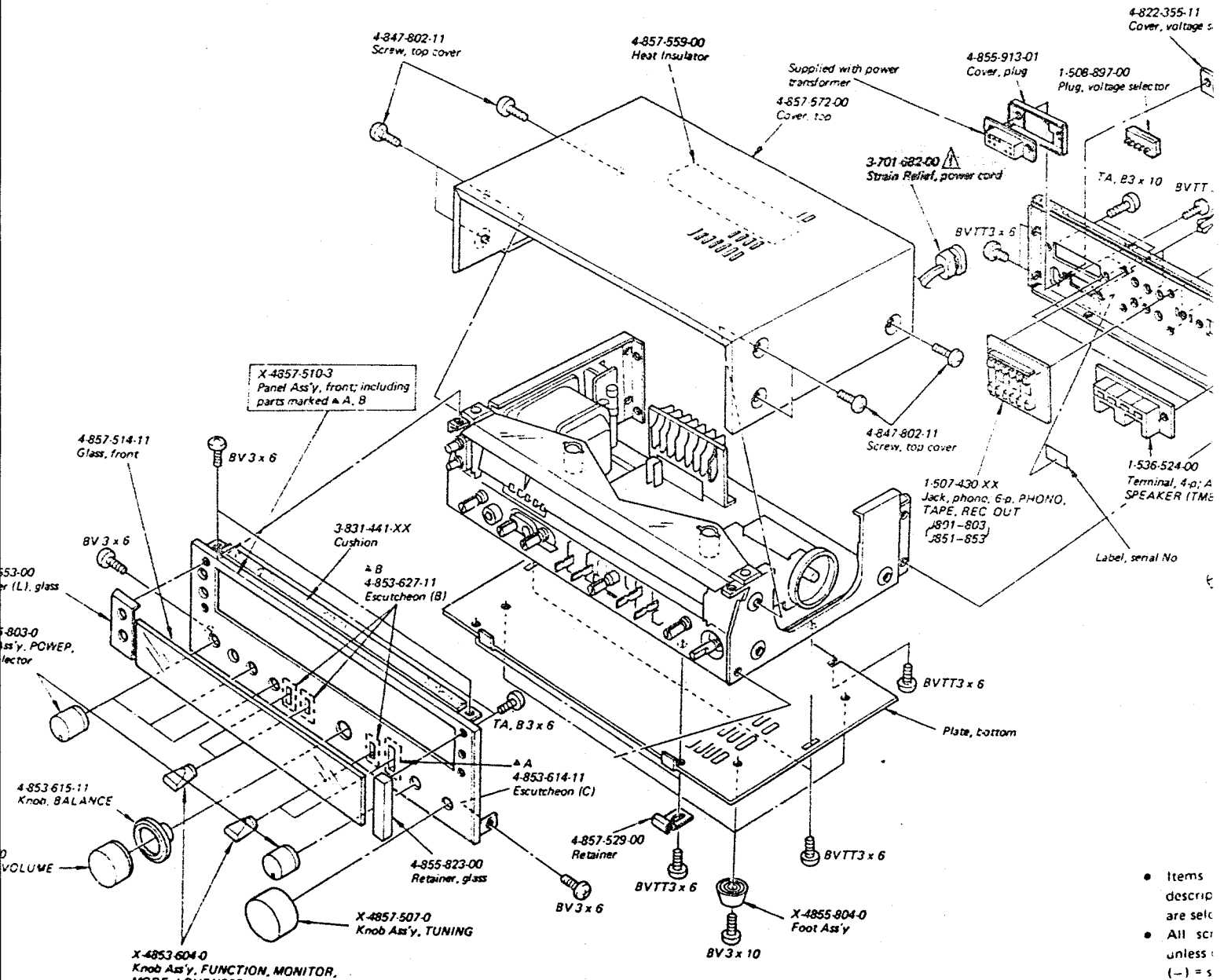
Ref. No.	Switch	Position
S1	Band Selector	PROGRAM SENSOR
S2	FUNCTION	FM
S3	MONITOR	SOURCE
S4	MODE	STEREO
S5	LOUDNESS	OFF
S6	POWER	OFF

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.





Note: The components identified by ⚠ are critical for safety. part number specified.



- Items
- All sc

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

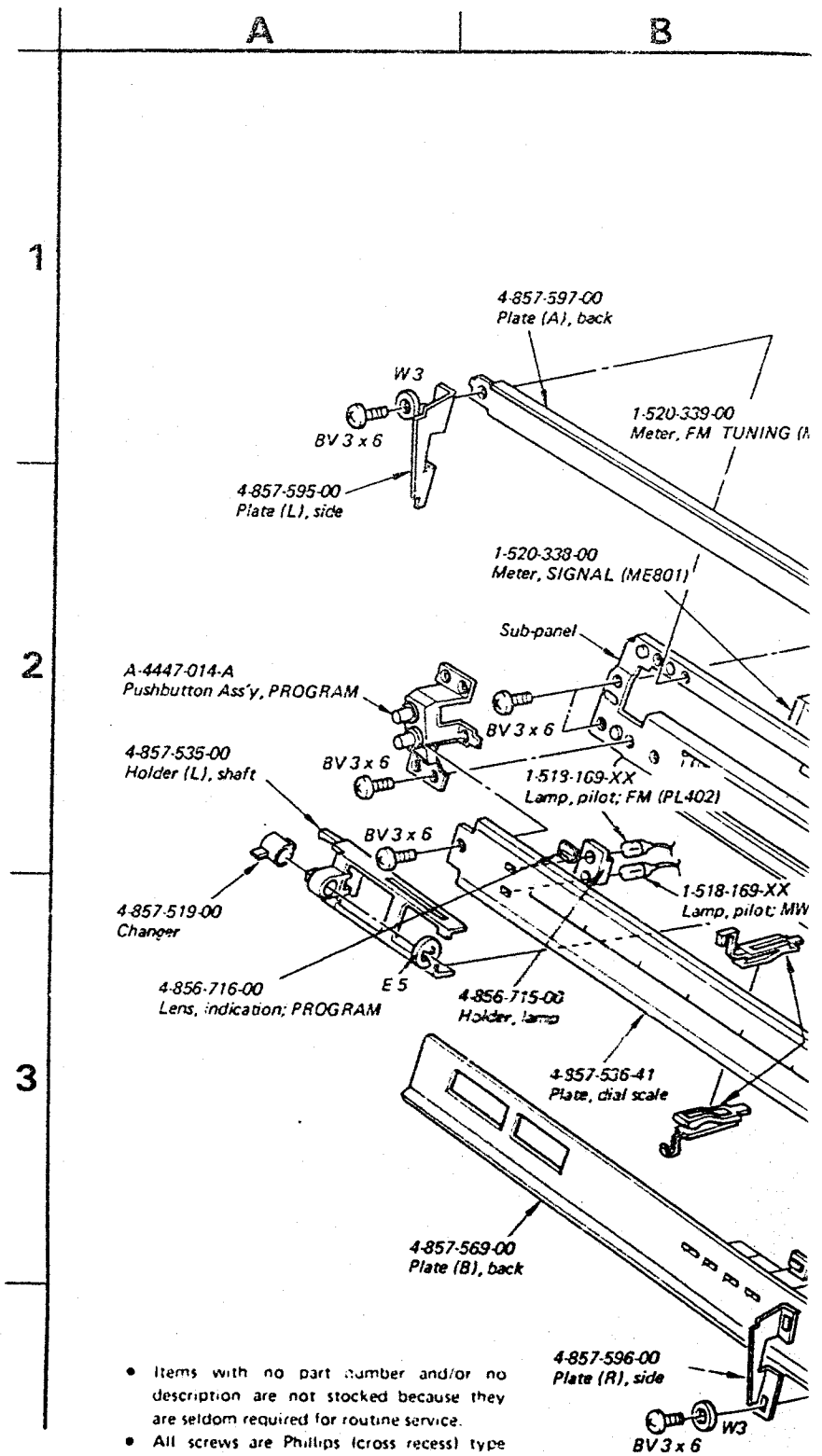
SECTION 5
EXPLODED VIEWS

C | D | E

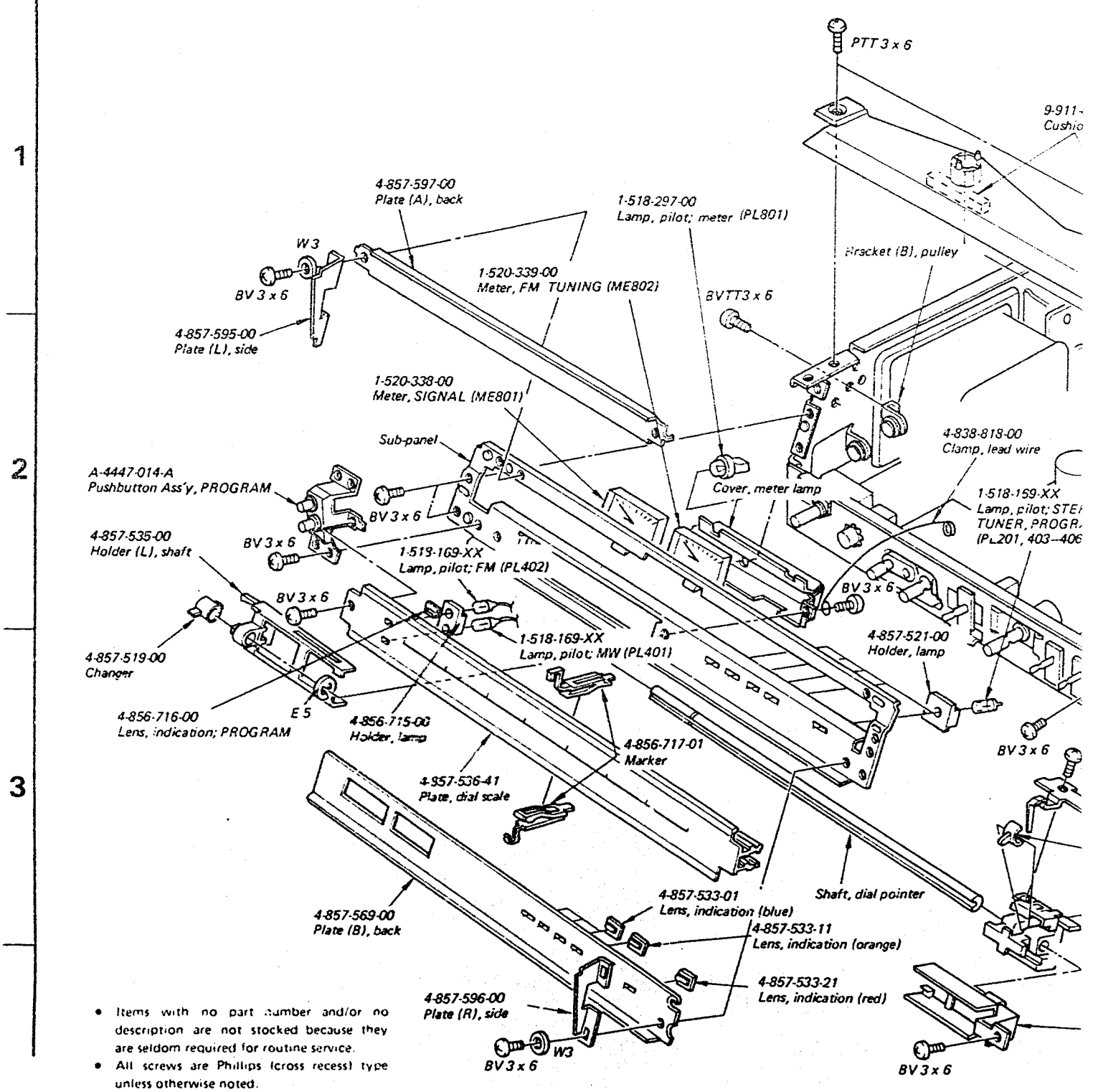
5-1.

- Items with no part number and or no description are not stocked because they are seldom required for routine service
- All screws are Phillips (cross recess) type unless otherwise noted
  (–) = slotted head

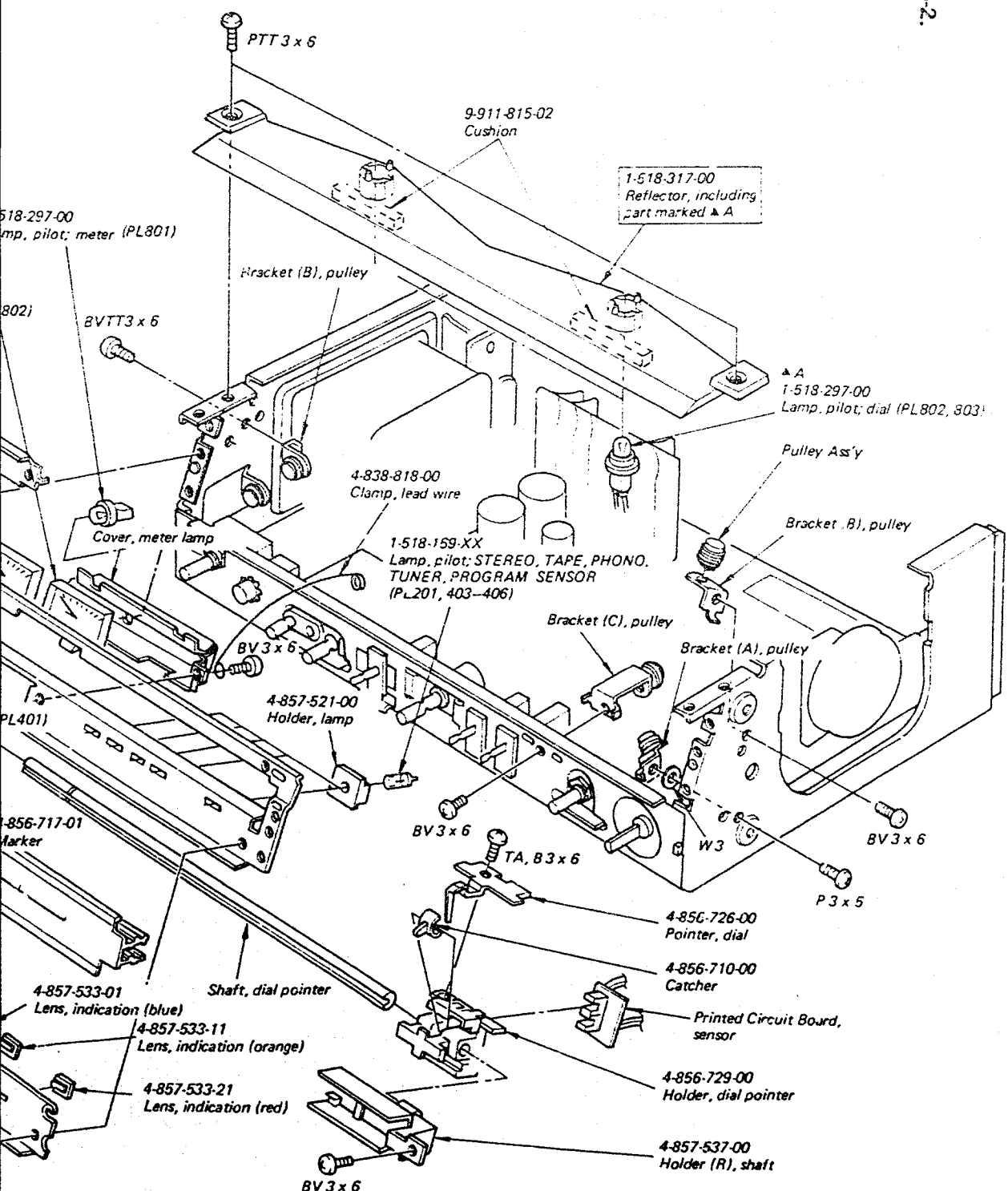
by shading and mark
Replace only with

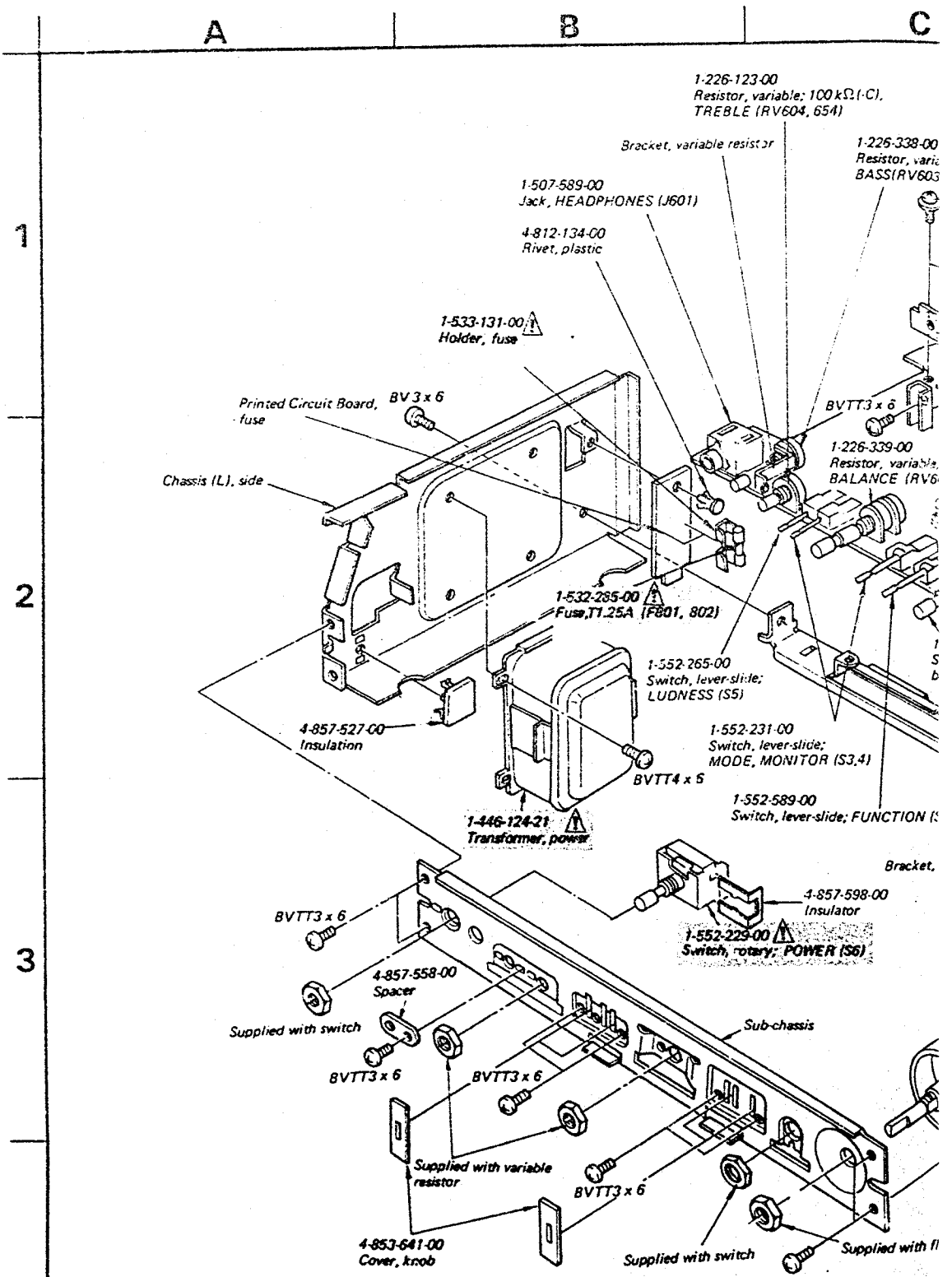


- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

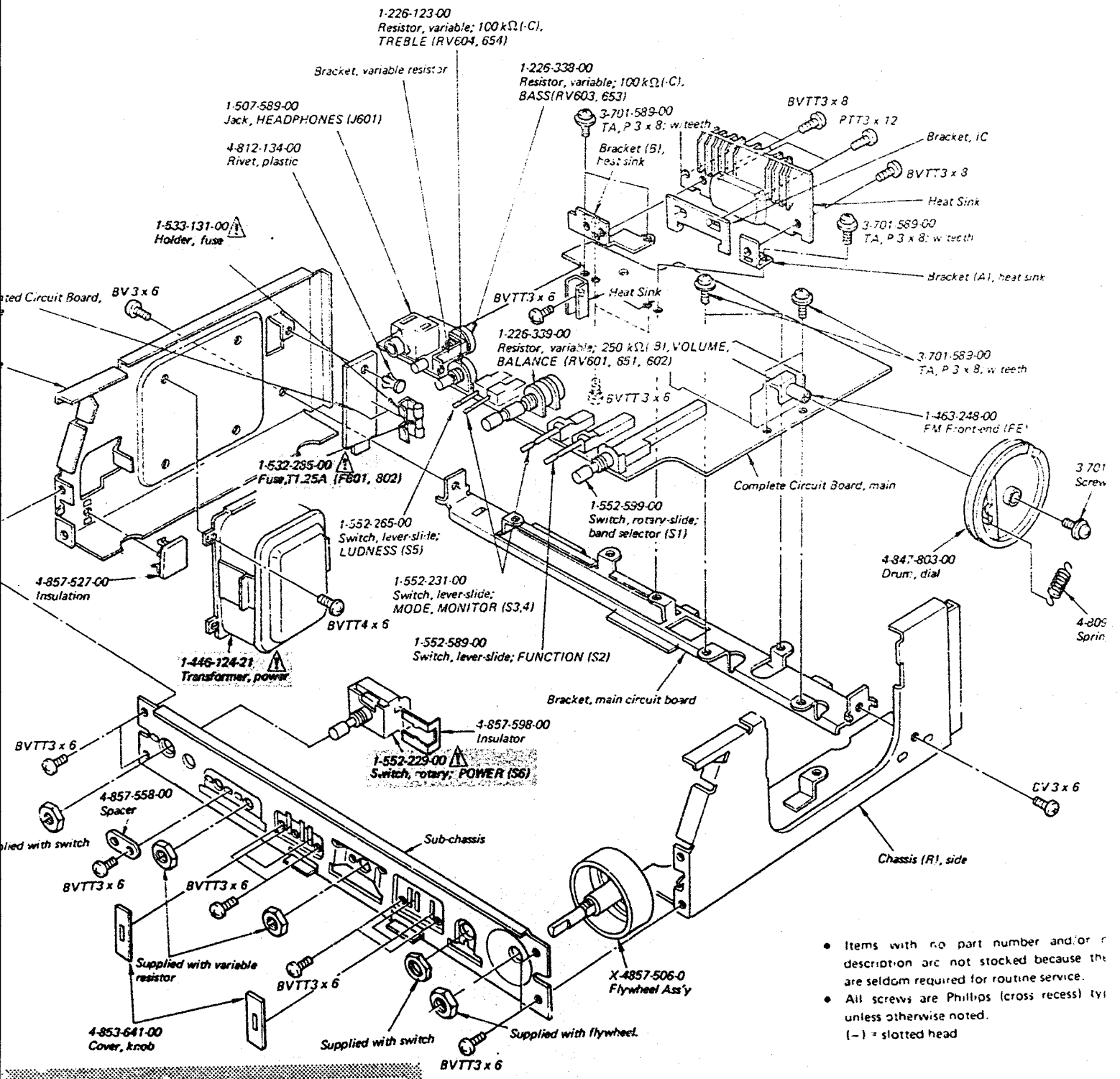


- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head





Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.



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  (–) = slotted head

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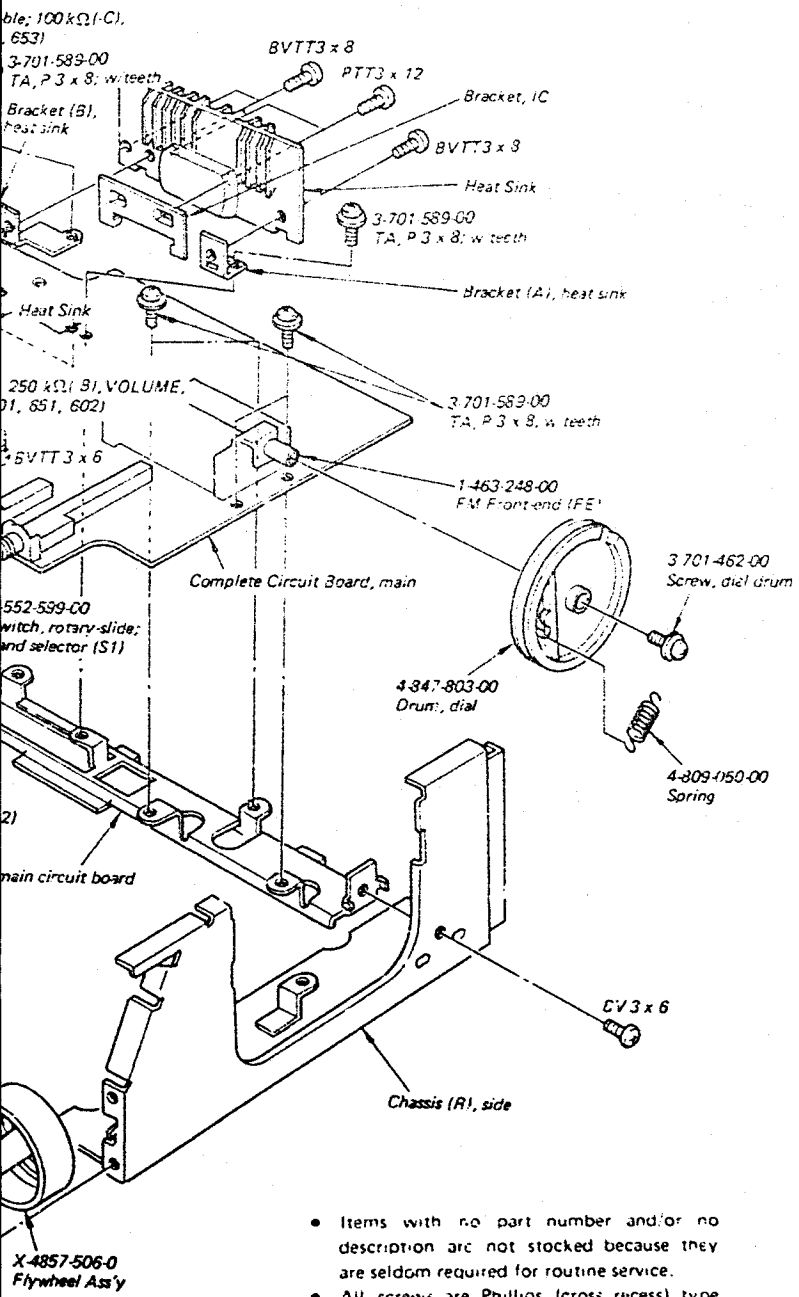


- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head

SECTION 6
ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
	SEMICONDUCTORS	
	Transistors	
Q201	8-729-334-58	2SC1345
⇒Q202	8-729-663-47	2SC1364
⇒Q401,402	8-729-663-47	2SC1364
⇒Q403	8-727-788-00	2SA678
⇒Q404	8-729-663-47	2SC1364
⇒Q405	8-727-788-00	2SA678
⇒Q406	8-729-663-47	2SC1364
Q501,551 Q502,552	8-729-334-58	2SC1345
Q701	8-729-217-33	2SC1173
	ICs	
IC201	8-751-680-01	CX168
IC202	8-751-780-00	CX178
IC401,402	8-719-902-01	SPI201
IC601	8-759-301-25	SI1125HD
	Diodes	
D201–204 D401–408	8-719-815-55	1S1555
⇒D601	8-719-931-07	EQB01-07
D701	⚠8-719-502-20	S2VB20
⇒D702	8-719-931-15	EQB01-15
	COILS	
L201	1-407-741-00	18μH, microinductor
L301	1-401-746-00	SW2 Ant
L302	1-401-745-00	SW1 Ant
L303	1-401-728-00	MW Ant
L304	1-405-816-00	SW2 Osc
L305	1-405-815-00	SW1 Osc
L306	1-405-797-00	MW Osc

Ref. No.	Part No.	Description
	TRANSFORMERS	
CFT201	1-404-066-00	AM IFT
IFT201	1-404-011-00	FM Discriminator
PT801	⚠1-446-124-21	Power
	CAPACITORS	

All capacitors are in μF and ceramic unless otherwise noted. 50WV or less are not indicated except for electrolytics. pF = μμF, elect = electrolytic

C201	1-102-936-11	3P		
C202	1-121-409-11	47	16V	elect
C203	1-101-006-11	0.047		
C204,205	1-101-005-11	0.022		
C206,207	1-101-006-11	0.047		
C208	1-121-651-11	10	16V	elect
C209	1-101-005-11	0.022		
C210,211	1-121-352-11	47	10V	elect
C212	1-101-005-11	0.022		
C213	1-121-450-11	2.2	50V	elect
C214	1-121-414-11	100	6.3V	elect
C215	1-121-450-11	2.2	50V	elect
C216	1-101-006-11	0.047		
C217	1-121-415-11	100	16V	elect
C218	1-101-005-11	0.022		
C219	1-121-751-11	330	6.3V	elect
C220	1-121-726-11	0.47	50V	elect
C221	1-101-004-11	0.01		
C222	1-121-395-11	4.7	25V	elect
C223	1-101-005-11	0.022		
C224	1-102-816-11	120p		
C225	1-108-355-12	0.0056		mylar
C226	1-108-249-11	0.068		mylar
C227	1-121-409-11	47	16V	elect
C228	1-121-726-11	0.47	50V	elect
C229,230	1-121-403-11	33	10V	elect
C231	1-121-479-11	22	16V	elect

- ⇒ : Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description		
C232,233	1-108-239-12	0.01		mylar
C234,235	1-121-391-11	1	50V	elect
C236,237	1-121-726-11	0.47	50V	elect
C238	1-121-651-11	10	16V	elect
C239	1-104-081-11	0.0015		polystyrol
C240	1-121-651-11	10	16V	elect
C241	1-101-005-11	0.022		
C242	1-121-409-11	47	16V	elect
C243	1-121-651-11	10	16V	elect
C244	1-121-726-11	0.47	50V	elect
C245	1-101-006-11	0.047		
C246	1-121-391-11	1	50V	elect
C247	1-101-005-11	0.022		
C301	1-102-953-11	18p		
C302	1-102-942-11	5p		
C304	1-102-295-11	18p		
C305	1-103-738-11	0.0036		polystyrol
C306	1-102-262-11	12p		
C307	1-104-081-11	0.0015		polystyrol
C308	1-102-997-11	10p		
C309	1-103-713-11	330p		polystyrol
C310	1-101-005-11	0.022		
C311	1-121-395-11	4.7	25V	elect
C312	1-101-005-11	0.022		
C313	1-121-414-11	100	6.3V	elect
C314	1-102-973-11	100p		
C319	1-102-118-11	0.0012		
C401	1-121-651-11	10	16V	elect
C501,551	1-121-915-11	4.7	25V	elect
C502,552	1-101-001-11	0.001		
C503,553	1-101-880-11	47p		
C504,554	1-108-355-12	0.0056		mylar
C505,555	1-108-228-12	0.0015		mylar
C506,556	1-121-391-11	1	50V	elect

Ref. No.	Part No.	Description		
C507,557	1-121-414-11	100	10V	elect
C508	1-121-415-11	100	16V	elect
C509,559	1-102-973-11	100p		
C510	1-101-001-11	0.001		
C601,651	1-108-228-12	0.0015		mylar
C602,652	1-108-244-12	0.033		mylar
C603,653	1-121-392-11	3.3	35V	elect
C604,654	1-108-244-12	0.033		mylar
C605,655	1-108-254-12	0.22		mylar
C606,656	1-101-361-11	150p		
C607,657	1-108-232-12	0.0033		mylar
C608,658	1-108-242-12	0.022		mylar
C609,659	1-121-409-11	47	16V	elect
C610,660	1-121-409-11	47	16V	elect
C611,661	1-123-062-11	100	35V	elect
C612,662	1-121-655-11	220	35V	elect
C614	1-121-398-11	10	25V	elect
C615,665	1-101-884-11	56p		
C701,702	⚠ 1-125-155-11	6800	35V	elect
C703	1-121-657-11	330	25V	elect
C704 - 707	1-108-377-12	0.01	100V	mylar
C708	1-121-409-11	47	16V	elect
C709	1-101-005-11	0.022		
CT301 - 306	1-141-171-00	trimmer		

RESISTORS

All resistors are in ohms. Common ¼W carbon resistors are omitted. Refer to the list on the last page for their part-numbers.

R210,238	⚠ 1-212-881-11	100	¼W	fusible
R240	1-244-860-11	300	½W	carbon
R411 R416, 417	1-244-860-11	300	½W	carbon
R418	1-244-859-11	270	½W	carbon
R419, 422	1-244-860-11	300	½W	carbon
R615,665	⚠ 1-212-950-11	47	½W	fusible
R[illegible]	⚠ 1-211-626-11	100	½W	carbon (nonflammable)
R[illegible]	⚠ 1-211-[illegible]	[illegible]	[illegible]	[illegible] (nonflammable)

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description
RT201	1-224-644-XX	4.7k-B adjustable, MPX
RT202	1-224-645-XX	10k-B adjustable, FM stereo separation
RV601,602 RV651	1-226-339-00	250k-B, variable; VOLUME BALANCE
RV603, 653	1-226-338-00	100k-C, variable; BASS
RV604, 654	1-226-123-00	100k-C, variable; TREBLE

SWITCHES

S1	1-552-599-00	Rotary-slide, band selector
S2	1-552-589-00	Lever-slide, FUNCTION
S3,4	1-552-231-00	Lever-slide, MONITOR, MODE
S5	1-552-265-00	Lever-slide, LOUDNESS
S6 ⚠	1-552-229-00	Rotary, POWER

MISCELLANEOUS

CB601,651	1-532-380-61	Circuit Breaker, 1.9A
CF201	1-527-346-00	Filter, ceramic
CNP801 ⚠	1-551-188-41	Cord, power; parallel blade plug
	1-551-530-00	Cord, power; euro-plug
F801,802 ⚠	1-532-285-00	Fuse, T1.25A
FE	1-463-248-00	FM Front-end
J601	1-507-589-00	Jack, HEADPHONES
J801 - 803 J851 - 853	1-507-430-XX	Jack, phono; 6p
ME8	1-520-338-00	Meter, SIGNAL
ME802	1-520-339-00	Meter, FM TUNING
PL201 PL401 - 406	1-518-169-XX	Lamp, STEREO, FM, MW, PROGRAM SENSOR, TUNER, PHONO, TAPE
PL801 - 803	1-518-297-00	Lamp, meter, dial
TM801,802	1-536-524-00	Terminal, 4p; ANTENNA, SPEAKER
	1-508-897-00	Plug, voltage selector
	1-518-317-00	Reflector, w/lamp
⚠	1-533-131-00	Holder, fuse

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

ACCESSORIES AND PACKING MATERIALS

Part No.	Description
1-501-184-00	Antenna, ribbon; FM
1-501-193-00	Antenna Wire, AM
3-701-630-00	Bag, plastic
3-770-593-51	Manual, instruction
4-857-573-00	Cushion, lower (left)
4-857-574-00	Cushion, lower (right)
4-857-575-00	Cushion, upper
4-857-578-00	Carton
4-857-599-41	Card, instruction; AM antenna
4-891-037-00	Bag, plastic

1/4 WATT CARBON RESISTORS

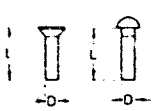
Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-244-601-11	10	1-244-625-11	100	1-244-649-11	1.0k	1-244-673-11	10k	1-244-697-11	100k	1-244-721-11	1.0M	1-244-745-11
1.1	1-244-602-11	11	1-244-626-11	110	1-244-650-11	1.1k	1-244-674-11	11k	1-244-698-11	110k	1-244-722-11	1.1M	1-244-746-11
1.2	1-244-603-11	12	1-244-627-11	120	1-244-651-11	1.2k	1-244-675-11	12k	1-244-699-11	120k	1-244-723-11	1.2M	1-244-747-11
1.3	1-244-604-11	13	1-244-628-11	130	1-244-652-11	1.3k	1-244-676-11	13k	1-244-700-11	130k	1-244-724-11	1.3M	1-244-748-11
1.5	1-244-605-11	15	1-244-629-11	150	1-244-653-11	1.5k	1-244-677-11	15k	1-244-701-11	150k	1-244-725-11	1.5M	1-244-749-11
1.6	1-244-606-11	16	1-244-630-11	160	1-244-654-11	1.6k	1-244-678-11	16k	1-244-702-11	160k	1-244-726-11	1.6M	1-244-750-11
1.8	1-244-607-11	18	1-244-631-11	180	1-244-655-11	1.8k	1-244-679-11	18k	1-244-703-11	180k	1-244-737-11	1.8M	1-244-751-11
2.0	1-244-608-11	20	1-244-632-11	200	1-244-656-11	2.0k	1-244-680-11	20k	1-244-704-11	200k	1-244-728-11	2.0M	1-244-752-11
2.2	1-244-609-11	22	1-244-633-11	220	1-244-657-11	2.2k	1-244-681-11	22k	1-244-705-11	220k	1-244-729-11	2.2M	1-244-753-11
2.4	1-244-610-11	24	1-244-634-11	240	1-244-658-11	2.4k	1-244-682-11	24k	1-244-706-11	240k	1-244-730-11	2.4M	1-244-754-11
2.7	1-244-611-11	27	1-244-635-11	270	1-244-659-11	2.7k	1-244-683-11	27k	1-244-707-11	270k	1-244-731-11	2.7M	1-244-755-11
3.0	1-244-612-11	30	1-244-636-11	300	1-244-660-11	3.0k	1-244-684-11	30k	1-244-708-11	300k	1-244-732-11	3.0M	1-244-756-11
3.3	1-244-613-11	33	1-244-637-11	330	1-244-661-11	3.3k	1-244-685-11	33k	1-244-709-11	330k	1-244-733-11	3.3M	1-244-757-11
3.6	1-244-614-11	36	1-244-638-11	360	1-244-662-11	3.6k	1-244-686-11	36k	1-244-710-11	360k	1-244-734-11	3.6M	1-244-758-11
3.9	1-244-615-11	39	1-244-639-11	390	1-244-663-11	3.9k	1-244-687-11	39k	1-244-711-11	390k	1-244-735-11	3.9M	1-244-759-11
4.3	1-244-616-11	43	1-244-640-11	430	1-244-664-11	4.3k	1-244-688-11	43k	1-244-712-11	430k	1-244-736-11	4.3M	1-244-760-11
4.7	1-244-617-11	47	1-244-641-11	470	1-244-665-11	4.7k	1-244-689-11	47k	1-244-713-11	470k	1-244-737-11	4.7M	1-244-761-11
5.1	1-244-618-11	51	1-244-642-11	510	1-244-666-11	5.1k	1-244-690-11	51k	1-244-714-11	510k	1-244-738-11	5.1M	1-244-762-11
5.6	1-244-619-11	56	1-244-643-11	560	1-244-667-11	5.6k	1-244-691-11	56k	1-244-715-11	560k	1-244-739-11		
6.2	1-244-620-11	62	1-244-644-11	620	1-244-668-11	6.2k	1-244-692-11	62k	1-244-716-11	620k	1-244-740-11		
6.8	1-244-621-11	68	1-244-645-11	680	1-244-669-11	6.8k	1-244-693-11	68k	1-244-717-11	680k	1-244-741-11		
7.5	1-244-622-11	75	1-244-646-11	750	1-244-670-11	7.5k	1-244-694-11	75k	1-244-718-11	750k	1-244-742-11		
8.2	1-244-623-11	82	1-244-647-11	820	1-244-671-11	8.2k	1-244-695-11	82k	1-244-719-11	820k	1-244-743-11		
9.1	1-244-624-11	91	1-244-648-11	910	1-244-672-11	9.1k	1-244-696-11	91k	1-244-720-11	910k	1-244-744-11		

HARDWARE NOMENCLATURE

Screw: P 3 x 10

- L: Length in mm
- D: Diameter in mm
- Type of head
- Indicated slotted-head only.

Unless otherwise indicated, it means cross-recessed head (Phillips type).



Nut, Washer, Retaining ring: N 3

- Diameter of usable screw or shaft
- Reference designation

Reference Designation	Shape	Description	Remarks
SCREWS			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		brazier-head screw	

Reference Designation	Shape	Description	Remarks
SELF-TAPPING SCREWS			
TA		self-tapping screw	ex. TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2 6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	

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