

ONKYO SERVICE MANUAL

SOLID STATE STEREO RECEIVER

TX-670

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SPECIFICATIONS

Type All Silicon Transistor Integrated Stereo Receiver

Circuitry Direct Coupling and Differential Circuits
Quasi Complementary SEPP System.
Transistors 57, FET 3, Diodes 43, ICs 2

Amplifier Section

Output Power 72 watts per channel, min. RMS, at 4 ohms from 20 Hz to 20 kHz, with no more than 0.3% total harmonic distortion.
56 watts per channel, min. RMS, at 8 ohms from 20 Hz to 20 kHz, with no more than 0.3% total harmonic distortion.
84 watts per channel, min. RMS, at 4 ohms, 1 kHz, 0.3% THD.
63 watts per channel, min. RMS, at 8 ohms, 1 kHz, 0.3% THD.

Total Harmonic Distortion 0.3% at Rated Power, 0.1% at 1W.

Damping Factor 50 (8 Ω 1 kHz 10W)

Frequency Response 15-30,000Hz (\pm 1 dB)

Sensitivity and Impedance PHONO 1/2: 2.5mV/50k Ω ,
AUX: 200mV/50k Ω ,
MIC: 4mV/50k Ω ,
TAPE PLAY-1/2 200mV/50k Ω

Output Level TAPE REC-1/2: 200mV/100k Ω

Phono Overload 140mV/1kHz 0.1%,
620mV/10kHz 0.1%

Bass Control \pm 10dB at 100Hz

Treble Control \pm 10dB at 10kHz

Signal to Noise Ratio PHONO: More than 65dB (IHF C Network)
AUX: More than 80dB (IHF C Network)

Loudness Control +7dB at 100Hz, +4.5dB at 10kHz

Filter High 6kHz (6dB/oct)

Low 70Hz (6dB/oct)

Tuner Section

Tuning Range FM: 88 - 108MHz
AM: 530 - 1605kHz

Sensitivity FM: 1.8 μ V (IHF)
AM: 25 μ V, 150 μ V/m

Intermediate Frequency FM: 10.7MHz
AM: 455kHz

Capture Ratio FM: 1.5dB

Image Rejection FM: 80dB AM: 40dB

IF Rejection FM: 100dB AM: 40dB

Signal to Noise Ratio FM: 70dB AM: 45dB

Alternate Channel Att. FM: 75dB

AM Suppression Ratio FM: 50dB

Harmonic Distortion FM MONO: 0.2%
FM ST: 0.5% AM: 0.8%

Frequency Response FM: 20 - 15,000Hz \pm 1dB

FM Stereo Separation 40dB (400Hz) 35dB (100 - 10,000Hz)

Muting Level FM: 7 μ V

Stereo Lamp Level FM: 7 μ V

Tuning Meters Signal Strength & Center Tuning

Antennas FM: 300 Ω balanced/75 Ω unbalanced
AM: Built-in Ferrite Core Antenna

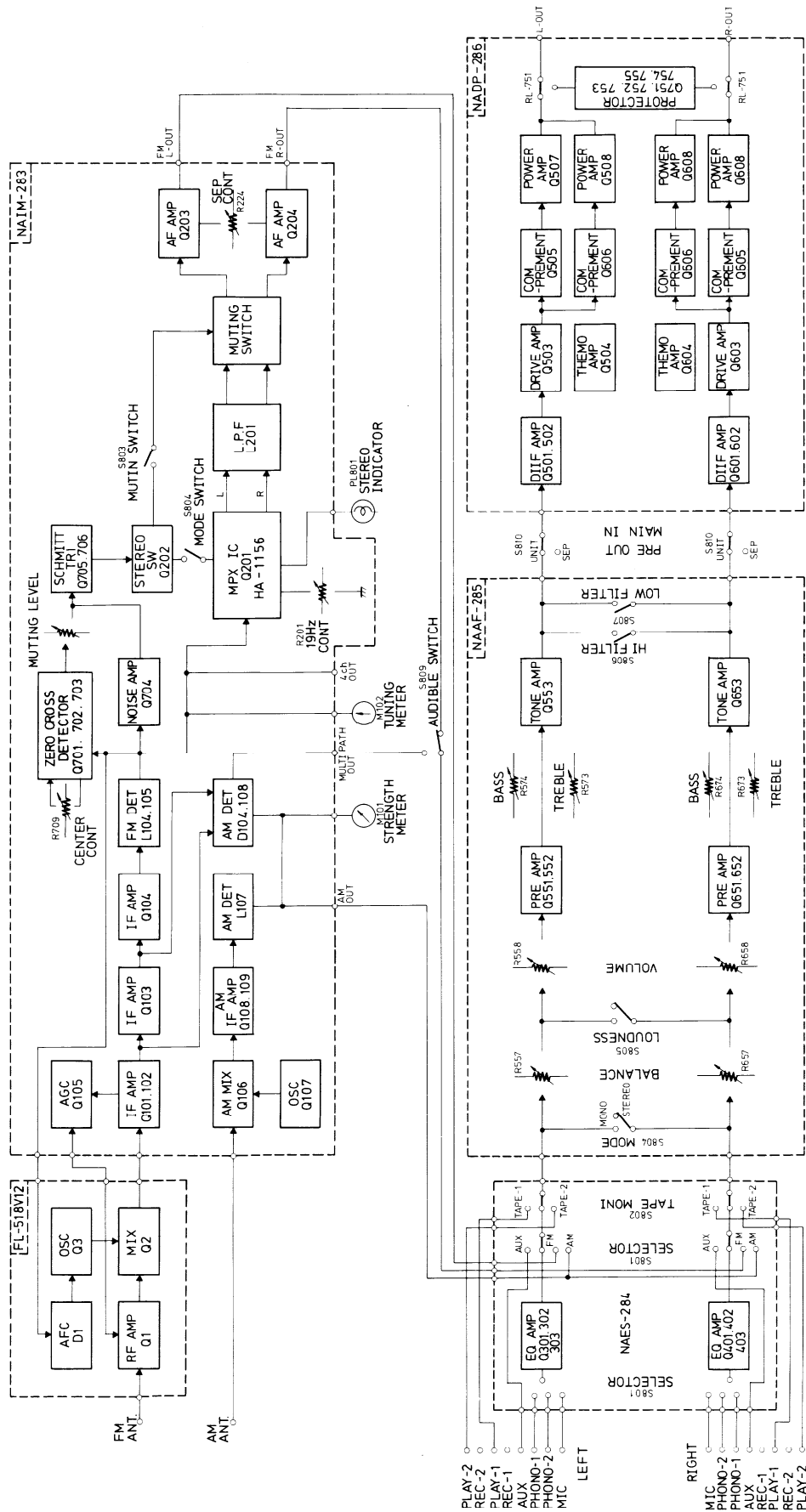
Power Supply Rating AC 120V 60Hz

Dimensions 21-1/32"(W) x 17-9/32"(D) x 9-7/16"(H).

Net Weight 30.4 lbs.

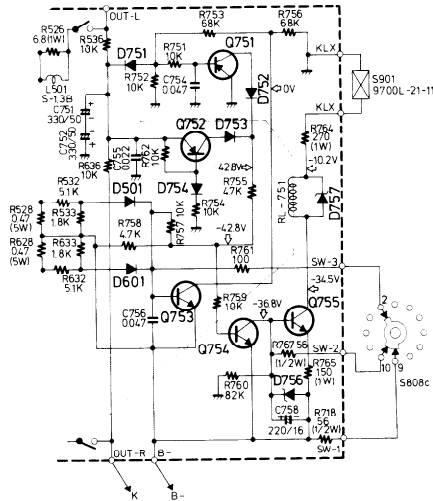
Specifications and features are subject to change without notice.

BLOCK DIAGRAM



NOTES

The Explanation of Protection Circuit



Examination of center voltage

To mix signals L and R by R 536 and R636, and cut high frequency which belong to C751, C752 and C755.

A. In case that center voltage is positive;

By action of Q752, current runs through R755 and R758, and by their drop of voltage, the base voltage of Q754 increases, by which Q754 is “ON”.

Simultaneously when the base voltage of Q754 is increasing, the base voltage of Q753 is increasing too, by intermediary of R757, and Q753 is “ON”. The collector voltage of Q753, i.e. the base voltage of Q751 drops and Q751 is “ON”, while the base voltage of Q754 increases further.

That is to say, there happens a positive feedback of loop of Q754-Q753-Q751-Q754, and instantly the saturated position of Q754, Q753 and Q751 is preserved.

On the other hand, when Q754 becomes “ON” with an increase of the base voltage of Q754, current runs through load resistor R760 of Q754, by which the collector voltage of Q754, i.e. the base voltage of Q755 drops, and the collector current of Q755, i.e. current running through the relay decreases, and when its value becomes less than preservative current, the relay becomes “OFF”.

B. In case that center voltage is negative;

1. By action of Q751, current runs through R755 and R758, and by their drop of voltage, the base voltage of Q754 increases, by which Q754 is “ON”. After that, the position becomes in the same with “Positive case”.

2. Examination of excessive current

When voltage is created to the extent enough to give Q753 “ON” by the drop of voltage of power TR’s emitter resistor, the relay instantly comes “OFF” by the loop of Q753-Q751-Q754-Q753, and Q754-Q755, like the same case with the above mentioned “center voltage examination”.

3. Power switch

A. When switched on;

Although the drive sources of electricity of Q755 is in negative electric sources (B^-), the relay comes “ON”, after 2-3 seconds, as the time constant of C758 & R760 is big.

B. When switched off;

The drive sources of electricity of Q755 being in negative electrical sources (B^-), charging and discharging time is so short that the relay comes “OFF” within 0.5 seconds.

As above described, one must remove the cause at each extraordinary case, by the examination of center voltage and of excess current, as the relay is not recovered when “OFF”. At the normal action, the relay comes “ON” after 2-3 seconds with sources of electricity switched on.

INSTRUMENTS REQUIRED

CR Oscillator

Oscilloscope

Differentiation Circuit

Output load 3Ω 100W 4Ω 100W

Knob Position

SPEAKER: A

VOLUME: MAX

MUTING: OFF

BASS: Center

FILTER: OFF

TAPE: SOURCE

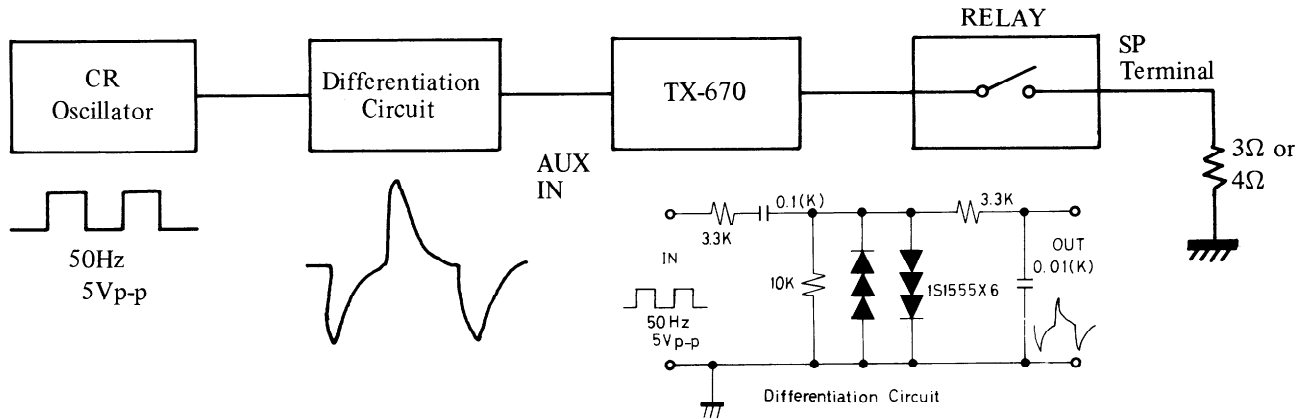
TREBLE: Center

LOUDNESS: OFF

SELECTOR: AUX

BALANCE: Center

MODE: STEREO



Confirmation

1. To feed the above specified signals into auxiliary terminal L(R), and connect output load signals 3Ω with SP load, and activate relay, when volume is set to the maximum and selector to the auxiliary.
2. To put off the power supply switch and to confirm likewise the action of other channels R(L).
3. As 1 & 2 are concerned, to confirm that "ON" action of the relay can be obtained in normality a few seconds afterward when the power supply switch is set "ON".
4. To confirm that in the item 1 no action of the relay should not be given, while to connect output load 4Ω with the state in which the item 1 is mentioned.

ALIGNMENT PROCEDURE

INSTRUMENTS REQUIRED

1. DC Ammeter
2. DC Voltmeter
3. AM and FM sweep generator
4. AM and FM signal generator
5. Vacuum tube voltage meter (V.T.V.M) AC, DC
6. Oscilloscope
7. Distortion meter
8. Stereo modulator
9. Frequency counter

GENERAL ALIGNMENT CONDITIONS

1. Signal input should be kept as low as possible.
2. Standard modulation is 400Hz 30% (AM), 400Hz 100% (FM, MONO), pilot 10% sub and main 90% (FM, STEREO)
3. Standard knob position
 SPEAKER..... A VOLUME Maximum
 BASS Center LOW FILTER OFF
 TREBLE Center HIGH FILTER... OFF
 BALANCE Center LOUDNESS OFF
 MODE.....STEREO
 MUTINGOFF
 TAPESOURCE

(1) IDLING CURRENT

SELECTOR SWITCH MIC VOLUME Minimum Open Load

When replacing the Power transistor (Q507, 508, 607, 608) or the Drive transistor (Q505, 506, 605, 606), check the idling current of the Power transistor. To adjust to normal value 38mA, proceed as follows.

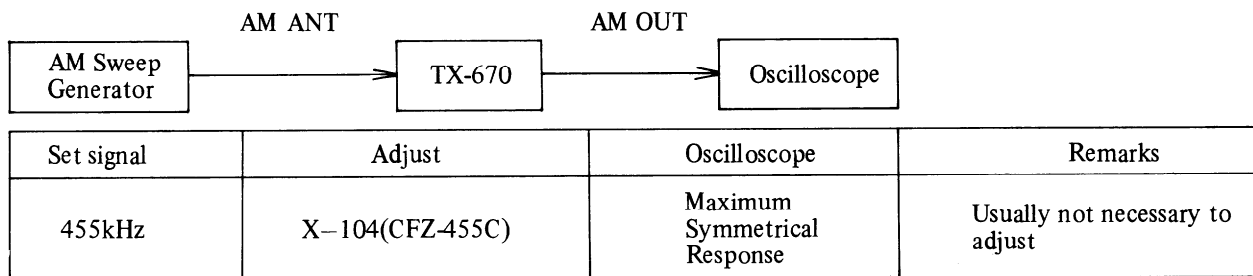
- (Lch) (1) Cut the connection between +B and collector of Q507 on Main Amp assembly, and connect a DC ammeter
 (2) Adjust the current to 38mA, with R509(2.2K Ω) after switching on for 10 minutes.
 (3) After adjusting, connect original wiring.

If a DC Voltmeter or V.T.V.M is available, connector the Voltmeter between E1 and CT terminal.
 Adjust the voltage to 19mV with R509 (2.2K Ω).
 Connect the Voltmeter between CT and E terminal.
 To Confirm that the space between CT and E terminal lies in 0 \pm 60mV.

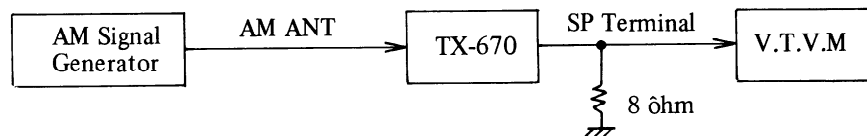
(Rch) Using R609 (2.2K Ω), adjust in the same manner as indicated above.

(2) AM IF

1. Set Selector Switch to "AM". Set Radio Dial to quiet point.



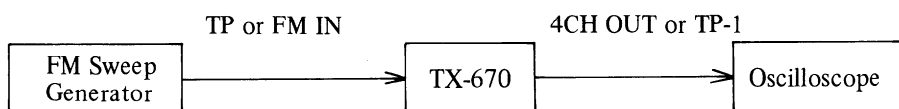
(3) AM RF

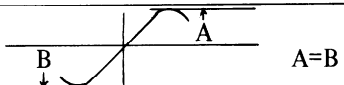


Step	Set signal	Set Radio Dial	Adjust	V.T.V.M reading	Remarks
1	515KHz (modulated)	Lower end (515KHz)	L106 (NMO-2503)	Maximum	Repeat Step 1 & 2 as necessary
2	1680KHz (modulated)	Upper end (1680KHz)	AM3	Maximum	
3	600KHz (modulated)	600KHz	L001 (NMA-2501)	Maximum	Repeat Step 3 & 4 as necessary
4	1400KHz (modulated)	1400KHz	AM1	Maximum	

(4) FM "S" Curve

1. Set Selector Switch to "FM". Set Muting Switch to "OFF". Set Mode Switch to "MONO".
2. Set Radio Dial to quiet point on Band.

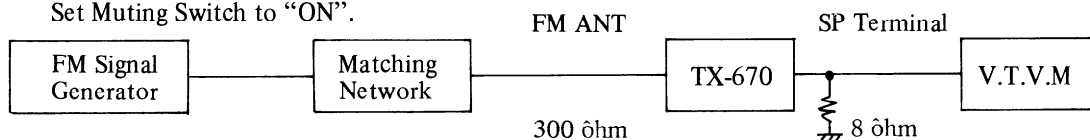


Set Signal	Adjust	Oscilloscope
±0.3MHz Sweep Centered at 10.7 MHz	L104 (NIT-0508P)	Adjust for maximum "S" Curve Lineality  A=B
	L105 (NIT-0508S)	

Remarks: Not necessary to adjust for symmetrical response or zero voltage.

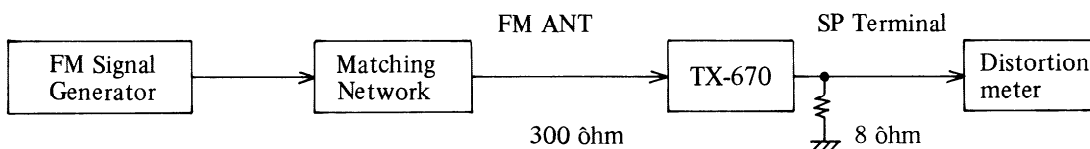
(5) FM RF

Set Muting Switch to "ON".



Step	Set signal	Set Radio Dial	Adjust	V.T.V.M reading	Remarks
1	88MHz (100% Mod)	88MHz	LO on FM Front End	Maximum	Repeat Step 1 & 2 as necessary
2	108MHz (100% Mod)	108MHz	TCO on FM Front End	Maximum	
3	90MHz (100% Mod)	90MHz	LA, LR1, LR2 on FM Front End	Maximum	Repeat Step 3 & 4 as necessary
4	106MHz (100% Mod)	106MHz	TCA, TCR1, TCR2 on FM Front End	Maximum	
5	98MHz (100% Mod)	98MHz	IF on FM Front End	Maximum	

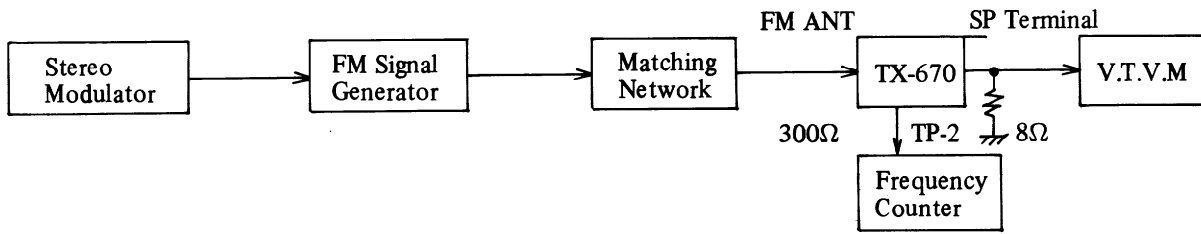
(6) FM Distortion



Set Signal	Set Radio Dial	Adjust	Distortion meter Reading
98MHz (100% Mod)	98 MHz	L104 (NIT-0508P)	Minimum Distortion (Less than 0.3%)

(7) FM MPX

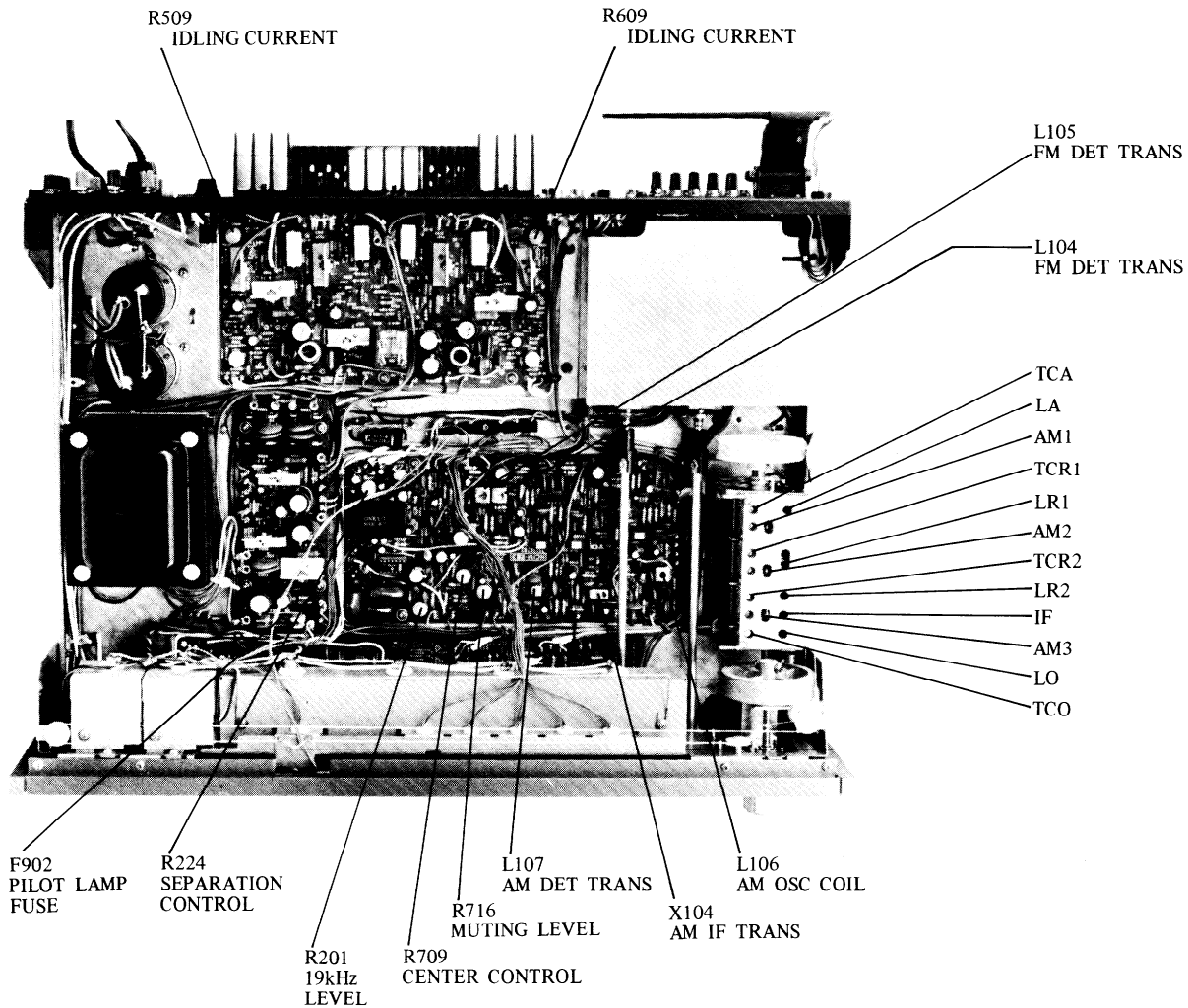
1. Set Mode Switch to "STEREO".
2. Set Muting Switch to "ON".



Set signal	Adjust	Frequency counter	Remarks
98MHz (Pilot Sig. 19KHz 10%) 1mV input	Variable Resistor R201 (10KB)	18.981KHz~19.019KHz	Stereo Indicator lights.

Step	Set Signal	Connect to V.T.V.M	Adjust	V.T.V.M reading	Remarks
1	98MHz (Pilot Sig. 19KHz 10%) Main & Sub Sig. 1KHz Lch 90%	Rch	Variable Resistor R224 (10KB)	Minimum	Retouch slightly
2	98MHz (Pilot Sig. 19KHz 10%) Main & Sub Sig. 1KHz Rch 90%	Lch	Variable Resistor R224 (10KB)	Minimum	Repeat Step 1 & 2 as necessary

CHASSIS LAYOUT



PARTS LIST

PARTS NO.	DESCRIPTION	SPECIFICATIONS	Q'TY	STOCK NO.	REMARKS
U1	FM Front End	FL-518U12	1	240017	
U2	IM-AS	NAIM-283	1	13819583	
U3	ES-AS	NAES-284	1	13819584	
U4	AF-AS	NAAF-285	1	13819585	
U5	DP-AS	NADP-286	1	13819586	
U6	PS-AS	NAPS-287	1	13819587	
Q507,508,607,608	Transistor	2SD370 (O)	4	2200123	
PL801	Pilot Lamp	6.3V 0.05AW-3 (UL)	1	210015A	Stereo Indicator
PL802~807	Pilot Lamp	6.3V 0.05AW-3 (UL)	6	210015	Mode, Pointer
PL808~813	Pilot Lamp	6.3V 0.25A (UL)	6	210012	Dial, Indicator
T901	Transformer-Power	NPT-578D (UL)	1	230105	
T001	Transformer-Balloon	NBLN-1	1	233026	
L001	Coil-Antenna	NMA-2501	1	232011A	
C901	Capacitor-Polyester (UL)	UL200V 103M (UL)	1	3504012	
C903,904	Capacitor-Electrolytic	CE62W50V8200S-R	2	3504061	
C905	Capacitor-Electrolytic	CE02W25V220B	1	351752211	
R801~802	Resistor-Metal Oxide Film	RS1WBK330	2	441623315	
S808	Switch-Rotary	NRS-337-30Y-AP (UL)	1	25030042	Speaker
S809,810	Switch-Slide	NSS-2228	2	25065019	Audible, Pre-Main Sep
P801,802	Jack-Pin	NTM-2WPBLE1	2	250170	Phono 1, 2
P803	Jack-Pin	NTM-6WPBLE1	1	250171	Aux, Rec 1 & Play 1
P804,805	Jack-Pin	NTM-4WPBLE1	2	250169	Rec 2 & Play 2, Pre Out & Main In
P806	Jack-Pin	NTM-1PBL1-H1	1	250141	4Ch Out
P807	Socket-DIN	S-13312	1	250008	
P808	Jack-Microphone	HJ-631S-H-2	1	250051	
P810	Terminal	NTM-5WPUN1	1	250257	Antenna
P811	Terminal	NTM-12WPUN1	1	25060007	Speakers
P812	Jack-Stereo Headphone	XG-7716	1	250078	
P901,902	Socket-AC	S-16432 (UL)	2	25050008	
W901	Power Supply Cord	AS-UC (UL)	1	253072	
F901	Fuse	4A (ST-2) (UL)	1	252038	
F901a	Holder-Fuse	S-N1301	1	250080	
M101	Tuning Indicator	NIND-0500S-29	1	243020-2	Strength
M102	Tuning Indicator	NIND-0250S-30	1	243021-2	Tuning
Q507a,508a, 607a,608a	Socket-Transistor	M1614	4	250249	
PL808a~813a	Socket-Pilot Lamp	PLS-G1	6	213002	

CHASSIS & CABINET

A006	Dial Drum (250mm)		1	270760	
A012	Holder		2	27190002	Switch Nut
A014	E Ring	E-5	4	893050	
A304	Dial Plate		1	28130014	
A034	Back Plate		1	28130015	
A035	F Film		1	28140016A	for Dial Pointer
A044	Drive Shaft AS		1	270268A	
A050	Pointer		1	270535	
A051	Pointer Case		1	270172-2	
A053	Pointer Slider AS		1	270173	
A065	Back Panel		1	27120018	
A066	Cover Transistor		1	27130038	
A068	Holder-Antenna		1	270204	
A069	Stay-Antenna		1	270205	
A070	Bracket-Antenna		1	270206	
A071	Screw-Antenna		1	801112	
A301	Amp. Box AS		1	28110021	
	Front Panel AS		1		
A501	Front Panel		(1)	27210010	

PARTS NO.	DESCRIPTION	SPECIFICATIONS	Q'TY	STOCK NO.	REMARKS
A502	End Cap		(2)	280319	
A503	Joiner L		(2)	280352-1	
A504	Joiner B		(2)	280499	
A507	Dial Frame		(1)	280322-1	
A512	Clear Plate		(1)	28130016	
A515	Guider-Knob		(2)	280502A	
A631	Bottom Cover		1	27170003	
A801	Knob-Tuning		1	283051	
A802	Knob-Speaker		3	283056	
A803	Knob-Volume		2	283050	
A804	Knob-Bass S		2	283053	
A805	Knob-Bass L		2	283054-3	
A806	Knob-Push		5	283123	

PRINTED MATTER & PACKING

A851	Master Carton Box		1	29050011	
A852	Pad		1	29090067A	
A856	Sheet		1	290008	
A871	Instruction Booklet		1	29340071	
A872	Warranty Card		1	293036	
A873	Caution Label		1	293041	
A876	Connection Card		1	29340072	
A877	W Caution Label		1	293078	
A878	Caution Label A		1	282969	
A901	Silicon Cloth		1	292017-2	
A902	FM Antenna	5059-01	1	292064	
A903	Shorted Pin Plug	PO 107	4	250153	
A904	Pin Plug R (Red)	SQ-4151	1	250091	
A905	Pin Plug L (White)	SQ-4152	1	250092	
A906	Fuse	4A (ST-2) UL	1	252038	

IM-AS NAIM-283

Q101,102,104, 106~109	Transistor	2SC380 (O)	7	2210123	
Q105,202,704, 706~708	Transistor	2SC733 (GR)	6	2210085	
Q705	Transistor	2SC733 (BL)	1	2210086	
Q203,204	Transistor	2SC1681 (GR)	2	2210675	
Q701	Transistor	2SK30 (Y)	1	2210274	
Q702,703	Transistor	2SA726 (F)	2	2210416	
D101~104,107~110, 113,117~120, 702~705	Diode-Germanium	1N60 FM	17	2231031	
D105,106,111,112, 701	Diode-Silicon	1S1555	5	223105	
Q103	I.C.	TA-7061AP	1	222402	
Q201	I.C.	HA-1156	1	222419	
L101~103	Coil-Choke	NCCH-1504	3	233040	
L104	Transformer-I.F.	NIT-0508P	1	233057	FM Det
L105	Transformer-I.F.	NIT-0508S	1	233058	FM Det
L107	Transformer-I.F.	NIT-5501D	1	232012	AM Det
L106	Coil-OSC	NMO-2503	1	232013	
L201	Coil-MPX	NMC-8-7	1	233032	Low Pass Filter
L701	Coil-MPX	NMC-4-11	1	233018	
L702	Coil-MPX	NMC-9-1	1	233031	
R201,224,709	Resistor-Semi Fixed	RHK10KB3M	3	5225015	
R205	Resistor Metal Oxide	RS2WBK180	1	441721815	
R716	Resistor-Semi Fixed	RHK100KB3M	1	5225016	
	Ceramic Filter	SFE-10.7MA	3	3010003	
	Ceramic Filter	CFZ-455C	1	3010004	

PARTS NO.	DESCRIPTION	SPECIFICATIONS	Q'TY	STOCK NO.	REMARKS
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ES-AS NAES-284

Q301,401	Transistor	2SA841 (GR)	2	2210665	
Q302,402	Transistor	2SC1000 (GR)	2	2210285	
Q303,403	Transistor	2SC853 (L)	2	2210291	
D301,401	Diode-Silicon	1S1554	2	223106	
C301,401	Capacitor Electrolytic	LR04B25V2.2S	2	392650221	
C414	Capacitor Electrolytic	LR04B25V10S	1	392651001	
C217,218	Capacitor Electrolytic	LR04B50V1S	2	392680101	
S801	Switch-Rotary	NRS-186-25V-A	1	25030041	Selector
S802	Switch-Rotary	NRS-165-25ZV-A	1	25030040	Tape Monitor

AF-AS NAAF-285

Q551,561	Transistor	2SA841 (GR)	2	2210665	
Q552,553,652,653	Transistor	2SC1000 (GR)	4	2210285	
R557,657	Resistor-Variable	N24RGP500KMN30	1	5172039	Balance
R558,658	Resistor-Variable	N24RGP250KBT30	1	5172038	Volume
R573,574,673,674	Resistor-Variable	N24RDL100KB30.20H	2	5104007	Treble, Bass
S803~807	Switch-Push	NPS-122LA3	5	250184-1	Muting, Mode, Loudness, High Filter, Low Filter

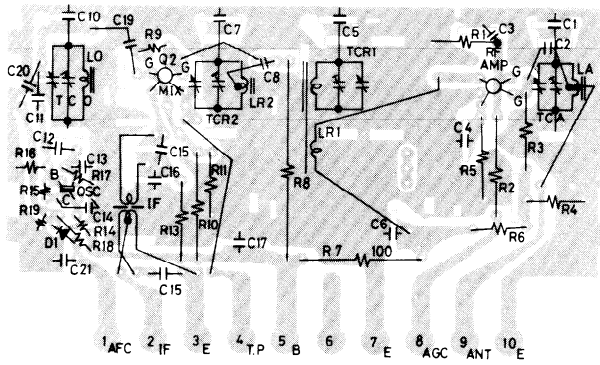
DP-AS NADP-286

Q501,502,601,602	Transistor	2SC1681 (O-1)	4	2210670	
		2SC1000 (O-1) ^{or}	4	2210280	
Q503,603,506,606	Transistor	2SA706 (42)	2	2200033	
Q504,604	Transistor	2SC945T (P)	2	2210353	
Q505,605,755	Transistor	2AC1124 (2)	3	2200016	
Q751,752	Transistor	2SA561 (GR)	2	2210075	
Q753,754	Transistor	2SC734 (GR)	2	2210065	
D501,601,751~754	Diode-Silicon	1S1554	6	223106	
D590	Diode-Zener	WZ-177	1	223920	
D756	Diode-Zener	WZ-061	1	223928	
D757	Diode-Silicon	WZ-240	1	223916	
L501,601	Coil-S	S-1.3B	2	231001	
R509,609	Resistor-Semi Fixed	RHK2.2KB	2	5225005	
R513,613	Resistor-Metal Oxide	RS1WBK3.3K	2	441623325	
R522,523,622,623	Resistor-Metal Oxide	RNU2WCK2.7	4	451731005	
R525,625	Resistor-Metal Oxide	RNU1WCK6.8	2	451630685	
R764	Resistor-Metal Oxide	RS1WBK270	1	441622715	
R765	Resistor-Metal Oxide	RS1WBK150	1	441621515	
R527,528,627,628	Resistor-Cement	RSS5WK0.47	4	48114794	
R512,612	Thermistor	D-22A	2	4000003	
RL751	Relay	NRL2P5A-DC24	1	25065015	

PA-AS NAPS-287

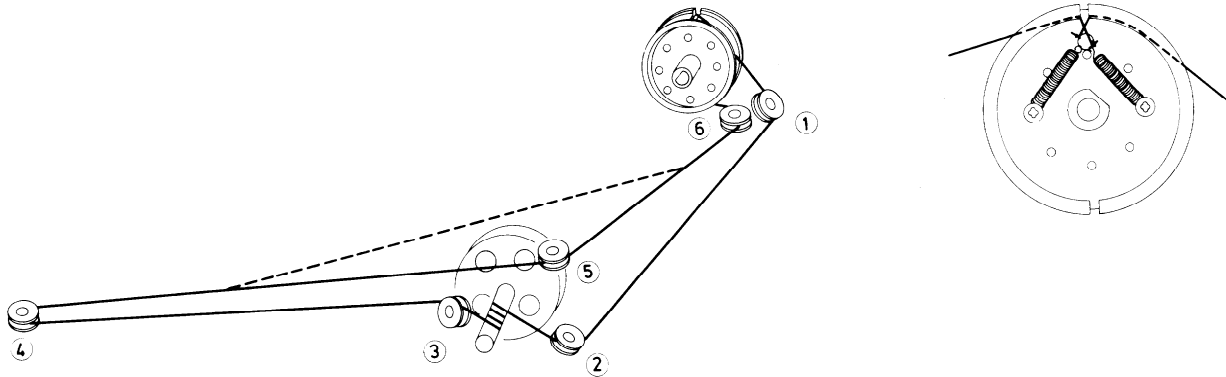
Q951,952	Transistor	2SD234 (O)	2	2200113	
Q955	Transistor	2SD234 (Y)	1	2200020	
Q953	Transistor	2SC734 (Y)	1	2210064	
Q954	Transistor	2SA561 (Y)	1	2210074	
D951~954	Diode-Silicon	SR3AM-6B	4	223815	
D955,956	Diode-Silicon	10D1	2	223801	
D957	Diode-Silicon	1S1554	1	223106	
D959	Diode-Zener	WZ-240	1	223916	
D960	Diode-Zener	WZ-130	1	223924	
R951,952	Resistor-Metal Oxide	RS2WBK220	2	441722215	
F902	Fuse	5A-T	1	252020	
	Holder-Fuse	SN5051	2	250113	

CIRCUIT BOARD-COMPONENT LOCATION



FM FRONT END (FL-518U12)

DIAL CORD ARRANGEMENT



PACKING PROCEDURE

