

SERVICE MANUAL

HF AUTOMATIC ANTENNA TUNER

AT-141

SECTION	1	SPECIFICATIONS	
SECTION	2	INSIDE VIEWS	
SECTION	3	CIRCUIT DESCRIPITON	
	3-1	RECEIVER CIRCUITS	B-3-1
	3-2	TRNSMITTER CIRCUITS	B-3-1
	3-3	POWER SUPPLY CIRCUITS	B-3-1
	3-4	OTHER CIRCUITS	B-3-2
SECTION	4	ADJUSTMENT PROCEDURES	
SECTION	5	PARTS LIST	
SECTION	6	MECHANICAL PARTS AND DISASSEMBLY	
SECTION	7	SEMI-CONDUCTOR INFORMATION	
SECTION	8	BOARD LAYOUT	
SECTION	9	BLOCK DIAGRAM	
SECTION	10	VOLTAGE DIAGRAM	

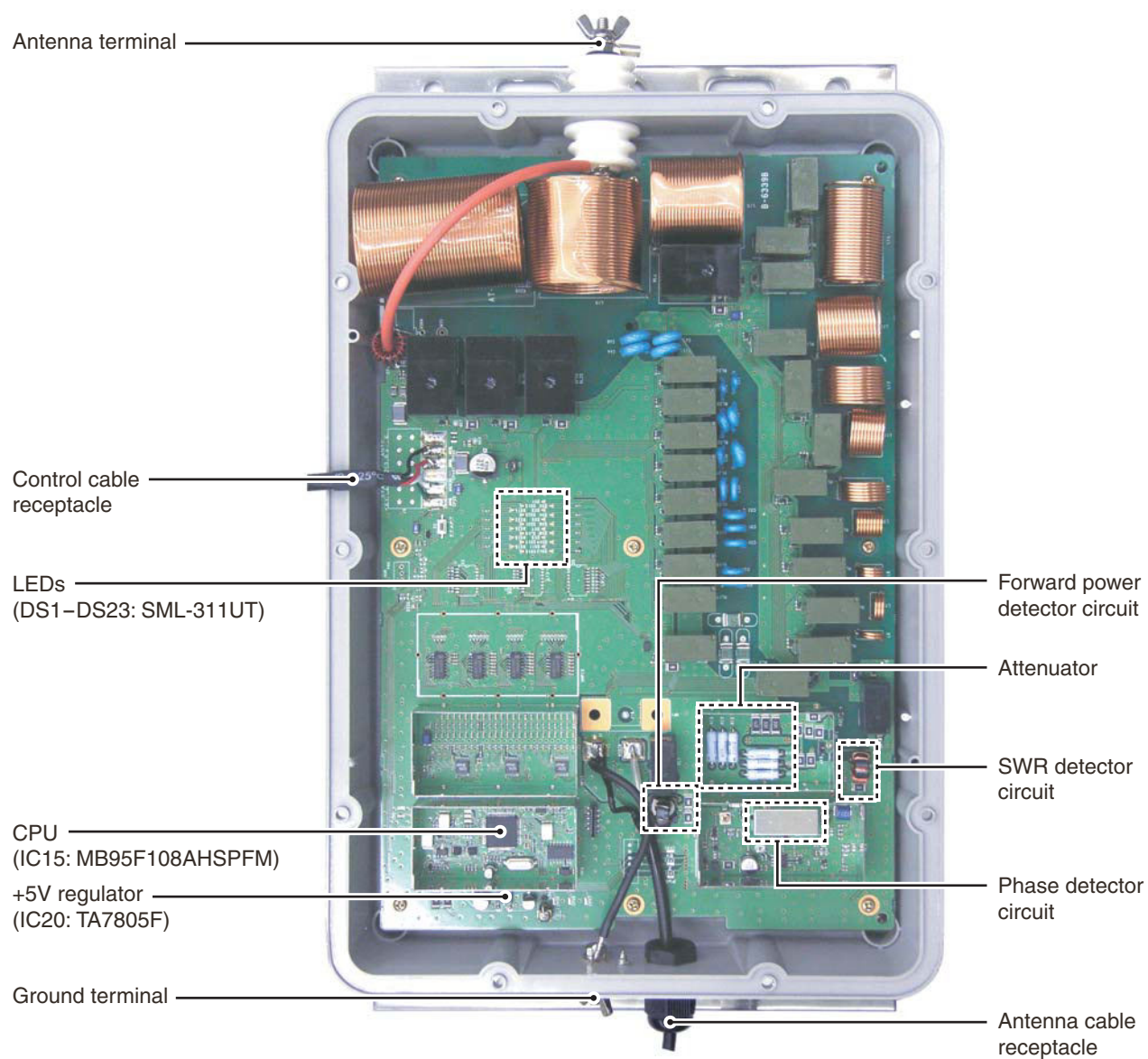
SECTION 1 SPECIFICATIONS

■ GENERAL

- Number of memory channels : 45
- Frequency coverage : 1.6–30 MHz with a 7 m or longer antenna element
- Maximum input power : 150 W PEP
100 W continuous
- Input impedance : 50 Ω
- Minimum operating input power : 5–15 W
- Automatic tuning time : Approx. 2 to 3 sec. (max. 15 sec.)
- Tuning accuracy (VSWR) : Better than 2.0 : 1
(after tuning; except for multiples of $\frac{1}{2} \lambda$)
- Power supply requirement : 13.6 V DC $\pm$ 15% (supplied from the transceiver)
- Driving current : Less than 2 A
- Usable temperature range : -30°C to $+60^{\circ}\text{C}$
- Dimensions (projections not included) : 230(W) $\times$ 80(H) $\times$ 340(D) mm
- Case construction : Weatherproof
- Weight : Approx. 2.5 kg

All stated specifications are subject to change without notice or obligation.

SECTION 2 INSIDE VIEWS



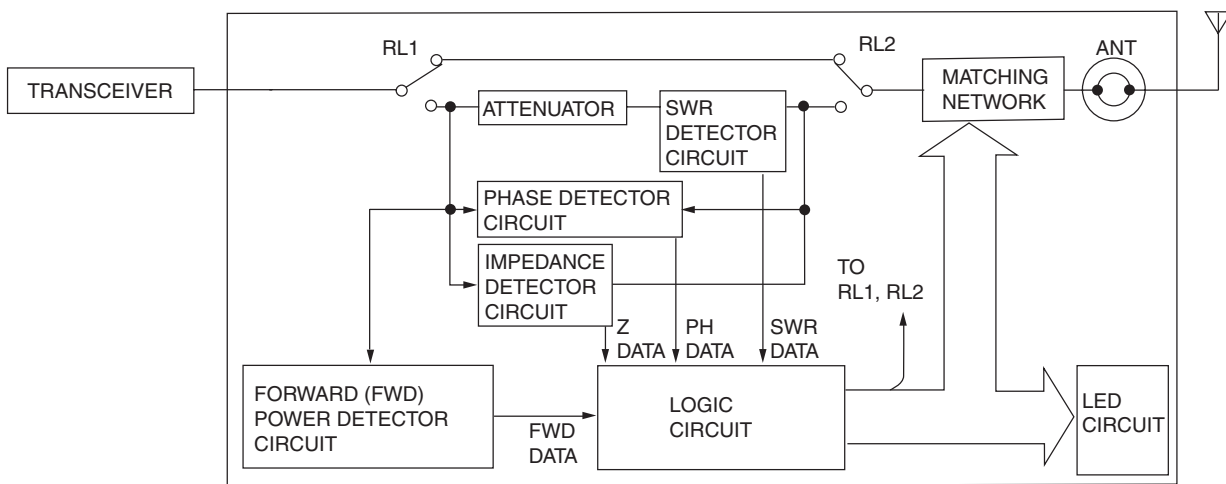
SECTION 3 CIRCUIT DESCRIPTION

3-1 GENERAL

An 8-bit microprocessor controls the AT-141. The antenna tuner matches the antenna system to the transceiver by using four kinds of detector circuits.

- (1) FORWARD POWER DETECTOR
- (2) SWR DETECTOR
- (3) PHASE DETECTOR
- (4) IMPEDANCE DETECTOR

Detailed descriptions for each circuit as follows.



3-2 FORWARD (FWD) POWER DETECTOR CIRCUIT

This circuit ensures the input power from the transceiver is low enough to be handled by the attenuator within the tuner.

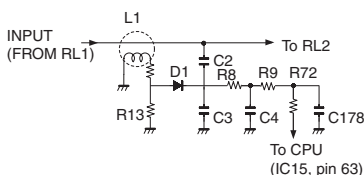
The RF power from the connected transceiver is detected at the power detector (L1) and then converted into a DC voltage. The converted voltage is applied to the CPU (IC15, pin 62) and then analyzed input RF power.

3-3 SWR DETECTOR CIRCUIT

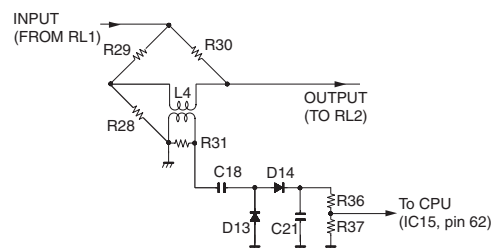
The SWR detector detects the reflected signal from the antenna system.

The reflected signal is detected at the SWR detector (L4) and then converted into DC voltage at D13, D14. The converted voltage is applied to the CPU (IC15, pin 62) and the CPU controls the setting of the coils and capacitors in the matching network.

• FORWARD POWER DETECTOR CIRCUIT



• SWR DETECTOR CIRCUIT

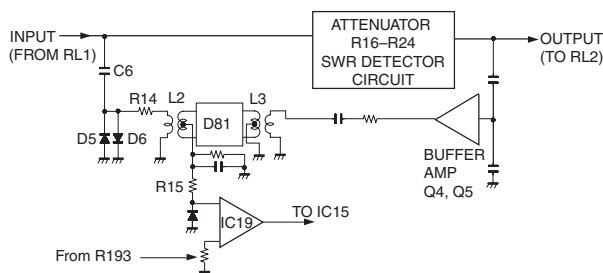


3-4 PHASE DETECTOR CIRCUIT

The phase detector consists of L2, L3 and D81. The phase detector's purpose is to detect reactance components and provide a pure resistance.

The output of D81 is a reference voltage of approximately 0 V when the load of L3 is a pure resistance with no reactance. An inductive load produces an output voltage from D81 which is lower than the reference voltage, whereas, a capacitive load produces an output voltage higher than the reference voltage. The output voltage from the phase detector is applied to the comparator (IC19b) and then applied to the CPU (IC15, pin 23).

• PHASE DETECTOR CIRCUIT



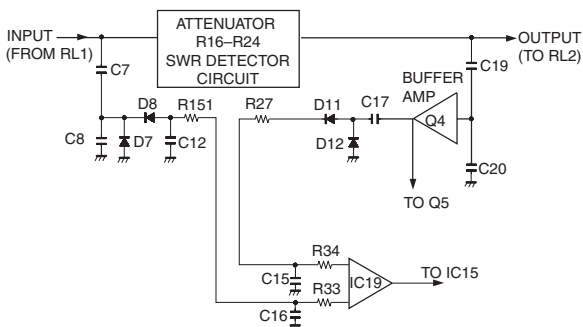
3-5 IMPEDANCE DETECTOR CIRCUIT

The tuner uses an attenuator to reduce the transmit power to a very low level. The low power minimizes the risk of interference to other stations while matching an antenna to the transmitter.

The VSWR at the input terminal is usually close to 1:1 even with a large change of impedance at the attenuator output due to the 16 dB of isolation between the input and the matching network.

The circuit uses the constant voltage at D7 and D8 as a reference. If the impedance of the attenuator output is higher than 50 Ω , the detected voltage by D11 and D12 is high. If the impedance is lower than 50 Ω , the voltage is low. Both the reference and detected voltages are applied to the comparator (IC19a). The output voltage from the comparator is applied to the CPU (IC15, pin 24)

• IMPEDANCE DETECTOR CIRCUIT



3-6 LOGIC CIRCUIT

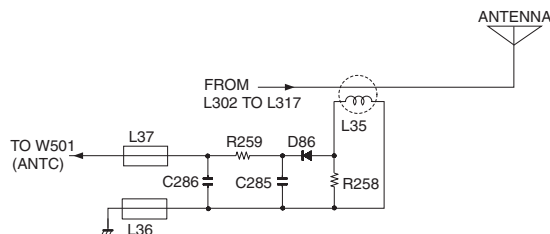
The CPU (IC15) controls the antenna matching network. The CPU receives +5V through IC20 when DC power is applied to the tuner. This voltage initializes the CPU and then the CPU sets each relay to the initial condition.

The tuning program begins only if the START line is at LOW level. RL1 and RL2 activate when RF power is applied to the tuner from the transceiver.

3-8 ANTENNA CURRENT DETECTOR CIRCUIT

Antenna current detected at antenna current detector (L35). The detected voltage is converted into a DC voltage at D86 and then applied to the ANTC line after passed through the low-pass filter (L36, C286).

• ANTENNA CURRENT DETECTOR CIRCUIT



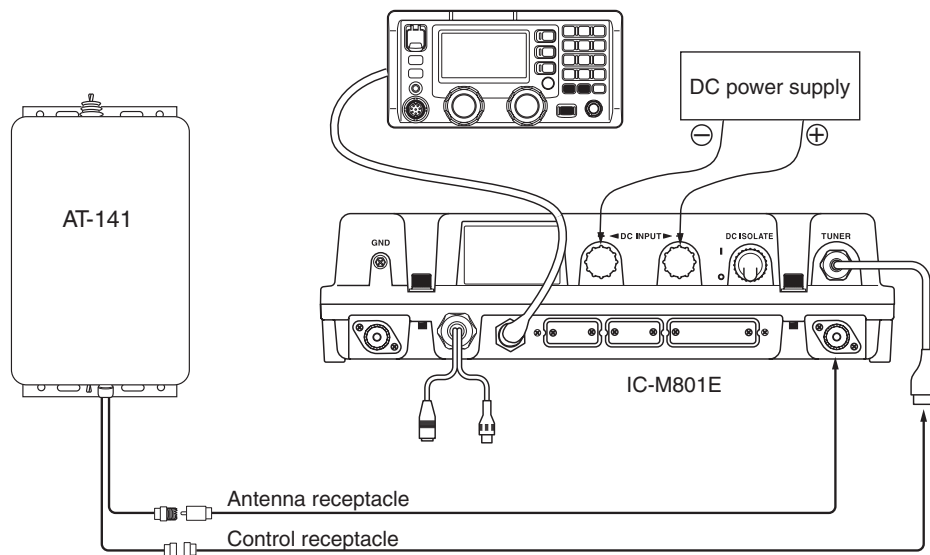
SECTION 4 ADJUSTMENT PROCEDURES

4-1 PREPARATION

■ REQUIRED TEST EQUIPMENT

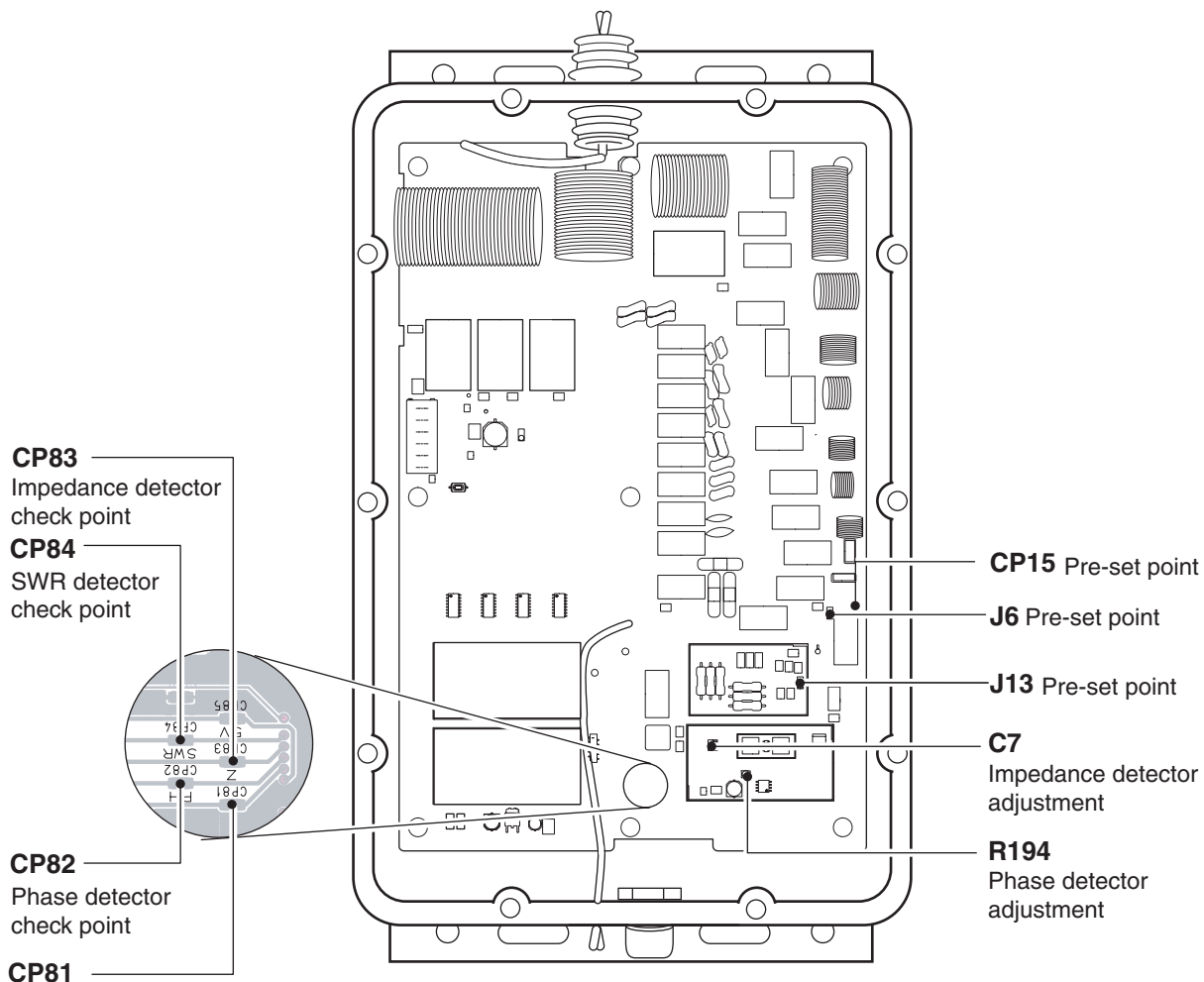
EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : Depended on connected transceiver Current capacity : Depended on connected transceiver
Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–10 V

• CONNECTION



4-2 TUNER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT	
			UNIT	LOCATION		UNIT	ADJUST
PREPARA-TION	1	• Disconnect short pin (P6) from J6 • Connect the disconnected short pin (P6) to J13. • Connect a wire between CP15 and ground. • TRANSCEIVER Display frequency : 1.6000 MHz Output power : 10 W (Carrier only)					
FORWARD DETECTOR CIRCUIT	2	• Transmit the transceiver.	TUNER	Connect a voltme-ter to CP81.	1.4 – 2.4 V	TUNER	Verify
SWR DE-TECTOR CIRCUIT	3	• Transmit the transceiver.		Connect a voltme-ter to CP84.	0 – 0.1 V		Verify
PHASE DETECTOR CIRCUIT	4	• Transmit the transceiver.		Connect an oscil-loscope to CP81.	5 V (Set R194 at the point where the voltage just before drops to 0 V.)		R194
IMPEDANCE DETECTOR CIRCUIT	5	• Transmit the transceiver.		Connect an oscil-loscope to CP83.	5 V (Set C7 at the point where the voltage just before drops to 0 V.)		C7
NOTE: • After the adjustment, remove the jumper wire between CP15 and ground. • After the adjustment, disconnect short pin (P6) from J13. • After the adjustment, connect the disconnected short pin (P6) to J6. • While the adjustment the transmitting time as short as possible.							



SECTION 5 PARTS LIST

[TUNER-1 UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
IC2	1130007570	S.IC BU4094BCFV-E2	T	64.3/127.9
IC3	1130007570	S.IC BU4094BCFV-E2	T	64.3/147.1
IC4	1130007570	S.IC BU4094BCFV-E2	T	64.3/166.2
IC5	1130008411	S.IC TC74A393F (EL, F)	T	30.6/128.3
IC6	1130007111	S.IC TC7W04FU (TE12L, F)	T	31.3/162.1
IC7	1110005791	S.IC S-80841CLUA-B62T2G	T	30.9/174
IC11	1160000120	S.IC μPA2004GR-E2	T	104/130
IC12	1160000120	S.IC μPA2004GR-E2	T	104/145.4
IC13	1160000120	S.IC μPA2004GR-E2	T	104/160.1
IC14	1160000120	S.IC μPA2004GR-E2	T	104/174.9
IC15	1140013390	S.IC MB95F108AHSFPM-GE1	T	38.9/151
IC17	1130013080	S.IC S-24CS08AFT-TB-1	T	47.8/135.8
IC18	1130007261	S.IC TC7W74FU (TE12, F)	T	31.3/168.2
IC19	1110001591	S.IC TA75393FG (EL)	T	27.4/43.5
IC20	1180001071	S.IC TA7805F (TE16L, Q)	T	13.4/150
Q2	1530002691	S.TR 2SC4116-GR (TE85R, F)	T	32.5/68.5
Q3	1590000430	S.TR DTC144EUA T106	T	27.2/27.2
Q4	1530002691	S.TR 2SC4116-GR (TE85R, F)	T	46.7/25.2
Q5	1530002691	S.TR 2SC4116-GR (TE85R, F)	T	43.5/25.2
Q7	1510000771	S.TR 2SA1586-GR (TE85R, F)	T	25/178.6
Q8	1530002691	S.TR 2SC4116-GR (TE85R, F)	T	37.6/175.1
Q11	1530002691	S.TR 2SC4116-GR (TE85R, F)	T	48.7/127.1
D1	1750000950	S.DIO MA732 (TX)	T	41.1/91
D2	1790000450	S.DIO MA862 (TX)	T	38.8/69.1
D5	1790000491	S.DIO HSM88ASTR-E	T	46/58.3
D7	1750000950	S.DIO MA732 (TX)	T	37.7/62.7
D8	1750000950	S.DIO MA732 (TX)	T	39.6/62.7
D9	1750000271	S.DIO 1SS301 (TE85R, F)	T	27.5/36.3
D11	1750000950	S.DIO MA732 (TX)	T	30.9/26.1
D12	1750000950	S.DIO MA732 (TX)	T	30.9/28
D13	1750000950	S.DIO MA732 (TX)	T	33.4/18.8
D14	1750000950	S.DIO MA732 (TX)	T	31.5/18.8
D16	1750000271	S.DIO 1SS301 (TE85R, F)	T	107.3/91.4
D17	1750000271	S.DIO 1SS301 (TE85R, F)	T	102/8.3
D22	1790001250	S.DIO MA2S111-(TX)	T	34.1/176.3
D52	1750000271	S.DIO 1SS301 (TE85R, F)	T	98.5/30.2
D53	1750000271	S.DIO 1SS301 (TE85R, F)	T	252.4/58.2
D54	1750000271	S.DIO 1SS301 (TE85R, F)	T	113/39.9
D55	1750000271	S.DIO 1SS301 (TE85R, F)	T	127.6/36.6
D56	1750000271	S.DIO 1SS301 (TE85R, F)	T	142.7/41.6
D57	1750000271	S.DIO 1SS301 (TE85R, F)	T	157.1/42.5
D58	1750000271	S.DIO 1SS301 (TE85R, F)	T	167.7/43.1
D59	1750000271	S.DIO 1SS301 (TE85R, F)	T	185/35.1
D60	1750000271	S.DIO 1SS301 (TE85R, F)	T	199.4/37.6
D61	1750000271	S.DIO 1SS301 (TE85R, F)	T	231.7/56.6
D62	1750000271	S.DIO 1SS301 (TE85R, F)	T	253.4/53.5
D63	1750000271	S.DIO 1SS301 (TE85R, F)	T	272.4/37
D64	1750000271	S.DIO 1SS301 (TE85R, F)	T	275/37
D65	1750000271	S.DIO 1SS301 (TE85R, F)	T	113/90
D66	1750000271	S.DIO 1SS301 (TE85R, F)	T	131.1/90.2
D67	1750000271	S.DIO 1SS301 (TE85R, F)	T	143.8/90.3
D68	1750000271	S.DIO 1SS301 (TE85R, F)	T	156.8/90.2
D69	1750000271	S.DIO 1SS301 (TE85R, F)	T	169.4/90.2
D70	1750000271	S.DIO 1SS301 (TE85R, F)	T	181.7/90.2
D71	1750000271	S.DIO 1SS301 (TE85R, F)	T	194/90.4
D72	1750000271	S.DIO 1SS301 (TE85R, F)	T	206.6/90.2
D73	1750000271	S.DIO 1SS301 (TE85R, F)	T	218.8/90.3
D74	1750000271	S.DIO 1SS301 (TE85R, F)	T	193.3/136.7
D75	1750000271	S.DIO 1SS301 (TE85R, F)	T	193.4/156.3
D76	1750000271	S.DIO 1SS301 (TE85R, F)	T	193.3/176.7
D77	1790000491	S.DIO HSM88ASTR-E	T	36.1/41.8
D78	1790001250	S.DIO MA2S111-(TX)	T	25/171.7
D79	1790001250	S.DIO MA2S111-(TX)	T	43.4/126.9
D80	1790000491	S.DIO HSM88ASTR-E	T	155/179.4
D81	1750000431	S.DIO HSB88WSTR-E	T	44.4/42.4
D85	1750000271	S.DIO 1SS301 (TE85R, F)	T	27.7/72.7
D86	1750000950	S.DIO MA732 (TX)	T	210.2/188.2
X1	6050009870	S.XTL CR-567 (9.8304 MHz)	T	26.6/143.7
L1	6140003490	COL LR-391		
L2	6140000930	COL LR-116		
L3	6140000930	COL LR-116		
L4	6140000070	COL LR-19		
L5	6200011630	S.COL NL565050T-222J-PF	T	47/20
L6	6110002750	COL LA-459		
L7	6110002760	COL LA-460		
L8	6110002770	COL LA-461		
L9	6110002780	COL LA-462		
L10	6110002790	COL LA-463		

[TUNER-1 UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
L11	6110002800	COL LA-464		
L12	6110002810	COL LA-465		
L13	6110002820	COL LA-466		
L14	6110002830	COL LA-467		
L15	6110002840	COL LA-468		
L16	6110002850	COL LA-469		
L17	6110002860	COL LA-470		
L18	6200003261	S.COL NLV32T-101J	T	23.1/126.2
L20	6200008820	S.COL HF70ACC 635050-T	T	196.8/190
L22	6200008820	S.COL HF70ACC 635050-T	T	177.7/166
L24	6200003261	S.COL NLV32T-101J	T	167.6/167.7
L25	6200003261	S.COL NLV32T-101J	T	157.6/184
L28	6200003261	S.COL NLV32T-101J	T	25.3/69
L31	6200011610	S.COL NLC453232T-100K-PF	T	238.8/60.8
L32	6200001831	S.COL NLV32T-100J	T	111.2/95
L33	6200011620	S.COL NLC453232T-470K-PF	T	75.3/179.8
L34	6200008820	S.COL HF70ACC 635050-T	T	10.3/134.7
L35	6140001550	COL LR-174		
L36	6200003950	S.COL HF50ACC 322513-T	T	205.3/192.3
L37	6200003950	S.COL HF50ACC 322513-T	T	205.4/188.8
R1	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	44.9/68.5
R2	7030007190	S.RES ERJ12YJ220U (22)	T	44.3/79.1
R3	7030007190	S.RES ERJ12YJ220U (22)	T	50.5/79.1
R8	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	40.6/95.1
R9	7030003590	S.RES ERJ3GEYJ 183 V (18 k)	T	36.9/72.1
R10	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	34.6/72.8
R11	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	36.1/47.7
R12	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	28.3/50.7
R13	7030006270	S.RES ERJ12YJ221U (220)	T	25.8/63.6
R14	7030003200	S.RES ERJ3GEYJ 100 V (10)	T	43.4/58.2
R15	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	36.1/44.9
R16	7070000731	RES ERG2SJ 331 (330)		
R17	7070000731	RES ERG2SJ 331 (330)		
R18	7070000721	RES ERG2SJ 271 (270)		
R19	7070000291	RES ERG2SJ 221 (220)		
R20	7070000291	RES ERG2SJ 221 (220)		
R21	7070000291	RES ERG2SJ 221 (220)		
R22	7030011300	S.RES ERJ1TY 331U (330)	T	80.8/45.6
R23	7030011300	S.RES ERJ1TY 331U (330)	T	80.8/49.4
R24	7030011310	S.RES ERJ1TY 271U (270)	T	80.8/53.2
R25	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	37.6/58.6
R26	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	33.2/38.4
R27	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	33.4/30.1
R28	7030006220	S.RES ERJ12YJ470U (47)	T	78.4/36.9
R29	7030006220	S.RES ERJ12YJ470U (47)	T	66.7/36.3
R30	7030006220	S.RES ERJ12YJ470U (47)	T	66.7/32.1
R31	7030006220	S.RES ERJ12YJ470U (47)	T	56.3/13.7
R32	7030003280	S.RES ERJ3GEYJ 470 V (47)	T	42.9/27.9
R33	7030003720	S.RES ERJ3GEYJ 224 V (220 k)	T	38/50.3
R34	7030003720	S.RES ERJ3GEYJ 224 V (220 k)	T	31.6/42.8
R35	7030003650	S.RES ERJ3GEYJ 563 V (56 k)	T	28.2/30.1
R36	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	27.5/19.9
R37	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	23.8/19.2
R38	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	37.7/28.5
R39	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	38/20.9
R40	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	39.5/20.9
R41	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	36.2/20.8
R42	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	38.5/26.1
R43	7030007990	S.RES ERJ12YJ820U (82)	T	78.1/32.8
R44	7030003360	S.RES ERJ3GEYJ 221 V (220)	T	41.3/20.8
R45	7540000250	ABS SA05C 401N		
R46	7030007980	S.RES ERJ12YJ473U (47 k)	T	83.8/31
R51	7030007240	S.RES ERJ12YJ680U (68)	T	103.1/85
R52	7030007240	S.RES ERJ12YJ680U (68)	T	103.5/20.6
R53	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	34.5/68.8
R54	7030003370	S.RES ERJ3GEYJ 271 V (270)	T	29.2/67.1
R55	7030010610	S.RES ERJ1TYJ 470U (47)	T	12.5/176.4
R56	7030003600	S.RES ERJ3GEYJ 223 V (22 k)	T	151.6/180.6
R57	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	25.7/180.8
R58	7030003500	S.RES ERJ3GEYJ 332 V (3.3 k)	T	37.7/170
R59	7030003580	S.RES ERJ3GEYJ 153 V (15 k)	T	37.7/171.4
R66	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	25/174.9
R67	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	25.4/126.3
R71	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	24.4/163.8
R72	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	24.4/162.4
R73	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	33.7/138.9
R74	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	33.7/137.6
R76	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	48/129.6
R77	7030003720	S.RES ERJ3GEYJ 224 V (220 k)	T	46.4/129.6
R78	7030005631	S.RES ERA3YKD 154V (150 k)	T	44.9/126.9
R84	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/174
R85	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/171.7
R86	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/169.4
R87	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/167.1

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

[TUNER-1 UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R88	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/164.8
R89	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/162.5
R90	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/160.2
R92	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/157.9
R93	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/155.6
R94	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/153.3
R95	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/151
R96	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/148.7
R97	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/146.4
R98	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/144.1
R99	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/141.8
R101	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/139.5
R102	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/137.2
R103	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/134.9
R104	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/132.6
R105	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/130.3
R106	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/128
R107	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/125.7
R108	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/123.4
R109	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	105/34.4
R110	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	119.9/33
R111	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	134.9/38
R112	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	149.9/39
R113	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	167.6/41
R114	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	182.2/33.8
R115	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	199.3/34
R116	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	234.2/53
R117	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	258.7/49.1
R118	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	274.8/31.7
R119	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	262.6/32.7
R120	7030010620	S.RES ERJ12YJ180U (18)	T	192.5/130.3
R121	7030010620	S.RES ERJ12YJ180U (18)	T	192.5/149.9
R122	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	98.5/32.4
R123	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	105.7/87.8
R124	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	126.4/89.6
R125	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	138.9/89.6
R126	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	151.4/89.6
R127	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	163.9/89.6
R128	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	176.4/89.6
R129	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	188.9/89.6
R130	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	201.5/89.6
R131	7030003240	S.RES ERJ3GEYJ 220 V (22)	T	213.5/89.8
R132	7030010620	S.RES ERJ12YJ180U (18)	T	241/66.8
R133	7030010620	S.RES ERJ12YJ180U (18)	T	192.5/162.1
R149	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	80.2/176.3
R150	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	24.5/51
R151	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	39.6/59.4
R156	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	133.3/183.1
R157	7030005521	S.RES ERA3YKD 334V (330 k)	T	34.9/174
R159	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	67.2/159.5
R160	7030003400	S.RES ERJ3GEYJ 471 V (470)	T	69.2/159.1
R162	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	31.3/165.8
R163	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	38.4/124.4
R167	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	167.7/125.9
R168	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	165.9/121.3
R169	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	164.3/125.7
R170	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	162.4/121.3
R171	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	160.7/125.8
R172	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	158.9/121.3
R173	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	157/125.9
R174	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	155.4/121.3
R175	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	153.7/125.8
R176	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	151.9/121.4
R177	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	150.2/125.8
R178	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	148.4/121.4
R179	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	167/152.4
R180	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	164/156.3
R181	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	148.4/152.4
R182	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	150.2/156.3
R183	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	151.9/152.5
R184	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	153.6/156.3
R185	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	155.3/152.5
R186	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	157.1/156.3
R187	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	158.9/152.5
R188	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	160.6/156.3
R189	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	162.5/152.5
R190	7030006070	S.RES ERJ12YJ101U (100)	T	77.6/28.9
R191	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	26.4/33
R192	7030003550	S.RES ERJ3GEYJ 822 V (8.2 k)	T	29.6/36.3
R193	7030003740	S.RES ERJ3GEYJ 334 V (330 k)	T	28.3/49.2
R194	7310005020	S.TRI RH03ADC14X (10 k)	T	32.5/51.0
R195	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	24.7/71.9
R196	7030003530	S.RES ERJ3GEYJ 562 V (5.6 k)	T	30.8/71.9
R198	7030003650	S.RES ERJ3GEYJ 563 V (56 k)	T	131.6/189.4
R200	7030003680	S.RES ERJ3GEYJ 104 V (100 k)	T	24.9/173.3
R201	7030003440	S.RES ERJ3GEYJ 102 V (1 k)	T	33.7/135.1
R202	7030003720	S.RES ERJ3GEYJ 224 V (220 k)	T	46.4/126.9
R203	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	25/176.3
R204	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	23.1/178.5
R205	7410000352	ARY RGLD3X104J		
R206	7410000352	ARY RGLD3X104J		
R207	7410000352	ARY RGLD3X104J		

[TUNER-1 UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R208	7410000352	ARY RGLD3X104J		
R209	7410000352	ARY RGLD3X104J		
R210	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/123.4
R211	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/125.7
R212	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/128
R213	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/130.3
R214	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/132.6
R215	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/134.9
R216	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/137.2
R217	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/139.5
R218	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/162.5
R219	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/160.2
R220	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/164.8
R221	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/167.1
R222	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/169.4
R223	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/171.7
R224	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/174
R225	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/141.8
R226	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/144.1
R227	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/146.4
R228	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/148.7
R229	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/151
R230	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/153.3
R231	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/155.6
R232	7030003480	S.RES ERJ3GEYJ 222 V (2.2 k)	T	72/157.9
R235	7030005521	S.RES ERA3YKD 334V (330 k)	T	44.9/129.6
R236	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	47.8/140.5
R237	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	47.8/142
R238	7030003520	S.RES ERJ3GEYJ 472 V (4.7 k)	T	47.7/144.6
R239	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	39.8/124.4
R240	7030003560	S.RES ERJ3GEYJ 103 V (10 k)	T	27.9/151.3
R242	7030003860	S.RES ERJ3GE JPW V	T	27.9/155.2
R243	7030003860	S.RES ERJ3GE JPW V	T	27.9/153.9
R244	7030003860	S.RES ERJ3GE JPW V	T	27.9/152.6
R248	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	40.5/165.5
R249	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	40.5/162.9
R250	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	40.5/164.2
R251	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	47.7/157.5
R252	7030003640	S.RES ERJ3GEYJ 473 V (47 k)	T	34.7/162.4
R253	7030007911	S.RES ERA3YKD 563V (56 k)	T	34.2/170.7
R255	7030010610	S.RES ERJ1TYJ 470U (47)	T	12.5/171.9
R256	7030003860	S.RES ERJ3GE JPW V	T	67.5/178.5
R257	7030003860	S.RES ERJ3GE JPW V	T	42.3/170
R258	7030010520	S.RES ERJ1TYJ 101U (100)	T	217.4/191.1
R259	7030003620	S.RES ERJ3GEYJ 333 V (33 k)	T	209.3/190.3
R262	7030010520	S.RES ERJ1TYJ 101U (100)	T	213.7/191.1
R263	7030010520	S.RES ERJ1TYJ 101U (100)	T	221.1/191.1
C1	4030006880	S.CER C1608 JB 1H 472K-T	T	42.2/68.5
C2	4030011120	S.CER GRM31M2C2H100JV01L	T	44.7/95.5
C3	4030007170	S.CER C1608 CH 1H 221J-T	T	40.6/93.7
C4	4030010760	S.CER C1608 CH 1H 331J-T	T	40.6/96.5
C6	4030011070	S.CER GRM31M2C2H5R0CY21L	T	49.3/60.9
C7	4610001160	S.TRI ECR-JA010 A11W	T	44.8/85.1
C8	4030007160	S.CER C1608 CH 1H 181J-T	T	39.5/65.1
C9	4510008690	S.ELE EEE1EA330SP	T	26.3/56
C10	4030006880	S.CER C1608 JB 1H 472K-T	T	24.4/49.2
C11	4030005110	S.CER C2012 JB 1E 473K-T	T	51.1/48.7
C12	4030010760	S.CER C1608 CH 1H 331J-T	T	37.6/60.3
C13	4030010760	S.CER C1608 CH 1H 331J-T	T	33.4/27.3
C14	4030005110	S.CER C2012 JB 1E 473K-T	T	47.1/27.9
C15	4030006880	S.CER C1608 JB 1H 472K-T	T	30.1/38.4
C16	4030006880	S.CER C1608 JB 1H 472K-T	T	37.6/57.2
C17	4030011600	S.CER C1608 JB 1E 104K-T	T	30.6/30.1
C18	4030005110	S.CER C2012 JB 1E 473K-T	T	32.5/15.8
C19	4030007010	S.CER C1608 CH 1H 100D-T	T	59.5/21.5
C20	4030008560	S.CER C1608 CH 1H 300J-T	T	59.5/19
C21	4030010760	S.CER C1608 CH 1H 331J-T	T	29.8/19.1
C22	4030006880	S.CER C1608 JB 1H 472K-T	T	24.9/27.1
C23	4030005110	S.CER C2012 JB 1E 473K-T	T	38.6/24.3
C24	4320001230	S.MIC UC552H 1201J-T	T	108.6/64.5
C25	4320001230	S.MIC UC552H 1201J-T	T	108.6/58
C26	4320001230	S.MIC UC552H 1201J-T	T	121.5/61.9
C28	4010008720	CER DEA1X3D271JA2B		
C29	4010008710	CER DEA1X3D331JA3B		
C30	4010008560	CER DEA1X3F151JA3B		
C31	4010008560	CER DEA1X3F151JA3B		
C32	4010008560	CER DEA1X3F151JA3B		
C34	4030006880	S.CER C1608 JB 1H 472K-T	T	100.7/30.2
C35	4010008560	CER DEA1X3F151JA3B		
C36	4010008560	CER DEA1X3F151JA3B		
C37	4010004790	CER DEC1X3J680JC4B		
C38	4010008680	CER DEA1X3F820JA3B		
C39	4010004770	CER DEC1X3J390JC4B		
C40	4010004770	CER DEC1X3J390JC4B		
C41	4010008730	CER DEA1X3F180JCDB		
C42	4010008730	CER DEA1X3F180JCDB		
C43	4030006880	S.CER C1608 JB 1H 472K-T	T	105/92.5
C44	4010004810	CER DEC1X3J101JC4B		
C45	4010004810	CER DEC1X3J101JC4B		
C46	4010004810	CER DEC1X3J101JC4B		

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

S.=Surface mount

[TUNER-1 UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
C47	4010004810	CER DEC1X3J101JC4B		
C48	4030006880	S.CER C1608 JB 1H 472K-T	T	99.9/8.2
C50	4030008960	S.CER C2012 JB 1C 104K-T	T	36.1/69
C53	4510008570	S.ELE EEE1CA220SR	T	11.6/140.4
C54	4030006880	S.CER C1608 JB 1H 472K-T	T	10.1/145.3
C55	4030006880	S.CER C1608 JB 1H 472K-T	T	9.7/154.5
C56	4510008520	S.ELE EEE1CA470SP	T	12.3/158.7
C58	4030006880	S.CER C1608 JB 1H 472K-T	T	185.3/165.3
C59	4030005110	S.CER C2012 JB 1E 473K-T	T	185.4/163.3
C60	4510008510	S.ELE EEE1CA471P	T	176.5/157.3
C62	4030006880	S.CER C1608 JB 1H 472K-T	T	151.5/182.5
C64	4030006880	S.CER C1608 JB 1H 472K-T	T	151.6/184
C65	4030006880	S.CER C1608 JB 1H 472K-T	T	37.7/172.8
C68	4030006880	S.CER C1608 JB 1H 472K-T	T	23.1/129.1
C73	4030006880	S.CER C1608 JB 1H 472K-T	T	26.9/178.5
C74	4030006880	S.CER C1608 JB 1H 472K-T	T	23.1/123.3
C75	4340000390	S.MLR ECWU1H224JC9	T	43.2/173.1
C76	4030006880	S.CER C1608 JB 1H 472K-T	T	36.5/140.7
C77	4030006880	S.CER C1608 JB 1H 472K-T	T	36.5/142
C78	4030006850	S.CER C1608 JB 1H 471K-T	T	24.4/161
C79	4030006850	S.CER C1608 JB 1H 471K-T	T	24.4/165.2
C81	4030006880	S.CER C1608 JB 1H 472K-T	T	27.9/157.8
C82	4510008540	S.ELE EEE1CA100SR	T	23.8/155.4
C84	4340000390	S.MLR ECWU1H224JC9	T	39.3/133.4
C85	4340000390	S.MLR ECWU1H224JC9	T	35.7/179.6
C86	4030006860	S.CER C1608 JB 1H 102K-T	T	48.6/125
C87	4030008560	S.CER C1608 CH 1H 300J-T	T	29.9/146.5
C88	4030008560	S.CER C1608 CH 1H 300J-T	T	29.9/143.4
C89	4030006880	S.CER C1608 JB 1H 472K-T	T	80.2/178.6
C91	4030006880	S.CER C1608 JB 1H 472K-T	T	67.6/150.9
C94	4030006880	S.CER C1608 JB 1H 472K-T	T	67.6/131.7
C98	4030006880	S.CER C1608 JB 1H 472K-T	T	110.8/40
C100	4030006880	S.CER C1608 JB 1H 472K-T	T	125.5/36.7
C102	4030006880	S.CER C1608 JB 1H 472K-T	T	140.5/41.6
C104	4030006880	S.CER C1608 JB 1H 472K-T	T	155/42.4
C106	4030006880	S.CER C1608 JB 1H 472K-T	T	167.6/45.1
C108	4030006880	S.CER C1608 JB 1H 472K-T	T	185.1/33.2
C110	4030006880	S.CER C1608 JB 1H 472K-T	T	199.3/35.5
C112	4030006880	S.CER C1608 JB 1H 472K-T	T	229.7/56.7
C114	4030006880	S.CER C1608 JB 1H 472K-T	T	251.5/53.5
C116	4030006880	S.CER C1608 JB 1H 472K-T	T	271.8/33.9
C118	4030006880	S.CER C1608 JB 1H 472K-T	T	275.6/33.9
C120	4030006880	S.CER C1608 JB 1H 472K-T	T	110.9/90.2
C122	4030006880	S.CER C1608 JB 1H 472K-T	T	129/90.3
C124	4030006880	S.CER C1608 JB 1H 472K-T	T	141.6/90.4
C126	4030006880	S.CER C1608 JB 1H 472K-T	T	154.8/90.3
C128	4030006880	S.CER C1608 JB 1H 472K-T	T	167.4/90.4
C130	4030006880	S.CER C1608 JB 1H 472K-T	T	179.7/90.3
C132	4030006880	S.CER C1608 JB 1H 472K-T	T	192/90.7
C134	4030006880	S.CER C1608 JB 1H 472K-T	T	204.3/90.3
C136	4030006880	S.CER C1608 JB 1H 472K-T	T	216.8/90.5
C147	4030006880	S.CER C1608 JB 1H 472K-T	T	193.4/134.5
C148	4030006880	S.CER C1608 JB 1H 472K-T	T	65.9/159.5
C150	4030006880	S.CER C1608 JB 1H 472K-T	T	250/58.3
C152	4030006880	S.CER C1608 JB 1H 472K-T	T	193.4/154.1
C153	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/176.3
C155	4030006880	S.CER C1608 JB 1H 472K-T	T	193.2/174.6
C162	4030011120	S.CER GRM31M2C2H100JV01L	T	74.1/5.8
C164	4030006880	S.CER C1608 JB 1H 472K-T	T	337/2.8
C165	4030006880	S.CER C1608 JB 1H 472K-T	T	25.4/19.2
C172	4030006880	S.CER C1608 JB 1H 472K-T	T	32.2/56.1
C173	4030006880	S.CER C1608 JB 1H 472K-T	T	24.6/38.4
C174	4030005110	S.CER C2012 JB 1E 473K-T	T	29.4/68.9
C176	4030006880	S.CER C1608 JB 1H 472K-T	T	173.4/170.7
C178	4030006880	S.CER C1608 JB 1H 472K-T	T	176.5/148.9
C179	4030006880	S.CER C1608 JB 1H 472K-T	T	102.7/27.5
C181	4030006880	S.CER C1608 JB 1H 472K-T	T	27/174
C182	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/123.4
C183	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/125.7
C184	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/128
C185	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/130.3
C186	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/132.6
C187	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/134.9
C188	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/137.2
C189	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/139.5
C190	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/160.2
C191	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/162.5
C192	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/164.8
C193	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/167.1
C194	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/169.4
C195	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/171.7
C196	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/174
C197	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/141.8
C198	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/144.1
C199	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/146.4
C200	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/148.7
C201	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/151
C202	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/153.3
C203	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/155.6
C204	4030006880	S.CER C1608 JB 1H 472K-T	T	76.6/157.9
C205	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/123.4
C206	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/125.7

[TUNER-1 UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
C207	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/128
C208	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/130.3
C209	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/132.6
C210	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/134.9
C211	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/137.2
C212	4030006880	S.CER C1608 JB 1H 472K-T	T	108.5/123.9
C213	4030006880	S.CER C1608 JB 1H 472K-T	T	107.2/123.9
C214	4030006880	S.CER C1608 JB 1H 472K-T	T	105.9/123.9
C215	4030006880	S.CER C1608 JB 1H 472K-T	T	104.6/123.9
C216	4030006880	S.CER C1608 JB 1H 472K-T	T	103.2/123.9
C217	4030006880	S.CER C1608 JB 1H 472K-T	T	101.9/123.9
C218	4030006880	S.CER C1608 JB 1H 472K-T	T	100.5/123.9
C219	4030006880	S.CER C1608 JB 1H 472K-T	T	108.5/139.3
C220	4030006880	S.CER C1608 JB 1H 472K-T	T	107.2/139.3
C221	4030006880	S.CER C1608 JB 1H 472K-T	T	105.9/139.3
C222	4030006880	S.CER C1608 JB 1H 472K-T	T	104.6/139.3
C223	4030006880	S.CER C1608 JB 1H 472K-T	T	103.3/139.3
C224	4030006880	S.CER C1608 JB 1H 472K-T	T	102/139.3
C225	4030006880	S.CER C1608 JB 1H 472K-T	T	100.7/139.3
C226	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/139.5
C227	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/141.8
C228	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/144.1
C229	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/146.4
C230	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/148.7
C231	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/151
C232	4030006880	S.CER C1608 JB 1H 472K-T	T	109.3/151.1
C256	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/164.8
C257	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/162.5
C258	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/160.2
C259	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/157.9
C260	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/155.6
C261	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/153.3
C262	4030006880	S.CER C1608 JB 1H 472K-T	T	104.6/168.8
C263	4030006880	S.CER C1608 JB 1H 472K-T	T	105.9/168.8
C264	4030006880	S.CER C1608 JB 1H 472K-T	T	107.2/168.8
C265	4030006880	S.CER C1608 JB 1H 472K-T	T	108.5/168.8
C266	4030006880	S.CER C1608 JB 1H 472K-T	T	100.7/154
C267	4030006880	S.CER C1608 JB 1H 472K-T	T	102/154
C268	4030006880	S.CER C1608 JB 1H 472K-T	T	103.3/154
C269	4030006880	S.CER C1608 JB 1H 472K-T	T	104.6/154
C270	4030006880	S.CER C1608 JB 1H 472K-T	T	105.9/153.9
C271	4030006880	S.CER C1608 JB 1H 472K-T	T	107.2/153.9
C272	4030006880	S.CER C1608 JB 1H 472K-T	T	108.5/153.9
C273	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/174
C274	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/171.7
C275	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/169.4
C276	4030006880	S.CER C1608 JB 1H 472K-T	T	83.8/167.1
C278	4030006880	S.CER C1608 JB 1H 472K-T	T	45/135.6
C279	4030011600	S.CER C1608 JB 1E 104K-T	T	33.2/142
C280	4030011600	S.CER C1608 JB 1E 104K-T	T	33.2/140.7
C281	4030011600	S.CER C1608 JB 1E 104K-T	T	127.1/183.5
C282	4030006880	S.CER C1608 JB 1H 472K-T	T	31.3/164.5
C283	4030006880	S.CER C1608 JB 1H 472K-T	T	31.3/170.7
C284	4030006880	S.CER C1608 JB 1H 472K-T	T	67.6/170
C285	4030011330	S.CER C1608 CH 1H 391J-T	T	210/192.3
C286	4030006880	S.CER C1608 JB 1H 472K-T	T	208.5/192.3
RL1	6330001070	RLY AJQ1341 B01		
RL2	6330001070	RLY AJQ1341 B01		
RL3	6330001060	RLY APQ 3311		
RL4	6330000570	RLY AR-39251		
RL5	6330001060	RLY APQ 3311		
RL6	6330001060	RLY APQ 3311		
RL7	6330001060	RLY APQ 3311		
RL8	6330001060	RLY APQ 3311		
RL9	6330001060	RLY APQ 3311		
RL10	6330001060	RLY APQ 3311		
RL11	6330001060	RLY APQ 3311		
RL12	6330001060	RLY APQ 3311		
RL13	6330001060	RLY APQ 3311		
RL14	6330001060	RLY APQ 3311		
RL15	6330001060	RLY APQ 3311		
RL16	6330001060	RLY APQ 3311		
RL17	6330001060	RLY APQ 3311		
RL18	6330001060	RLY APQ 3311		
RL19	6330001060	RLY APQ 3311		
RL20	6330001060	RLY APQ 3311		
RL21	6330001060	RLY APQ 3311		
RL22	6330001060	RLY APQ 3311		
RL23	6330001060	RLY APQ 3311		
RL24	6330001060	RLY APQ 3311		
RL25	6330000570	RLY AR-39251		
RL26	6330000570	RLY AR-39251		
RL27	6330000570	RLY AR-39251		
J4	6910003141	CNR IMSA-9202B-1-02Z041-PT1		
J6	6910003141	CNR IMSA-9202B-1-02Z041-PT1		
J13	6910003141	CNR IMSA-9202B-1-02Z041-PT1		
J16	6510003100	CNR RT01T-1.3B		
J19	6510022621	S.CNR 10FMN-MBTTT-A-TBT (LF) (SN)	T	43.5/115.6

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

S.=Surface mount

[TUNER-1 UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
P4	6910003120	CNR	IMSA-9206H-T		
P6	6910003120	CNR	IMSA-9206H-T		
DS1	5040002620	S.LED	SML-311UT T86	T	167.6/134.7
DS2	5040002620	S.LED	SML-311UT T86	T	165.9/131.5
DS3	5040002620	S.LED	SML-311UT T86	T	164.3/134.7
DS4	5040002620	S.LED	SML-311UT T86	T	162.4/131.5
DS5	5040002620	S.LED	SML-311UT T86	T	160.7/134.7
DS6	5040002620	S.LED	SML-311UT T86	T	158.9/131.5
DS7	5040002620	S.LED	SML-311UT T86	T	157/134.7
DS8	5040002620	S.LED	SML-311UT T86	T	155.4/131.5
DS9	5040002620	S.LED	SML-311UT T86	T	153.7/134.7
DS10	5040002620	S.LED	SML-311UT T86	T	151.9/131.5
DS11	5040002620	S.LED	SML-311UT T86	T	150.2/134.7
DS12	5040002620	S.LED	SML-311UT T86	T	148.4/131.6
DS13	5040002620	S.LED	SML-311UT T86	T	165.9/143
DS14	5040002620	S.LED	SML-311UT T86	T	164.3/146.9
DS15	5040002620	S.LED	SML-311UT T86	T	148.3/143
DS16	5040002620	S.LED	SML-311UT T86	T	150.1/146.9
DS17	5040002620	S.LED	SML-311UT T86	T	151.9/143
DS18	5040002620	S.LED	SML-311UT T86	T	153.6/146.9
DS19	5040002620	S.LED	SML-311UT T86	T	155.3/143
DS20	5040002620	S.LED	SML-311UT T86	T	157.1/146.9
DS21	5040002620	S.LED	SML-311UT T86	T	158.9/143
DS22	5040002620	S.LED	SML-311UT T86	T	160.6/146.9
DS23	5040002620	S.LED	SML-311UT T86	T	162.5/143
DS24	5040002620	S.LED	SML-311UT T86	T	127/185.1
S2	2260001890	S.SW	SKQDPA	T	154/172.9
W18	9011570360	WIR	35/00/110/W06/W06		
W61	9011570370	WIR	99/02/170/W06/W06UL3239		

[CHASS UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.	H/V LOCATION
W501	8900014990	CBL	OPC-1468		
W502	8900011400	CBL	OPC-1164		

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

SECTION 6 MECHANICAL PARTS AND DISASSEMBLY

[CHASSIS PARTS]

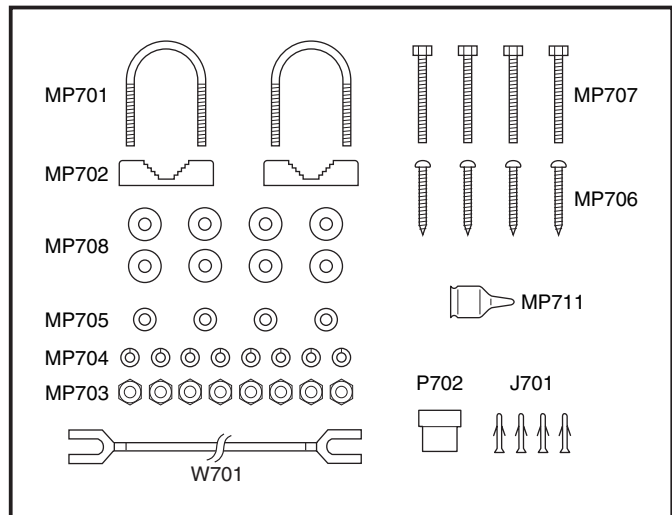
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
W501	8900011380	Cable OPC-1146	1
W502	8900011400	Cable OPC-1164	1
EP501	6910000880	Sheet NC-1 (SUS)	1
EP502	6910000880	Sheet NC-1 (SUS)	1
MP501	8310006540	High voltage waring seal	1
MP502	8010019030	1157 U-case	1
MP503	8010019020	1157 L-case	1
MP504	8930006900	Mounting plate	2
MP505	8930006540	Waterproof seal	1
MP506	8930002800	O ring (G)	2
MP507	8930006550	Sealing washer (A)	1
MP508	8930006560	Sealing washer (C)	1
MP509	8930006570	Sealing washer (D)	4
MP510	6910000470	Pair insulator	1
MP512	8310066500	Caution seal (P)	1
MP517	8810000620	Screw PH M3 × 13 SUS	1
MP518	8830000230	Nut M3 SUS	1
MP519	8810003480	Hex head bolt M5 × 60 SUS	1
MP520	8860000160	Earth lug B8 (M5) AG BS	1
MP521	8850000500	Spring washer M5 SUS	1
MP522	8850000180	Flat washer M5 SUS	1
MP523	8830000250	Nut M5 SUS	1
MP524	8860000190	Earth lug (M5) AG BS	1
MP525	8850000600	Gear Washer M5 SUS	1
MP526	8830000370	Wing nut M5 SUS	1
MP527	8810003470	Hex head bolt M5 × 20 SUS	1
MP528	8860000160	Earth lug B8 (M5) AG BS	1
MP529	8850000500	Spring washer M5 SUS	1
MP530	8850000180	Flat washer M5 SUS	1
MP531	8830000250	Nut M5 SUS	1
MP532	8860000190	Earth lug D5 (M5) AG BS	1
MP533	8850000600	Gear Washer M5 SUS	1
MP534	8830000370	Wing nut M5 SUS	1
MP535	8810002800	Screw PH M5 × 10 SUS	4
MP536	8810000660	Screw PH M4 × 14 SUS	10
MP537	8810001480	Screw PH A M5 × 10 SUS	2
MP538	8810001691	Screw PH B0 3 × 8 (PL)	9
MP539	8830000240	Nut M4 SUS	10
MP541	8930006570	Sealing washer (D)	1
MP544	8930006570	Sealing washer (D)	1
MP551	8950001980	Cable tie-140	1
MP552	6910014570	Super ground (FGA13-08B)	1
MP553	6910014570	Super ground (FGA13-08B)	1

[TUNER-1 UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP3	8510001101	Shied case (A) cover (A)-1	1
MP4	8510001081	Shield case (A)-1	1
MP6	8510003500	406 shield case	1
MP7	8510002020	MIX shield case	1
MP11	8510003500	406 shield case	1
MP12	8510003510	406 shield case cover	1
MP22	8510003500	406 shield case	1
MP23	8510003510	406 shield case cover	1

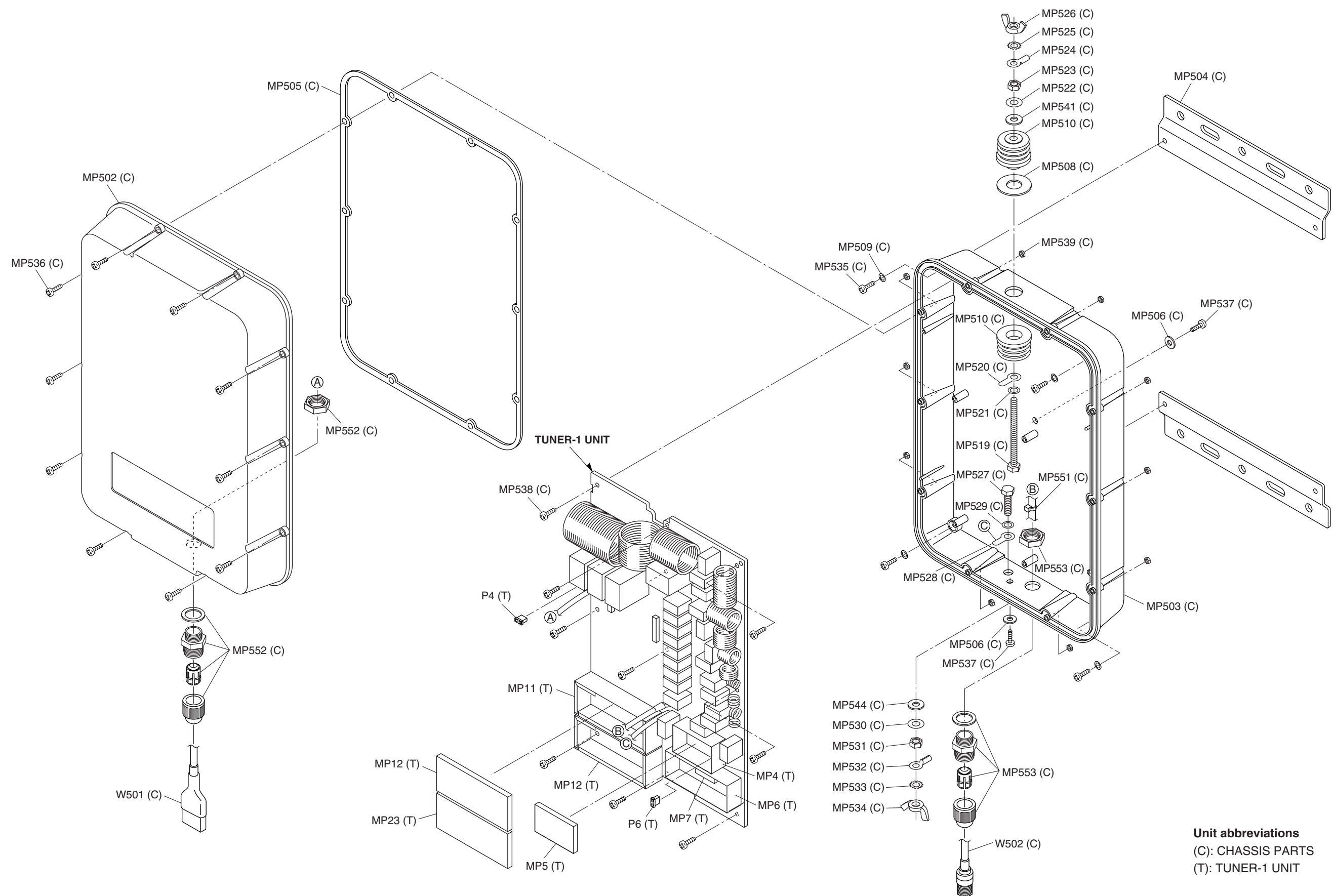
[ACCESSORIES]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
W701	8900004200	Cable OPC-412	1
J701	6510002030	Connector 1380T	4
P702	6510001930	1490P1	1
MP701	8820000440	U-bolt A SUS	2
MP702	8010000010	U-bolt plate	2
MP703	8830000260	Nut M6 SUS	8
MP704	8850000510	Spring washer M6 SUS	8
MP705	8850000190	Flat washer M6 SUS	4
MP706	8810001500	Screw PH A M6 × 30 SUS	4
MP707	8810003500	Hex head bolt M6 × 50 SUS	4
MP708	8850000200	Flat washer M6 SUS	8
MP711	6950000010	Waterproof cap	1



Screw abbreviations

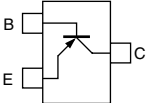
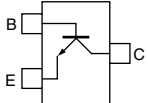
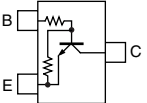
A,B0,B1: Self-tapping
 PH: Pan head BS: Brass
 NI: Nickel SUS: Stainless



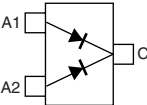
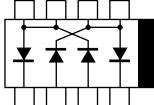
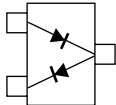
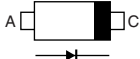
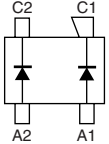
SECTION 7

SEMICONDUCTOR INFORMATION

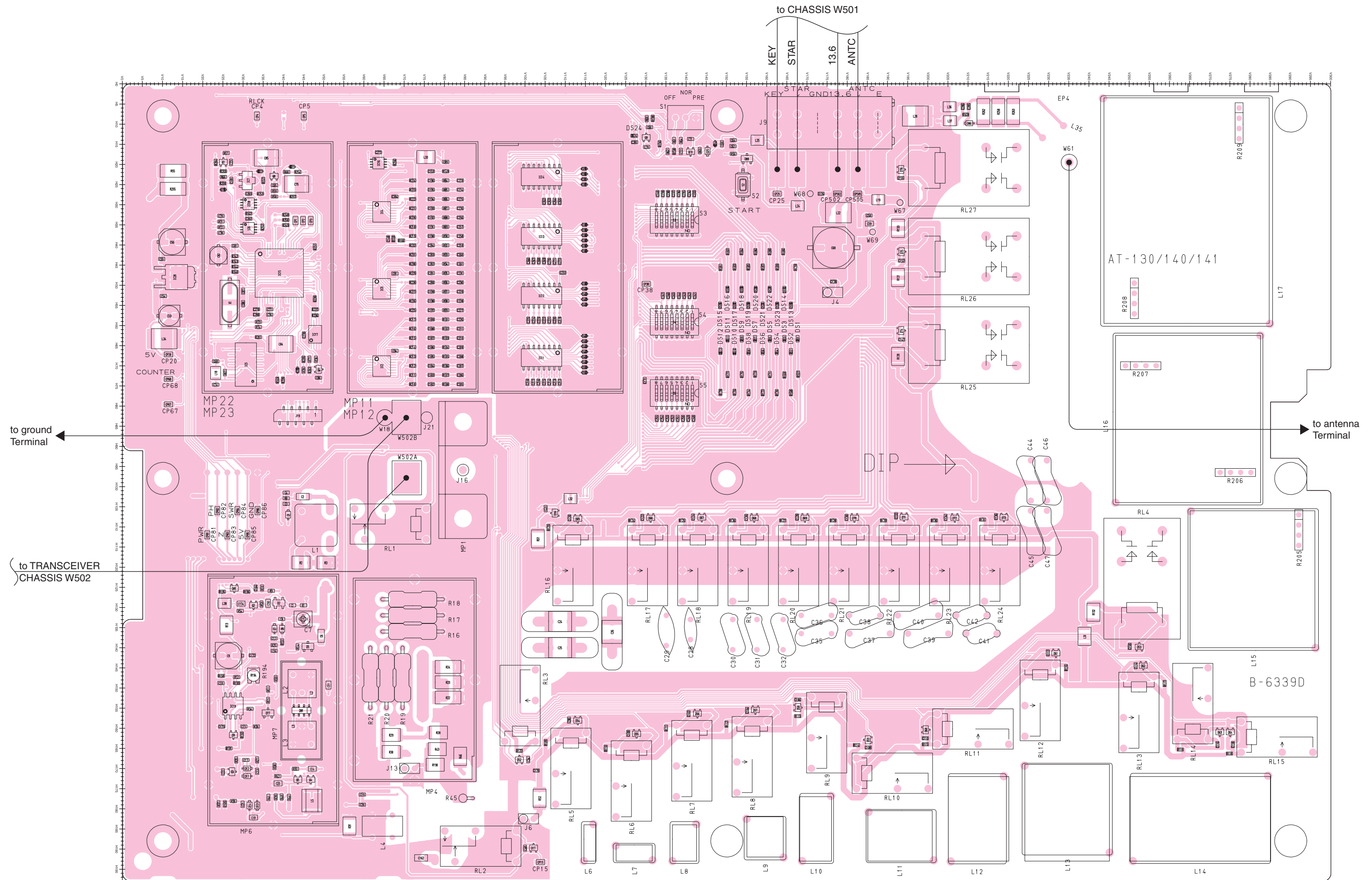
• TRANSISTORS AND FET'S

2SA1586 GR (Symbol: SG) 	2SC4116 GR (Symbol: LG) 	DTC144EUA T106 (Symbol: 26_) 		
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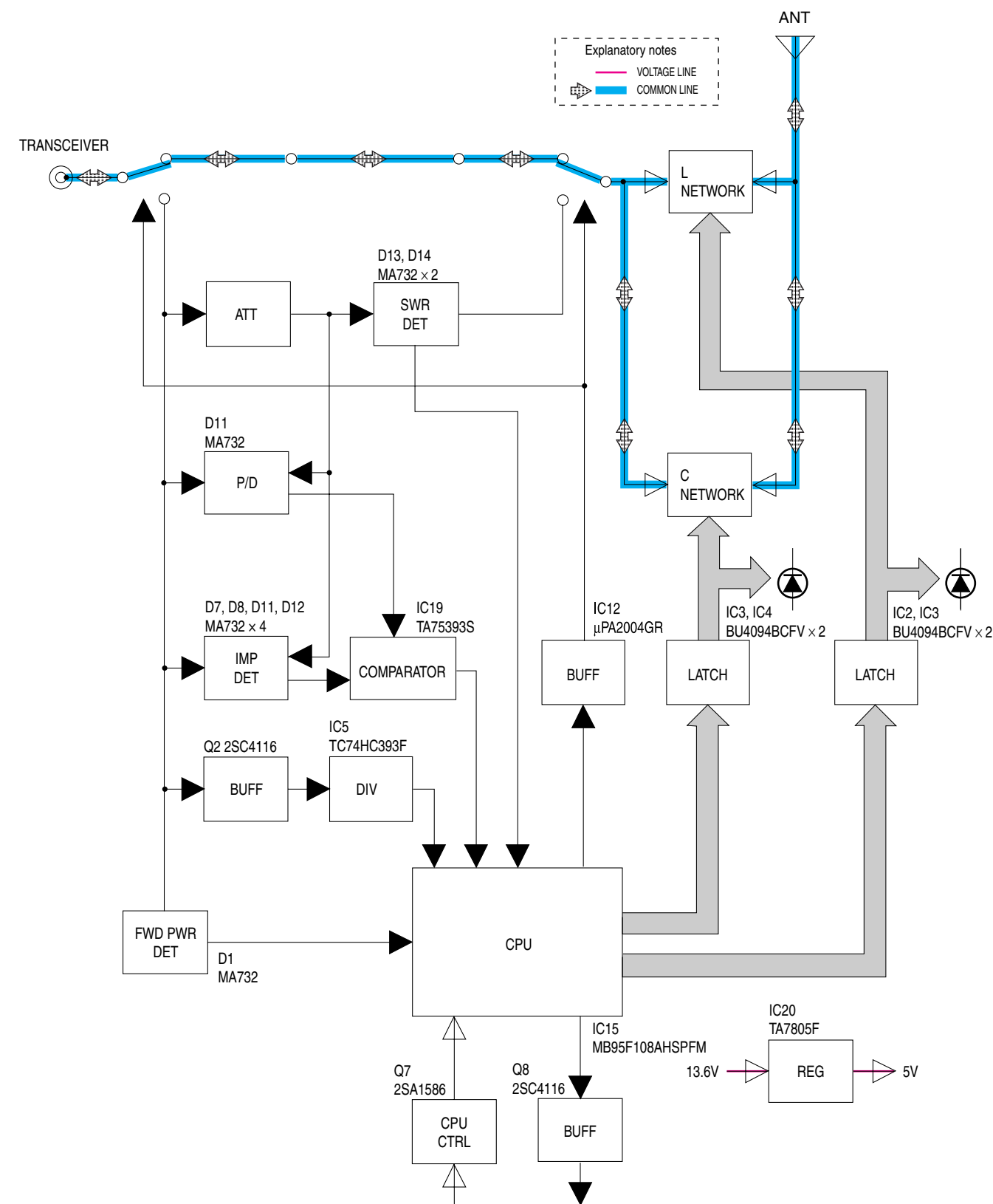
• DIODES

1SS301 (Symbol: B3) 	HSB88WSTR (Symbol: Silver line) 	HSM88AS TR (Symbol: C1) 	MA2S111 (Symbol: A) 	MA732 (Symbol: 2C) 
MA862 (Symbol: M1I) 				

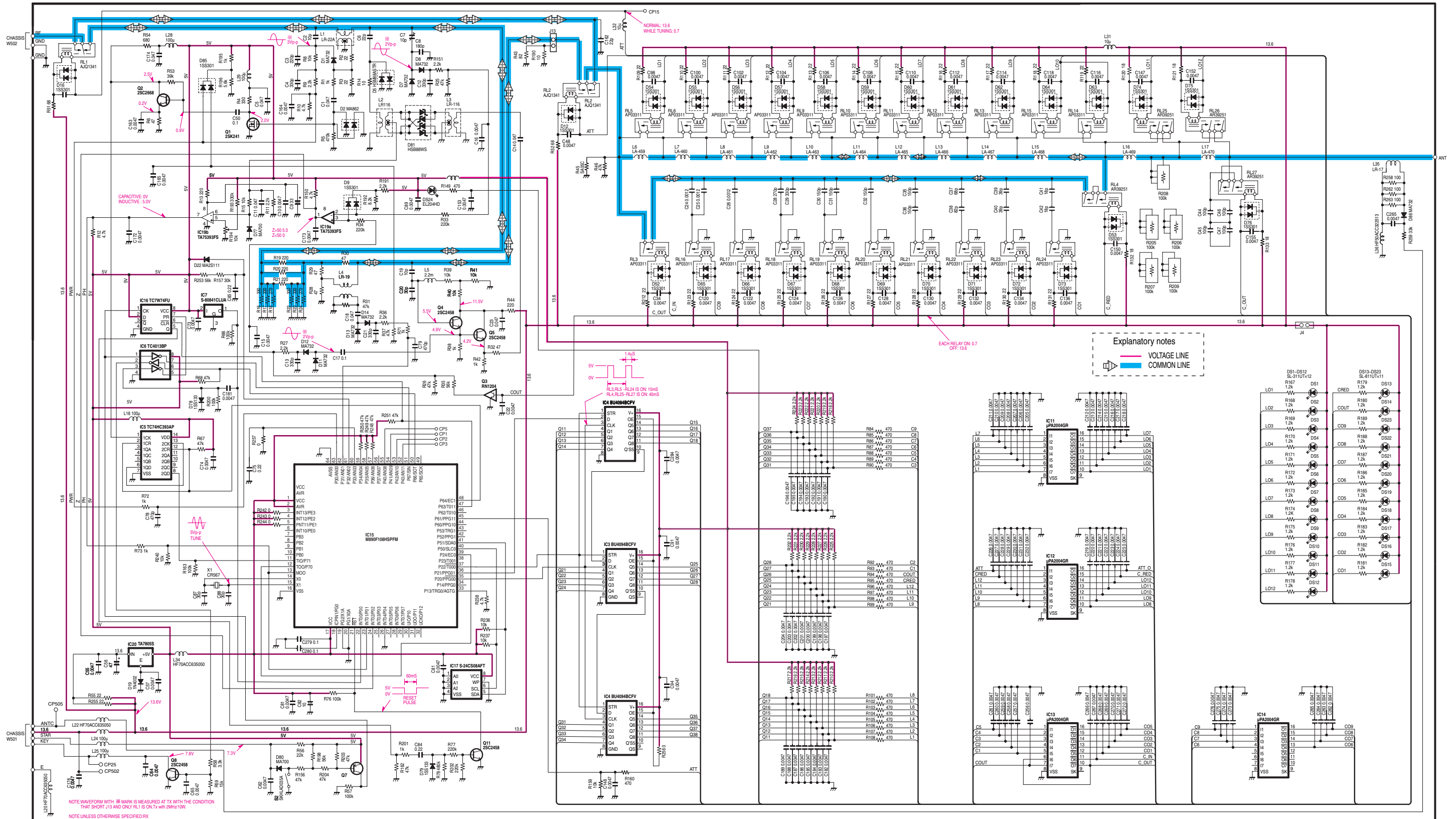
SECTION 8 BOARD LAYOUT



SECTION 9 BLOCK DIAGRAM



SECTION 10 VOLTAGE DIAGRAM



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