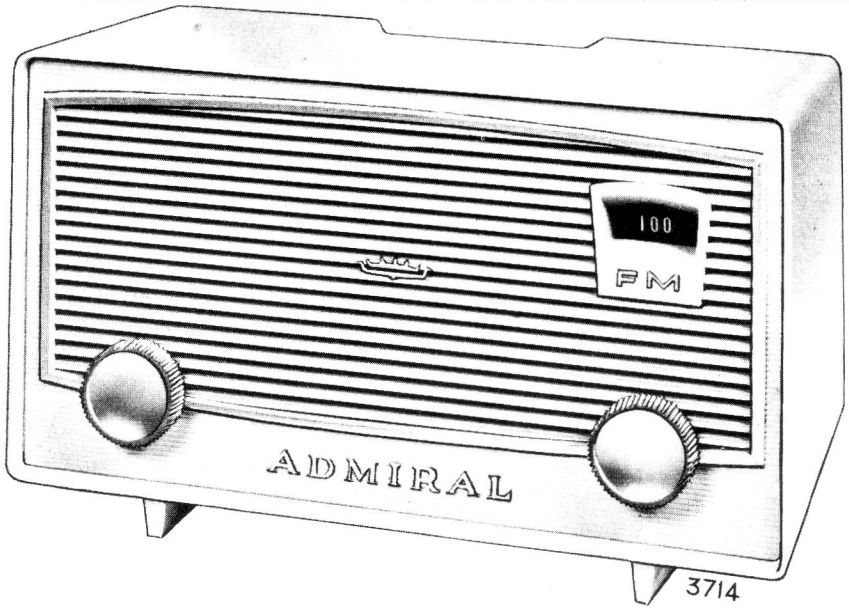
ADMIRAL

FM TABLE RADIO

5V5X CHASSIS



MODEL	COLOR	CHASSIS
Y3083X	White and Beige	5V5X

SPECIFICATIONS

ANTENNA: Unipole type. An exact length of wire lead that should never be lengthened or shortened.

CIRCUIT: Superheterodyne, using five miniature type tubes; one 19CL8A (RF Amplifier and Mixer-Oscillator), one 19EA8 (First and Second IF Amplifiers), one 12BN6 (Detector) one 35EH5 (Output) and one 35W4 (Rectifier).

FREQUENCY RANGE: standard FM band, 88 to 108 megacycles.

INTERMEDIATE FREQUENCY: 10.7 megacycles.

POWER SUPPLY: 105-120 volts 60 cycle AC or DC.

POWER CONSUMPTION: 30 watts.

SPEAKER: 4″ PM with alnico V magnet. Voice coil impedance 3.2 ohms.

GENERAL

This compact and efficient table FM radio is engineered to provide fair volume and fidelity for its size and to be practically drift free. All resistor, capacitor and coil components are mounted underneath the chassis, except a small ceramic disc capacitor C3, a half watt resistor R4 and a wire wound variable rheostat R10. It is important to note that part of the unique design of this receiver is in the use of feed-through type capacitors for the many bypassing purposes. This reduces lead lengths of capacitors and therefore reduces their inductive effects over capacitors with leads. The feed-through capacitor also has an unbeatable record for trouble free service.

CHASSIS REMOVAL

To remove the chassis from the cabinet it is necessary to remove only the rear cabinet section, since the front panel and knobs are attached to the chassis.

1. Turn set bottom side up and using a screw driver, force chassis forward by pushing on the front panel section visible through the elongated chassis mounting holes. A small elevation is provided on the section of the panel inside this slot for this purpose. After the AC interlock connection has been broken, the chassis with the front panel attached will slide forward easily and out of the rear section.

   When replacing chassis into the cabinet rear, first thread the unipole antenna lead into the small hole provided in the rear of the cabinet. Also make certain the AC interlock plug on the chassis, makes a good connection into its socket in the cabinet, before tightening the mounting screws.

SERVICE MANUAL T1101

CIRCUIT DESCRIPTION

The 19CL8A tube is a pentode-triode type tube used as a tuned RF Amplifier and combined mixer-oscillator. The 19EA8 tube is also a pentode-triode type. The triode section is used as a grounded grid IF amplifier while the pentode section is a conventional IF amplifier.

The 12BN6 tube is used as a gated beam discrimmator performing the three functions of FM detector, noise limiter and AF amplifier.

Any pentode tube will act as an FM detector if the signal voltages applied to two grids are in quadrature; that is, if they are 90° out of phase. The signal applied to the first grid will automatically produce a quadrature voltage on a second grid (through space charge coupling), if the second grid is tuned to the same frequency.

The 12BN6 tube has been specially designed for this purpose. Electrons from the cathode are beamed at the first or limiter grid through a slotted anode. This grid (g1 or limiter grid) acts like a gate, since with a zero or positive voltage applied, it allows the beam to pass through, but with a few volts negative applied the beam is stopped (cut off). With at least one volt of signal applied, the beam is stopped and then started producing a ½ cycle, squarelike waveform that is limited in amplitude.

The electrons that are passed through the first grid are sent through another slotted anode into a second grid (g3 or quadrature grid). The coil L8, tuned to the same center frequency as the original signal, will develop across it a voltage approximately 90° out of phase. This quadrature grid clips the ½ cycle pulses into ¼ cycle pulses which are passed on to the plate.

No amplitude modulated signals can get through the tube, but frequency modulated signals will affect the phase displacement between the half cycle electron pulses and the voltage produced on the quadrature grid. The fm signal will therefore cause variations in the plate current in proportion to the deviations and the amplitudes of DC voltage variations across the plate load resistor (R11) will be proportional to the deviations in the original signal. The output from the tube is therefore an amplified reproduction of the original audio. The cathode resistor (R10) is adjusted to supply a bias that will prevent objectionable grid current and signal damping in the input circuit.

SERVICE HINTS

Trouble shooting and repairing of this receiver other than tube checking, should be relatively simple, due to the extensive use of feed-through type capacitors for the many by-passing purposes. As this type capacitor is practically trouble free, very few cases of shorted capacitors will be encountered.

In case it becomes necessary to replace a feed-through capacitor, first remove all wiring and component leads from the center point. Heat the chassis starting at a point about ¼ inch away from the capacitor and gradually move soldering iron against the sides until the capacitor can be removed. To replace new capacitor, fill hole with a bubble of solder and while keeping solder molten insert new capacitor, holding it in position with long nose pliers until the solder cools.

If the complaint is that the receiver appears to drift badly resulting also in distortion and noise, check first to make certain that customer understands the methods of tuning required to obtain optimum results with a receiver of this type. First; any FM receiver is normally more critical in tuning than an AM radio, to obtain optimum performance. Second; in a receiver with a gated beam detector there is a theoretical possibility of obtaining some stations at three closely separated points on the dial. It is therefore necessary for the operator to tune in only the middle one. If the tuning operation is understood and done carefully no trouble from this type complaint should be had.

PARTS LIST

RESISTORS

Sym.	Description	Part No.
R1	470,000 Ohms ½ watt	60B 8-474
R2	33,000 Ohms, ½ watt	60B 8-333
R3	47 Ohms, ½ watt	60B 470
R4	1 Megohm, ½ watt	60B 8-105
R5	1.2 Megohms, ½ watt	60B 8-125
R6	1000 ohms, 3 watts,10% (wirewound)	61A 38-1
R7	470,000 Ohms, ½ watt	60B 8-474
R8	68 Ohms, ½ watt, 5%	60B 7-680
R9	10,000 Ohms ½ watt	60B 8-103
R10	0-400 Ohms Rheostat (wirewound)	75A 79-1
R11	470 Ohms, ½ watt	60B 8-470
R12	100,000 Ohms, ½ watt	60B 8-104
R13	500,000 Ohms Volume control (includes Off On switch, S1)	75B 78-1

CAPACITORS

C1A C1B C1C	14.9 mmf max ANT. 14.9 mmf max RF. 14.9 mmf max OSC.	gang 68B 85-1
C2	1.5 mmf 10%, ceramic feed-through NPO Temp Coeff.	65A 71-1
C3	47 mmf, 10%, 500 volts, ceramic disc.	65D 10-8
C4	.001 mf, ceramic feed-through	65A 72-1
C5	22 mmf, 10%, 500 volt, ceramic disc NPO temp. Coeff.	65D 10-166
C6	12 mmf, 10%, ceramic feed-through NPO temp coeff.	65A 73-1
C7	.001 mf, ceramic feed-through	65A 72-1
C8	.001 mf, ceramic feed-through	65A 72-1
C9	1.5-7.5 mmf steatite trimmer Nut for above trimmer	65B 74-1 2C 6-47-71

CAPACITORS (Cont.)

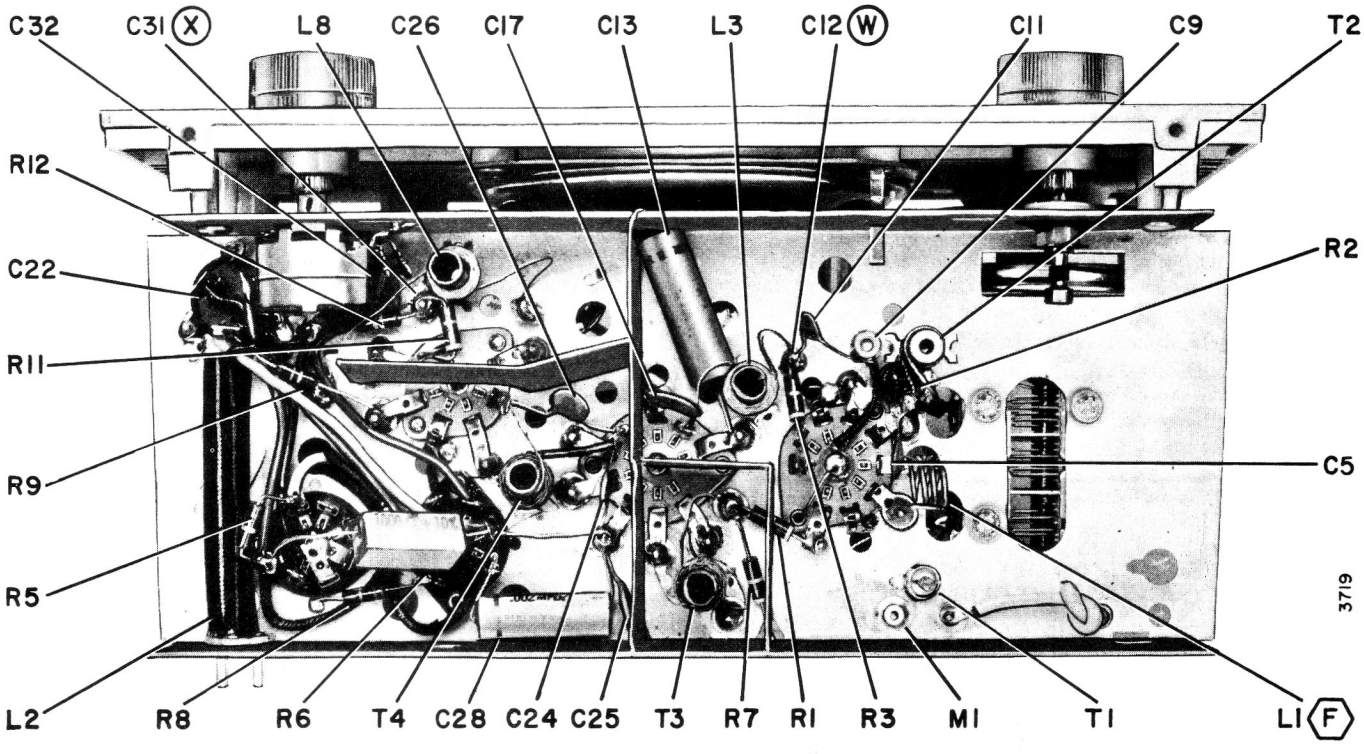
Sym.	Description	Part No.
C10	.001 mf, ceramic feed-through	65A 72-1
C11	15 mmf, 5%, 500 volt, ceramic disc N470 temp coeff.	65D 10-124
C12	12 mmf, 10%, ceramic feed-through NPO temp coeff.	65A 73-1
C13	.1 mf, 200 volts, paper, tubular	64C 2-19
C14	.001 mf, ceramic feed-through	65A 72-1
C15	.001 mf, ceramic feed-through	65A 72-1
C16	.001 mf, ceramic feed-through	65A 72-1
C17	100 mmf, 5%, 500 volts, ceramic disc NPO temp coeff.	65D 10-106
C18	15 mmf, 5%, ceramic feed-through NPO temp coeff.	65A 73-2
C19	.001 mf, ceramic feed-through	65A 72-1
C20	.001 mf, ceramic feed-through	65A 72-1
C21	9 mmf, 5%, ceramic feed-through NPO temp coeff.	65A 73-3
C22A	60 MF, 150 volt	
C22B	60 MF, 150 volt } electrolytic	67A 57-1
C22C	100 MF, 3 volt	
C23	.001 MF, ceramic feed-through	65A 72-1
C24	47 mmf, 10%, 500 volt, ceramic disc	65D 10-8
C25	.01 mf, 500 volt, ceramic disc	65D 10-192
C26	47 mmf, 10%, 500 volt, ceramic disc	65D 10-8
C27	.001 mf, ceramic feed-through	65A 72-1
C28	.002 mf, 400 volt, paper, tubular	64C 2-25
C29	.001 mf, ceramic feed-through	65A 72-1
C30	12 mmf, 10%, ceramic feed-through NPO temp coeff.	65A 73-1
C31	.001 mf, ceramic feed-through	65A 72-1
C32	.01 mf, 500 volt, ceramic disc	65D 10-192

COILS, TRANSFORMERS AND MISCELLANEOUS CHASSIS PARTS

L1	Coil, RF Plate tuning	73D 20-73
L2	Choke Coil, Dual AC Line Filter	73A 50-1
L3	Coil, Mixer Output Tuning	72B 229-1
L4	Heater Choke Coil	73B 51-3
L5	Heater Choke Coil	73B 51-4
L6	B+ Choke Coil	73B 51-1
L7	B+ Choke Coil	73B 51-2
L8	Coil, Quadrature Detector	72B 229-1
T1	Transformer Antenna	72B 230-1
T2	Transformer, Oscillator	72B 231-1
T3	Transformer, 1st IF	72B 229-2
T4	Transformer, 2nd IF	72B 229-3
T5	Transformer, Output	79B 98-1
M1	Network, Isolating, feed-through type (.6-1 megohms and 400 mmf)	63B 16-1
M2	AC Interlock Terminal Plug	88B 64-1
M3	Line Cord and Interlock	89C 62-11
M4	Speaker 4" PM	78C 176-1
Bushing, Tuning Shaft		27B 342-1
Cover, Chassis Bottom		15C 2350-1
Dial Indicator		21B 144-1
Shaft, Tuning		28B 141-1
Shield, Telescoping for 19CL8A and 19EA8		87B 109-1
Shield, captive type, for 12BN6		87B 108-1
Socket, (9 pin min.) for 19CL8A and 19EA8		87B 105-1
Socket, (7 pin min.) for 12BN6		87B 106-11
Socket, (7 pin min.) for 35EH5		87B 106-9
Socket, (7 pin min.) for 35W4		87B 107-1
Spring, Coil, Dial cord Tension		19D 1-5
Spring, "C" type, Tuning shaft Retainer		4C 12-23
Spring, Push-on, Bushing Retainer		19B 184-1

CABINET PARTS

Cabinet, Front (Beige)	34D 175-1
Cabinet, Rear (White)	34D 176-1
Knob, Tuning and Volume	33B 447-1
Screw, Cabt. mtg. (Front Panel at Bottom)	1A 105-6-71
Screw, Cabt. mtg. (Front Panel at Top) #6 x 3½" PHST	1B 236-1-71
Screw, Speaker mtg.	1A 105-5-71
Cup, Washer (Spkr. Mtg.)	4A 7-7-71



Bottom View of Chassis Showing Parts Locations.

ALIGNMENT PROCEDURE

ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

- Allow set and test equipment to warm up for approximately 15 minutes before alignment.
- Use an isolating transformer or insert a .01 mfd capacitor in series with the high side of signal generator. DO NOT CONNECT AN EARTH GROUND TO THIS RECEIVER.
- Connect a short wire jumper from the center point of C30 to chassis. (To short L8 to chassis ground.)
- Set signal generator for 400 or 1000 cycle modulation, 30%. Set volume control full on. Keep signal generator output low to prevent overloading.
- Turn bias control, (R10) to full counterclockwise position (maximum bias point).
- Connect the VTVM across output transformer secondary (voice coil leads). Use the 1.5 volt AC scale for output readings.

  NOTE: If available, a commercial output meter is more desirable for this purpose. Disconnect voice coil leads and use a 3.2 ohm load.
- Use nonmetallic alignment tools. Use hex tool (Admiral part no. 98A30-7) for transformer adjustment slugs.

STEP	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	RECEIVER GANG SETTING	ADJUSTMENT FOR MAXIMUM
1	Test Point W (Center Point of C12)	10.7 MC	Fully open	A, B, C, and D
2	Set trimmers J and K one turn from tight. Set adjustment screw (H) ½ inch above chassis.			
3	Antenna. (Center point of C2 through 75 ohm resistor.)	87.5 MC	Fully closed (set indicator dial on end mark)	E, *F, and G
4	Same as step 3	108 MC	108 MC	H, J, K and L
5	Same as step 3	87.5 MC	Fully closed	Touch-up E
6	Same as step 3	108 MC	108 MC	Touch-up H, J and K
7	a. Set up equipment as in step 1 above. b. Remove short across L8 and adjust M for maximum ouput. c. Adjust N (R10, starting from full clockwise position) to the first point of maximum sound. Use weakest signal possible.			
7 op.	OPTIONAL METHOD FOR STEP 7 a. Disconnect signal generator from receiver. b. Remove wire jumper from across L8 (C30 to chassis ground). c. Tune in a very weak signal, or reduce signal level, until a strong hiss is heard in the sound. (If necessary coil up antenna in a ball or short antenna lead to chassis or both.) d. Adjust M (quadrature coil, L8) for maximum output. e. Adjust N (R10) for maximum output and clearest tone.			

IF ALIGNMENT CHECK USING SWEEP GENERATOR AND OSCILLOSCOPE

a. Use the same equipment setup as in step 1 but add the oscilloscope (vert. input) connected to test point "X".

b. Use a wideband sweep, unmodulated for response check, except the final adjustment given in step e.

c. Sweep generator signal injected at the same points as given in steps above.

d. Oscilloscope pattern should be a typical response curve. Adjust as in step 1 for best symmetry as well as maximum gain.

e. Final Adjustment: With generator connected as in step 4, and dial set to 108 MC; use ±75 KC sweep and 400 cycle modulation. Remove short from across L8. Adjust M and N for maximum output, using minimum signal input.

*Coil (L3) is adjusted by squeezing or spreading turns of the coil.

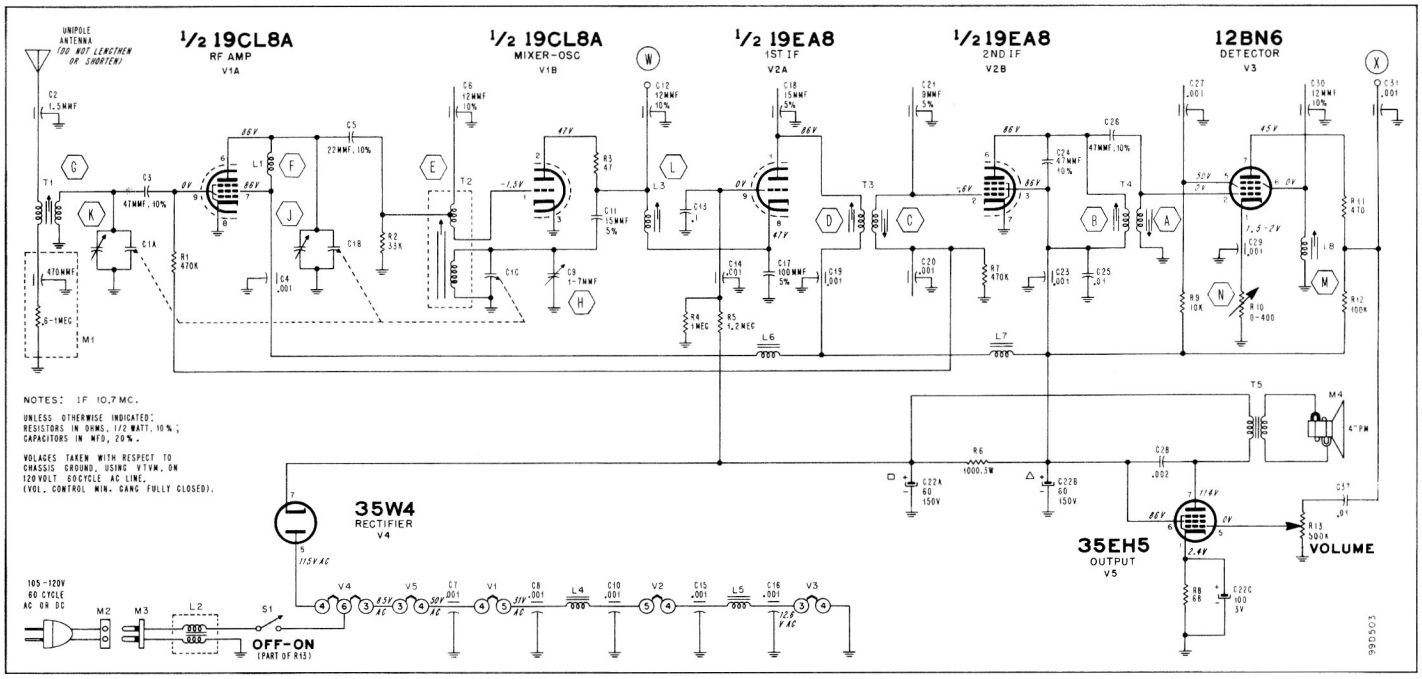
VOLTAGE PRECAUTION

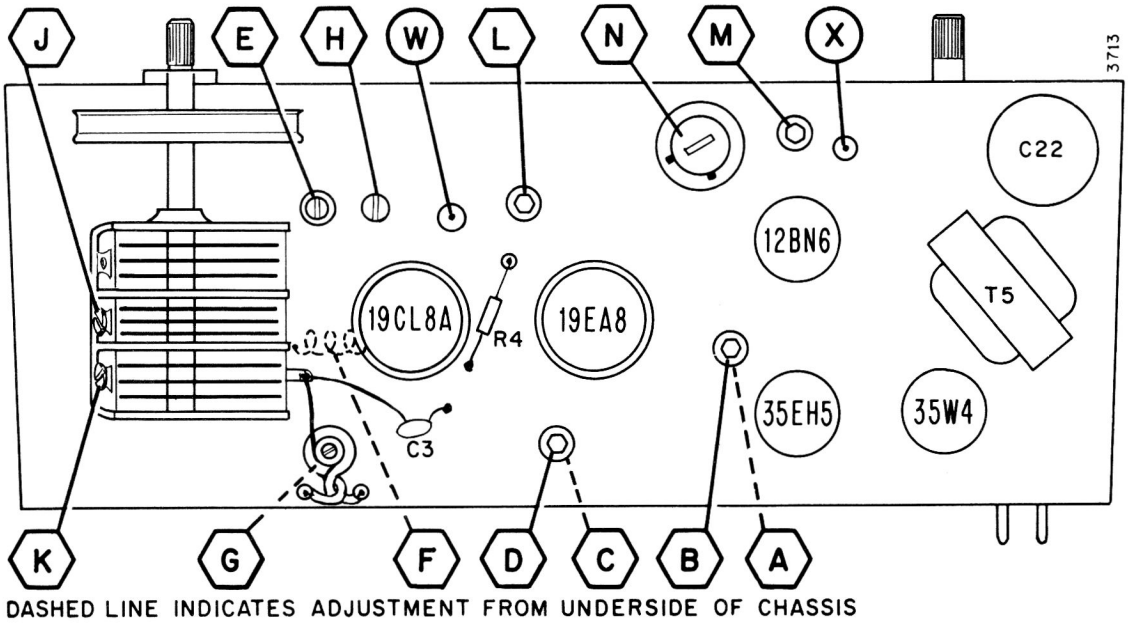
Do Not Connect an Earth Ground To This Receiver

The chassis is connected directly to one side of the power line. To avoid possibility of damage to test equipment or to receiver, do not place the chassis directly on a metal service bench, tools, or other metal objects.

VOLTAGE DATA

- All readings made between tube socket terminals and chassis ground.
- Dial turned to low frequency end; volume control at minimum.
- All voltages measured with vacuum-tube voltmeter, on 120 Volts AC line.





DASHED LINE INDICATES ADJUSTMENT FROM UNDERSIDE OF CHASSIS

Top View of Chassis Showing Tube and Alignment Point Locations.