

**INSTALLATION AND TUNING  
INSTRUCTIONS  
EXCALIBER 121 T/B  
MOBILE ANTENNA  
CM-1013**

**ENCLOSURES**

Description .....	CI-1092
Specifications .....	CI-1093
Outline and Installation .....	CI-1094
Installation .....	CI-1095
Tuning .....	CI-1096
Tuning Charts .....	CI-1097
Modification (121B) and Parts List .....	CI-1098
Rivnut Installation .....	CI-1099

**EXCALIBER 121 T/B  
MOBILE ANTENNA****DESCRIPTION**

The Excaliber 121 T/B is a convertible top or bottom tuning antenna with radome.

The antenna is normally furnished as a top tuning version as standard unless the customer specifies a bottom tuning version.

In order to convert the top tuning (which the customer has installed to a vehicle) to a bottom tuning version, instructions are detailed on page CI-1098 in this manual.

This low band VHF antenna has found its place for use on electrical utility service trucks, buses and other industrial service vehicles where the conventional quarter-wave whip and other antennas cannot survive the rough treatment they receive, or where the whip itself is a hazard.

The antenna covers a frequency range of 25-50 MHz in 14 sub-bands of 2.5 MHz increments and are furnished at a specific frequency as required by the customer at the time of order.

Accessory cable kits to suit specific applications are available.

Consult Sinclair Sales for cable types, prices and delivery.

**CAUTION**

**Antenna contact with high voltage wires may result in death from electrocution.**

## Excaliber 121 T/B Mobile Antenna

### Specifications

#### ELECTRICAL SPECIFICATIONS

Frequency Range	MHz	25-50
Sub-Band Bandwidth	MHz	2.5
Bandwidth at 1.5:1 VSWR	MHz	0.03-0.06
Polarization		Vertical
Pattern		Omnidirectional
Nominal Gain	dBd	Unity
Power Rating	Watts	300
Termination		"UHF" Female

#### Notes:

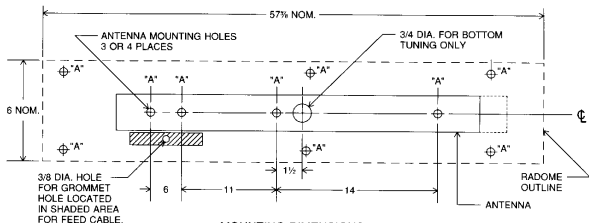
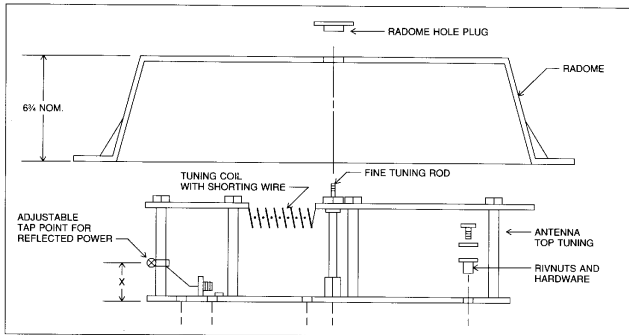
1. Sub-band bandwidths are in 2.5 MHz increments.
2. Bandwidth at 1.5:1 VSWR is referenced to 50 OHMS.
3. Specify exact frequency when ordering.
4. When ordering, specify 121T for top tuning or 121B for bottom tuning.

#### MECHANICAL SPECIFICATIONS

HEIGHT	IN (mm)	6.8 (173)
WIDTH	IN. (mm)	5.7 (145)
LENGTH	IN. (mm)	57.3 (1455)
WEIGHT	LB (Kg)	11 (3.4)
MINIMUM	IN.	36x54
GROUND PLANE SIZE	(mm)	(914x1372)

Refer to page CI-1095 for installation instructions. Sinclair policy of continuing development may result in improvement or changes in specifications.

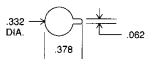
OUTLINE AND INSTALLATION DETAIL



MOUNTING DIMENSIONS

"A" MOUNTING HOLES (NOTE)

USING A-25K-B80  
TITELock FASTENERS (RIVNUT)



NOTE: IN PLACE OF USING RIVNUTS WHICH ARE FURNISHED FOR INSTALLATION, HEX. HEAD SHEET METAL SCREWS AND WASHERS CAN BE SUBSTITUTED FOR MOUNTING BOTH THE ANTENNA AND RADOME - PROVIDED THAT THE HOLES ARE PROPERLY SEALED TO PREVENT MOISTURE PENETRATION.

REFER TO CI-1098 AND CI-1093 FOR MOUNTING HARDWARE AND ELECTRICAL SPECIFICATIONS.

## EXCALIBER 121 T/B MOBILE ANTENNA

### ANTENNA INSTALLATION AND TUNING - 121T TOPTUNED

#### INSTALLATION

Refer to Page C1-1094 using dimensions shown, and position the antenna and radome for mounting hole locations which do not interfere structurally with the vehicle, keeping the tuning access hole in the radome over the tuning screw.

Underside access is required to install the feed cable and should be considered at this time. The feed cable is assumed to be of RG-53/U or similar cable, which passes through a grommeted hole alongside the antenna input connector and sealed with RTV silicone rubber adhesive sealant.

The cable must not loop upward into the antenna field but be dressed along the base of the antenna. The cable must be installed through the roof before the second connector is attached, as noted on Page CI-1094.

**NOTE:** Prior to installing the antenna, a minimum metal ground plane size of 36x54 inches must be maintained in order for the antenna to operate properly.

The antenna proper should be mounted first using 1/4-20 rivnuts which are furnished, (#AK-25K-B80) and installed with a model C-845 BF Goodrich rivnut header which is available on request. No underside access is required for rivnut installation. Rivnuts will be water tight when properly installed.

Refer to Page CI-1094 for optional hardware which may be substituted for mounting both the antenna and radome.

Mount the antenna proper (less radome) first, as some preliminary adjustments to the feed tap wire "x" (not affected by the radome) must be made initially.

Properly located mounting holes and squareness of rivnut installation is important for trouble free antenna mounting. A metal drilling template would be a valuable aid if more than 5 or 10 antennas are to be mounted.

## EXCALIBER 121 T/B MOBILE ANTENNA

### TUNING

The first step in tuning is to short out the advised number of loading coil turns and set the inductive tap wire to the 'x' dimension, referring to page CI-1097 with the transmitter in the 'low power' or 'tune' position (if provided), and a thru-line wattmeter in the antenna line, tune the antenna for maximum forward power. On rare occasions, when the operating frequency is at the extreme of one of the tuning ranges indicated, due to the ground plane variations, it may be necessary to go to the number of active turns above or below that shown for the trial selection. The lowest frequency in the tuning range is obtained by turning the tuning rod up into the antenna. This fact can be used to judge about where the tuning rod should be for your frequency and also if more turns (to lower range) or less turns on loading coil are needed. Once you have located the tuning area, switch to reflected power and tune for a minimum. If the reflected power cannot be reduced to 2 watts out of 50 watts forward (or similar ratio), adjust the feed point tap 'x' dimension up or down in about 1/8" increments, retuning each time, until an acceptable reflected power is obtained. It should be possible to obtain almost zero reflected fairly easily.

The final step is to place the radome over the antenna and install it before doing the final tuning. (See notes on radome installation page CI-1094) The tuning rod will now back out a distance due to the capacitive loading effects, but the inductive tap position will not be effected. Tune for minimum reflected power as before and make sure the allen set screw on the tuning rod bushing is 'firmly' tightened. This should complete the installation of the antenna.

The tuning instructions as described apply to both the top or bottom tuning versions. The 3/4 inch diameter mounting hole shown on page CI-1094 is not required for top tuning.

In order to convert a top tuning antenna to a bottom tuning version, refer to page CI-1098.

### WARNING

For top tuning, the tuning screw is R.F. hot even though it is at D.C. ground potential. An insulated Tuning Tool must be used at all times unless adjustments are made with the transmitter unkeyed.

### TROUBLE SHOOTING

Verify that all the following precautions have been met:

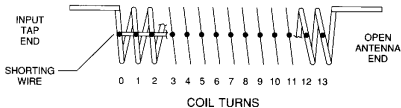
1. The proper number of turns on the tuning coil have been made for the tuning range sub-band.
2. The feed point dimension "x" has been adjusted for minimum reflected power.
3. The minimum ground plane size is used.
4. The feed cable is properly routed so as not to interfere with the antenna field.

## EXCALIBUR 121 T/B MOBILE ANTENNA

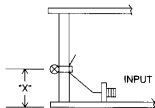
### TUNING CHART

Coil turn shorting chart and inductive tap setting of feed point.

The tuning coil consists of 14 turns of self supporting 1/4 in. copper tubing (air dielectric) 1 1/2 in. I.D. with a shorting wire. The shorting wire is cut to the proper number of turns to obtain the frequency range required according to the chart shown.



Shorted Coil Turns	Tuning Range MHz
None	23.4 - 25.0
1	24.6 - 26.5
2	25.6 - 27.6
3	26.7 - 28.8
4	27.8 - 30.0
5	29.2 - 31.4
6	30.9 - 33.2
7	32.8 - 35.3
8	34.7 - 37.3
9	37.5 - 40.3
10	40.1 - 43.4
11	43.1 - 46.5
12	46.5 - 49.8
13	49.2 - 52.2



FEED POINT HEIGHT  
DIMENSION "X"

THE DIMENSION "X" IS  
ADJUSTED TO OBTAIN MINIMUM  
REFLECTED POWER.

The antenna is furnished with the required number of coil turns shorted and tuned to the customer frequency as ordered.

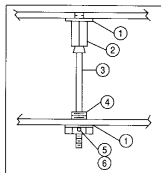
If frequency changes are required in the field, the number of coil turns can be added or removed according to the chart and adjustment of the feed point dimension "X".

Always short at least one more turn than the chart shows to allow for varying conditions. All turns under the shorting wire must be securely soldered, or unpredictable current effects will occur.

## Excaliber 121 T/B Mobile Antenna

### Modification and Parts List

#### MODIFICATION FROM TOP TO BOTTOM TUNING



Reverse ass'y of the bushing, tuning rod, and sleeve ass'y's as shown.  
The shrink tube is not required for bottom tuning.

#### Part's Identification:

1	MD-3889-1	(.050) 5/8 int. tooth L.Wsr.
2	MD-3353	Bushing and Sleeve Ass'y
3	MD-3367	Tuning Rod
4	MD-3366	Tuning Rod Bushing
5	10-32 x 1/4	Allen Set Screw
6	MD-2032	Nylon Spacer Cushion

PART NUMBERS 1 - 6  
ARE PART OF TOP ASSY,  
BUT CAN BE ORDERED  
AS REPLACEMENT PARTS.

The following parts are furnished as hardware kit with the antenna when delivered:  
Hardware Kit No. HK-121 T/B.

QTY	PART NO.	DESCRIPTION
I	MD-3421	Neoprene Washer
I	BPF- 3/4	(B-659) Caplug
II	AK-25K-B80	Rivnut Titelok Fastener
II	1/4-20 x 3/4	SS, HexHD Bolt
I	1/4	SS Flat Wshr
I	GC-1042	3/8 Grommet
I	5/8	SS, Flat Wshr
I	435-1970	Cambion Tuning Tool (optional)

To order replacement parts, consult Sinclair Sales for prices and delivery.

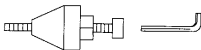


## Excaliber Series Mobile Antennas

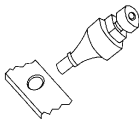
### Rivnut Header

Model C-845

Thread Size 1/4 - 20

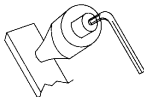


### Operating Instructions



#### Step 1

Engage all threads of the rivnut on the pull-up stud. Advance anvil until it is tight on head of rivnut. Insert rivnut into the hole.



#### Step 2

Place the hex wrench into the socket of the jack screw and hold stationary. Turn the hex nut in counter-clockwise direction with a wrench while holding the tool at right angles to the work.

#### Step 3

For 1/4 thread size of rivnuts, turn nut to approximately 2 turns to obtain the maximum grip or until firm resistance indicates complete upset of the rivnut. A hex end hatchet wrench will speed up this operation.

#### Step 4

Break nut loose with clockwise movement. Remove both wrenches from the tool.

Remove the tool from the rivnut by revolving the entire tool in a counter clockwise direction.

**NOTE:** The rivnut header tool is not furnished with the antenna but can be ordered from Sinclair or by contacting the B.F. Goodrich Co. Aerospace Products, Akron, Ohio 44318.

Refer to page CI-1094 for alternate methods of installation using sheet metal screws.

# SINCLAIR