axis is the distance from the Flagship hotel in all cases. The plots may thus be "overlaid" to see the relative signal strength of Coastel, GTE and Galveston Cellular at any distance from the Flagship hotel. Three radials from the Flagship were measured. The first run started from the Flagship and was at a heading of 086° true. The second radial extended 28.2 statute miles into the Gulf and is at a heading of 144° true. The third radial was at a heading of 224° true.

DATA REDUCTION

A. LAND DATA

1. 102 total measurement points were recorded on land on the three drive tests. The Coastel signal was within the 39 dBu contour (-94.6 dBm per report R-6406) at 33 of these measurement points on land. Three additional measurement points were made on the Flagship pier which were also within the 39 dBu contour.

2. Both the GTE and the Galveston Cellular signal levels exceeded the Coastel signal level at 28 of these 33 locations. Indeed, both GTE and Galveston Cellular had stronger signals than Coastel on the entry ramp to the Flagship hotel. (Land run 3, marker 43.)

3. There were four measurement points where the Coastel signal exceeded the GTE signal; at three of these the differential was less than one dB thus it would be unlikely that Coastel would ever become "best server" at any point on land.

4. Table 1 is a compilation of the land measurement data.

5. The data points contained in table 1, land run 3, markers 43 and 45 may be compared to get an effective measure of the front-to-back ratio of the Coastel antenna system including shielding and attenuation provided by the hotel. At the end of the pier, approximately 150' in front of the Coastel antenna, the

signal level is -30.0 dBm. Behind the antenna and directly behind the hotel the signal level is -72.4 dBm. The "real-world" front-to-back ratio therefore measures 42.4 dB. Approximately 12 or 13 dB of this is believed to be attributable to the influence of the hotel structure.

B. WATER DATA

Figures 7,8, and 9 are measurements of the actual signal levels of Coastel, Galveston Cellular and GTE respectively measured in the Gulf on a heading of 086° true from the Flagship hotel. The "gap" in the data between 6.7 and 9.2 miles is where the GPS locating signal was not available. The ERP from the Coastel Transmitter was approximately 65 watts on this heading. Figures 10, 11 and 12 are the signal levels of the three carriers on a heading of 144°. Figures 13, 14 and 15 are at a heading of 224°. The following results may be seen from examining this data:

1. Carey report R-6406 predicts 8.95 miles to the 39 dBu contour from the GTE cell site (200' AMSL, 45 watts ERP). The actual measurement, to a 6' high dipole receiving antenna, is approximately 18 miles from the Flagship after reducing the received signal by 1.5 dB to take antenna gain (6 dBd) and cable loss (-4.5 dB) into consideration. At 18 miles the Coastel signal is about 9 dB weaker than GTE, even though the Coastel signal is "beamed" into the Gulf. This is true on all three radials.

2. Carey used a 9 dB correction factor to convert his measured data at 32' to a receiving antenna height of 6'. If this same factor were applied to convert the GTE data to 32', which is a more

appropriate antenna height on a ship, the GTE Galveston cell site 39 dBu contour (-94.6 dBm received signal) would extend approximately 26 miles offshore.

CONCLUSIONS

1. There is a small amount of land directly behind and to the southwest of the Flagship hotel which is under the Coastel 39 dBu contour. This is limited to a strip approximately four blocks inland from the shoreline.
2. The Coastel signal exceeded the 860 mHz 39 dBu contour at 33 measurement points; however, GTE had the stronger signal and remained "best server" at 28 of these 33 points. At three of the remaining four points the GTE and Coastel signals were within one dB of the same level.
3. The Coastel signal was greater than 1 dB stronger than GTE at only one data point (Seawall Blvd and 37th street). At this one point Coastel was 7.84 dB stronger than GTE.
4. Since a cellular telephone will typically not go to "roam" mode unless the home signal goes below some preset threshold set by the manufacturer, it is believed that Coastel would not serve any of the GTE home market, and would serve "roamers" only on occasion. These roamers would have to be either inside or in the immediate vicinity of the Flagship hotel at the time the call was initiated.
5. The actual GTE 39 dbu contour, at a receiving antenna height of 6', extends approximately 18.4 miles into the Gulf and encompasses approximately 530 square miles of water area. The GTE real-world service area (28 dBu contour) extends approximately 24.5 miles into the Gulf and encompasses approximately 880 square miles at this 6' antenna height.

6. It should be remembered that the measured 39 dBu contours shown in figure 3 were measured at an antenna height above water of 6'. Ship and platform antennas are more likely to be at 30 to 120 feet above water. This significantly increases the service area of all of the service providers.

7. At a ship's antenna height of 32 feet, the 39 dBu and the 28 dBu contours of the three providers, on the 144° radial, extend from the Flagship hotel approximately as follows:

Provider	Miles to Contour	
	39 dBu	28 dBu
Coastel	18.5	24.5
Galveston Cellular	22	28.5
GTE	26	32 (estim.)

FIGURE #1

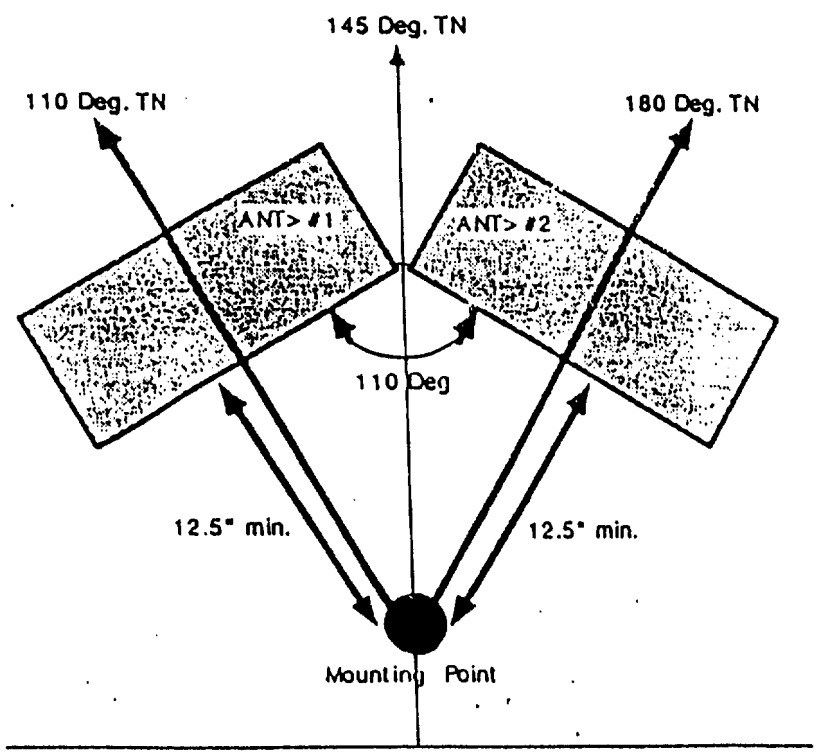
RVC SERVICES, INC.
KNKA412- MARKET 0306 B-1
GULF OF MEXICO

ANTENNA MOUNTING CONFIGURATION
FOR COVERAGE TESTS

MAY, 1992 SHAFFER & ASSOCIATES

Antenna Information

Type:	Two Kathrein Antennas (Scala Model# BP-13-875) Co-Phased
Beamwidth:	47 Degrees each (140 degrees Co-Phased)
Gain:	9.9 db
Orientation:	Ant. #1 - 110 Deg. TN
	Ant. #2 - 180 Deg. TN
Power:	100 Watts ERP
Mounting:	South face of the building, approximately 5' below the roof line and 15" off of the south wall of the building.



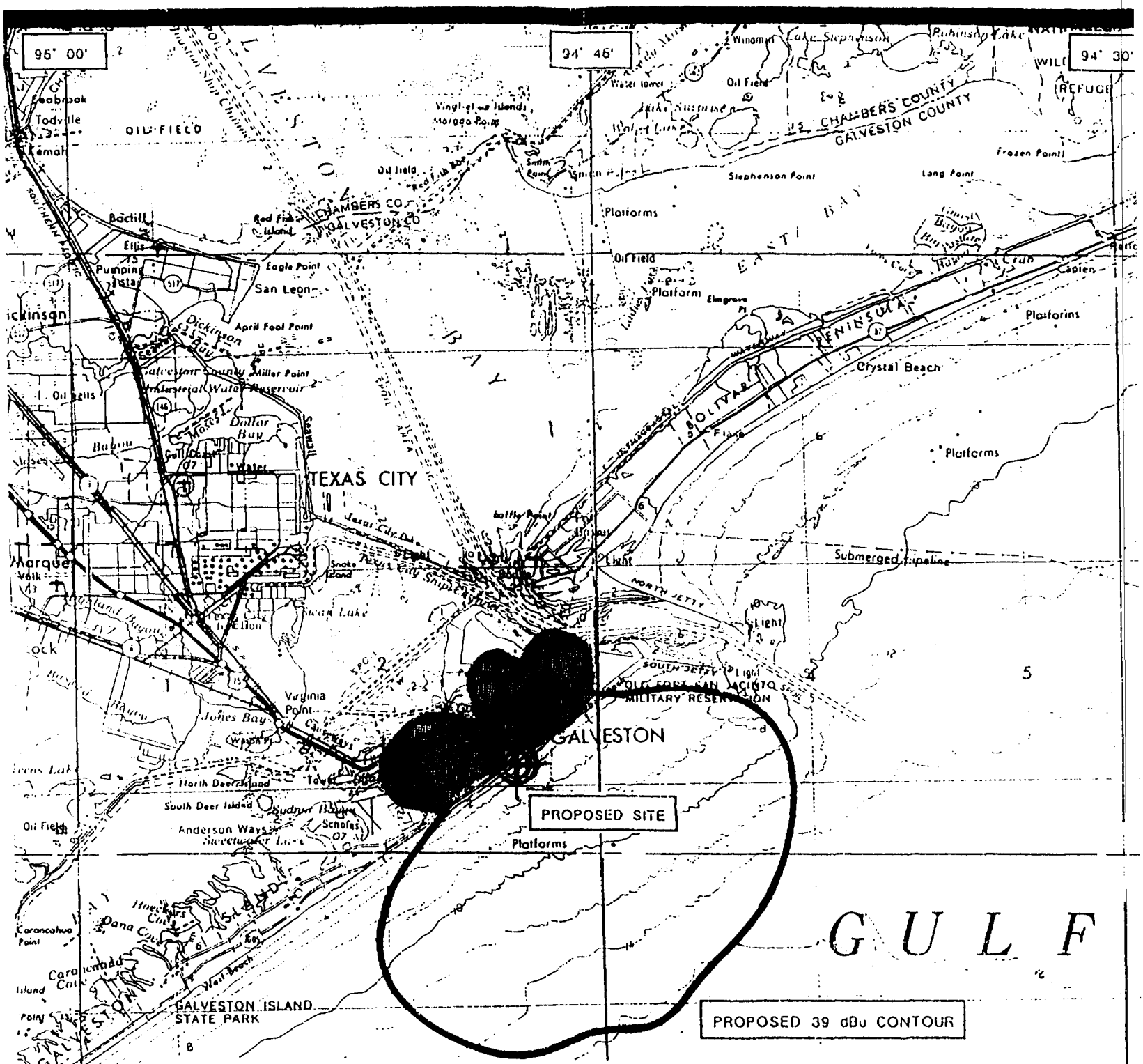


FIGURE #2

RVC SERVICES, INC.
KNKA412- MARKET 0306 B-1
GULF OF MEXICO

MAP SHOWING CAREY 39 dBu CONTOUR
(GREY AREA INDICATES AREAS WHICH WERE
MEASURED TO BE OUTSIDE OF THE 39 dBu CONTOUR)

MAY, 1992

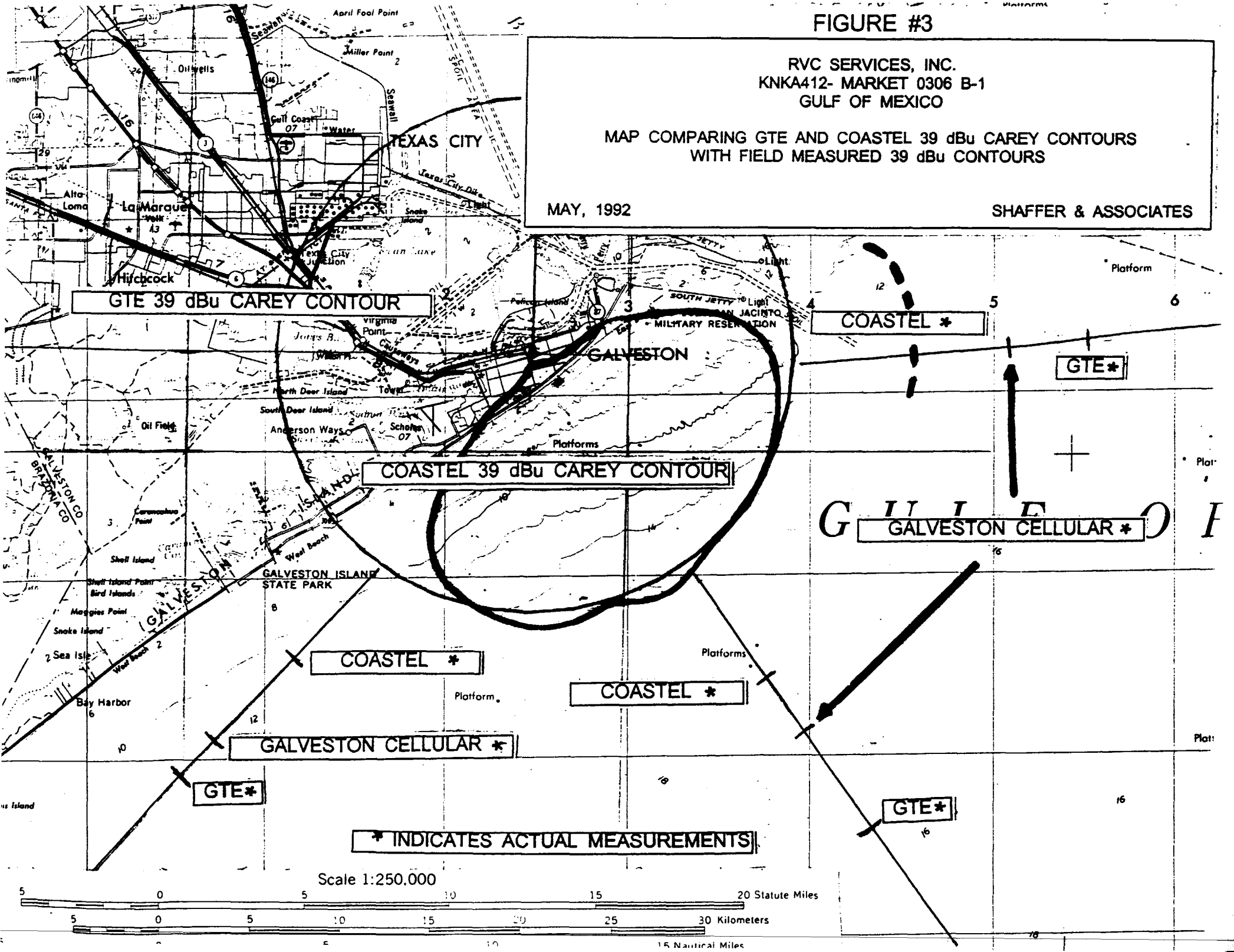
SHAFFER & ASSOCIATES

FIGURE #3

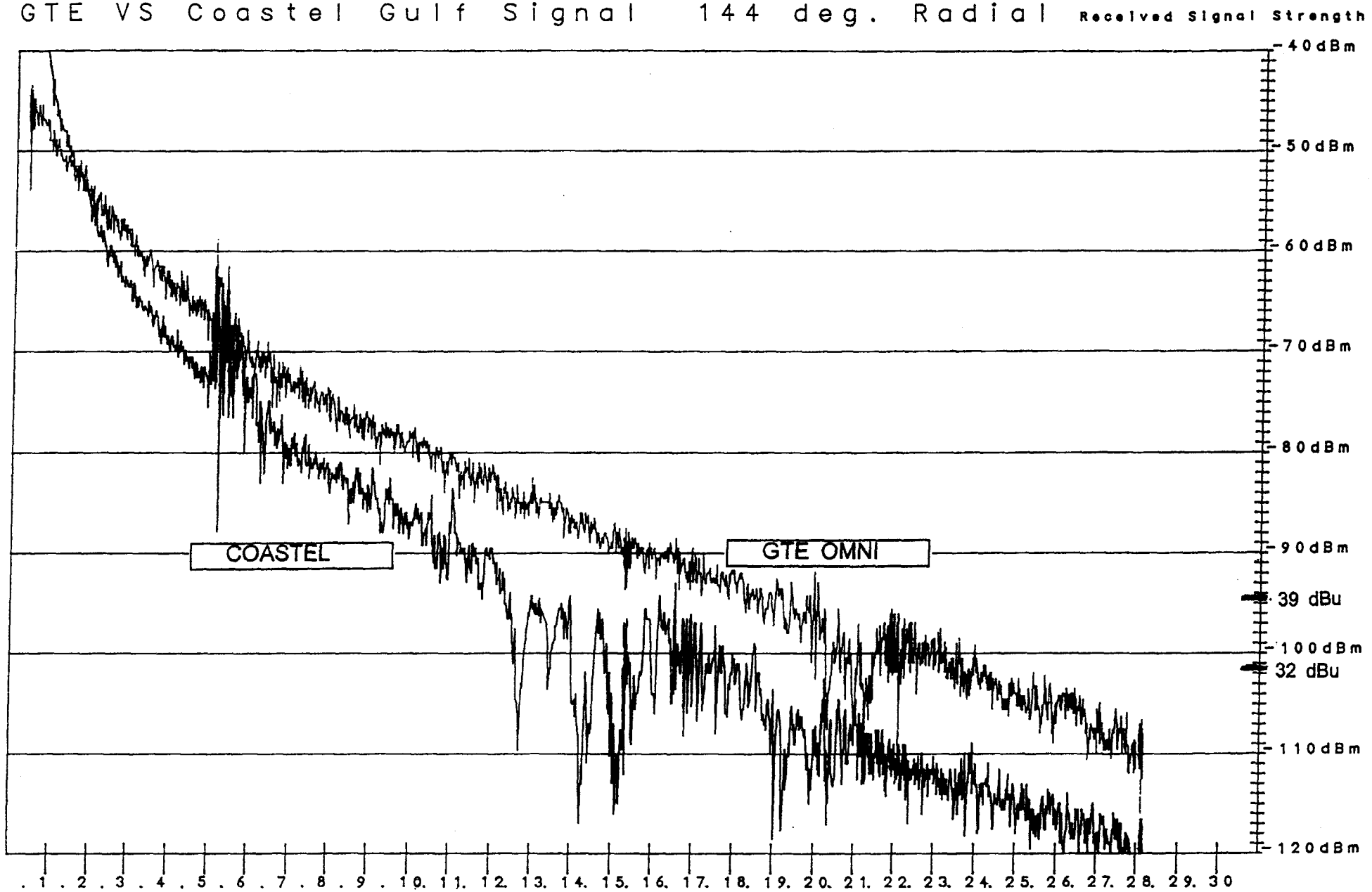
RVC SERVICES, INC.
KNKA412- MARKET 0306 B-1
GULF OF MEXICO

MAP COMPARING GTE AND COASTEL 39 dBu CAREY CONTOURS
WITH FIELD MEASURED 39 dBu CONTOURS

MAY, 1992 SHAFFER & ASSOCIATES

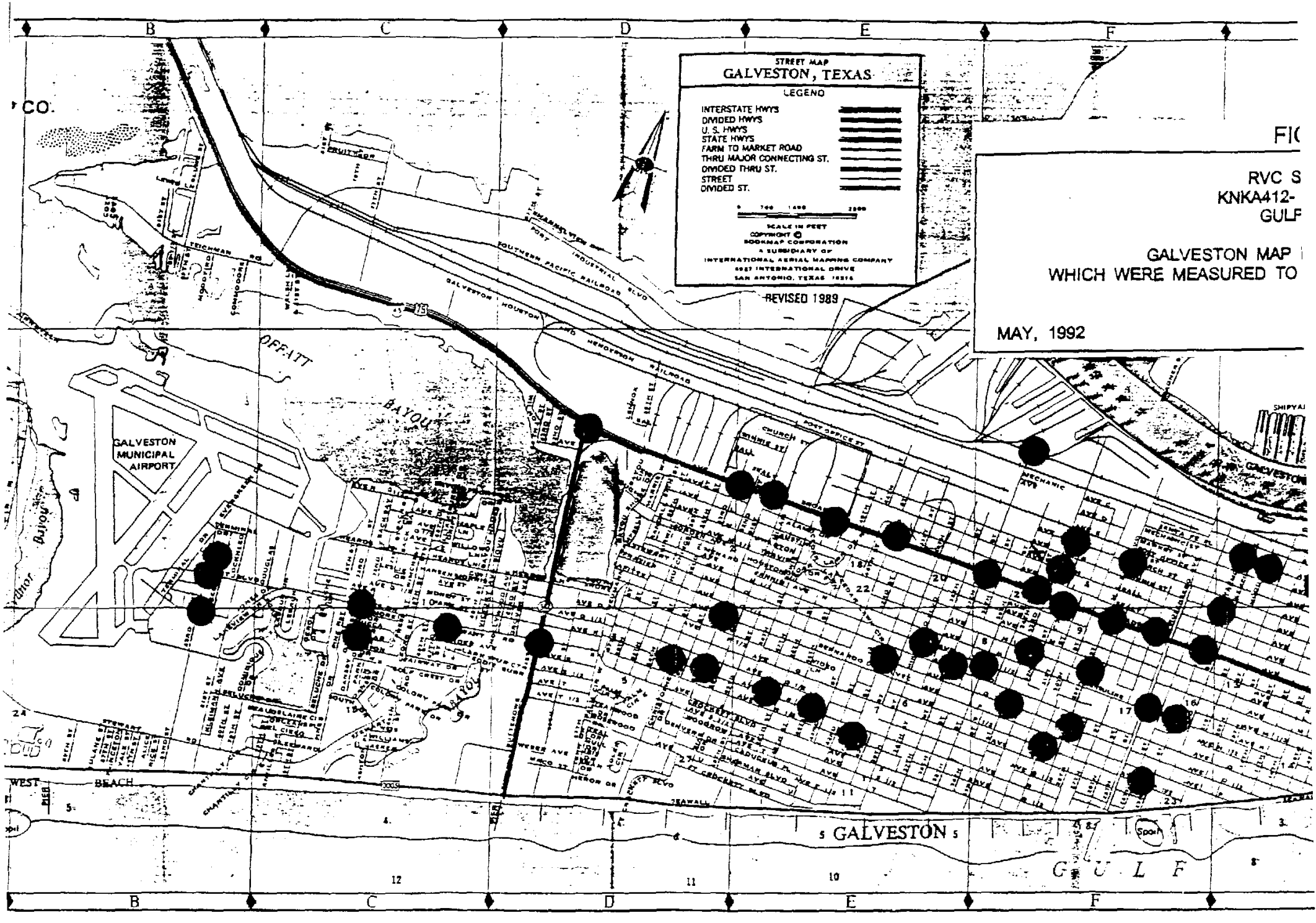


GTE VS Coastel Gulf Signal 144 deg. Radial



KEY:
BLACK: COASTEL CH 338
RED: GTE CH 352

FIGURE #4

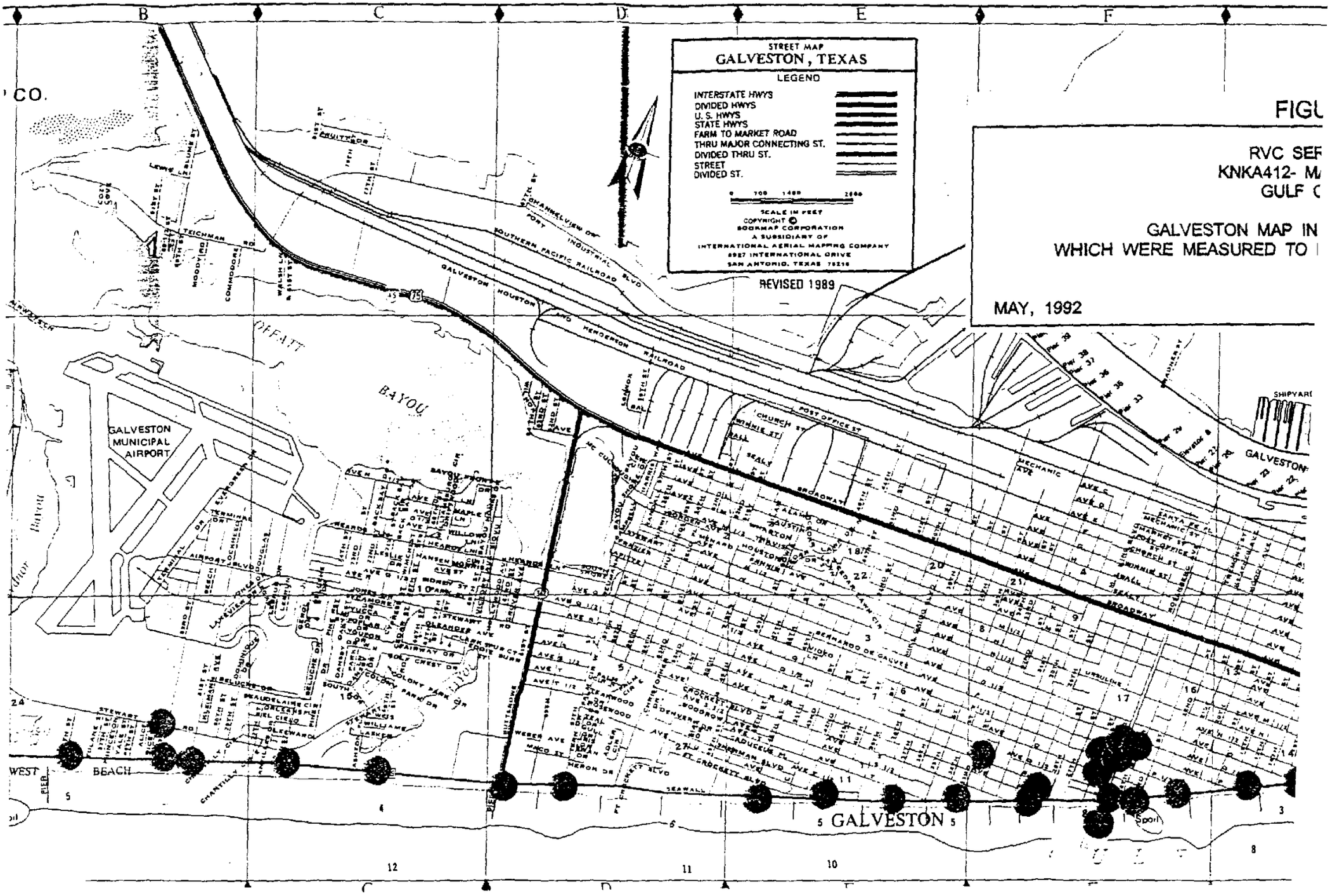


FI(

RVC S
KNKA412-
GULF

GALVESTON MAP
WHICH WERE MEASURED TO

MAY, 1992



FIGU

RVC SEF
KNKA412- M
GULF C

GALVESTON MAP IN
WHICH WERE MEASURED TO

MAY, 1992

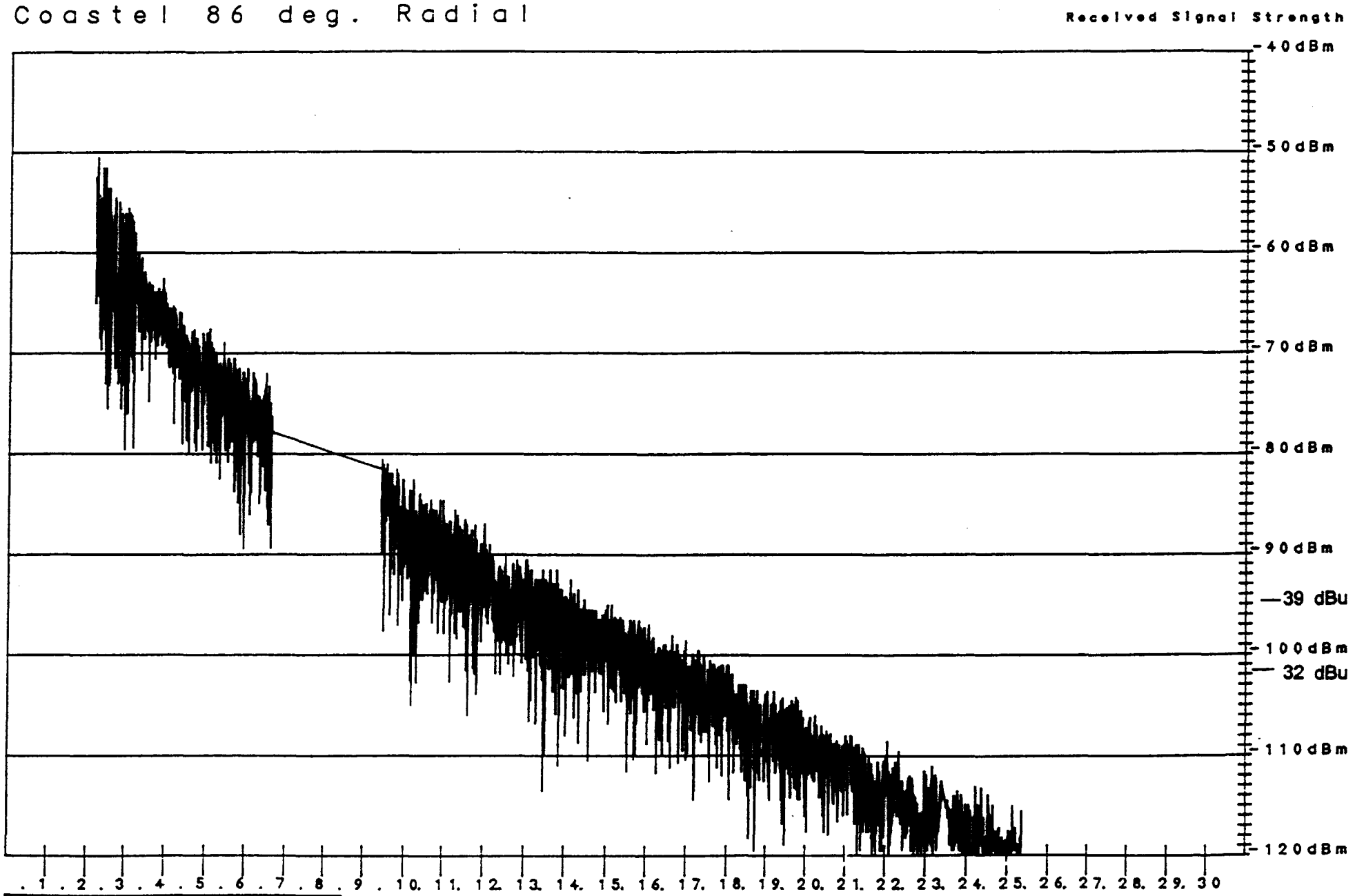
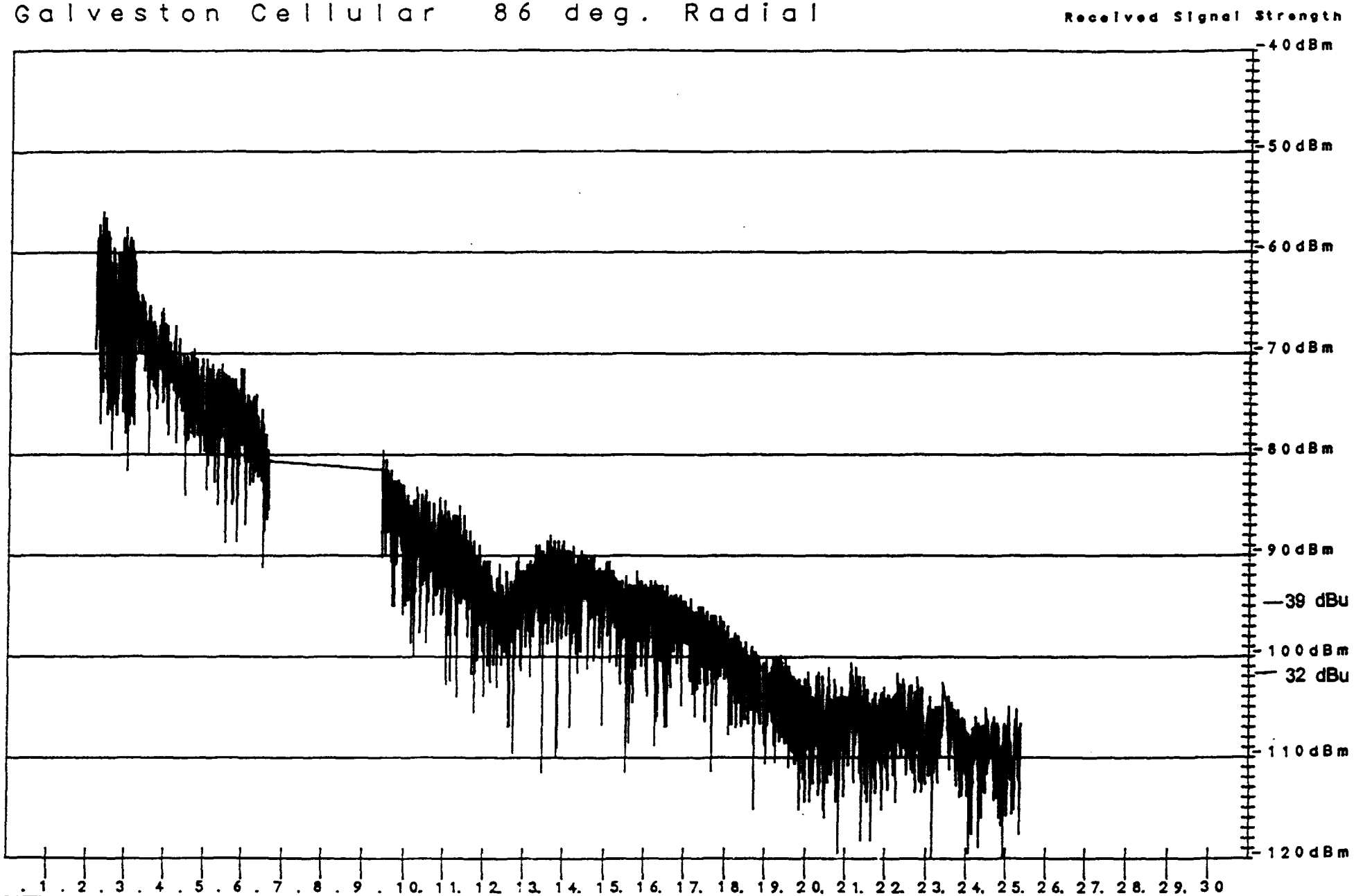

Coastel 86 deg. Radial
Received Signal Strength
-40dBm
-50dBm
-60dBm
-70dBm
-80dBm
-90dBm
39 dBu
-100dBm
32 dBu
-110dBm
-120dBm
.1 .2 .3 .4 .5 .6 .7 .8 .9 .10 .11 .12 .13 .14 .15 .16 .17 .18 .19 .20 .21 .22 .23 .24 .25 .26 .27 .28 .29 .30
DISTANCE FROM FLAGSHIP HOTEL (STATUTE MILES)
CH 338 COASTEL TEST XMTR
DISTANCE FROM FLAGSHIP
GALVESTON TX

FIGURE #7

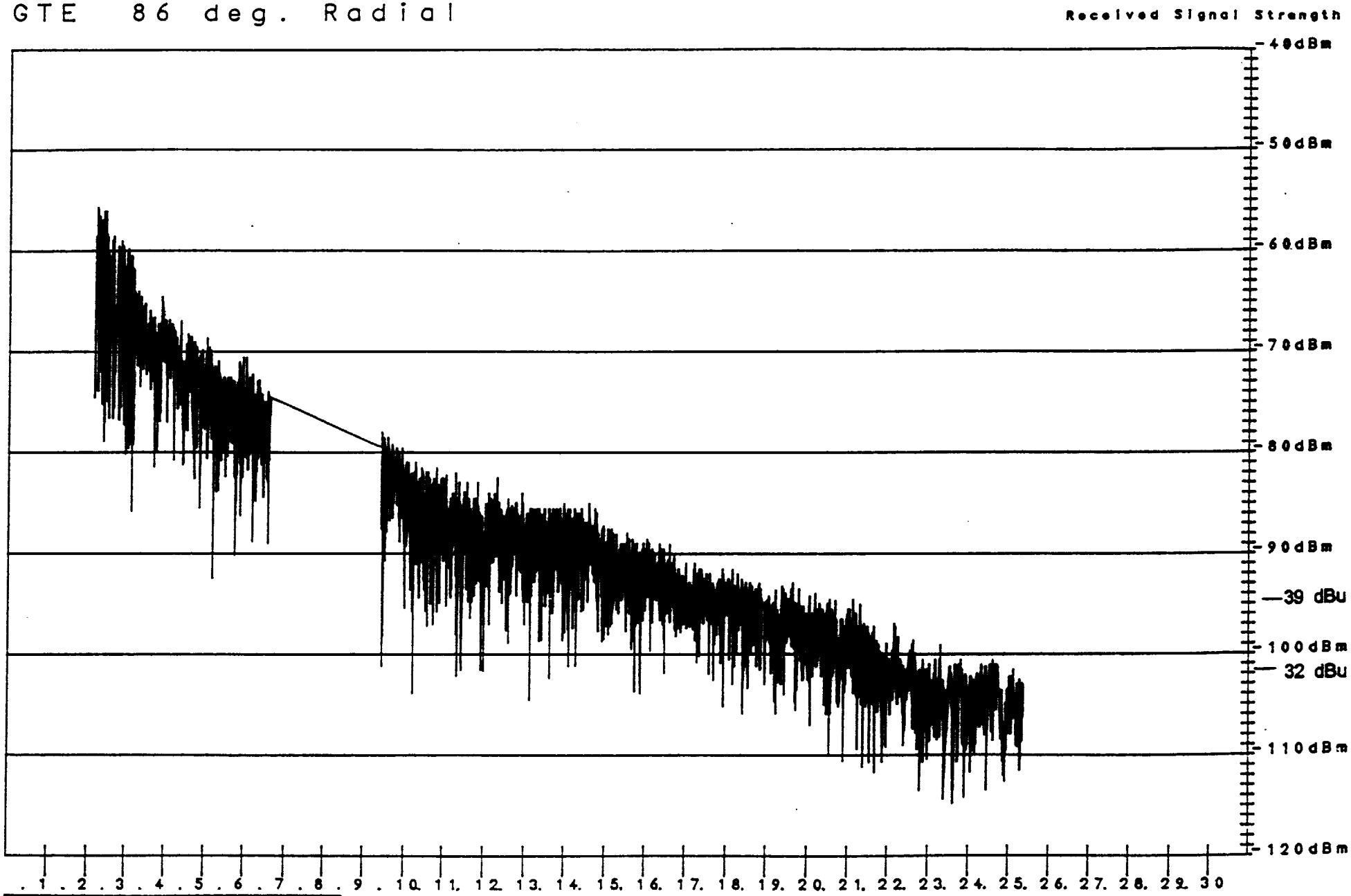
Galveston Cellular 86 deg. Radial



CH 332 GALVESTON CELLULAR
DISTANCE FROM FLAGSHIP
GALVESTON TX

FIGURE #8

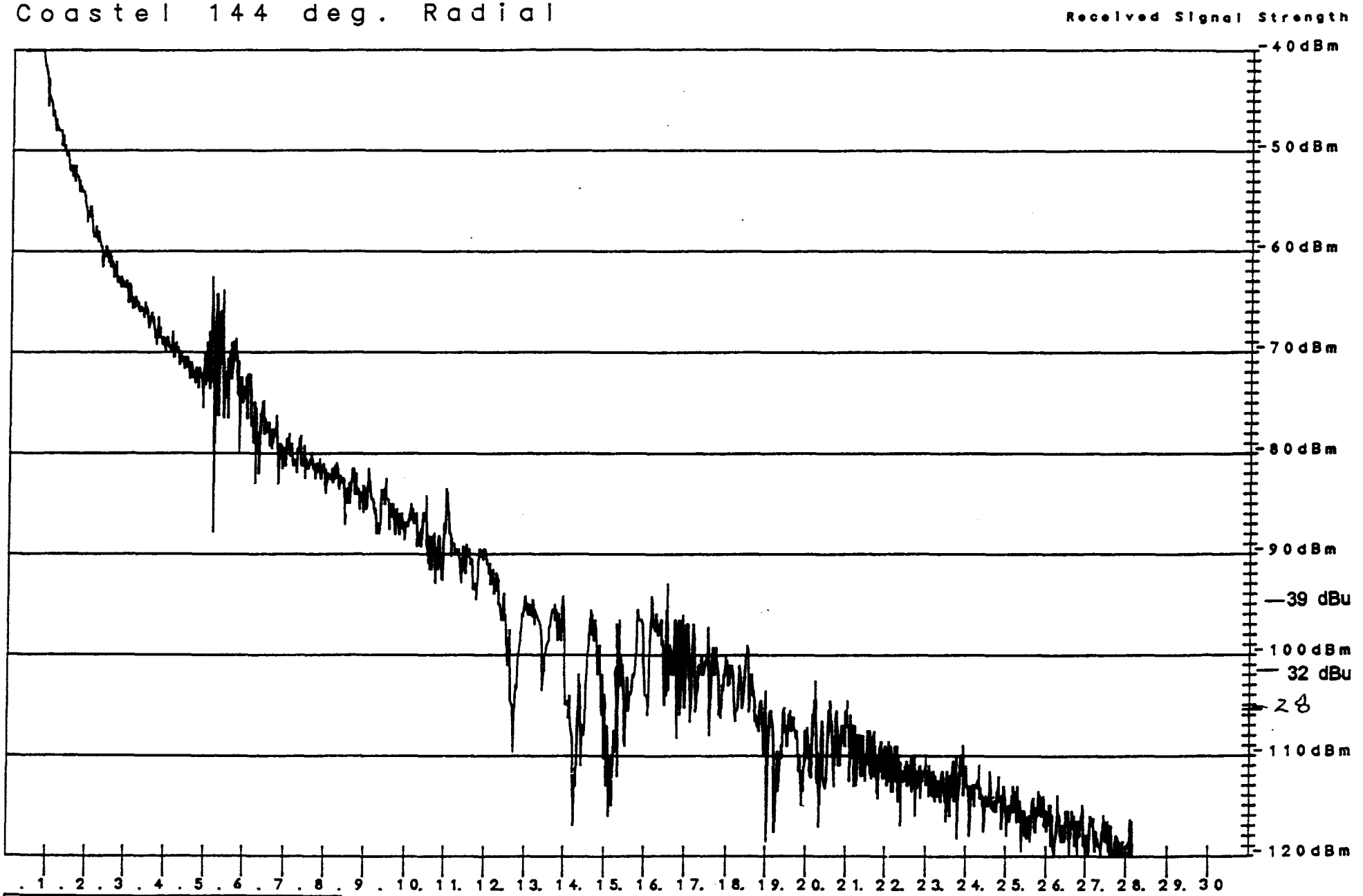
GTE 86 deg. Radial



CH 352 GTE GALVESTON OMNI
DISTANCE FROM FLAGSHIP
GALVESTON TX

FIGURE #9

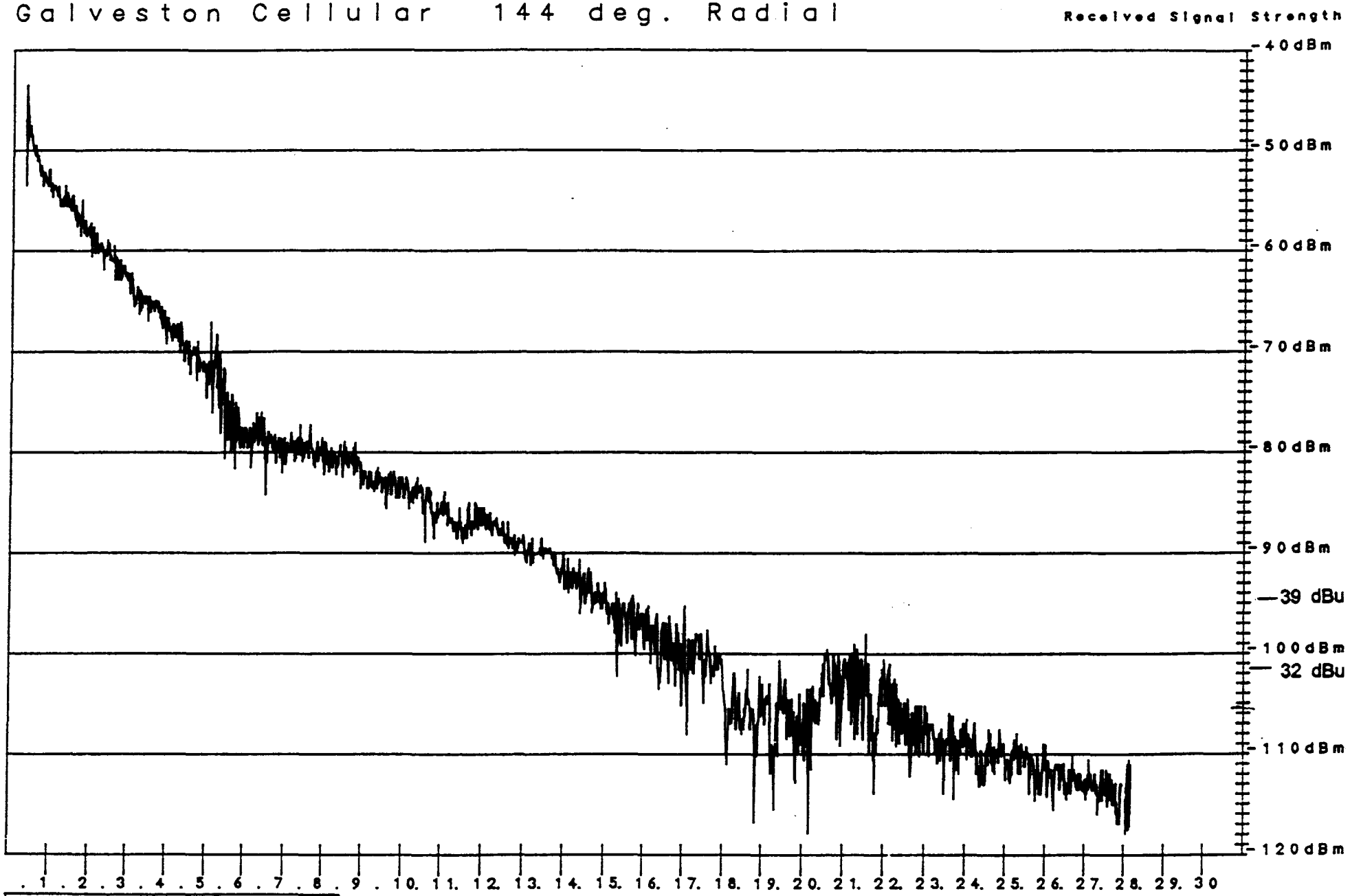
Coastel 144 deg. Radial



CH 338 COASTEL TEST XMTR
DISTANCE FROM FLAGSHIP
GALVESTON TX

FIGURE #10

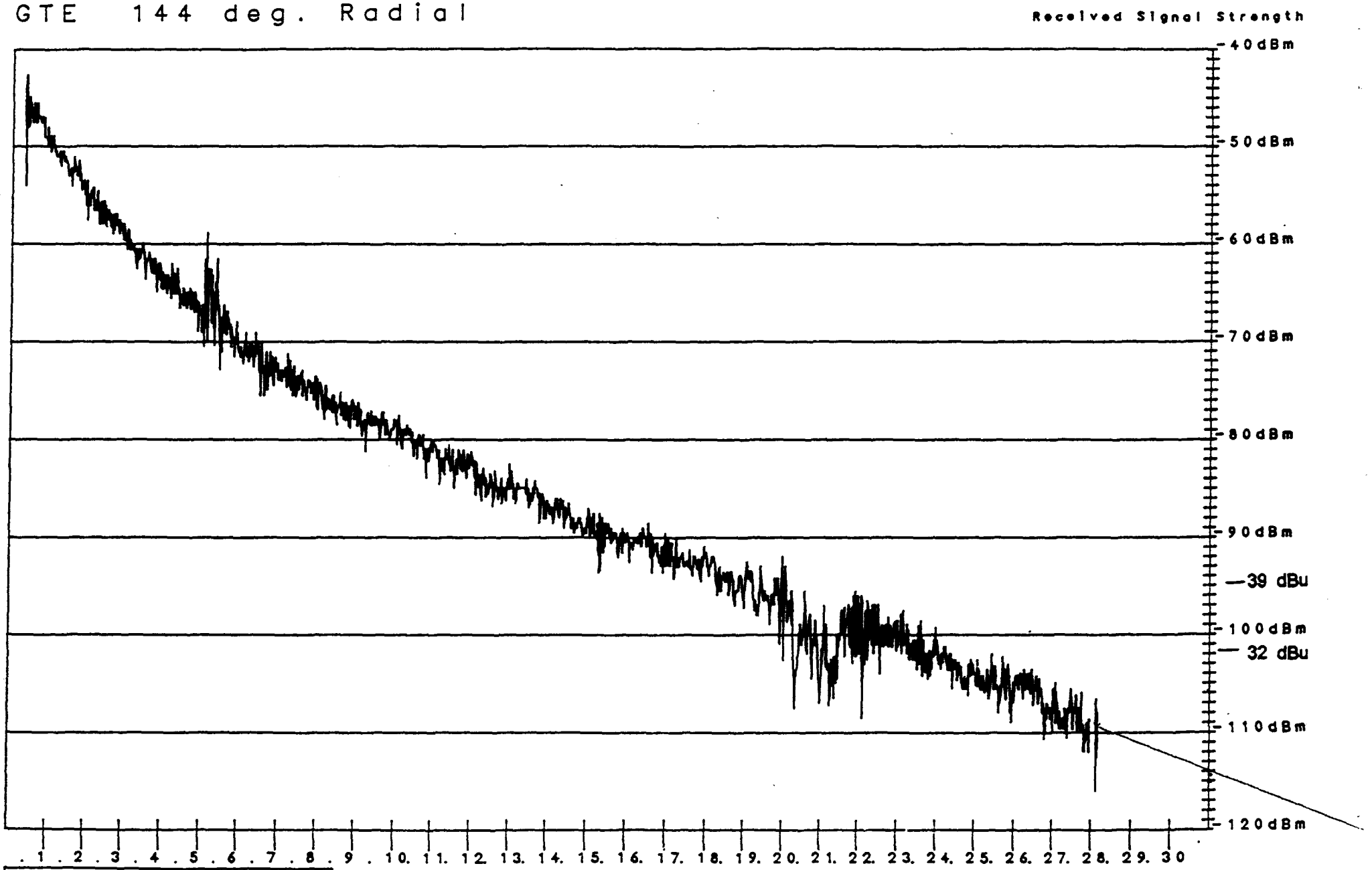
Galveston Cellular 144 deg. Radial



CH 332 GALVESTON CELLULAR
DISTANCE FROM FLAGSHIP
GALVESTON TX

FIGURE #11

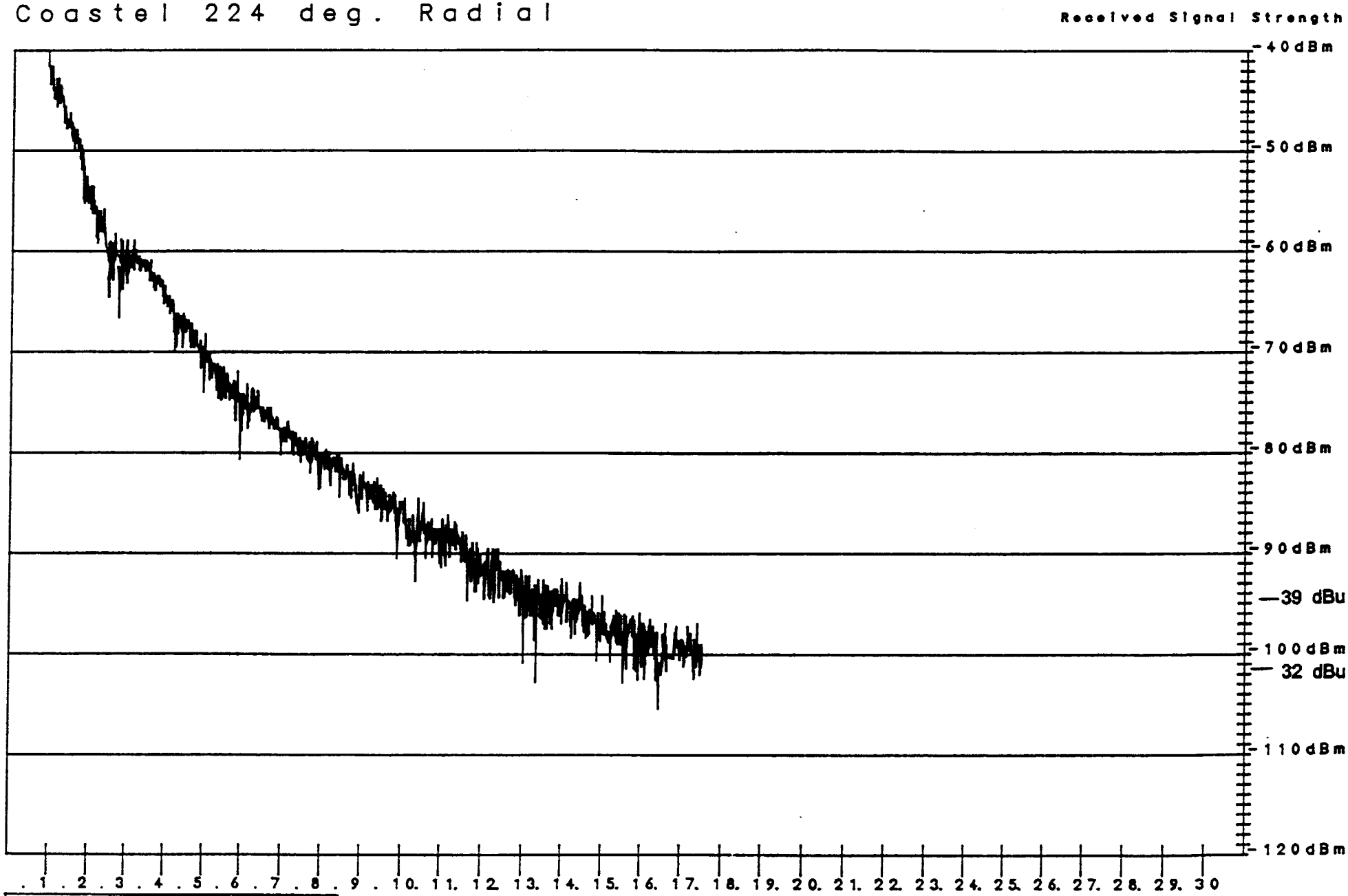
GTE 144 deg. Radial



CH 352 GTE GALVESTON OMNI
DISTANCE FROM FLAGSHIP
GALVESTON TX

FIGURE #12

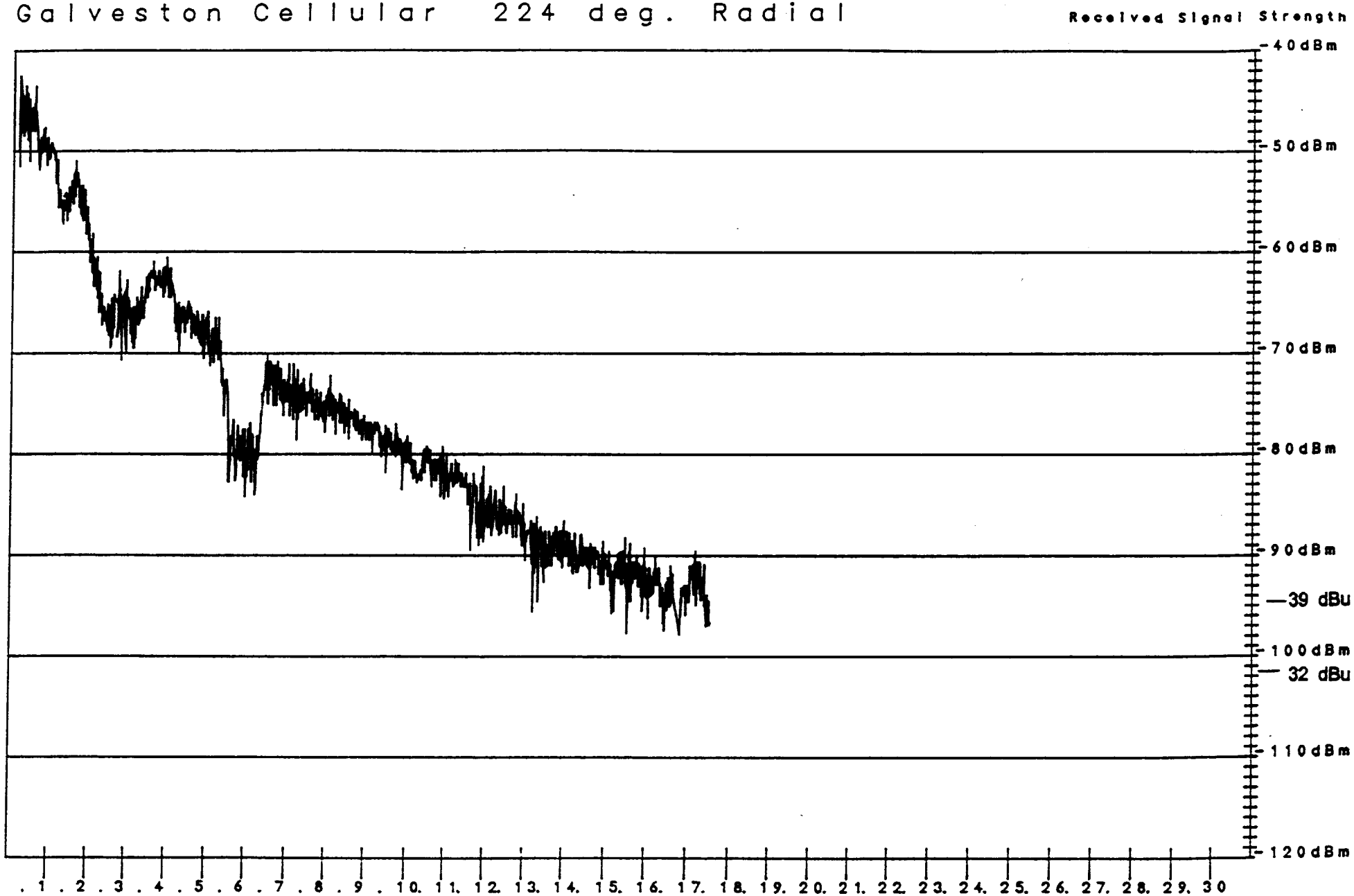
Coastel 224 deg. Radial



CH 338 COASTEL TEST XMTR
DISTANCE FROM FLAGSHIP
GALVESTON TX

FIGURE #13

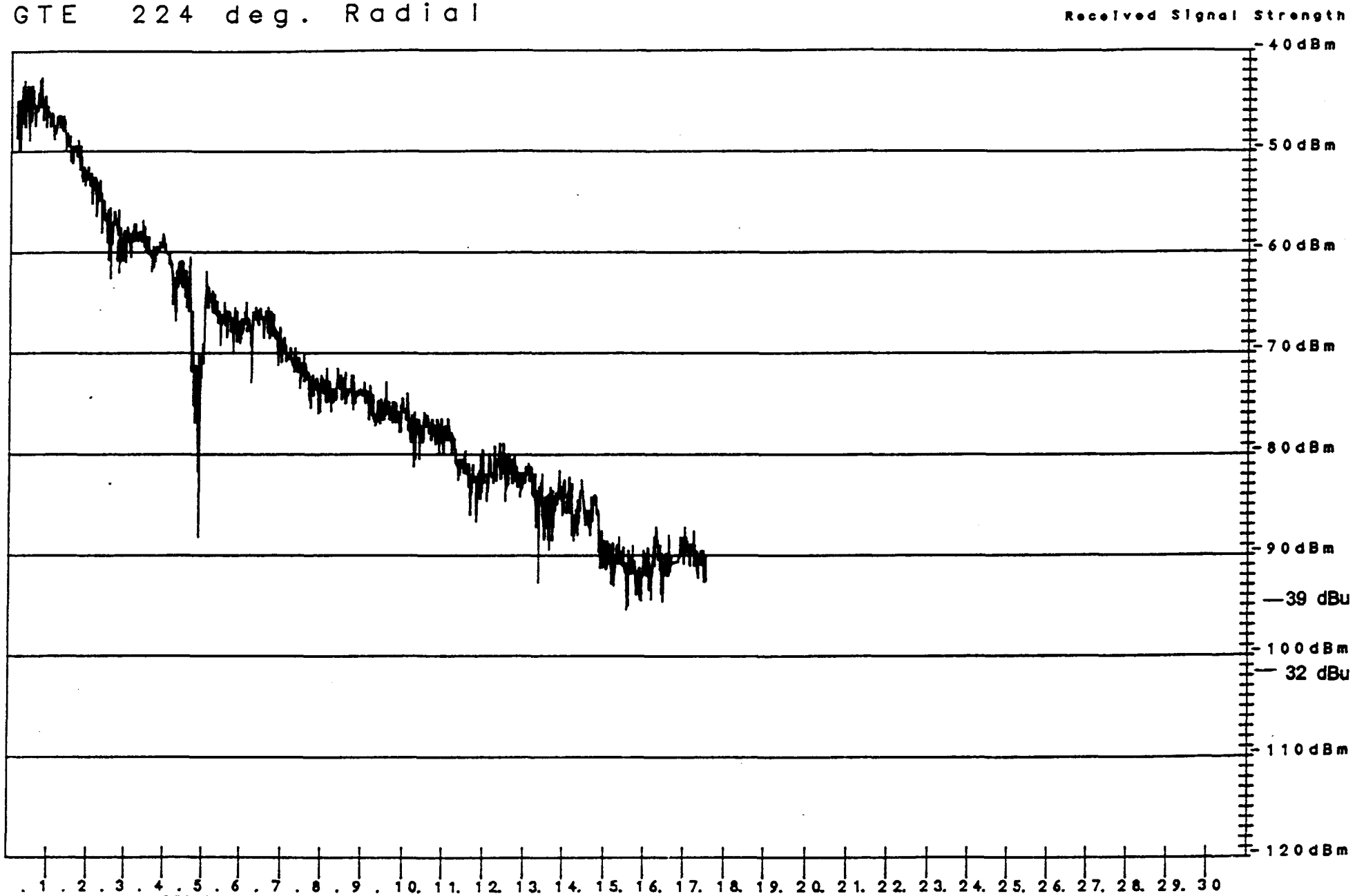
Galveston Cellular 224 deg. Radial



CH 332 GALVESTON CELLULAR
DISTANCE FROM FLAGSHIP
GALVESTON TX

FIGURE #14

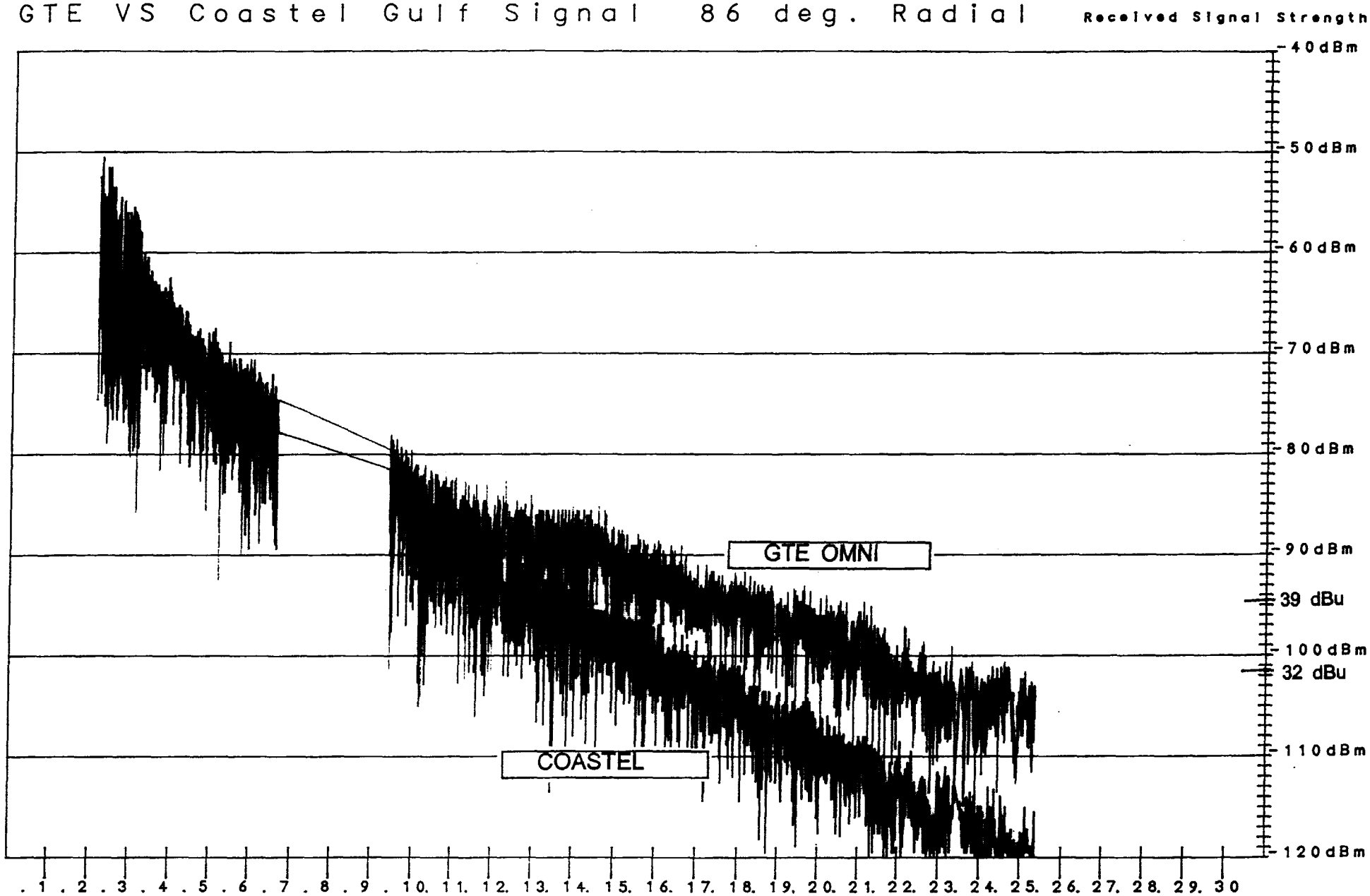
GTE 224 deg. Radial



CH 352 GTE GALVESTON OMNI
DISTANCE FROM FLAGSHIP
GALVESTON TX

FIGURE #15

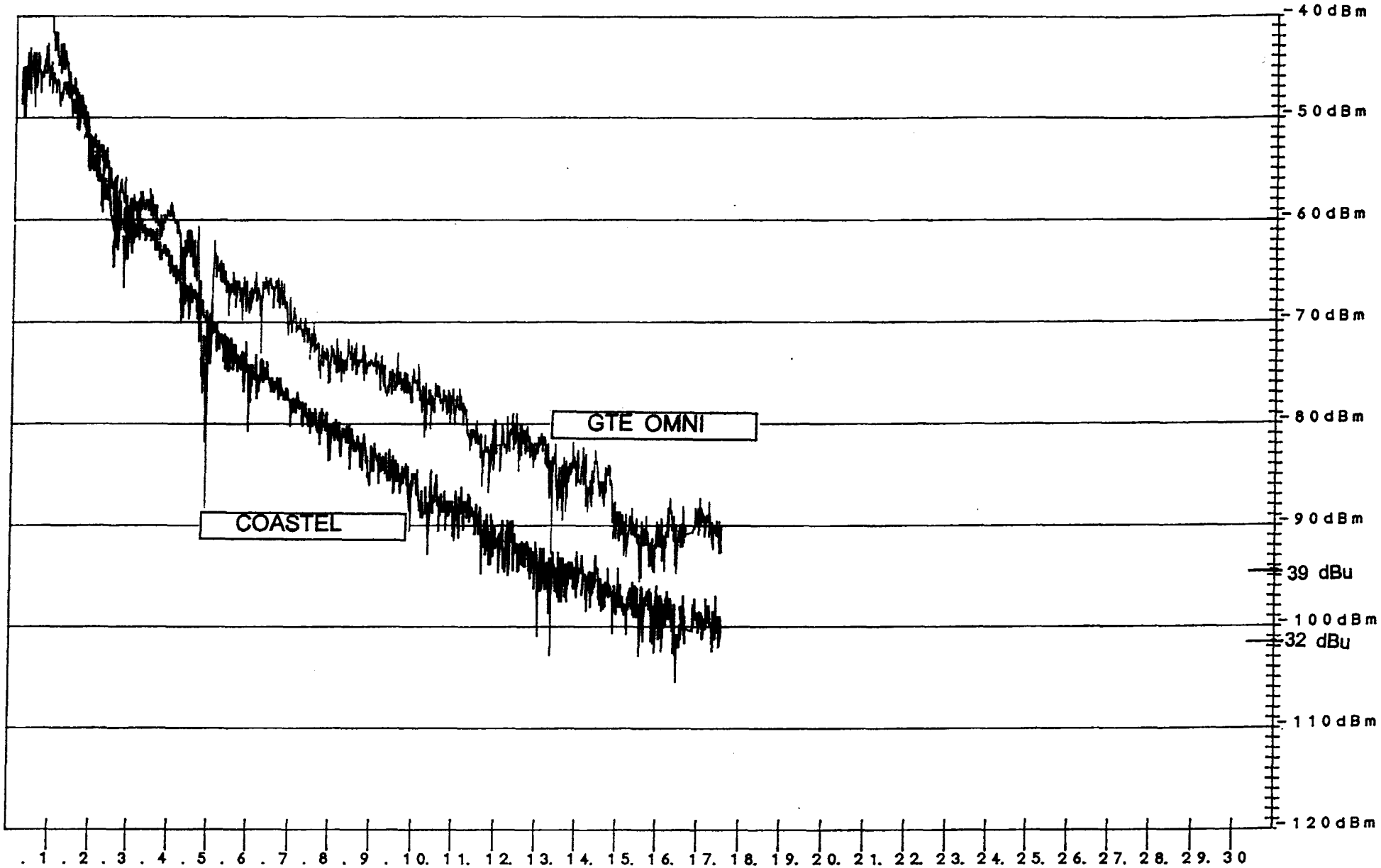
GTE VS Coastel Gulf Signal 86 deg. Radial



KEY:
BLACK: COASTEL CH 338
RED: GTE CH 352

FIGURE #16

GTE VS Coastel Gulf Signal 224 deg. Radial



KEY:
BLACK: COASTEL CH 338
RED: GTE CH 352

FIGURE #17

TABLE II

LAND DATA TABULATION FILE 1

Marker #1 32ND & BROADWAY

GALVESTON CELLULAR	-51.53
GTE GALVESTON OMNI	-51.30
COASTEL TEST XMTR	-116.64

Marker #2 33RD & M

GALVESTON CELLULAR	-45.94
GTE GALVESTON OMNI	-52.77
COASTEL TEST XMTR	-113.75

Marker #3 33RD & O

GALVESTON CELLULAR	-50.17
GTE GALVESTON OMNI	-57.00
COASTEL TEST XMTR	-117.08

Marker #4 33RD & R

GALVESTON CELLULAR	-56.75
GTE GALVESTON OMNI	-56.34
COASTEL TEST XMTR	-92.90

Marker #6 33RD & SEAWALL

GALVESTON CELLULAR	-56.26
GTE GALVESTON OMNI	-55.37
COASTEL TEST XMTR	-63.91

Marker #7 SEAWALL & 37TH

GALVESTON CELLULAR	-65.04
GTE GALVESTON OMNI	-67.80
COASTEL TEST XMTR	-59.96

Marker #8 SEAWALL & 41ST

GALVESTON CELLULAR	-61.65
GTE GALVESTON OMNI	-62.70
COASTEL TEST XMTR	-63.98

Marker #9 SEAWALL & 45TH

GALVESTON CELLULAR	-64.51
GTE GALVESTON OMNI	-65.91
COASTEL TEST XMTR	-66.61

Marker #10 SEAWALL & SAN LUIS SIGN

GALVESTON CELLULAR	-75.95
GTE GALVESTON OMNI	-72.16
COASTEL TEST XMTR	-71.51

Marker #11 SEAWALL & 57TH

GALVESTON CELLULAR	-70.87
GTE GALVESTON OMNI	-68.26
COASTEL TEST XMTR	-72.94

Marker #12 SEAWALL & 61ST

GALVESTON CELLULAR	-69.71
GTE GALVESTON OMNI	-68.79
COASTEL TEST XMTR	-71.03

Marker #13 SEAWALL & 67TH

GALVESTON CELLULAR	-80.73
GTE GALVESTON OMNI	-78.29
COASTEL TEST XMTR	-77.62

Marker #14 SEAWALL & 69TH

GALVESTON CELLULAR	-69.72
GTE GALVESTON OMNI	-62.89
COASTEL TEST XMTR	-80.46

Marker #15 SEAWALL & 75TH

GALVESTON CELLULAR	-77.18
GTE GALVESTON OMNI	-75.97
COASTEL TEST XMTR	-82.35

Marker #16 SEAWALL & 81ST

GALVESTON CELLULAR	-80.63
GTE GALVESTON OMNI	-77.00
COASTEL TEST XMTR	-79.77

Marker #17 SEAWALL & 89

GALVESTON CELLULAR	-76.37
GTE GALVESTON OMNI	-73.97
COASTEL TEST XMTR	-82.53

Marker #18 SEAWALL & 7 1/2 MI RD

GALVESTON CELLULAR	-74.32
GTE GALVESTON OMNI	-75.27
COASTEL TEST XMTR	-98.71

Marker #19 SEAWALL & FM 3005

GALVESTON CELLULAR	-79.13
GTE GALVESTON OMNI	-77.64
COASTEL TEST XMTR	-98.01

Marker #20 SEAWALL & PEAN

GALVESTON CELLULAR	-77.73
GTE GALVESTON OMNI	-76.11
COASTEL TEST XMTR	-100.58

Marker #21 SEAWALL & PABST

GALVESTON CELLULAR	-79.97
GTE GALVESTON OMNI	-78.68
COASTEL TEST XMTR	-97.64

LAND DATA TABULATION FILE 2

Marker #1 PABST & SEAWALL HWY 3005

GALVESTON CELLULAR	-79.69
GTE GALVESTON OMNI	-80.65
COASTEL TEST XMTR	-94.98

Marker #2 SEAWALL & ANDERSON WAY

GALVESTON CELLULAR	-77.76
GTE GALVESTON OMNI	-76.96
COASTEL TEST XMTR	-95.27

Marker #3 SEAWALL & 89TH

GALVESTON CELLULAR	-74.54
GTE GALVESTON OMNI	-75.12
COASTEL TEST XMTR	-77.49

Marker #4 SEAWALL & 83RD

GALVESTON CELLULAR	-78.52
GTE GALVESTON OMNI	-77.84
COASTEL TEST XMTR	-77.63

Marker #5 STEWART RD & 83RD

GALVESTON CELLULAR	-78.86
GTE GALVESTON OMNI	-77.18
COASTEL TEST XMTR	-96.07

Marker #6 BEACON RD & 83RD

GALVESTON CELLULAR	-73.50
GTE GALVESTON OMNI	-77.84
COASTEL TEST XMTR	-105.82

Marker #7 AIRPORT RD & 83RD

GALVESTON CELLULAR	-65.57
GTE GALVESTON OMNI	-73.45
COASTEL TEST XMTR	-105.33

Marker #8 AIRPORT RD & HOPE BLVD

GALVESTON CELLULAR	-71.38
GTE GALVESTON OMNI	-74.57
COASTEL TEST XMTR	-107.64

Marker #9 JONES BLVD & 73RD & OAK

GALVESTON CELLULAR	-69.94
GTE GALVESTON OMNI	-71.34
COASTEL TEST XMTR	-107.50

Marker #10 JONES BLVD & STEWART

GALVESTON CELLULAR	-60.95
GTE GALVESTON OMNI	-61.74
COASTEL TEST XMTR	-103.86

Marker #11 61ST(BUTTERROWE) & STEWART

GALVESTON CELLULAR	-65.27
GTE GALVESTON OMNI	-68.62
COASTEL TEST XMTR	-105.20

Marker #12 61ST(BUTTERROWE) & CAUSEWAY

GALVESTON CELLULAR	-57.15
GTE GALVESTON OMNI	-59.17
COASTEL TEST XMTR	-106.61

Marker #13 61ST(BUTTERROWE) & BROADWAY

GALVESTON CELLULAR	-56.31
GTE GALVESTON OMNI	-60.33
COASTEL TEST XMTR	-107.61

Marker #14 53RD & BROADWAY

GALVESTON CELLULAR	-49.26
GTE GALVESTON OMNI	-60.75
COASTEL TEST XMTR	-113.08

Marker #15 51ST & BROADWAY

GALVESTON CELLULAR	-49.18
GTE GALVESTON OMNI	-60.27
COASTEL TEST XMTR	-111.25

Marker #16 51ST & BERNARDO DE GALVEZ

GALVESTON CELLULAR	-67.46
GTE GALVESTON OMNI	-71.62
COASTEL TEST XMTR	-106.26

Marker #17 51ST & R

GALVESTON CELLULAR	-71.05
GTE GALVESTON OMNI	-67.85
COASTEL TEST XMTR	-101.99

Marker #18 R & 47TH

GALVESTON CELLULAR	-67.71
GTE GALVESTON OMNI	-64.57
COASTEL TEST XMTR	-108.00

Marker #19 R & 44TH

GALVESTON CELLULAR	-69.25
GTE GALVESTON OMNI	-66.05
COASTEL TEST XMTR	-107.22

Marker #20 R & 41ST

GALVESTON CELLULAR	-74.39
GTE GALVESTON OMNI	-69.40
COASTEL TEST XMTR	-104.11

Marker #21 41ST & O 1/2

GALVESTON CELLULAR	-57.22
GTE GALVESTON OMNI	-58.50
COASTEL TEST XMTR	-113.29

Marker #22 41ST & N 1/2

GALVESTON CELLULAR	-56.90
GTE GALVESTON OMNI	-60.40
COASTEL TEST XMTR	-118.68

Marker #23 N 1/2 & MIKE GAIDO

GALVESTON CELLULAR	-65.47
GTE GALVESTON OMNI	-59.41
COASTEL TEST XMTR	-116.38

Marker #24 N 1/2 & 35TH

GALVESTON CELLULAR	-52.11
GTE GALVESTON OMNI	-43.64
COASTEL TEST XMTR	-114.96

Marker #25 35TH & R

GALVESTON CELLULAR	-58.58
GTE GALVESTON OMNI	-50.52
COASTEL TEST XMTR	-98.69

Marker #26 R & 53RD

GALVESTON CELLULAR	-59.11
GTE GALVESTON OMNI	-52.30
COASTEL TEST XMTR	-96.33

Marker #27 R & MLK

GALVESTON CELLULAR	-61.85
GTE GALVESTON OMNI	-61.97
COASTEL TEST XMTR	-91.44

Marker #28 28TH & SEAWALL

GALVESTON CELLULAR	-55.74
GTE GALVESTON OMNI	-57.06
COASTEL TEST XMTR	-68.16

Marker #29 SEAWALL & FLAGSHIP

GALVESTON CELLULAR	-59.50
GTE GALVESTON OMNI	-61.69
COASTEL TEST XMTR	-66.84

Marker #30 SEAWALL & TREMONT

GALVESTON CELLULAR	-62.38
GTE GALVESTON OMNI	-65.22
COASTEL TEST XMTR	-70.30

Marker #31 SEAWALL & MOODY AVE

GALVESTON CELLULAR	-66.38
GTE GALVESTON OMNI	-67.01
COASTEL TEST XMTR	-84.53

Marker #32 SEAWALL & 17TH

GALVESTON CELLULAR	-67.80
GTE GALVESTON OMNI	-69.06
COASTEL TEST XMTR	-89.03

Marker #33 SEAWALL & CHRISTOPHER COLUMBUS

GALVESTON CELLULAR	-68.08
GTE GALVESTON OMNI	-67.46
COASTEL TEST XMTR	-90.24

Marker #34 SEAWALL & 10TH

GALVESTON CELLULAR	-63.91
GTE GALVESTON OMNI	-64.06
COASTEL TEST XMTR	-101.75

Marker #35 SEAWALL & BROADWAY

GALVESTON CELLULAR	-60.44
GTE GALVESTON OMNI	-64.94
COASTEL TEST XMTR	-96.52

Marker #36 STEWART BEACH

GALVESTON CELLULAR	-66.61
GTE GALVESTON OMNI	-66.35
COASTEL TEST XMTR	-111.57

Marker #37 SEAWALL & APPFEL

GALVESTON CELLULAR	-73.34
GTE GALVESTON OMNI	-79.90
COASTEL TEST XMTR	-98.09

Marker #38 APPFEL & LAKESIDE DR.

GALVESTON CELLULAR	-64.01
GTE GALVESTON OMNI	-66.89
COASTEL TEST XMTR	-104.92

Marker #39 APPFEL PARK AT END OF ROAD

GALVESTON CELLULAR	-77.12
GTE GALVESTON OMNI	-79.44
COASTEL TEST XMTR	-109.74

Marker #40 APPFEL PARK AT JETTY

GALVESTON CELLULAR	-78.53
GTE GALVESTON OMNI	-80.62
COASTEL TEST XMTR	-111.64

LAND DATA TABULATION FILE 3

Marker #3 FERRY & SEAWALL

GALVESTON CELLULAR	-63.02
GTE GALVESTON OMNI	-61.74
COASTEL TEST XMTR	-105.58

Marker #4 BARRACUDA & HOLIDAY

GALVESTON CELLULAR	-86.97
GTE GALVESTON OMNI	-86.76
COASTEL TEST XMTR	-118.82

Marker #5 STRAND & 6TH

GALVESTON CELLULAR	-74.55
GTE GALVESTON OMNI	-76.42
COASTEL TEST XMTR	-118.63

Marker #6 STRAND & 15

GALVESTON CELLULAR	-72.51
GTE GALVESTON OMNI	-71.80
COASTEL TEST XMTR	-114.27

Marker #7 15 & MECHANIC

GALVESTON CELLULAR	-66.55
GTE GALVESTON OMNI	-70.70
COASTEL TEST XMTR	-118.39

Marker #8 18 & MECHANIC

GALVESTON CELLULAR	-71.15
GTE GALVESTON OMNI	-72.23
COASTEL TEST XMTR	-119.34

Marker #9 20 & MECHANIC

GALVESTON CELLULAR	-68.88
GTE GALVESTON OMNI	-75.05
COASTEL TEST XMTR	-118.33

Marker #10 TREMONT & MECHANIC

GALVESTON CELLULAR	-60.11
GTE GALVESTON OMNI	-58.27
COASTEL TEST XMTR	-111.99

Marker #11 TREMONT & AVE G

GALVESTON CELLULAR	-57.11
GTE GALVESTON OMNI	-49.90
COASTEL TEST XMTR	-106.96

Marker #12 23(TREMONT) & BROADWAY

GALVESTON CELLULAR	-53.97
GTE GALVESTON OMNI	-61.60
COASTEL TEST XMTR	-104.21

Marker #13 23(TREMONT) & URSILINE

GALVESTON CELLULAR	-63.15
GTE GALVESTON OMNI	-65.32
COASTEL TEST XMTR	-96.16

Marker #14 23(TREMONT) & P 1/2

GALVESTON CELLULAR	-56.44
GTE GALVESTON OMNI	-62.27
COASTEL TEST XMTR	-84.83

Marker #15 25TH & P 1/2

GALVESTON CELLULAR	-56.36
GTE GALVESTON OMNI	-59.42
COASTEL TEST XMTR	-90.03

Marker #16 26TH & P 1/2

GALVESTON CELLULAR	-61.32
GTE GALVESTON OMNI	-60.89
COASTEL TEST XMTR	-87.88

Marker #17 29TH & P 1/2

GALVESTON CELLULAR	-57.76
GTE GALVESTON OMNI	-57.60
COASTEL TEST XMTR	-100.56

Marker #18 29TH(MLK) & O

GALVESTON CELLULAR	-59.20
GTE GALVESTON OMNI	-60.56
COASTEL TEST XMTR	-103.39

Marker #19 29TH(MLK) & M

GALVESTON CELLULAR	-50.51
GTE GALVESTON OMNI	-53.82
COASTEL TEST XMTR	-105.28

Marker #20 29TH(MLK) & BROADWAY

GALVESTON CELLULAR	-58.00
GTE GALVESTON OMNI	-51.45
COASTEL TEST XMTR	-107.58

Marker #21 29TH(MLK) & AVE E

GALVESTON CELLULAR	-45.23
GTE GALVESTON OMNI	-47.90
COASTEL TEST XMTR	-102.76

Marker #22 33RD & MARKET

GALVESTON CELLULAR	-44.19
GTE GALVESTON OMNI	-62.22
COASTEL TEST XMTR	-103.99