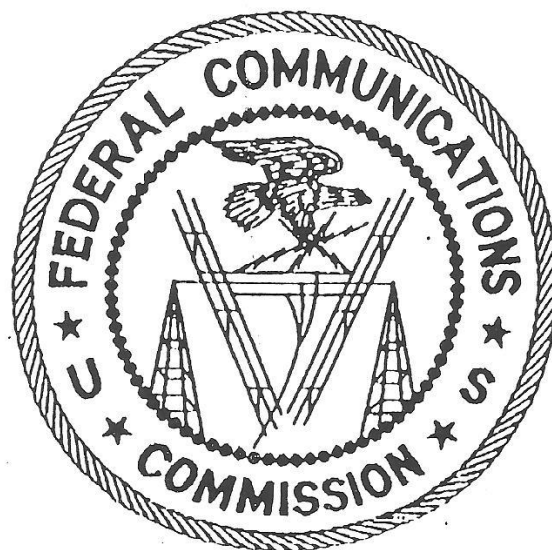


TELEPHONE INTERFERENCE SURVEY

February 28, 1994



Telephone Interference Survey

Background

The Federal Communications Commission (FCC) receives 25,000 complaints per year from individuals who are unable to use their telephones because nearby radio stations interfere with the proper operation of the telephones. Whenever the radio stations are on the air, the telephones pick up their transmissions which then override any ongoing telephone conversation.

The FCC's Field Operations Bureau (FOB) has done an informal survey to obtain information about telephone interference such as:

- which telephones are affected
- what type transmitting stations are involved
- the power levels at which the stations were transmitting
- whether commonly available filters would be effective in eliminating the interference
- whether specially designed telephones would be effective in eliminating the interference

In setting forth the results of its informal survey, FOB emphasizes that, because this survey is based on a random sample it cannot be claimed that identical results would be derived under scientific surveying and testing, nor should the results be construed as FCC endorsement or criticism of any particular manufacturer's product. Rather, FOB believes these results to be a good "first look" at the problem.

Procedure

Thirty-five FCC field offices across the country participated in the survey. Each office was to choose three recent complaints of telephone interference on a random basis, and then to investigate the complaints.

At the transmitting station FOB staff would determine the type of station (i.e., amateur, citizens band, broadcast, etc.), measure the station power, and obtain information on antenna height, antenna gain, and distance from the complainant.

At the complainant's location, FOB would disconnect all telephones, take them to a chosen telephone jack, and plug them in one at a time while the station was transmitting. FOB would then record which telephones received interference and which did not.

FOB also tested the effectiveness of several commercially-available telephone filters, connecting the filters to telephones which were receiving interference while the radio station was transmitting.

Finally, FOB connected "bulletproof" telephones to the telephone jacks and observed whether these telephones received interference. A "bulletproof" telephone is one that is specially designed to be immune to interference.

Findings

Types of Transmitting Stations

FOB inspected 108 transmitting stations which were involved in the telephone interference complaints, as follows:

| | |
|-------------------------|----|
| Citizens Band | 47 |
| Amateur | 27 |
| AM Broadcast | 23 |
| FM Broadcast | 10 |
| International Broadcast | 1 |

Power Levels

The power levels of the radio transmitting stations varied from two watts to half a million watts. One-third of the transmitting stations operated with less than ten watts, and one-third of the interfering stations were broadcast stations using between 3000 and half a million watts. Attachment 1 lists the power levels of the transmitting stations.

Types of Telephones

FOB tested 241 telephones found in the complainants' residences for interference. Of the 241 telephones 68 percent received interference. Attachment 2 lists the telephones tested. FOB did not observe interference on 32 percent of the telephones it tested. These telephones are listed in Attachment 3.

Types of Filters

FOB tested the effectiveness of the AT&T Z100B1 filter on 138 telephones receiving interference. After connecting the filter to the telephones, 62 percent of the telephones continued to receive interference. The filter did eliminate interference on 38 percent of the telephones. A number of other filters were also tested on 82 telephones receiving interference. As a group these filters eliminated interference on 29 percent of the telephones. They did not eliminate interference on 71 percent of the telephones. Attachment 4 lists the filters which eliminated the interference.

ATTACHMENT 1

FIELD OPERATIONS BUREAU TELEPHONE INTERFERENCE SURVEY POWER LEVELS OF INTERFERENCE SOURCES

| | |
|---------------|------------|
| UNKNOWN | 2 sources |
| 2 watts | 4 sources |
| 3 watts | 7 sources |
| 4 watts | 14 sources |
| 5 watts | 7 sources |
| 6 watts | 1 source |
| 7 watts | 4 sources |
| 12 watts | 2 sources |
| 26 watts | 1 source |
| 30 watts | 1 source |
| 35 watts | 1 source |
| 50 watts | 1 source |
| 53 watts | 1 source |
| 54 watts | 1 source |
| 57 watts | 1 source |
| 75 watts | 1 source |
| 80 watts | 1 source |
| 100 watts | 5 sources |
| 101 watts | 1 source |
| 110 watts | 2 sources |
| 114 watts | 1 source |
| 131 watts | 1 source |
| 150 watts | 1 source |
| 160 watts | 1 source |
| 200 watts | 1 source |
| 250 watts | 1 source |
| 438 watts | 1 source |
| 462 watts | 1 source |
| 500 watts | 3 sources |
| 600 watts | 1 source |
| 800 watts | 1 source |
| 1,000 watts | 3 sources |
| 1,500 watts | 2 sources |
| 3,000 watts | 2 sources |
| 5,000 watts | 5 sources |
| 8,000 watts | 1 source |
| 10,000 watts | 4 sources |
| 16,000 watts | 1 source |
| 25,000 watts | 1 source |
| 50,000 watts | 11 sources |
| 51,000 watts | 4 sources |
| 54,000 watts | 1 source |
| 100,000 watts | 1 source |
| 500,000 watts | 1 source |

Total sources: 108

ATTACHMENT 2

FIELD OPERATIONS BUREAU
TELEPHONE INTERFERENCE SURVEY
TELEPHONES RECEIVING INTERFERENCE

| fo | fil | ix | power | att | oth | fcc | make | model |
|----|-----|-----|-------|-----|-----|-----|-----------------------------|--------------------------|
| DL | N | AMA | 800 | Y | Y | Y | SEARS | 34505 |
| LV | N | CB | 4 | N | N | | SEARS | SR-2000 |
| KI | N | FM | 3000 | N | | | SOUND DESIGN | 7255 AR |
| TP | Y | CB | 3 | N | N | Y | SOUNDESIGN | 7339 IVY |
| NY | Y | AMA | 100 | Y | Y | | SOUTHWESTERN BELL | FCC 2555 |
| BE | N | CB | 4 | | N | | SOUTHWESTERN BELL | FREEDOM PHONE |
| ST | Y | CB | 75 | N | N | Y | SOUTHWESTERN BELL | FREEDOM PHONE FC 2570 |
| BS | N | AM | 10000 | Y | N | | SOUTHWESTERN BELL | FT-325 |
| SF | N | AM | 50000 | | | | STROMBERG | IMAGE 1 AND IMAGE 2 DTMF |
| ST | Y | FM | 51000 | N | N | Y | TECHNICO | TT-2201 |
| SJ | N | CB | 26 | N | | Y | TELEFONICA HISPANO AMERICAN | TXE-1 |
| SJ | N | CB | 7 | N | | Y | TELEFONICA HISPANO AMERICAN | TXE-1 |
| TP | N | CB | 3 | N | N | Y | TELKO | 221 |
| ST | Y | CB | 4 | N | N | Y | THOMAS | PP9D NOSTALGIA PHONE |
| FE | N | AM | 50000 | Y | | | TIME LIFE (MADE IN TAIWAN) | (NONE) |
| DS | N | AM | 5000 | Y | Y | Y | TISONIC | PT-91 |
| LV | Y | CB | 5 | N | N | | ULTRASONIC | 019 |
| KC | N | FM | 8000 | N | | | UNIDEN | TRIMLINE |
| FE | N | AM | 50000 | Y | | | UNISONIC | (NONE) |
| AL | Y | AM | 5000 | N | N | N | UNISONIC | (NONE) |
| VB | Y | CB | 30 | Y | | | UNISONIC | 6434 |
| BM | N | CB | 4 | N | N | Y | UNISONIC | 9370 |
| PL | Y | AM | 5000 | Y | Y | Y | WESTERN ELECTRIC | (NONE) |
| DT | N | AM | 438 | Y | | Y | WESTERN ELECTRIC | (NONE) ROTARY DIAL PHONE |
| DT | N | AM | 438 | | | | WESTERN ELECTRIC | (NONE) ROTARY DIAL PHONE |
| NF | N | AMA | 1500 | Y | Y | Y | WESTERN ELECTRIC | AS543M-62587-TE-T |
| PA | N | AMA | 110 | N | | Y | WESTERN ELECTRIC | CS 2500 DMG 84121 |

fo=office fil=filter already attached? ix=ix source (AM/FM/CB/AMATEUR/International Broadca
att=AT&T 7 100 R1 filter eliminate ix? oth=other filters eliminate ix?
fcc=FCC 'bulletproof' telephones free from ix?

ATTACHMENT 2

FIELD OPERATIONS BUREAU
TELEPHONE INTERFERENCE SURVEY
TELEPHONES RECEIVING INTERFERENCE

| fo | fil | ix | power | att | oth | fcc | make | model |
|----|-----|-----|--------|-----|-----|-----|-----------------------------|----------------------------|
| PO | N | AM | 50000 | Y | N | | GENERAL ELECTRIC | 2-90511RA |
| MA | N | CB | 6 | N | | | GENERAL ELECTRIC | 2-9166B |
| CG | N | AM | 50000 | Y | | Y | GENERAL ELECTRIC | 2-9166B |
| TP | Y | CB | 4 | N | | Y | GENERAL ELECTRIC | 2-9167A |
| KC | N | CB | 2 | Y | | Y | GENERAL ELECTRIC | 2-9212BLB |
| LV | Y | CB | 4 | N | N | | GENERAL ELECTRIC | 2-9243 |
| DT | N | AM | 438 | | | | GENERAL ELECTRIC | 2-9243C |
| KC | N | FM | 8000 | N | | | GENERAL ELECTRIC | 2-9355A |
| LV | Y | CB | 5 | N | N | | GENERAL ELECTRIC | 2-9356 |
| VB | N | AMA | 100 | Y | | | GENERAL ELECTRIC | 2-9400C |
| HL | N | FM | 54000 | | | | GENERAL ELECTRIC | 2-94050A |
| HL | N | FM | 54000 | | | | GENERAL ELECTRIC | 2-94050A |
| HL | N | FM | 54000 | | | | GENERAL ELECTRIC | 2-94050A |
| HL | N | FM | 54000 | | | | GENERAL ELECTRIC | 2-94050A |
| MA | N | CB | 6 | N | | | GENERAL ELECTRIC | 2-9420A |
| HU | N | FM | 100000 | N | | | GENERAL ELECTRIC | 2-9675A |
| PS | Y | CB | 5 | Y | Y | Y | GENERAL ELECTRIC | 2-9892A |
| DV | N | CB | 2 | Y | Y | Y | GENERAL ELECTRIC | 2-9895A |
| LV | N | CB | 4 | N | N | | GENERAL ELECTRIC | 29270 A |
| DV | N | AM | 5000 | Y | | | GENERAL ELECTRIC | 7-4700A |
| LA | N | AM | 5000 | Y | Y | | GENERAL ELECTRIC | CRYSTAL CLEAR PLUS |
| BF | N | CB | 5 | N | | Y | GENERAL ELECTRIC | MEMORY MODEL 21 |
| MA | N | CB | 6 | Y | | | GENERAL ELECTRIC | NO 29420A |
| SD | N | CB | 54 | N | N | | GENERAL ELECTRIC | SPEAKER PHONE 2-9375F |
| CG | N | AMA | 1500 | | | | GENERAL ELECTRIC | TL-5/TPS |
| PO | N | AMA | 35 | Y | N | | GTE | 58821 |
| ST | Y | FM | 51000 | N | N | Y | GTE | 7400 |
| GI | N | AMA | 101 | Y | | | GTE | AUTO ELEC -WALL PHONE |
| GI | N | AMA | 101 | Y | | | GTE | AUTOMATIC ELECTRIC |
| PL | N | AM | 5000 | | N | | IMA | (NONE) |
| AL | Y | AM | 5000 | N | N | Y | ITT (CORINTH TELECOM. CORP) | 3480 FEATURE TELEPHONE |
| DS | N | FM | 3000 | Y | N | Y | LENEX SOUND | P4316 |
| PL | N | AM | 5000 | | | | LLOYDS (PHONE-CLOCK-RADIO) | T510 |
| HU | N | CB | 110 | N | | | LONE STAR | 912 |
| PA | N | CB | 4 | | | Y | LONE STAR | TRIMLINE |
| BS | N | CB | 5 | N | N | | LOTTEL | 5020 DUEL LINE |
| BS | N | CB | 5 | N | N | | LOTTEL | 5020 DUEL LINE |
| FE | N | AMA | 131 | N | | | NORTHERN TELECOM | FCC REG #AB6982-68817-TE-T |
| AN | N | FM | 51000 | Y | Y | | NORTHERN TELECOM | NT3L00AA |
| DT | Y | CB | 5 | Y | N | Y | NORTHERN TELECOM | SYMPHONY 3000 |
| PS | N | AMA | 200 | N | N | Y | NORTHWESTERN BELL | "EASY TOUCH" |
| SD | Y | CB | 12 | N | | | NORTHWESTERN BELL | BASIC TGT 51450 |
| LV | N | CB | 4 | N | N | | PAC BELL | TR 2203 CHAC |
| PO | Y | AM | 50000 | N | N | | PACTEL | FE5700 |
| DS | N | AMA | 500 | N | Y | | PANASONIC | EASA-PHONE VA-8205 |
| NY | N | AMA | 100 | Y | Y | | PANASONIC | EASA-PHONE-AUTO LOGIC |
| BS | N | AM | 10000 | N | N | | PANASONIC | EASE PHONE KX-TX175-B |
| TP | Y | CB | 3 | N | N | Y | PANASONIC | KX-T-2420 |
| SF | Y | AMA | 250 | Y | N | | PANASONIC | KX-T-3155 |
| DV | N | AMA | 114 | N | Y | Y | PANASONIC | KX-T2315 |
| DL | N | CB | 4 | Y | Y | Y | PANASONIC | KX-T2315 |
| PO | Y | AM | 50000 | Y | Y | | PANASONIC | KX-T2355 |
| CG | N | AMA | 1500 | N | | Y | PANASONIC | KX-T2355 |
| ST | Y | AM | 10000 | N | N | Y | PANASONIC | KX-T2622 EASAPHONE |
| HL | N | AMA | 462 | | | | PANASONIC | KX-T3145 |
| OR | N | AM | 50000 | N | Y | | PANASONIC | KXT 2388 |
| KI | N | CB | 5 | N | | | PHONE MATE | 3900 |
| NF | N | CB | 7 | Y | N | Y | PHONEMATE | 3950 |
| GI | Y | AMA | 101 | N | | | PHONEMATE | 4650 |
| BS | N | AM | 10000 | N | N | | RADIO SHACK | 209 DUCPHONE 43-617A |
| DS | N | FM | 3000 | | | Y | RADIO SHACK | 43-384 |
| PS | Y | CB | 5 | | | | RADIO SHACK | 43-384 |
| DT | N | CB | 3 | | | Y | RADIO SHACK | 43-625 DUOFONE 202 |
| TP | Y | CB | 4 | N | | Y | RADIO SHACK | 43.430 |
| PO | Y | AM | 50000 | Y | N | | RADIO SHACK | DUOPHONE TAD-250 |
| OR | N | CB | 4 | Y | | | RADIO SHACK | ET 200 |
| LR | N | CB | | N | | | SANYO | TA S 855 |
| AT | N | CB | 160 | N | | Y | SEARS | 3293 4761550 SR 3000 |
| KI | N | FM | 3000 | N | | | SEARS | 34403 |

fo=office fil-filter already attached? ix=ix source (AM/FM/CB/AMateur/International Broadcast)
att=AT&T 2 100 B1 filter eliminate ix? oth=other filters eliminate ix?
fcc=FCC 'bulletproof' telephones free from ix?

ATTACHMENT 2

FIELD OPERATIONS BUREAU
TELEPHONE INTERFERENCE SURVEY
TELEPHONES RECEIVING INTERFERENCE

| fo | fil | ix | power | att | oth | fcc | make | model |
|----|-----|-----|--------|-----|-----|-----|------------------|-------------------------|
| DL | N | AMA | 800 | N | N | Y | (UNKNOWN) | (UNKNOWN) |
| AL | N | CB | 4 | N | N | Y | (UNKNOWN) | (UNKNOWN) |
| PL | N | CB | 2 | N | N | Y | AT&T | (NONE) |
| DT | N | CB | 5 | N | N | Y | AT&T | (NONE) (FCC AS593M-702) |
| LR | N | AM | 1000 | Y | | | AT&T | 100 |
| KI | N | FM | 3000 | N | | | AT&T | 1306 |
| KI | N | AMA | 100 | N | | | AT&T | 1504 |
| DV | N | AM | 5000 | Y | Y | Y | AT&T | 150E |
| NY | N | CB | 3 | Y | Y | | AT&T | 1510 |
| PO | N | AMA | 35 | Y | N | | AT&T | 1521 |
| BS | N | AM | 10000 | Y | N | | AT&T | 1532 |
| GI | N | AMA | 53 | N | N | | AT&T | 1611 |
| DL | Y | CB | 5 | N | | Y | AT&T | 1618 |
| KI | N | AMA | 100 | N | | | AT&T | 210 |
| KI | N | AMA | 100 | N | | | AT&T | 210 |
| DS | N | AM | 5000 | | | Y | AT&T | 210 |
| DS | Y | AMA | 500 | N | Y | | AT&T | 210 |
| NF | Y | CB | 3 | Y | N | Y | AT&T | 210 |
| PL | N | AMA | 1000 | Y | Y | Y | AT&T | 530 |
| DL | N | AMA | 800 | Y | Y | Y | AT&T | 5455 |
| GI | N | AMA | 101 | N | | | AT&T | 610 |
| BF | N | AMA | 100 | N | | Y | AT&T | 710 |
| KI | N | CB | 5 | N | | | AT&T | 720 |
| CG | N | AMA | 1000 | Y | | Y | AT&T | 720 |
| KC | Y | CB | 4 | N | | Y | AT&T | 725 |
| GI | N | AMA | 101 | N | | Y | AT&T | 725 |
| PA | N | CB | 3 | N | | | AT&T | 732 |
| HL | N | AMA | 462 | N | N | | AT&T | 732 |
| MA | Y | AMA | 600 | N | | | AT&T | AOH9RN 10451-TE-E |
| LR | Y | CB | 4 | N | | | AT&T | AS 550Z 71597 |
| MA | N | AMA | 50 | N | | | AT&T | ASSSOZ-71597-TE-E |
| DT | N | AM | 438 | | | | AT&T | MODEL 1506 |
| NY | N | AM | 25000 | N | N | | AT&T | PRINCESS |
| BM | N | CB | 7 | N | N | Y | AT&T | PRINCESS AS 550 2-71 |
| PA | N | CB | 3 | N | | Y | AT&T | SPKK REMOTE & ANS MAC |
| PO | N | AM | 50000 | Y | Y | | AT&T | SW204 |
| BM | N | FM | 16000 | Y | N | Y | AT&T | TRIMLINE 210 |
| BF | Y | AM | 50000 | N | | Y | AT&T | TRIMLINE 210 |
| DL | N | CB | 5 | Y | | Y | AT&T | TRIMLINE 220 |
| NF | N | AMA | 1500 | Y | Y | Y | AT&T | TRIMLINE AS550Z-7159 |
| ST | N | AM | 10000 | Y | N | Y | AUDIOVOX | AT-11 |
| PO | N | AM | 50000 | Y | N | | BELL | FAVORITE |
| PL | N | AM | 5000 | | | Y | BELL | TT 51490 |
| KI | N | CB | 5 | N | | | BELL PHONES | 100-5800 |
| AT | Y | CB | 160 | N | N | Y | BELL SOUTH | 2000 |
| BS | N | AM | 50000 | Y | N | | BELL SOUTH | 227V |
| DT | N | CB | 3 | | | | BELL SOUTH | 473 |
| KI | N | CB | 5 | N | | | BELL SOUTH | 473 |
| DS | N | AM | 5000 | | | Y | BELL SOUTH | 473 |
| MA | N | AMA | 600 | | | | BELL SOUTH | CWIMLA-61669-ANN |
| OR | N | AMA | 100 | N | Y | | BELL SOUTH | DPK-62W70687-TE-T |
| AT | N | IB | 500000 | N | | Y | BELL SOUTH | HAC 572 |
| PS | Y | AMA | 150 | N | N | Y | BELL SOUTH | TP-201 L-10 |
| SF | N | AM | 50000 | Y | | | CANON | FAX-350 |
| PO | Y | AMA | 500 | Y | | | CODE-A-PHONE | 1610 |
| LA | Y | AM | 50000 | N | N | | COMDIAL | 25270-IY |
| SF | N | AM | 50000 | | | | COMDIAL | VOICE EXPRESS |
| ST | N | CB | 75 | N | N | Y | CONAIR | PR 1000 |
| AT | Y | CB | | Y | | Y | CONAIR | PR 5001 |
| LV | N | CB | 57 | N | N | | CONAIR | SW 2502 |
| TP | N | CB | 5 | | | | CONAIR | SW204 |
| BE | N | AMA | 80 | | N | | CONAIR | SW204A |
| PO | N | AM | 50000 | Y | | | CONAIR | TR1001 |
| AN | N | FM | 51000 | Y | Y | | CONAIRPHONE | PR1006 |
| PO | Y | AMA | 500 | Y | | | CONAIRPHONE | PRIMA SERIES |
| DT | N | CB | 3 | N | N | Y | CONAIRPHONE | SW-102 |
| HL | N | AM | 10000 | | | | DELTA | HEK-EB-200DSIHF-EXT |
| SD | N | CB | 12 | N | | | FORTEL CORP | RECORD A CALL #2140 |
| SF | N | CB | 2 | N | N | | GENERAL ELECTRIC | 12-MEMORY 2-9240A |

fo=office fil=filter already attached? ix=ix source (AM/FM/CB/AMateur/International)
att=AT&T 7 100 B1 filter eliminate ix? oth=other filters eliminate ix?

ATTACHMENT 3

FIELD OPERATIONS BUREAU
TELEPHONE INTERFERENCE SURVEY
TELEPHONES NOT RECEIVING INTERFERENCE*

| off | filter | make | model |
|-----|--------|------------------|-------------------------------|
| NF | Y | AT&T | 1316C |
| DL | N | AT&T | 1321 |
| SF | N | AT&T | 1323 |
| NY | N | AT&T | 5200 |
| SF | N | AT&T | 5200 |
| BF | N | AT&T | 5400 |
| ST | N | AT&T | 5600 |
| PA | N | AT&T | 60921 |
| CG | N | AT&T | 700 |
| ST | N | AT&T | 730 |
| PA | N | AT&T | ANS MACHINE |
| PA | N | AT&T | AS5 THA-60921-MT-E |
| DL | N | AT&T | CS8702A |
| DL | Y | AT&T | NE-229A |
| OR | N | AT&T | OLD DIAL STYLE |
| BF | Y | AT&T | TRIMLINE |
| BM | N | BELL SOUTH | 665 CORDLESS PHONE |
| HU | N | BELL SOUTH | HAE-701 |
| OR | N | BELL SYSTEM | TRIMLINE |
| AL | N | COBRA | AN-8519 |
| DT | N | COBRA | ST-410 |
| SD | N | CODE A PHONE | 8100 |
| AL | N | CONAIR CORP | XS2400 |
| LV | N | CONAIR | CORPORATE AMERICA |
| BS | N | DAK INDUSTRIES | DAL-4000 AX |
| NF | Y | DAK INDUSTRIES | DK 4000 AX |
| CG | N | GANDALF | COMDIAL |
| AL | N | GENERAL ELECTRIC | 2-9051LRB |
| KC | N | GENERAL ELECTRIC | 2-9800B |
| BM | N | GTE | (UNKNOWN) |
| ST | N | GTE | 980 SLIMLINE |
| PS | N | ITT | 183499-236 |
| FE | N | ITT | 500D |
| AN | N | ITT | RJ11C |
| AL | N | LENNOX SOUND | PH-319 |
| HL | N | UNKNOWN (CHINA) | FCC #: GEZ 364-16521 TE-E |
| HL | N | NORTHERN TELECOM | SYMPHONY 1000 |
| DV | N | NW BELL | FAVORITE PLUS DHT6CJ-14584-TE |
| BS | N | PANASONIC | EASE PHONE-ONE LINE |
| HU | N | PANASONIC | GASA-PHONE |
| DV | N | PANASONIC | KX-T-3120 |
| HL | N | PANASONIC | KXT-2355 |
| KC | N | PHONEMATE | 4300 |
| ST | N | RADIO SHACK | 43-368A |
| FE | N | RADIO SHACK | 43-500 |
| FE | N | RADIO SHACK | 43-5018 |
| DV | N | RADIO SHACK | 43-621 |
| OR | N | SEARS | 329 34451750 |
| DT | N | SEARS | 34413 |
| GI | N | SEARS | HAC 3466 |
| ST | N | SEARS | SR 3000 SERIES |
| SF | N | SHARP | UX-172 |
| SF | N | SOUND DESIGN | AM/FM CLOCK RADIO PHONE |

*This list does not include 11 telephones which received interference in one

ATTACHMENT 3

FIELD OPERATIONS BUREAU
TELEPHONE INTERFERENCE SURVEY
TELEPHONES NOT RECEIVING INTERFERENCE*

| off | filter | make | model |
|-----|--------|------------------|--------------------|
| AL | N | SPECTRA PHONE | TL-4 |
| DT | N | STC TELECORP INC | SOUNDDESIGN 7255 |
| ST | N | TELECONCEPTS | (NONE) |
| NF | N | WESTERN ELECTRIC | (UNKNOWN) |
| BM | N | WESTERN ELECTRIC | (UNKNOWN) |
| DL | N | WESTERN ELECTRIC | (UNKNOWN) |
| KC | Y | WESTERN ELECTRIC | (UNKNOWN) |
| LA | N | WESTERN ELECTRIC | "LA OLYMPIC PHONE" |
| PA | N | WESTERN ELECTRIC | 2554 BMPG-82103 |
| BS | N | WESTERN ELECTRIC | RB 1311 (ROTARY) |
| NF | Y | WESTERN ELECTRIC | TRIMLINE #CS 2224A |
| NF | N | WESTERN ELECTRIC | TRIMLINE PHONE |

ATTACHMENT 4

FIELD OPERATIONS BUREAU
TELEPHONE INTERFERENCE SURVEY
OTHER FILTERS TESTED

| | |
|--------------------|---|
| K-COM RF-1 | 1 |
| K COM RF1 | 3 |
| RADIO SHACK-SNAPON | 1 |
| TCE | 1 |
| TCE536 | 2 |
| TCE TP12 | 4 |
| TEC RF1400 | 2 |
| TII 931-W1 | 2 |

The filters listed here deserve further study. During the project, FOB found that these filters eliminated interference when tried in individual cases. However, because FOB did not use any of these filters in a sufficient number of cases, we cannot conclude whether any of them would be effective in eliminating interference most of the time.

Attachment 5

FCC BULLET PROOF PHONE

| Manufactuer | Make | Address |
|------------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------|
| Pro Distributors (\$79.95 plus shipping) | Western Electric Desk Model Touch Tone | 2811 74th Street, Lubbock, TX 1-800 (658 2027) |
| TCE Labs | | Rural Route 9 Box 243D New Branufels, TX 78133 (512 899-595 |

Note: All phones were refurbished, internally modified commerical units.

(\$49.95)

"Bulletproof Telephones"

The FCC tested "bulletproof" telephones at 52 locations where the individuals were receiving interference to their telephones. The "bulletproof" telephones eliminated interference at 96 percent of the locations.

Conclusions

The transmitting stations most likely to cause telephone interference are citizens band, amateur, and broadcast stations. Citizens band stations accounted for half the telephone interference cases. Amateur stations and broadcast stations accounted for the other half.

The power levels used by the radio transmitting station did not appear to be a significant factor in causing telephone interference. Power levels of 10 watts or less caused telephone interference in a third of the cases.

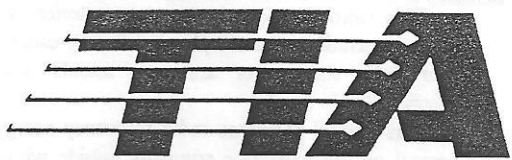
A large portion of the residential telephones appeared to be susceptible to interference from nearby radio transmitting stations. Although some telephones did not receive interference, the limited nature of the testing performed in conjunction with this survey would not support the conclusion that they would always reject interference.

Telephone interference filters cannot be relied upon to eliminate telephone interference: in two out of three cases in the test sample, they did not work. Manufacturers can design telephones to be interference free. "Bulletproof" telephones were immune from interference virtually all of the time.

A Final Note

Notwithstanding the 25,000 reports of telephone interference the FCC has received to date, it is FOB's experience that, as large as this number is, it probably represents only a fraction of the actual instances in which this interference occurs. Given the enormous numbers of instances in which this type of interference is experienced by consumers, it is our hope that this survey, notwithstanding its informality, will serve as a catalyst for affected parties to productively address and resolve this problem. As always, FOB remains ready to assist in that effort.

TELECOMMUNICATIONS



INDUSTRY ASSOCIATION

**What to do if you have
interference problems on
your telephone from radio,
TV stations or other sources.**

Radio Frequency Interference

**What is it? What causes it? Who's responsible?
How to fix it.**

Radio frequency energy comes primarily from radio and TV stations, amateur (ham) and citizens band radios, cordless and cellular telephones, and other devices that use radio transmitters.

This radio frequency energy can interfere with the normal operation of a telephone. It may cause you to hear radio stations or annoying sounds over your telephone.

It is normal for some radio frequency energy to be present on the telephone company outside wiring even though you may not hear anything in your telephone receiver. However, in unusual cases, audible interference present on the telephone company's wiring must be referred to the telephone company for correction.

You should be aware that if you call the telephone company and request a special inspection and the trouble is found in your wiring or telephone, the telephone company may charge you for a service call.

Contacting Telephone Manufacturers

You may wish to contact the manufacturer of your telephone directly. The manufacturer's telephone number can usually be found in the user's manual provided with the telephone or, in some cases, on the bottom of the telephone. Ask if the manufacturer provides a filter to solve your problem or has any other solution to eliminate the radio interference problem; also ask the manufacturer as to whether or not it charges for its services.

If you are unable to contact the manufacturer, most interference problems can be solved by performing the following three steps:

Step 1: Determining the source of the interference

By carefully listening on the telephone handset, you may be able to identify the source of the interference. The following table can help in this step.

| <u>Interference Source</u> | <u>Characteristics</u> |
|---------------------------------|-----------------------------------------------|
| Amateur and Citizens Band Radio | Speech switches on and off and may be garbled |
| AM Radio | Music, speech |
| TV, FM Radio | Garbled music and speech |
| Cordless Telephone | Speech |

If an amateur or citizens band radio transmitter is causing interference, the transmitter is probably located within a few blocks of your house. The transmitters may be identified by the outdoor antenna that they use. Most operators will be pleased to work with you towards a solution.

If you are experiencing interference from a radio or TV station, the station is probably operating within the law (rules are set forth by the Federal Communications Commission). The radio or TV station owners may be required to help you solve your interference problem depending, in part, on how far you live from the station. If the radio or TV station is not required to solve your interference problem, then it is your responsibility and this guide is intended to help you.

Other possible sources of interference include noise generated by fluorescent lights, light dimmers, and motors. Determine if the noise occurs only when such a device is turned on.

Step 2: Determining where the interference is being picked up

Radio interference usually enters your telephone through one or more of the following paths:

- the coiled handset cord of your telephone;
- line cord of your telephone;
- the telephone set;
- other telephone equipment;
- internal telephone wiring in your house;
- external wiring to your house.

A) To check the coiled handset cord, bundle the cord in your hand while listening to the telephone. Continue to listen to the telephone while stretching the handset cord out. If the interference is noticeably louder with the cord stretched out, the cord is acting like a radio antenna.

Also, try moving around the room with the handset cord stretched out. Avoid using cords longer than 10 feet if you are experiencing interference problems.

B) Repeat the test described in Step 2-A on the line cord, the cord connecting the telephone to the wall jack. (Does not apply to wall telephones which have no line cord.)

C) If you have a neighbor whose telephone operates normally, you may wish to consider borrowing your neighbor's telephone to see if it corrects your problem when plugged into your telephone jack. If the interference disappears, then your telephone may be too sensitive to the interference. Go to Step 3.

D) To check the effect of other telephone equipment connected to your telephone line, such as answering machines, FAX machines, or computer modems, listen on the affected telephone while disconnecting and reconnecting all other telephone equipment one by one. (Do not disconnect an alarm system. This will send a false alarm that may cause you to be fined. Notify the alarm company if you suspect a problem in its equipment.) If the problem disappears when a given device is disconnected, then the source of the radio interference problem is associated with the device just taken off the line.

E) To check the telephone wiring in the house, try plugging the telephone into different jacks in the house (if you have more than one jack). If the house wiring is picking up the interference, the noise level that you hear at each jack may vary.

F) If the previous checks do not determine where the interference is being picked up, it may be occurring on the external wiring.

Step 3: Solving the problem

If, in Step 2, you have identified the handset cord, telephone line cord wiring, or your telephone as

the point of the interference, you may need to use a radio frequency interference filter (described below) or change your telephone to eliminate the interference. (See Step 2C.)

The application of a radio frequency interference filter is often an effective solution to correcting some interference problems. The following table gives examples of filters to use to eliminate the problem. They can all be easily installed on your telephone wiring without the use of tools.

| <u>Interference Source</u> | <u>Filter</u> |
|--------------------------------------|--------------------------------------------------------------------------------------------------|
| AM, Citizens Band, and Amateur Radio | AT&T Z100B1 (Single-line telephone), or AT&T Z200A (4-line telephone) |
| Citizens Band Radio | Northern Telecom CB suppressor: NTOC03CA (Single-line telephone), or NTOB14AA (2-line telephone) |
| Amateur Radio | Snap-On Filter Choke: Radio Shack model 273-104 |

Check the supplier's return policy before you purchase any device to eliminate interference. Purchase the appropriate filters from telephone stores or local electronics stores, or contact the filter manufacturers directly. When using filters, carefully follow the directions for proper installation. Following are some additional hints:

- Place filters on all equipment identified in Step 2.
- For maximum effectiveness, place a telephone line cord filter next to the telephone, not at the wall jack.
- If one filter works, but some interference is still present, try two filters.

For FM and TV station interference, filtering may not correct the problem; use the shortest practical handset cord and avoid extending it. You may have to change your telephone. (See Step 2C.)