

TONING IN A NOISY ENVIRONMENT

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(577.5 hertz) and a narrowband filter in the detection circuit.

1. PURPOSE

1.01 A family of new test sets is now available. These test sets can be used to a distinct advantage over test sets that are presently specified in the Bell System Practices.

1.02 This section is intended to define when and how these test sets can be used to an advantage. This instruction will also identify the relevant Bell System Practices.

2. GENERAL

2.01 The tone generators are the basic elements of this new procedure. The tone generators provide a tone (577.5 hertz) that is stable to within 1 hertz. This tone is spaced between troublesome harmonics of the power sources, thus allowing for detection with extremely narrowband filters.

2.02 The combination of a precision tone and a narrowband filter will permit an employee to perform operations in the presence of noise and power influence in areas where such an operation is not possible using the conventional equipment.

3. BENEFITS OF USING PRECISION TONE AND NARROWBAND FILTER

3.01 The following is a list of operations that can be accomplished in the presence of noise and power influence by using the precision tone

- (1) Identification of pairs
- (2) Location of buried cable and pipe using low frequency techniques (93B test set)
- (3) Fault Location
 - (a) Open shields in buried cables (B ground probe, AT-8681)
 - (b) Exploring coil (101B and 105D test sets)
- (4) Routine cable tests where 500 hertz tones and amplifiers are used.

3.02 The 147-type amplifier while having a maximum gain near 500 hertz does not have a sharp cut off on either side.

Signal as Heard Without a Filter

3.03 Figure 1 illustrates frequency components that can be present on conductors in a cable that is located in an area where the influence of power lines is a problem. These power line frequency components are shown as solid lines. The precision tone is superimposed on this illustration as a dash line.

Signal as Heard With a Filter

3.04 Figure 2 shows the effect that the filter has in rejecting the power components.



To realize the advantage that the stable 577.5 hertz tone offers, a narrowband filter must be used in the tone detection circuit.

4. EQUIPMENT

4.01 Figure 3 illustrates those pieces of equipment that are capable of producing and receiving the precision tone.

NOTICE

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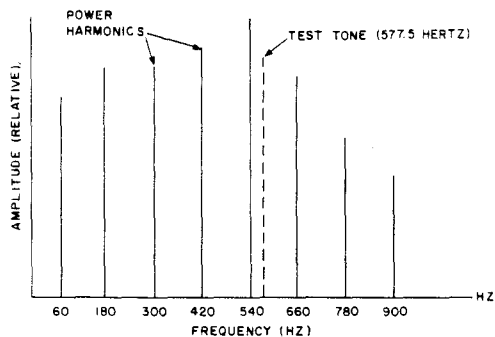


Fig. 1—Signal as Heard Without a Filter

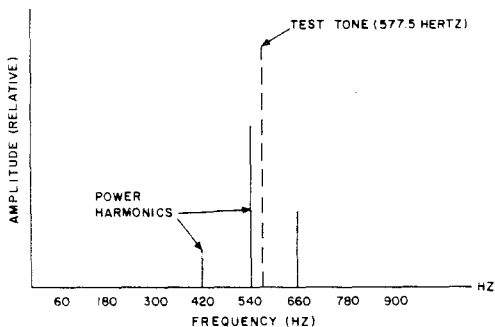


Fig. 2—Signal as Heard With a Filter

577.5 Hz Tone Sources

4.02 The tone sources include:

- (1) Tone of the KS-14103 L6 breakdown test set.
- (2) 138A test set
- (3) 146A test set.

577.5 Hz Receivers

4.03 The receiving arrangements include:

- (1) One 147C amplifier with a 1097A filter attached. The 147-type amplifier provides

the battery power for the 1097A filter when it is plugged into the "REC" jack. (The 1097A will not operate with the 147B amplifier.)

- (2) Two 147-type amplifiers with a F-59133 filter cord connecting the two amplifiers. (The loss introduced by the F-59133 filter must be compensated for by using an additional 147-type amplifier.)

Detectors

4.04 The following are typical detector devices:

- (1) 101B or 105D test set
- (2) B ground probe, AT-8681
- (3) 513A tool
- (4) 111A test set
- (5) 93B test set

5. APPLICATION

5.01 The following listed Bell System Practices define various operations where the precision tone and filter would provide an advantage over those equipments specified in environments where noise and power influence are bothersome.

| SECTION | TITLE |
|--------------|--|
| 106-300-100 | 91A TEST SET—DESCRIPTION AND MAINTENANCE |
| 106-340-115 | 101- AND 105-TYPE TEST SET—DESCRIPTION AND MAINTENANCE |
| 624-800-300* | MULTIPLE WIRE FAULT TESTING |
| 634-020-502 | CABLE TESTING—GENERAL DETECTING TONE WITH AN AMPLIFIER (513A Tool) |
| 634-200-501 | IDENTIFYING CONDUCTORS. 76C TEST SET (3.10) |
| 634-220-500 | LOCATING UNDERGROUND PIPES AND CABLES. LOW FREQUENCY METHOD (93B TEST SET) |

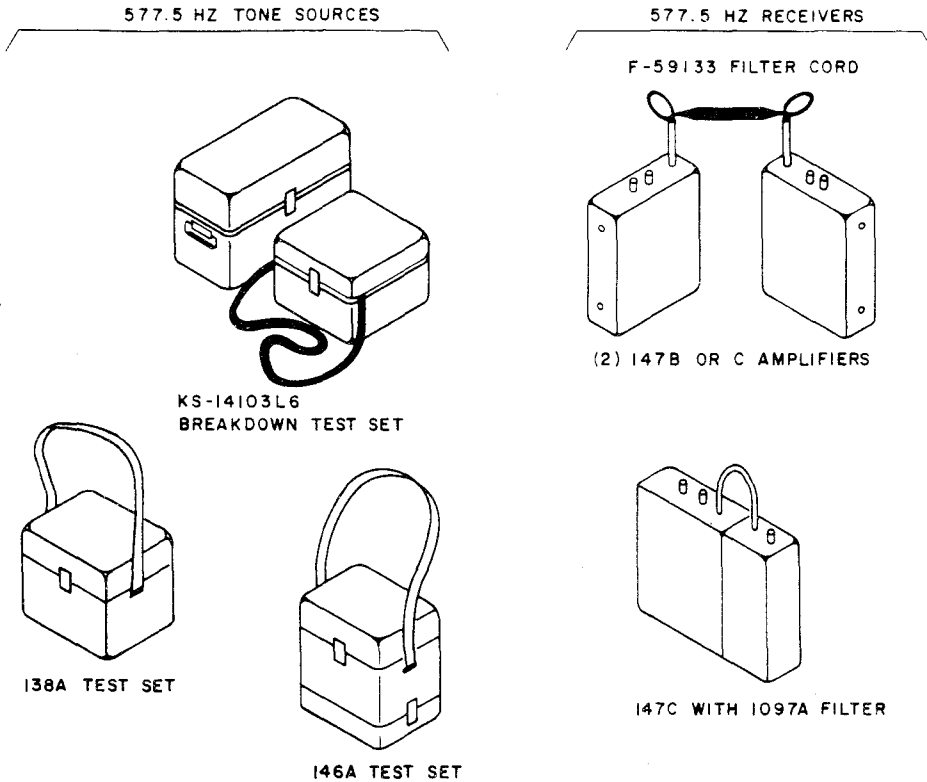


Fig. 3—The Precision Tone Family

| SECTION | TITLE | SECTION | TITLE |
|--------------|---|--------------|---|
| 634-220-505 | AT-8681 B GROUND PROBE DESCRIPTION AND USE | 634-305-505* | CABLE TESTING—GENERAL LOCATING FAULTS IN NON- LOADED CABLES BY THE EXPLORING COIL METHOD |
| 634-305-501* | FAULT LOCATING USING THE BREAKDOWN TEST SET (KS-14103 TYPE) | 634-355-501 | SECTION REPLACEMENT CABLE CONTAINING VOICE- FREQUENCY PAIRS (Audible- tone method) |
| 634-200-504* | 146A TEST SET—DESCRIPTION AND USE | | |

Note: Use the 138A test set as a tone source when fault locating with the KS-14103 L5 test set.

***Caution:** In order to prevent "carry-by" it is recommended that the tone source be set at the lowest level consistent with one's ability to trace the tone along a cable. The tone generators are provided with level controls for this purpose.