TYPE N2 REPEATER

REPEATERED HIGH-FREQUENCY LINE

CARRIER LINE-UP — HIGH-FREQUENCY

LINE MEASUREMENTS

CHECK OF 304-KHZ FREQUENCY

In N- and ON-type systems, frequency frogging is used in order to provide some self-equalization of the signals transmitted over the line and to block directional crosstalk paths. Low group frequencies fed into a low-high repeater are retransmitted as high group frequencies and high group frequencies fed into a high-low repeater are retransmitted as low group frequencies. To accomplish this, each N-type repeater is equipped with a local 304-kHz oscillator which provides the modulating carrier for the frogging function.

Because of temperature, aging effects, or improper adjustment at the factory, the 304-kHz oscillator could drift off its nominal frequency and thus cause a frequency error in the signals appearing at the repeater output. Depending upon a number of factors, this frequency error could accumulate along the line to as much as 25 Hz. Thus, the line signal at the receiving terminal may be offset by this amount with respect to the terminal bandpass filters. This problem is especially critical where ON systems are used with N-type lines, since the pilot frequencies in the ON systems are separated with narrow bandpass filters.

The performance of N3 carrier systems is generally not degraded because of the line frequency correction feature of these systems. Also, N1 and N2 systems are generally not degraded because the bandpass filter characteristic is wide enough for both sidebands with the carrier located in the center.

The purpose of this section is to provide instructions for measuring the oscillator frequency at type N2 repeaters. It is not necessary to make this measurement on a periodic basis, but if the overall line shows an excessive frequency error, this procedure should be used to identify the repeater or repeaters having an oscillator frequency out of limits. When measuring on working systems, caution should be exercised to avoid causing hits or interruptions on the carrier channels and systems.

APPARATUS:

1 — Electronic Frequency Counter (Hewlett-Packard Model 5232A or 5532A, or equivalent)

1 — Test Fixture per Fig. 1 (see note) to be made up locally

1 — Pomona Electronics 2BC-BNC-60 Cord or equivalent

1 — Cord (Fabricate as shown in Fig. 1 or use equivalent)

Note: This test fixture is required because there may be up to 150 vdc between the test points and ground and because under some field conditions there may also be stray low-frequency voltage which can cause erratic operation with some types of counters.

STEP	PROCEDURE
1	Energize the electronic counter and allow an adequate warmup period (10 to 30 minutes, as required) before performing tests. The counter should be checked for maximum accuracy capabilities in accordance with the specifications of the manufacturer.
2	Connect the counter input to the OSC E2 and NEG test points on the face of the N2 repeater using the test fixture shown in Fig. 1.
3	Set the function switch on the counter to read frequency with 1-second interval counting and read the output frequency to the closest 1 Hz. ***Requirement:*** 303,995 to 304,010 Hz (304,000 Hz nominal) ***Note:*** These limits apply when the temperature of the oscillator crystal is between 30° and 110° F. Frequency measurements performed at higher or lower temperatures may be lower than the above lower limit.
4	If the requirement of Step 3 is not met, the repeater should be replaced.

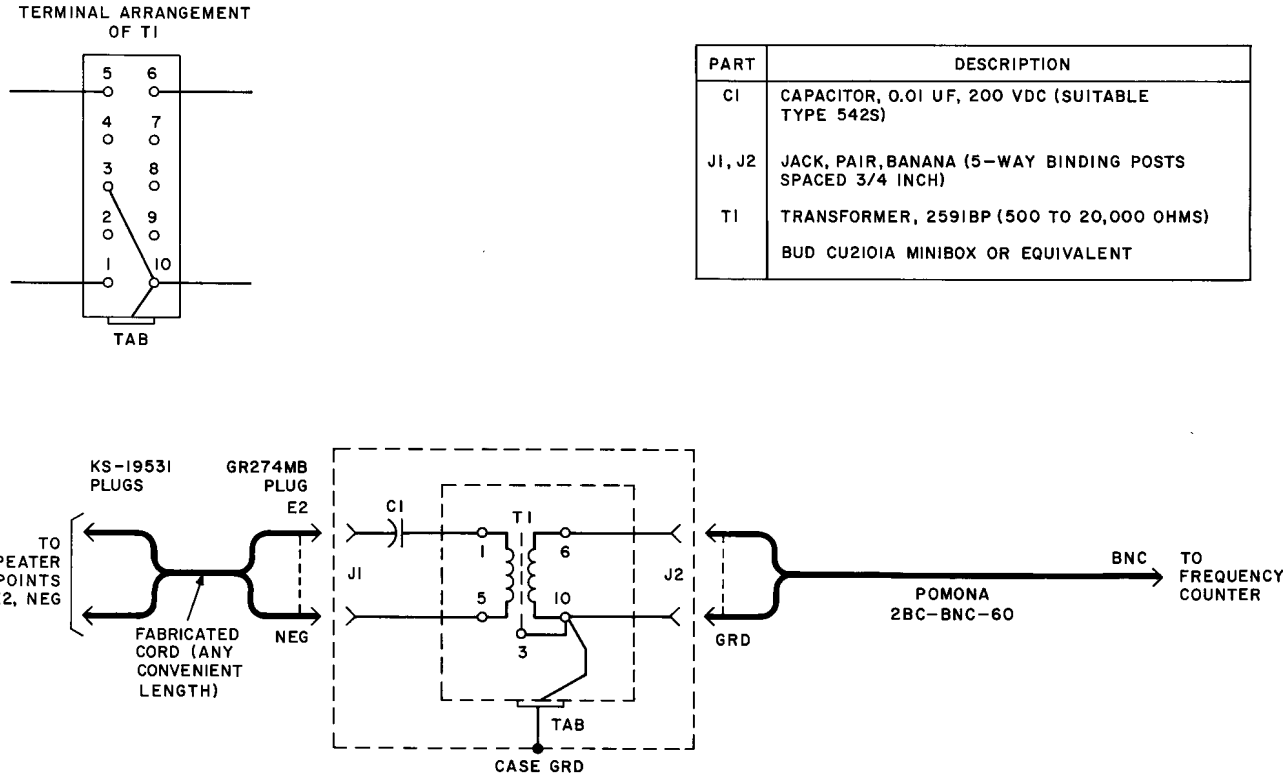

Fig. 1 — Test Fixture for 304-KHZ Frequency Check