

Description of Test Lines

Test line and test termination are terms sometimes used interchangeably to designate testing equipment, facility, circuit, or testing communication channel. These include simple passive terminations and relatively complex testing circuits capable of applying marginal signaling tests, transmission tests, and recognizing and replying to specific signals received.

Trunk test lines return off-hook (answered) supervision. This permits measurements to be made in the normal "in-service" (talk) condition.

Test lines are adjusted to provide correct level and impedance as measured at their actual switch appearance.

Test lines are reached by dialing a customer-type telephone number when testing toward a class 5 office, or by dialing from 3 to 7 digits when testing toward a toll (class 0-4) office.

NOTE: Test line directories are organized strictly by NPA-NXX relative to the serving switch, there may be test lines located in class 5 offices in adjacent bordering states that are, or are NOT within your local service area.

Class 5 office test lines are arranged to trip machine ringing and may furnish timed disconnect features when joint-holding and/or in-band signaling is used. Line equipment is arranged for terminating service only.

The 10X (ten X) codes are reserved system wide for assignment to special purpose test lines. If the function of a test line is equivalent to that of a test line assigned to 10X code, it is described as a "10X-type".

Following is a description of the various test lines:

- **100-type** provides a termination equivalent to the office switching impedance and is used for balance and noise tests. A typical sequence after seizure is:
 - off-hook supervision
 - 175 millisecond delay
 - 5.5 second burst of 1000 HZ tone
 - 5.5 second termination
 - 1 second interval of on-hook supervision
 - Termination with off-hook supervision until release by calling end.

Earlier versions are not equipped with timed test tone and may return repetitive 1 second intervals of on-hook every 10 seconds until released.

- **101-type manual** is a communication and manual test trunk to a Testboard Maintenance Center or PBX equipment room for purposes of obtaining assistance in trunk testing and as a termination for making two-person overall transmission tests.
- **102-type milliwatt** provides connection to a 1004 HZ power source (milliwatt) required for one-way transmission testing. Typical features are:
 - off-hook supervision
 - 175 millisecond delay
 - 1004 HZ at a reference level
 - 1 second interval of on-hook supervision, without tone, every 10 seconds until released
 - idle circuit termination during on-hook

Fixed PADs (TP2, TP9) and PAD switching signals are included in the test line, when required, to furnish proper reference level at switch.

- **104-type transmission measuring and noise checking** provides a test termination for 2-way transmission testing, a near-end noise measurement and far-end noise checking. This termination may be used to test trunks from offices equipped with automatic trunk test frames. It may also be used for manual 1-person 2-way transmission measurements from a test position.
- **105-type (local and toll)** provides access to a far-end automatic transmission measuring system (ATMS) responder. Two-way transmission, noise and gain-slope measurements may be made between the far-end responder under control of automatically or manually directed test equipment.
- **107-type** provides connection to a signal source that provides test signals for 1-way testing of data and voice transmission parameters (1004 HZ, 404 HZ and 2804 HZ). The test line provides a peak-to-average ratio (P/AR) signal, gain-slope frequencies, quiet termination, and intermodulation-distortion test signals. The test line also allows measurement of return loss, frequency shift, phase jitter, C-notched noise, impulse noise, gain hits, phase hits, and dropouts.
- **108-type non-inverting loopback** test line provides for digital testing capabilities between digital exchanges and/or digital PBXs. The digital loopback test line provides a dialable, 4-wire test line capability; it consists of circuitry that accepts and loops back received octets which are retransmitted so that the positions of the bits within the octets are preserved.
- **109-type echo canceler** test line provides loopback arrangements for in-service testing of far-end echo cancelers. Upon access, the test line returns off-hook supervision and, after a

2-second delay, returns a 1004 HZ tone at -10 DBMO for approximately 8 seconds. After an on-hook flash, a connection is made to a quiet termination.

- **606-type inverting loopback** test line provides operational and digital testing capability for switched digital trunks. This test line is used by the 1AESS for diagnostic (routine and demand) tests on 1AESS to digital switching system trunks.
- **103-type signal-supervisory** test line provides a connection to a supervisory and signaling test circuit for overall testing of these features on intertoll trunks equipped with ring forward (re-ring) features that can be reached by an automatic trunk test frame or by dialing manually. The features of the 103-type connection are:
 - On seizure, the test trunk returns an off-hook signal.
 - On receipt of a ring forward (re-ring) signal, the test trunk returns an on-hook signal.
 - On receipt of a second ring forward (re-ring) signal, the test trunk returns a 120 interruptions per minute (IPM) flash.
- **106-type loop around** test lines permit manual two way transmission measurements without far end assistance. Two test line numbers are required for access in class 5 offices.
 - Port A, seized alone, provides the functions of a 102-type test line.
 - Port B, seized alone, provides the functions of a 100-type test line.
 - Ports A and B, seized sequentially, enables the loop-around feature.

Trunk A is directed to port A and a far-near measurement is made and recorded. With port A held, trunk B is directed to port B. This loops the far end transmission paths of A and B.

A reference tone is transmitted near-far over trunk B and measured as far-near over trunk A. The first recorded measurement subtracted from the second measurement indicates the near-far loss of trunk B.

Early versions may not be equipped with reference tone, and the initial far-near measurement must first be ascertained from a 102-type test line. Also, some early versions do not trip ringing on port A until port B is seized.

NOTE: All loop-around test lines should be equipped with 60A control units.

- **Synchronous type** enables automatic and manual testing of the signaling and supervisory features of trunks not equipped to recognize ring forward signals.

After ringing signal and pretripping test, a 1.3 second synchronizing pulse (off-hook signal) is sent. This synchronizes the automatic progression test equipment in the originating office with the test line.

The synchronizing pulse is followed by three 0.2 second pulses of on-hook, separated by 0.3 second intervals of off-hook. During the off-hook periods, soak current is applied; during the on-hook periods, an open circuit is presented to the supervisory relays.

A third series of signals may be provided to test transfer features of Centrex offices.

Results of tests are as follows: 0.3 second bursts of audible ringing at 0.2 second intervals indicate that the trunk tripping feature operated on the pretripping tests, or a tick-tone at 120 IPM, without flash, indicates that all tests are completed.

- **Nonsynchronous type** - after ringing signal and tripping of ringing tests are made, flashing supervisory signals are sent. A typical sequence is:
 - 1.0 or 1.5 seconds off-hook
 - 0.5 second on-hook
 - 1.0 or 1.5 second off-hook
 - 0.2 second on-hook
 - 0.3 second off-hook
 - Repeats of 0.2 second on-hook and 0.3 second off-hook twice
 - 2.0 seconds on-hook
 - Alternate 5.5 seconds off-hook and 2.0 seconds on-hook until released. Low tone is generally applied during the off-hook periods.

In offices also equipped with synchronous test line, the nonsynchronous test line may trip ringing, and return alternate 0.5 second off-hook and on-hook signals, with low tone applied during the off-hook period, until released.

- **AC short and AC open termination** - used to test the stability of trunks with negative impedance repeaters. These test lines:
 - Trip ringing
 - Return off-hook supervision
 - Provide essentially an AC short circuit and an AC open circuit respectively. They may be equipped with repetitive disconnect features.
- **Verify route** - receipt of a tone signal indicates routing is correct. Route verification line numbers are unique to each prefix. Recommended standardization of line numbers is to precede the prefix with the digit one (1). Example: 365-1365.

- **Verify charge** tests the ability of a trunk circuit to recognize and return charge supervision. Hold the call 10 seconds to insure proper test. In some instances, the route and charge verification test lines may be common and assigned the same test line number.
- **Loop checker generator** provides access to a 24-type loop checker generator. Upon seizure this test line:
 - Trips ringing
 - Returns on-hook supervision
 - Sends a repeated frequency sweep signal from a nominal 100 HZ to 3000 HZ. The sweep signal rises with frequency in a curve complimentary to the frequency roll-off curve of a typical customer loop.

The level, as read at the customer location on a 24-type loop checker, will be substantially flat. This enables an “in the green” acceptance of the transmission quality of the loop.

The loop checker test line is not used for trunk testing. On-hook supervision is a standard arrangement.

NOTE 1: Operational test lines do not interwork with SS7

Operational test lines (signal-supervisory test line 103, synchronous, and nonsynchronous) are not functional when the terminating route uses SS7 trunk signaling. SS7 requirements documents have not provided for such test lines (because operational test lines are designed for “per trunk signaling,” which requires E&M off- and on-hooks -- in SS7 all signaling is done in the separate SS7 path). This can be confusing when trying to isolate a problem, because testers often use operational test lines for call-through tests; if you are in office ‘A’, and you are testing through office ‘B’ (a tandem) to office ‘C’, even if your route to office ‘B’ is not SS7 the distant route from ‘B’ to ‘C’ might be, and a failure (the call goes either to “fast busy” (120 IPM) or reorder announcement) can be misleading. The thing to remember is that if you are doing any sort of call-through it is best to use milliwatt or similar test line, unless you are certain the route does not include SS7.