



SALES SERVICE INFORMATION

The Technical Materiel Corporation
Mamaroneck New York

SALES SERVICE BULLETIN NUMBER 122

Model TDR-1 Triple Diversity Receiver

A. TECHNICAL SUMMARY - SPECIFICATIONS

1. Electrical Characteristics

a. Frequency Range: 6 bands, 0.54 megacycles to 54 megacycles.

Band 1 -	0.54 to	1.35 mc/s
Band 2 -	1.35 to	3.45 mc/s
Band 3 -	3.45 to	7.40 mc/s
Band 4 -	7.40 to	14.8 mc/s
Band 5 -	14.8 to	29.7 mc/s
Band 6 -	29.7 to	54.0 mc/s

b. Types of signals accomodated:

- (1) Double side-band, full carrier, telephony and broadcast.
- (2) Single side-band, full carrier, telephony and broadcast.
- (3) Single side-band, reduced carrier, telephony and broadcast.
- (4) Tone modulated Morse (A-2).
- (5) Two tone frequency shift modulated teletype (A-2).
- (6) High-speed on-off telegraphy (c.w.).
- (7) On-off radio teletype.
- (8) Frequency shift radio teletype and c.w.
- (9) Tone modulated Hellschreiber.
- (10) On-off Hellschreiber.
- (11) Frequency Shift Hellschreiber.
- (12) Frequency Shift Facsimile (Radio-photo).
- (13) Phase modulation telephony.

c. Classes of Reception:

- (1) Single Channel in all of above listed operations.
- (2) Dual Channel space diversity.
- (3) Triple channel space diversity.
- (4) Dual or triple frequency diversity.
- (5) Dual or triple polarization diversity.

(Note: - All of the above classes of reception are possible with both the side-band selector units and with the Hammarlund receivers connected in diversity, making use of the a.v.c. circuit contained within the receivers and combining in the diode loads of the receivers).

SALES SERVICE BULLETIN NUMBER 122

Model TDR-1 Triple Diversity Receiver

d. Modes of Reception:

- (1) Normal mode with single, dual or triple receivers for all above listed type of signals.
- (2) Exalted carrier double side-band full carrier for telephony and broadcast.
- (3) Exalted carrier upper side-band full carrier for telephony and broadcast.
- (4) Exalted carrier lower side-band, full carrier for telephony and broadcast.
- (5) Locally supplied carrier, upper side-band, for reduced carrier telephony and broadcast.
- (6) Locally supplied carrier, lower side-band, for reduced carrier telephony and broadcast.
- (7) Locally supplied carrier, double side-band, reduced carrier telephony and broadcast.
- (8) Normal mode, phase modulation detection for narrow band frequency or phase modulation telephony and facsimile detection.
- (9) Normal mode, with variable frequency beat frequency oscillator, for on-off telegraphy, on-off radio teletype, and on-off Hellschreiber operation.
- (10) Normal mode, with common fixed frequency beat frequency oscillator for frequency-shift radio teletype, c.w. and Hellschreiber operation.
- (11) Normal mode, with common fixed frequency beat frequency oscillator for facsimile operation.

2. Performance Data:

- a. Input - 100 ohms balanced or 50 ohms unbalanced.
- b. Sensitivity for 100 milliwatts output - 3 microvolts.
- c. Spurious responses - down 50 to 80 db.
- d. Automatic gain control - flat within plus/minus 3 db. for signals above 25 microvolts.
- e. Signal level - input signals up to 1/2 volt.
- f. Outputs -
 - (1) Program lines "A" and "B" - 100 milliwatts balanced 600 ohms lines, net over 5% distortion.
 - (2) Headphone lines "A" and "B" - 100 milliwatts balanced, not over 5% distortion.
 - (3) Monitor, up to 2 watts output, net over 5% distortion.
 - (4) Additional audio output circuits from each Hammarlund receiver are connected directly to patch panel, for use without the side-band selector units.
 - (5) Audio output from tone keyer for c.w. operation.
 - (6) Polar and Neutral d.c. output from converter to patch panel for frequency shift and c.w. output.

SALES SERVICE BULLETIN NUMBER 122

Model TDR-1 Triple Diversity Receiver

- (7) Audio outputs either to jacks on patch panel or to input of line amplifiers from output of phase modulation detectors.
 - g. Program and Monitor routing. A jack panel and control panel provide patching and switching facilities for interchange and substitution of amplifier and outgoing lines.
 - h. Selection of operational mode. In addition to the facilities provided by the control panel to switch the audio outputs of the side band selector units, the following additional switching and patching facilities are provided.
 - (1) Provisions for patching or switching of audio output circuits of any two side-band selector units or any two receivers directly to the input of the frequency-shift and c.w. converter.
 - (2) Provisions for connecting the a.v.c. lines of the Hammarlund receivers together for operation with the a.v.c. circuits contained within the receivers.
 - (3) Provisions for connecting the diode loads of the Hammarlund receivers together for use of the diode load combining system of diversity.
 - (4) Provision for connecting the audio output of the Phase and Frequency modulation detectors to the input of the line amplifiers.
 - (5) Provisions for use of the exalted carrier circuit in the detection of phase modulation.
 - (6) Provisions for connecting external common crystal controlled beat frequency oscillator to the side-band selector units, and to select either the common crystal controlled oscillator or the contained variable frequency oscillator.
3. Vacuum Tubes - Total 244 .
4. Mechanical Specifications:
- a. Racks - 3 steel relay racks 7 feet high and arranged to mount 19 inch panels. These have rear doors.
 - b. Units - total of 24 exclusive of a storage compartment. Units have steel and aluminum chassis and panels. Removal of front panels gives access to chassis wiring for most of the units. Cabling and power outlets are at the rear.
 - c. Installed weight- approximately 1200 pounds.
 - d. Colors - gray, light umber gray and dark umber gray.

Model TDR-1 Triple Diversity Receiver

5. Power Requirements:

- a. Input: approximately 1.5 kva.
- b. Voltage: input directly from 115 v. a-c line or through an auto-transformer from the 230 volt a-c line.
- c. Line frequency - 40 to 70 c.p.s.

B. DESCRIPTION:

The Diversity Receiving System Model TDR is a radio receiver providing 3 channels arranged to operate primarily in space diversity. It offers a secondary utility in frequency and polarization diversity reception. The system is housed in 3 relay rack cabinets, each 7 feet high.

The System comprises 24 units having various circuit functions:

1. Receiving Units:

Three Hammarlund Model SP-600-X receivers constructed to JAN specifications are used, one for each diversity channel. The frequency range of the receivers is from 0.54 to 54 mc/s in six bands. Minor modification have been made to the receivers to adapt them to the system.

2. Master Oscillator Unit:

The Northern Radio Company Variable Master Oscillator is used to provide a very stable first conversion oscillator common to the three diversity channels. The Variable Master Oscillator is employed without modifications.

3. Crystal Oscillator Unit:

The Crystal Oscillator Unit provides three crystal controlled radio frequency output voltages, each common to the three channels of the system. A 3500 kc. oscillator is employed as the second conversion oscillator. A 137 kc. oscillator provides a locally generated carrier when receiving suppressed carrier signals. A 139.975 kc. oscillator provides common beat frequency oscillator voltage for use in reception of frequency-shift radio teletype signals.

4. Side-band Selector Units:

- a. Provides the third and final conversion function.
- b. Provides a variable bandwidth i-f channel for the signals.
- c. Reconditions and exalts the signal carrier.
- d. Provides the injection of a locally generated 137 kc carrier for signals having no carrier of their own.

Model TDR-1 Triple Diversity Receiver

- e. Serves to operate on the signals to accomplish the optional modes of reception.
 - (1) "NORMAL" (reception in the ordinary sense).
 - (2) "EXALTED" (double sideband reception with locally reinforced carrier).
 - (3) "UPPER" (upper sideband reception with locally reinforced carrier and with the lower sideband balanced and filtered out).
 - (4) "LOWER" (lower sideband reception with locally reinforced carrier and with the upper sideband balanced and filtered out).
 - f. Provides the foregoing reception modes independently and/or simultaneously (all four modes can be heard at the same time).
 - g. Provides automatic gain control potentials to the channel and provides a-g-c tie point to which the other channels join for the diversity reception suppression function.
 - h. Contains the demodulators and the preliminary audio amplification with gain equalizers.
 - i. Furnishes the automatic frequency control for locking the signals in tune.
 - j. Provides variable beat frequency oscillator for use when receiving c.w. signals.
5. Control Unit:
- One unit is required. The switching facilities consist of three groups of push button switches, used for interconnecting the various units of the system.
6. Monitor Unit:
- One is required. A power amplifier with loud speaker for aural monitoring of the circuits in the system.
7. Line Amplifier Unit:
- One is required. The Line Amplifier Unit contains five individual line amplifiers for use in providing the required audio output level into the program lines and terminal equipment.
8. Power Supply Units:
- Seven identical electronic regulated power supply units are required to power the system.

SALES SERVICE BULLETIN NUMBER 122

Model TDR-1 Triple Diversity Receiver

9. Master Switch Unit:

One unit is required. The Master Switch Unit contains circuit breaker master switch for incoming line power.

10. Frequency Shift Converter and C.W. Demodulator, Dual Channel:

One unit is used. This unit consists of required circuits to convert the mark and space audio frequencies from each of two receivers operating in diversity into D.C. pulses to operate a teletypewriter, tape recorder or such associated equipment requiring d.c. pulses for operation.

11. Tone Keyer:

One unit is used. This unit consists of required circuits to convert the d.c. pulses from the Frequency Shift Converter/Demodulator to standard tones of 425, 765, 1105, 1445, 1785 or 2125 cycles per second.

12. Phase Modulation Detector:

Three units used. This unit consists of required circuits to accept the i.f. voltage which is modulated with the received phase modulation, and delivers audio output.

Equipment is manufactured in accordance with JAN specifications wherever practicable.

We reserve the right to make engineering changes in these specifications when required.