Military Accessories for Russian Motorcycles

Part XI: Radios for Russian Sidecar Motorcycles

(Русские мотоциклов)

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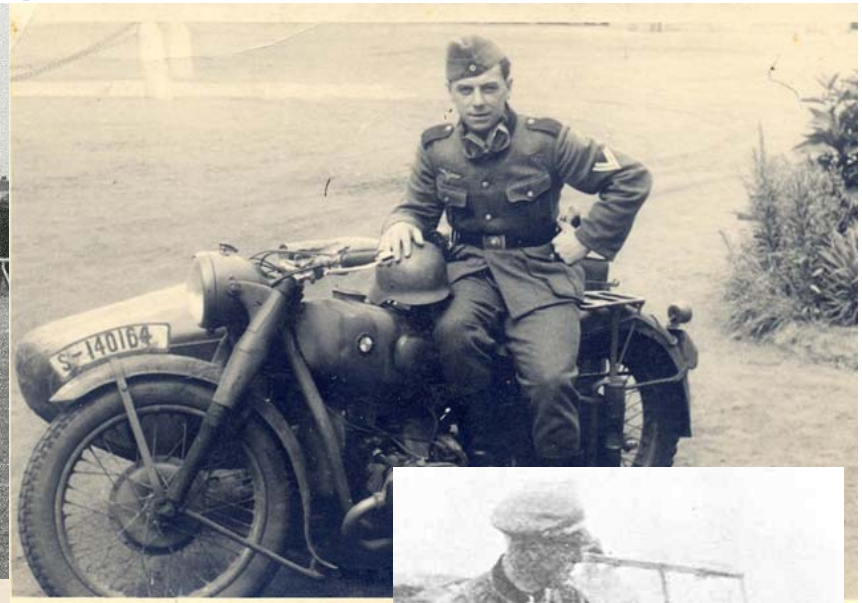
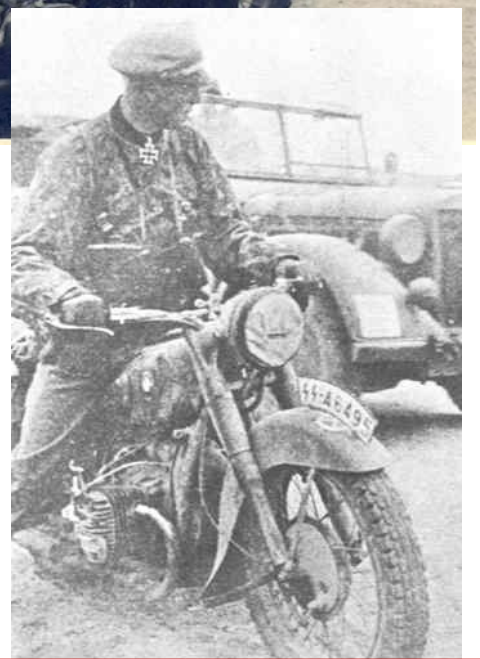
Adding a Mobile/Portable Radio to a Russian Sidecar

- In 1940, the Soviet Union Acquired Blueprints and Casting Molds for BMW's Out-Dated R-71 Motorcycles and Sidecars
- First M-72 Model Finished in 1941
- M-72 Was Sole-Source for Russian Military Motorcycles
  - During World War-II, 9,799 M-72 Motorcycles Delivered for Reconnaissance Detachments and Mobile Troops
  - M-72 Outfits Were Used Against German Invasion of Russia in 1941
  - Initially Used in Combat
    - Many Functions of WW II Military Motorcycles Were Replaced by Jeeps
    - Later Motorcycle Used Only for Dispatch Riders, Scouts and Military Police
- Just Like Demo Machine-Guns, Radios Might Not Be Used for Communication Today
  - Russian Radios Use FM: Not Available for Citizen Band (CB) Which Uses AM and SSB
  - Radios R-107 / R-108 Work on 10-meter Amateur (Ham) Band 28 MHz to 29.7 MHz
    - FM Sub-Band: 29.510 MHz to 29.700
    - Sub-Band Channelized into Repeater Input/Output and Simplex Frequencies
      - Repeater Input Channels: 29.520, 29.540, 29.560, and 29.580 MHz
      - Repeater Output Channels: 29.620, 29.640, 29.660, and 29.680 MHz
      - Main or Calling Simplex Channel: 29.600 MHz
      - Other FM Simplex Channels in Use: 29.5 to 29.7 MHz (98% of the Activity)
      - Normal Modulation: 16 kHz Wide Signals with ±5 kHz Peak Deviation
      - Legal IF Participants hold a General, Advanced, or Amateur Extra Class License
        - » Persons Holding Technician or Novice Class License CANNOT Use FM on that Frequency (47 CFR Part 97 Section 97.307(f)(10))
      - FM Legal on All Amateur Frequencies below 29.0 MHz IF Modulation Index Doesn't Exceed 1.0 (47 CFR Part 97 Section 97.307(f)(1))
- WW II Russian Radio Was in Its Infancy
  - Low-Efficiency, High-Consumption Designs
    - Electron Tubes (no Transistors until Late 1950's)
  - Radio Development Took Off in Late 1950's (after WW-II)

Typically folks add radios to complete their WW-II Russian bikes, while folks with a ham license can actually use them.

BMW R-61 Motorcycle and Sidecar





The BMW R-61 was used by the Wehrmacht (German Army) between 1938 and 1941, before switching to the R-75. The M-72 (father of all Russian bikes) was a direct descendant of the BMW R-61/71 series.

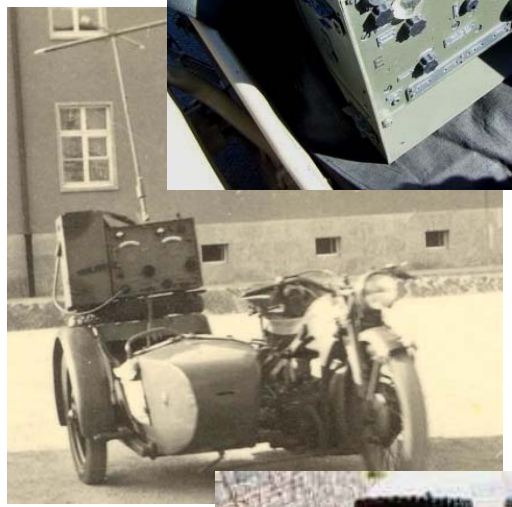
Early (pre WW-II) vs. Later (post WW-II) Russian Radio Development Follows German and American Leads

- *German Influence on Russian Portable/Mobile Radios*
  - *HF (High-Frequency) AM (Amplitude-Modulation) Operation*
    - *Tornister.Funkgerät (Torn.Fu.*) HF AM Portable Transceivers*
    - *Stationary Operation (On-the-Halt)*
  - *VHF (Very High Frequency) AM Operation*
    - *Kleinfunksprecher d (KlFuSpr.d) "Dorette“ Transceiver*
  - *VHF (Very High Frequency) FM (Frequency Modulation) Operation*
    - *Mobile Operation (On-the-Move)*
    - *Tornister.Feldfunksprecher (Feld.Fu.*) VHF AM Back-Pack Transceivers*
- *American Influence on Russian Portable/Mobile Radios*
  - *Use of VHF (Very High Frequency)*
    - *Reliable Line-of-Sight Operational Range*
    - *Short Whip Antenna for Portable Use*
    - *Mobile On-the-Move or On-the-Halt Operation*
  - *Edwin Armstrong Invented Frequency Modulation (FM) in 1933*
    - *Low-Noise*
    - *BC-1000 VHF FM Man-Pack Transceiver*
    - *SCR-508 or SCR-528 (BC-603/BC-604) VHF FM Vehicular Transceiver*
- *America Lend-Lease Act*
  - *Serious Equipment Shortfalls for Russian Armed Forces*
  - *Stalin Met with Representatives of Western Allies*
  - *British and Americans Both Stepped In to Keep Russia in the War*
  - *Lend-lease Act of March 11th 1941 Permitted President of U.S. to ‘Sell, Transfer Title To, Exchange, Lease, Lend, or Otherwise Dispose Of, to Any Such Government Whose Defense the President Deems Vital to the Defense of the United States‘*
  - *President Roosevelt Approved $1 billion in Lend-lease Aid to Soviet Union in 1941*
  - *First Deliveries of Military Aid to Russia Began in November 1941*
  - *34,190 Motorcycles delivered to the USSR during WW-II, Nicknamed 'Liberators' in Europe*
    - *26,670 Harley-Davidson Model 42WLA*
    - *7,520 Indian Models 741, 340 and 344*
    - *Most of the WLAs Delivered to USSR Were Equipped with M-72 Sidecar*
  - *$11 billion in Materiel Given to Russia Until Lend-Lease Ended in 1945*

Just as the M-72 sidecar was a copy of the German BMW R-71, Russian radios owe their heritage to captured German radios from WW-II, the invention of FM, and to the lend-lease program.

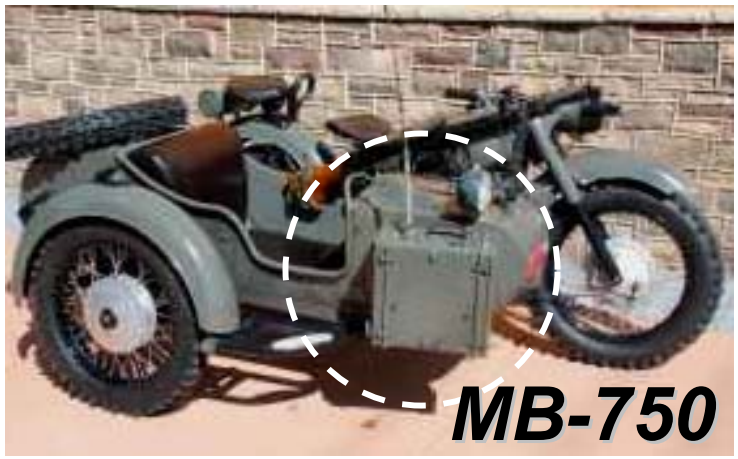
Two Types of WW-II Russian Radios

- Two Types of WW II Russian Radios
  - –Seat Mounted: Strapped onto Seat
    - Larger Radios
    - On-the-Halt Operation
    - Examples:
      - –German Back-Pack Transceiver Torn.Fu.d2
      - –German KlFuSpr.d “Dorette”
      - –German Transceiver WR1



  - –Side Mounted: Bracket Mount on Sidecar
    - Smaller Man-Pack Radios
    - On-the-Halt and On-the-Move Operation
    - Examples:
      - –German Feld.Fu.b/c/f Backpack Sets
      - –Russian R-104/-105/-106/-108/-109

Russian Bikes with a R-105d (Д) Mounted on Sidecar



The portable radio may be mounted inside or outside the tub.

German BMW with Radio

On many German bikes, the radio was secured on the passenger seat for portable operation.

Radio Direction-Finding from the Sidecar

The direction-finding equipment was mounted in the boot of the sidecar.

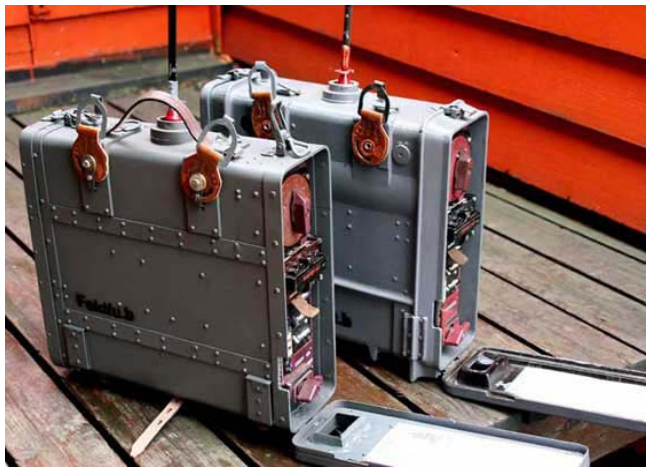
***Repro* German Field Radio Torn.Fu.d2** *(www.worthpoint.com)*

- *Squad-Level Radio*
- *Very Common Throughout WW-II*
- *Complete original Torn.Fu.d2 Radio Is Very Rare*
- *Many Original Radios Were Destroyed in Battle or by Allies after the War*
- *Full-Scale Replica of German Torn.Fu.d2*
- *Proportions of the Box Are Correct, as Copied from Original Box*
- *Made from Similar Materials as Original Box and is Same Weight*
- *Faceplate Was Cast from Original Radio*

Torn.Fu.d2 on Passenger Seat of Motorcycle

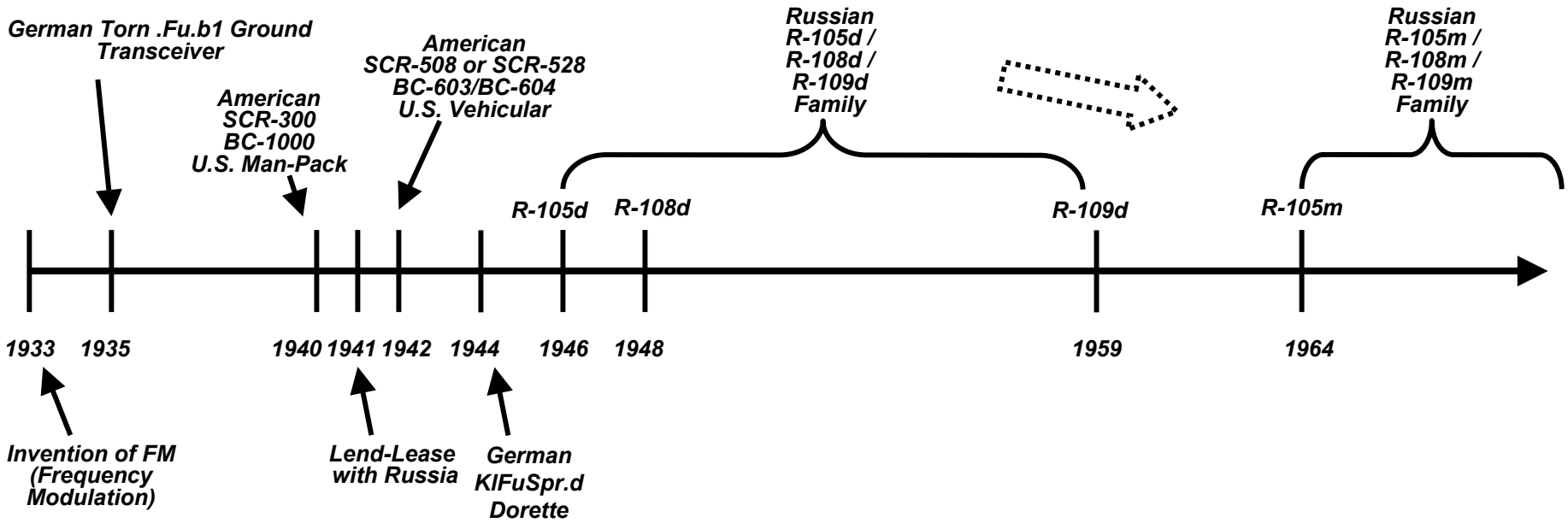
If you have been wanting an accurate radio to complete your WW-II impression, then this is the radio you want.

***Repro* German Field Radio Feld.Fu Container, together with Original** *(http://home.online.no)*



The replica box for the Feld.Fu is excellent for surviving in the field.

WW-II Russian Radio Time-Line



Captured and Duplicated German Radios

Lend-Lease of American Radios and Motorcycles

Russian Portable and Man-Pack Radios

Development of FM and American Radios

Russian Portable and Man-Pack Radios

The R-105 was first introduced in the late 1940's and revamped in the 1960's to use more modern materials.

1920's NYPD Sidecar

During early development of radio, folks were eager to find new methods of tactical communications. During the 1930's and until 1947, police agencies used RCA, GE, Motorola, Comco, Air Associates, Link Radio (Vetric) and a variety of home-made radios.

Motorcycle Radio Transmitters Aid Police in War on Crime *(Modern Mechanix, Nov. 1933)*

Motorcycle Radio Transmitters Aid Police in War on Crime

Radio transmitters installed in motorcycle sidecars, as shown above, are used by British police to call reserves quickly.

DURING running gun battles with bandits, British motorcycle police can send radio calls for reserves through short wave transmitting sets.

The sending outfit is the latest police radio equipment for the quick suppression of crime. It is an addition to the usual receiving set tuned to the frequency of a central police transmitting station.

The motorcycle policeman travels with a radio operator who operates the sending and receiving sets fitted in a sidecar. When an alarm is received the motorcycle policeman rushes to the scene. If he finds that he is outnumbered and unable to handle the situation, his operator can transmit an alarm that can be picked up by other radio-equipped motorcycles in the vicinity.

The 1930's continued to see development of mobile radio for tactical communications.

CHiP Motorcycle, circa 1938, with RCA Receiver

(www.wb6nvh.com)

Prior to 1946, virtually all commercially-made police motorcycle radios were one-way "receive-only" sets.

American Development of Jeep: Man-Pack Radio

- SCR-300: BC-1000 Back-Pack VHF FM Transceiver
  - –In 1940, Motorola Received Contract to Develop Portable, Battery-Powered FM voice Transceiver (transmitter / receiver), for Field Use by Infantry Units
    - Weight Limit of 35 lbs, To Be Carried on Back of a Soldier
    - Waterproof and Be Able to Withstand Tropical Fungus
    - Same Frequency Band of VRC-3 (used in tanks) for Intercommunication between Armor and Infantry
  - –Frequency Range: 40.0 to 48.0 MHz and Transmitter Output Power: 0.3 Watts FM
  - –Range of 3 miles with Longer 33" (84 cm) End-Loaded, Whip Antenna
  - –Almost 50,000 Walkie-Talkies Produced by Motorola during WW-II
- Radio Set SCR-508/SCR-528: BC-603 Receiver and BC-604 Transmitter WW II Jeep Radio
  - –Very High Frequency (VHF) Two-Way Transceiver (transmitter / receiver)
  - –Mounted in American Jeeps or Carried as Back-Pack by American GI's
  - –Communication between Moving or Stationary vehicles or as Portable Field Transceivers
  - –Shipped from USA as Part of US Lend-Lease program in War against Nazi Germany
  - –Used in WW-II Armored Fighting Vehicles such as M3, M26, M5 and M4 "Sherman" Tanks
  - –Operates from 12-Volt Vehicle Battery
  - –Frequency Range: 20 to 28 MHz and Transmitter Output Power: 30 Watts FM
  - –Range: 15 miles (Voic) and 30 miles (code) between Moving Vehicles; Much Longer if Used in Stationary Position with Long Antenna

BC-1000
Backpack Radio

BC-603/BC-604
Vehicular Radio

The R-Series Russian radios owe part of their heritage to the development of American radios and to lend-lease.

German WWW-II Portable and Mobile Radios

- German Portable and Mobile Radios Fore-Runners
  - Rapid Radio Development of Radio in Germany
    - Torn.Fu.* (1937) Proved Rugged and Reliable for Portable Use
      - Two Features Needed in USSR
    - German tanks were all equipped with radios, allowing them to communicate with one another throughout battles,
  - Rapid development of Sidecar Motorcycles in Germany
    - BMW Developed R-71 (Fore-Runner of Ural and Dnepr)
    - BMW Developed R-75 (Principle German WW-II Sidecar Motorcycle)
  - Portable/Mobile Radio Added to Motorcycles
  - Inexpensive Vehicles Developed
    - Kubelwagen Developed
  - Use of Jeep-Like Vehicles Later Preferred
  - Radio Proved Most Valuable for Artillery Spotting

German radio and motorcycle development strongly influenced the development of mobile communications in the USSR.

German Radio Communication Vehicles

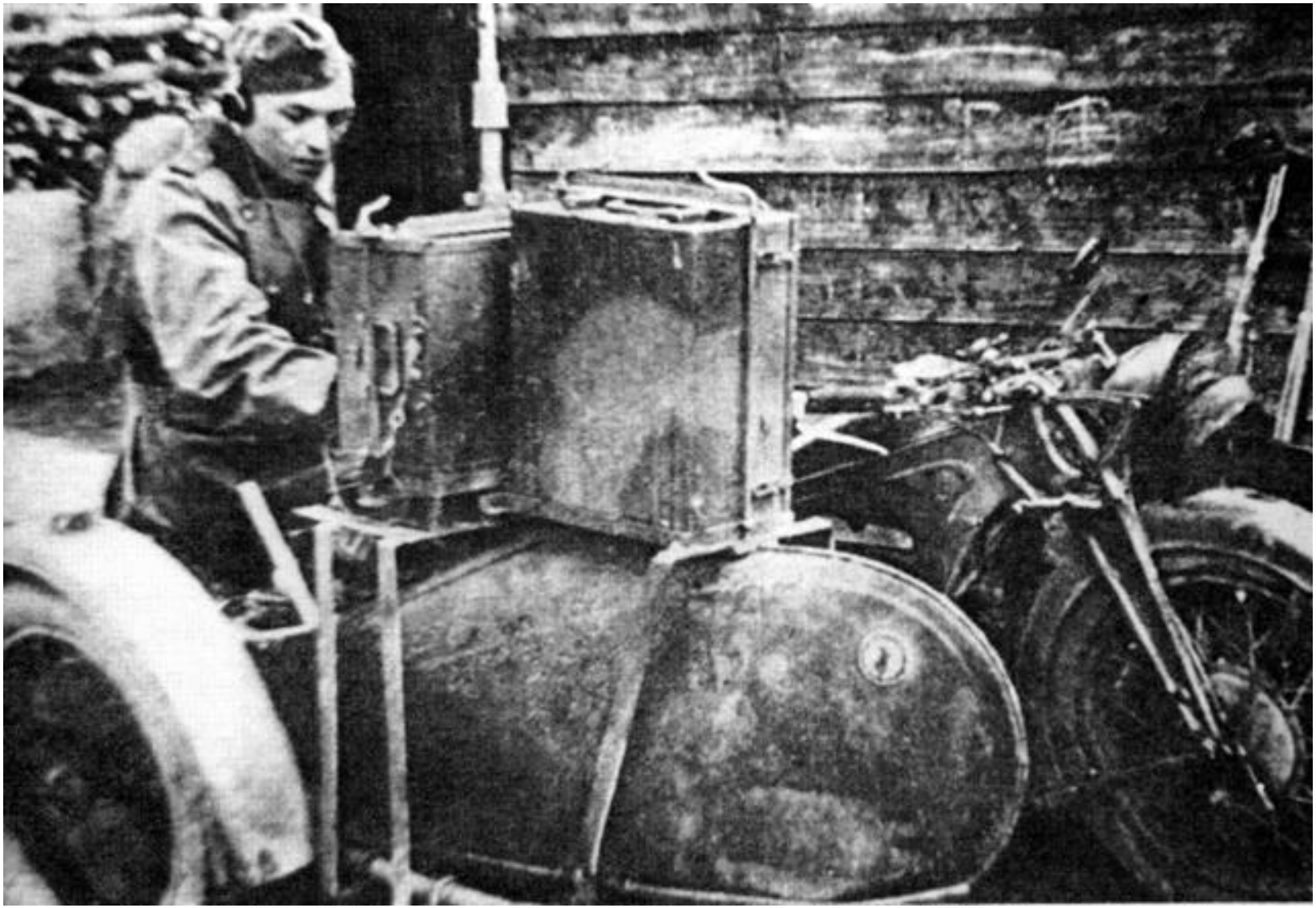
Sd. Kfz. 260 unarmed radio communication vehicle, used in tank and motorized units

Sd. Kfz. 261's main difference from the Sd. Kfz. 260 was the type of antenna

German Sd. Kfz. 222 was the main light-armored vehicle of the German Wehrmacht, used in all fronts of WW II

Early German blitzkrieg, with tank and armored formations, created new requirements for split-second communication by radio among all members.

WW-II German Radio Operator Using a Torn.fu.b1 Transceiver (Transmitter/Receiver) Mounted on Sidecar



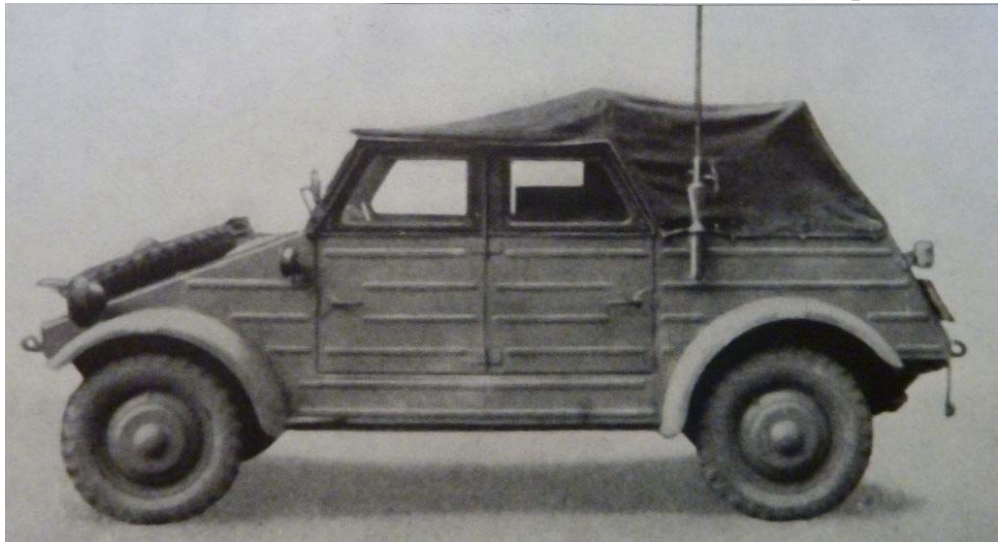
German radios, unlike Japanese sets, were extremely well-adapted sets.

German Torn.Fu.* Transceiver on Zundapp (desyatnik.com)

* = model number

Portable operation proved valuable as a rapidly-deployed, front-line observation post.

German Radio (Kfz 2) Kuebelwagen



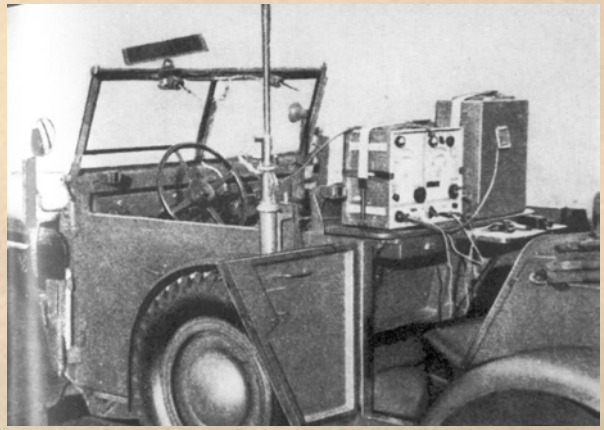
KFZ stands for Kraftfahrzeug
(common abbreviation for car)

The Volkswagen Kübelwagen (short for Kübelsitzwagen, meaning "bucket seat car") was a military vehicle designed by Ferdinand Porsche and built by Volkswagen during WW II

Torn.Fu Radio

Ultimately the Wehrmacht replaced the motorcycle with the Kuebelwagen, a Jeep-like radio-car based on the Volkswagen, designed to accommodate Torn.Fu transceivers.

German Torn.Fu.* on Kraftfahrzeug 2 (battlefrequencies.com)



In every tank there was at least one radio and in some command tanks as many as three.

German Trench Operation with the Torn.Fu.

The Torn.Fu. portable transceiver was not intended to be used while on the move.

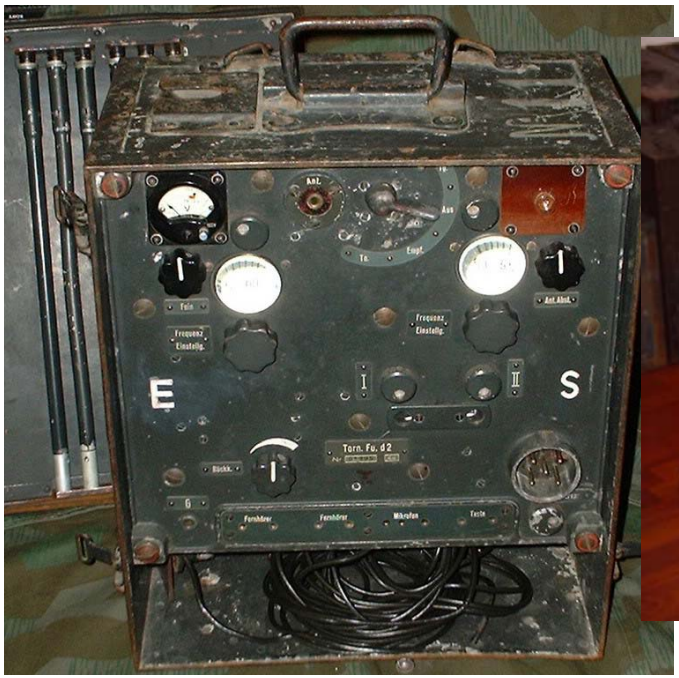
German Tornister-Funkgerät (Back-Pack Radio Set) Torn.Fu.b1 Portable Transceiver

- Developed as a Mobile Transceiver
- Robust, Small Enough to Be Carried by Infantry
- Easily Installed into Vehicles
- Introduced by Lorenz Company in 1935
- Antenna Assembly Mounts Directly onto Top Using Screwed Collar
- Frequency Range
  - Receiver (Left Empfänger): 3 to 6.7 MHz
  - Transmitter (Right Sender): 3 to 5 MHz
- Power Source: One Filament Battery (2.4 MC38) and Two 90-Volt Anode Batteries
- External Power Supply: 12-Volt / 4.5 Amp
- Size and Weight:
  - Carried by Two Men: Hooks on Reverse Side for Infantry Carrying-Straps
  - Transceiver (Transmitter/Receiver) Unit: 13-1/2 x 17 x 8 inch / 38 lbs
  - Other Chest: Battery Pack, Headphones, Key, Microphone, Antenna Assembly and Other Accessories: 13-1/2 x 17 x 8 inch / 35 lbs

In the 1920's and 1930's, when the blitzkreig tactics were being developed, inter-vehicle communication was necessary, utilizing an array of available frequency bands.

German Tornister-Funkgerät (Back-Pack Radio Set)
Torn.Fu.d2 Portable Transceiver

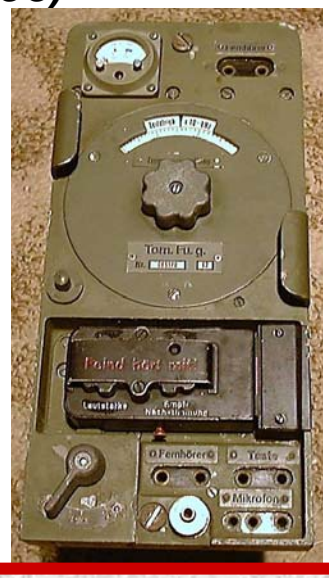
- Produced in 1936 with Latest Electron Tube Technology Available
- VHF 2-Way Communications Device
- Frequency Range: 33.8 to 38.0 MHz
- AM Modulation: A1 (Code) and A3 (Voice)
- Communication Range: Approx. 10 km (A1) / 3 km (A3)
- Can Be Operated from Field Telephone via 1-to-2 km Field Line
- Transmitter Output Power: 1 Watt
- Size / Wt: 0.39 X 0.34 X 0.19 m / 17 kg



All German tanks were equipped with Tornister E.b radio receivers, and many had transmitters as well.

German Tornister-Funkgerät Torn.Fu.g Portable Transceiver

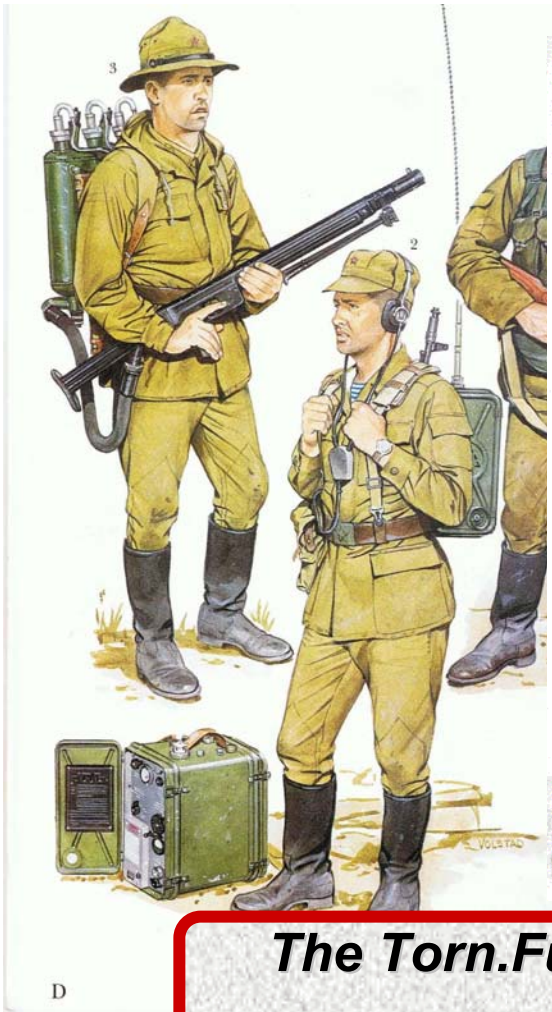
- Carried (dismounted) in Steel Container with Carrying Straps
- Transceiver Container Has Operating Side with Remote Control Unit
- Used for Battalion-to-Company, Company-to-Platoon and -Lower Echelons
- Frequency Range: 2.5-3.5 MHz.
- Antenna
  - –Antenna Socket on Top
  - –Sectional Rod with Umbrella (stationary); Whip Antenna When On-the-Move
- Power Source: One 2.4-Volt Storage Battery and Built-in Vibrator Unit
- Battery Capacity: 15 hrs (33% transmit / 67% receive)
- Similar to American SCR-194, SCR-195 and SCR-300
- Used in Stationary Positions or On-the-Move
- Modulation: A1 (Code) and A3 (Voice)



The Torn.Fu.g was mainly used by Panzer Grenadiers to communicate with command vehicles. Panzer Grenadiers were infantry troops assigned to protect tanks in battle, as tanks by themselves are vulnerable to infantry with anti-tank weapons.

German Tornister-Funkgerät Torn.Fu.h Portable Transceiver

- Transmitter Output Power: 0.06 Watt
- Frequency Range: 23-25 MHz
- Modulation: A3 (Voice)
- Antenna: Whip Antenna Socket on Top
- Power Source: One 2.4-Volt Battery (2.4NC28)



The Torn.Fu.h, like the Torn.Fu.d2, operated at VHF to yield line-f-sight service.

German Tornister-Funkgerät Torn.Fu.i Portable Transceiver

- Introduced by Lorenz Company in 1944
- Transmitter Output Power: 3 Watt
- AM Modulation: A1 (Code) and A3 (Voice)
- Two Types of Antenna
  - –Antenna-Tuning Spool and Simplified Base
  - –Whip Antenna, similar to Feld.fu.b1
- Frequency Range: 1.8 to 3.0 MHz
- Power Source: Two 2.4NC58 Batteries or Manual Generator

The Torn.Fu.i was a more compact and powerful replacement for the Torn.Fu.b1, Torn.Fu.f and Torn.Fu.k.

German Tornister-Funkgerät Torn.Fu.k Portable Transceiver

- Introduced in 1943
- Frequency Range
  - Transmitter: 4.5 to 6.7 MHz (same as Torn.Fu.f)
  - Receiver: 3 to 6.7 MHz (same as Torn.Fu.c)
- Antenna: Wire or Rod
  - Low-Rod Antenna
  - High-Rod Antenna for Longer Range
  - 45 foot wire from set to tree can also be used
  - Can Be Operated with American 15 ft Vehicular Antenna
- Sensitivity: 100 µV for 1 mV Audio Output
- Transmitter Output Power: Approx. 0.7 Watts
- Use:
  - Portable Radio Sets Intended for Field Service as Pack-Sets
  - Could Be Operated Remotely Using Ordinary Field Telephone Lines
  - Not Used While On-the-Move
- AM Modulation: A1 (Code) and A3 (Voice)
- Range: 12 miles (CW), 6 miles (Voice) with Long-Wire Antenna
- Operating Time: 33 hrs with One Set of Batteries (20% transmit / 80% receive)
- Power Source: Two Filament Batteries (2 X 2.4NC58) and Vibrating Power Supply
- Size: 0.7 x 0.36 x 0.215 m (18.5 x 14.3 x 8.5”)

German radios were similar to the American SCR-511. Russian radios were similar to both American and German transceivers.

German KlFuSpr.d Dorette (www.laud.no and www.armyradio.com)

- Kleinfunksprecher d (KlFuSpr.d) a.k.a. "Dorette“
- Lightweight Two-Way Radio Transceiver Used by Infantry and Artillery Observations Posts
  - –Smallest Set Germans Fielded
  - –Designed for Artillery Forward-Observers
  - –Last Transceiver Designed in Third Reich
  - –Ready for Use at End of WW II: Oct. 1944, Seven Months before End of War
- Frequency Range: 33.8 to 38 MHz
- Transmitter Output Power: Approx. 0.2 Watt
- Antenna: 1.6 meter Band Antenna
- Size / Weight
  - –Transceiver: 0.13 x 0.7 x 0.20 m / 1.6 kg
  - –Battery/Accessory Box: 0.11 x 0.10 x 0.17 m / 1.5 kg
- Operational Use:
  - –Base Station with Long-Wire Antenna (Stationary): Point-to-point traffic, Net Operations
  - –On-the-Move with Whip: Radio Worn on Belt in Front and Battery Box Worn in the Rear
- AM Modulation: A1 (Code) and A3 (Voice)
- RANGE:
  - –Between Two Dorettes or Between one Dorette and one Torn. Fu. D2: 2-4 km.
  - –Between Dorette and Feld.fu.f: 1-2 km
- Power Source: 1.4-Volt Filament Battery (LS1.4bp) and 150-Volt Anode Battery (LS150bp)
- Operating Time: 25 hrs with One Battery (20% transmit / 80% receive)

The German KlFuSpr.d “Dorette” served as the inspiration for several post-war Russian Radios.

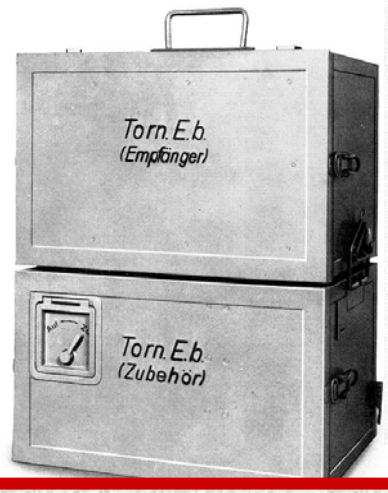
Tornister.Funkgerät (Torn.Fu.*) German Portable VHF AM Transceivers

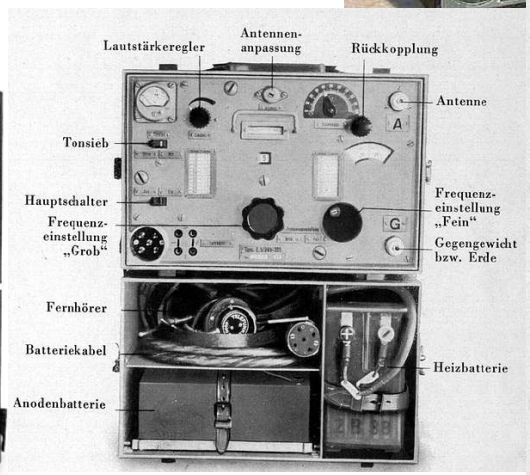
Torn.Fu.*	Torn.Fu.a	Torn.Fu.b1	Torn.Fu.c	Torn.Fu.d2	Torn.Fu.f	Torn.Fu.g	Torn.Fu.h	Torn.Fu.k	Torn.Fu.i	Torn.Fu.t	FuSpr.d
Use		Infantry	Forward Artillery Observer	Infantry	Infantry	Panzer Grenadiers		Artillery			Infantry, Forward Artillery Observer
Frequency Range	3.0–6.7 MHz	3.0–6.7 MHz	1.5–2.6 MHz	34-38 MHz	3.0–6.7 MHz	2.5-3.5 MHz	23-25 MHz	3.0-6.7 MHz	1.87-3.0 MHz	2.5-3.0 MHz	32-38 MHz
Year		1935/36	1936	1937 - 1945	1935/36	1942	1942	1943	1944	1945	1944
TX Power	2 Watt	0.6-0.8 Watt	0.6 Watt	0.6-1.0 Watt	0.6 Watt	0.5 Watt	0.1 Watt	1.5 Watts	3.0 Watts	0.5 Watt	0.2 Watt
AM Sensitivity		100 uV input for 1 mV Audio	100 uV input for 1 mV Audio	100 uV input for 1 mV Audio	100 uV input for 1 mV Audio	100 uV input for 1 mV Audio	100 uV input for 1 mV Audio	100 uV input for 1 mV Audio	100 uV input for 1 mV Audio		
Modulation		A1 (Code) A3 (Voice)	A1 (Code) A3 (Voice)	A1 (Code) A3 (Voice)	A1 (Code) A3 (Voice)	A1 (Code) A3 (Voice)			A1 (Code) A3 (Voice)		
Antenna		1.American 15 ft vehicular ant. 2. Long Wire				1.5 m Whip, with adjustable coil in the base, with freq marks			1.5 m Whip, with adjustable coil in the base, with freq marks		1.6-m Band ant.
Approx. Range		12 miles (CW), 6 miles (Voice)		10-km (A1) 3-km (A3)		9-25 km		12 miles (A1) 6 miles (A3)			
Operate Time						15 hrs with one set of batteries @33% TX-67% RX		33 hrs with one set of batteries @20% TX, 80% RX			25 hrs with one set of batteries @20% TX, 80% RX
Size		Radio: 13-1/2" X 17" X 8" Battery Box: 1/2" X 17" X 8"	Radio: 0.46 X 0.4 X 0.2 m Battery Box: 0.46 X 0.4 X 0.2 m	0.39 X 0.34 X 0.19 m (15.4 X 13.4 X 7.5")				0.7 x 0.36 x 0.215 m (18.5 x 14.3 x 8.5")			Radio: 0.13 X 0.7 X 2.0 m Battery Box: 0.11 X 1.0 X 1.7 m
Weight		Radio: 38 lbs Battery Box: 35 lbs		17 kg (37 lbs)				23 kg			Radio: 1.6 kg Battery Box: 1.5-kg

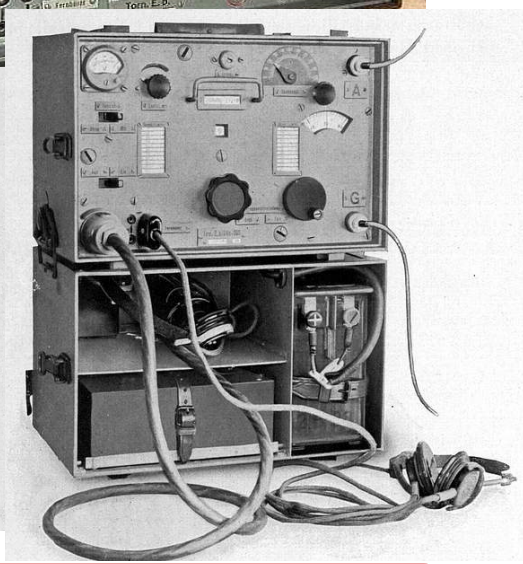
Complete radio sets in armored vehicles are referred to by the designation Fu, with the exception of the FuSpr.f.

Tornister Empfanger (Receiver) Torn.E.b (www.laud.no and www.gdrecon.co.uk)

- Designed around 1935/36
- Lightweight Mobile Use with German Signal Corps
  - Used in vehicles
  - Light Enough for Infantry to Carry in Back-Pack
- Tuned radio Frequency (TRF) Receiver and Regenerative Detector
- Frequency Range from 0.097 to 7.095 MHz:
  - Band I --- 97-175kHz
  - Band 2 ---172-310kHz
  - Band 3 --- 306-552kHz
  - Band 4 --- 541-977kHz
  - Band 5 --- 958-1720 kHz
  - Band 6 --- 1685-3030 kHz
  - Band 7 --- 2940-4760 kHz
  - Band 8 --- 4420-7095 kHz
- Modulation: A1 (Morse Code) and A3 (Voice)
- Power Requirement: 2V, 0.8A and 90V, 10mA (HT)







All German tanks were equipped with Tornister E.b radio receivers, and many had transmitters as well.

German Transceiver WR1 (www.gdrecon.co.uk and www.worthpoint.com)

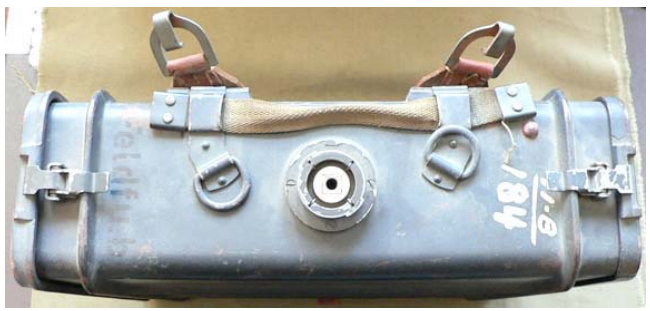
- Developed in 1940 by Blaupunkt Company
- In 1941, Other German Companies, such as Philips, and Telefunken, Were Contracted to Manufacture More of These Highly-Successful Transceivers
- In 1941, Improvements in Bandwidth Ranges and More Versatility in the Ranges of Power Supply Became Known as the WR1/P
- Operating frequencies for the improved WR1/P are in 3 bandwidths; 0.150 to 0.425MHz; 0.517 to 1.54 MHz; and 5.9 to 15.5 MHz.
- Power Supply Model P Was 90-Volt Anode Battery; 2xEML 1.25-Volt Batteries; 4NC58
- Designed to Be Carried by Infantry/Mobile Units

The German transceiver WR1 was developed in preparation for WW-II.

Feld.Fu.b/c/f Backpack Sets

- *Portable Transceiver Unit*
- *Short-Range Tactical radio for* man pack, or in vehicular *mobile use*
- *self-contained, light weight, backpack radio designed to attach directly to the Y-Straps*
- *Came into Service about 1940/41*
- operated while stationary or on the move.
- *Range: Approx. 1-3 km*
- *Transmitter Output Power: a1 and f: 0.12-0.150 Watts, b and c: 1.2 Watts*
- *Receiver Sensitivity: 2 uV for 8 dB Quieting*
- *Frequency Range:*
  - *–Feld.Fu.b: 90 - 110 MHz*
  - *–Feld.Fu.c: 130 - 160 MHz*
  - *–Feld.Fu.f: 32 - 38.0 MHz*
- *Modulation: A1 (Morse Code) and A3 (Voice)*
- *Range: 3/4 mile (Voice)*
- *Antenna Type: 28.5 inches Flexible whip*
- *Power Source: 2.4 battery (Nickel Cadmium)*

Feld.fu. b set (left), complete with flex antenna and battery charger (right)



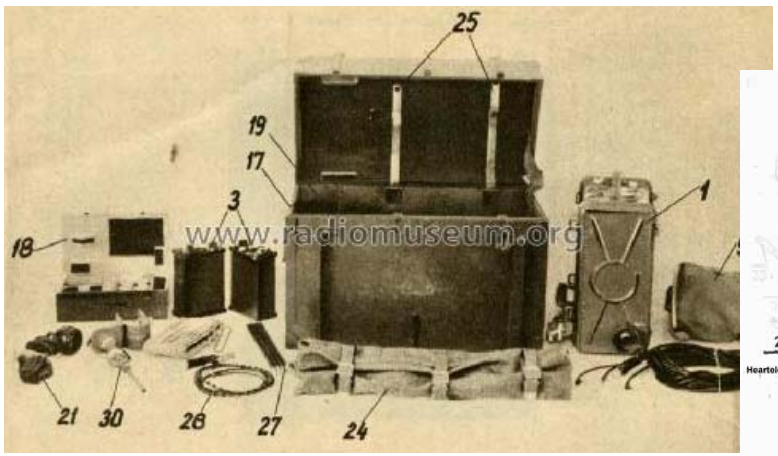
The b and c models operate at over 100 MHz putting them outside the operating frequencies of all other German tactical radios. This meant that they could only be used within infantry formations. Panzer Grenadiers (armored reconnaissance units) were issued the f model which operated between 32 and 38 MHz, the same frequency range most commonly found in armored vehicles.

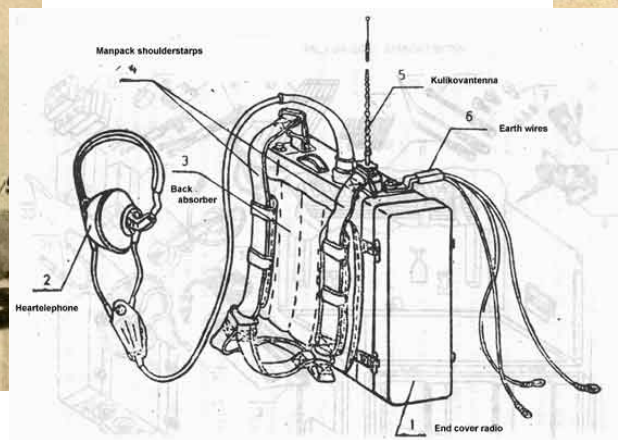
Tornister.Feldfunksprecher (Feld.Fu.*) German VHF AM Back-Pack Radios (Knapsack Field Radio)

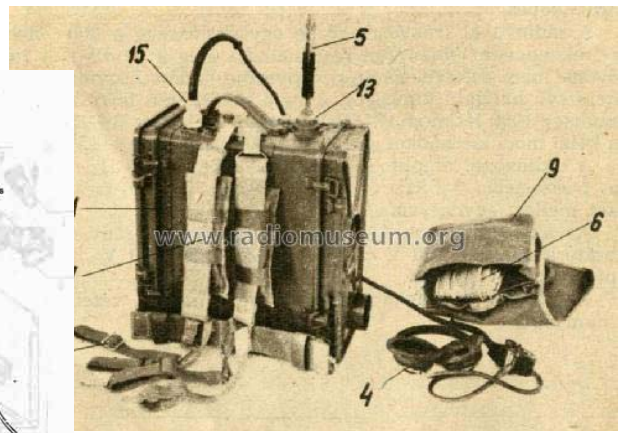
Feld.Fu.*	Feld.Fu.a	Feld.Fu.b	Feld.Fu.c	Feld.Fu.d	Feld.Fu.f	Feld.Fu.h
Use	Infantry, Reserve Army	Infantry, Panzer Grenadiers	Infantry, Reserve Army	Infantry	Panzer Grenadiers	
Frequency Range	120-156 MHz	90-110 MHz	130-160 MHz	32-38 MHz	28-33 MHz	23.1-25.0 MHz
Year Developed		1941				
TX Power	0.15 Watt	0.15 Watt	0.15 Watt	0.15 Watt	0.15 Watt	0.15 Watt
Operate Time						
Amplitude Modulation	A1 (Code), A3 (Voice)	A1 (Code), A3 (Voice)	A1 (Code), A3 (Voice)		A1 (Code), A3 (Voice)	
Antenna	Whip Ant. base-color dark brown steel-blade: 55 cm	Whip Ant. base-color dark red steel-blade: 75 cm	Whip Ant. base-color dark green steel-blade: 52 cm		Whip Ant. base-color white steel-blade with base coil: 1.5 m	Whip Ant. base-color dark blue with base coil: 1.5 m
Approx. Range	A3: ¾ mi	A3: ½ to 1 mi	A3: ½ to 1 mi	A3: ¾ mi	A3: ¾ mi	
Size/Wt						

German radio technology in the pre-war and early war-time period was a full 20 years ahead of all other countries in many cases.

Russian Military Transceiver R-105d







The R-105 series was used by Russian and East German armies to provide radio communication within the Division at all levels down to Company HQ, Infantry and Artillery.

R-105d/108d/109d Family of Man-Pack Transceivers

(www.armyradio.com and www.greenradio.de)

- Manufactured in Early 50's
- Portable or Mobile Transceiver
  - Can Be Operated by Remote Control and Used in Relay Operation
- RF Power Output : Approx. 1.2 Watts
- Modulation: F3 (FM) simplex
- Co-operates with R-107, R-111, R-113, R-123.
- Frequency Ranges in one continuous band :
  - R-105d: 36.0 - 46.1 MHz (Channels: 203)
  - R-108d: 28.0 - 36.5 MHz (Channels: 171)
  - R-109d: 21.5 - 28.5 MHz (Channels: 141)
- Size and Weight:
  - Radio: 0.365 x 0.23 x 0.385 m; 21 kg
  - Wooden Box: 0.615 x 0.34 x 0.460 m; 40 kg
- Sensitivity: 1.5 µV for 10 dB Quieting
- Antennas:
  - Whip 1.5 meter (using counterweight of 3 rays)
  - on-board antenna consisting of a combined whip antennas, special bracket with shock absorber mounting antennas on board vehicles and connecting wire with the length of 1 m-to work on the car
  - combined antenna consisting of a whip antenna and 6 tribes (the total height of the antenna 2.7 m), using counterweight of 5 rays-to work in the parking lot;
  - Directional Beam Antenna 40 meters long, hanging at a height of 1 m above the ground-work for increased range and from shelters;
  - Long wire antenna (Beverage Traveling Wave), 40 m, 6 timber columns, 4 herrings with anchoring wire (higher antenna consisting of beam antennas with 40 m raised at a radio station to a height of 5-6 m, with gradually declining the opposite end to correspondent-for increased range and from shelters)
  - Kulikov antenna, 4 flagpole antenna-parts for 2.7-m-rod antenna, 1 counterpoise
- Power Source: 2 Sets of 2NKN24 Rechargeable batteries (2NKN-24 or 2KN-32)

In a similar fashion to U.S. allocations in the 50's and early 60's, the VHF frequency spectrum was sectioned-off for different types of combat units having their own frequency range; the R-108d being operated by artillery units on 28-36.5 MHz and the R-109d by anti-aircraft artillery on 21.5-28.5 MHz.

R-105m/108m/109m Family of Man-Pack Transceivers

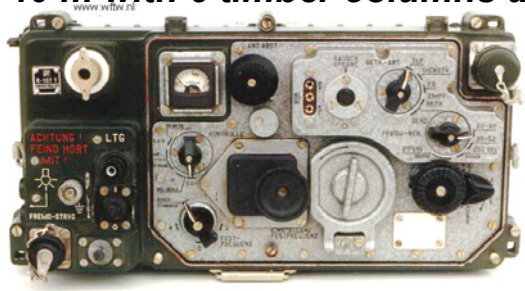
(www.armyradio.com and www.greenradio.de)

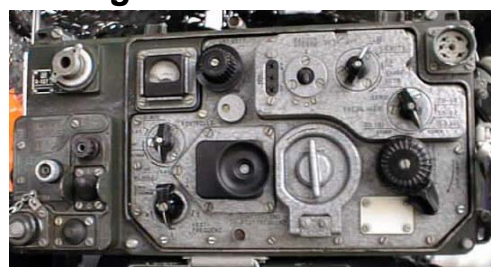
- Most Common Russian Radios Found Around the World
- Developed in the 1960s
- Used in Large Quantities in Warsaw Pack Countries primarily by Infantry for Company to Battalion Communication
- Replaced the R-105d/108d/109d Family of Transceivers with Similar Technical Specifications
- Frequency Range:
  - R-105m: 36 - 46.1MHz
  - R-108m: 28 - 38.5MHz (artillery units)
  - R-109m: 21.5 - 28.5MHz (anti-aircraft artillery)
- Transmitter Output Power: Approx. 1 Watt
- Modulation: F3 (FM) Simplex
- Can Be Operated Remotely and Used as Radio Relay Operation
- Sensitivity: 2 µV for 20 dB Quieting
- Power Source: Two sets of 2NKN24 2.4 NiCad batteries
- Replaced by R-107 Series
- Antennas:
  - Short "Kulikov" Antenna (constructed of a series of aluminum beads strung on a steel cable, a stiff spring on the end keeps pressure against these beads and a semi rigid but flexible antenna results. Releasing this spring tension collapses the antenna allowing it to be rolled up for easy storage and the radio will receive with the antenna collapsed)
  - Long Wire Antenna (Beverage), 40 m, 6 timber columns, 4 herrings with anchoring wire
- The M-series is built in two variants:
  - Meter in Center
  - Meter in the Upper Left Corner
- Size and Weight
  - Radio: 0.31 x 0.17 x 0.325 m; 14 kg
  - Wooden Box: 0.62 x 0.35 x 0.42 m; 40 kg

The R-105m/108m/109m family of man-pack transceivers has been referred to by many as a slightly updated copy of captured WW-II German sets and many of it's characteristics, and accessories will show this lineage.

Russian VHF FM Man-Pack Transceiver R-107 Family

- Replaced R-105m/108m/109m Family of Man-Pack Transceivers (Transmitter/Receiver)
  - Thus Covers Frequency Range of These Three Models
  - Frequency Range: 20-52 MHz in Two Bands:
    - Range 1: 20... 36 MHz
    - Range 2: 36... 52 MHz
  - both continuous tune and pre-set capability, with up to four pre-set frequencies
- Usage: Portable or Mobile Backpack
  - Designed for communications up to company level
  - can be operated by remote control by using standard field telephones
  - Can be operated as a radio relay station , co-operates with R-111, R-113, R-114d, R-105d to R-109d and R-105m to R-109m
- RF Output: 1 Watt
- Sensitivity: 1.5 µV for 20 dB Quieting
- Modulation: F3 (FM), simplex
- Channel Spacing: 25kHz (1,231 Channels)
- Range: 6 km (3.75 miles) with Whip Antenna, 6-8 km (3.75 - 5 miles) with Combined Rod and 12 - 25 km (9.4 to 15.6 miles) with Traveling Wave (Beverage) Antenna
- Power: Two Rechargeable KNP-20 (HKN-20) 2.4V NiCad batteries
- Size and Weights:
  - Radio: 0.375 x 0.185 x 0.27 m; 16.9 kg.
  - Wooden Box: 0.615 x 0.34 x 0.46 m; 45 kg
- Antennas:
  - Kulikow Antenna
  - 2.7-m rod Antenna (6 parts)
  - Long Wire Antenna (Beverage): 40 m with 6 timber columns and Anchoring Wire





Later versions of the R-107 family were fully transistorized (t) with digital frequency readout.

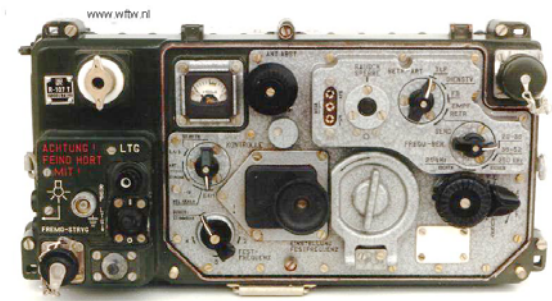
Russian VHF FM Transceiver R-107m (wftw.nl and www.greenradio.de)

- *Nothing in Common with Former R-107 Sets*
- *Fully Transistorized: Solid-State Circuitry with Unique Digital Display*
- *Usage: Backpack, Used by Civil Defense and Special Forces*
- *Frequency Range: 20 - 52 MHz*
- *Modulation: F3 (FM), simplex and MCW (Modulated Morse Code)*
- *Transmitter Output Power: 1 and 5 Watt*
- *Powered by 3 sets of 2.4V NiCad batteries 2KNP20 or 12-Volt*
  Fully Automatic Antenna Tuning
- *Frequency Display*
  - *–Unique Digital Readout Using Small Bulbs*
  - *–Round Window Fitted on Right-Hand Side of Front Panel*
  - *–Digital Frequency Readout of kHz Digits*
  - *–Mechanical Selection of MHz Digits*

The Russian VHF FM Transceiver R-107m was fully transistorized.

Russian VHF FM Transceiver R-107t (wftw.nl and www.greenradio.de)

- Resembles and Uses Basic Structure of R-107-Series
  - Uses Transistors / IC's
  - Mechanical Tuning Replaced by Digital LED -Type Operating Frequency Display
- Usage: Back-Pack, Portable and Mobile
- Can Be Operated Remote Control or Used as Relay Operation
- Frequency range 20-52MHz in two ranges
  - Range 1: 20 to 36 MHz
  - Range 2: 36 to 52 MHz
- Transmitter Output Power: 1 Watt
- Modulation: F3 (FM) Simplex
- Channel spacing: 25kHz
- Powered by two sets of 2.4V NiCad batteries (HKN-20)
- Co-operates with R-111, R-113, R-114d, R-105 D to R-109 D and R-105 to R-109m.
- Size and Weight
  - Radio: 0.375 x 0.185 x 0.27 m; 17 kg
  - Wooden Box: 0.615 x 0.34 x 0.46 m; 45 kg
- Sensitivity: 1.5 µV for 20 dB Quieting
- Antennas:
  - Kulikow Antenna
  - 2.7-m Rod Antenna
  - Long Wire Antenna (Beverage), 40 m



The R-107t is operationally and functionally similar to the other sets in the R-107 family.

Russian WW-II VHF FM Transceivers (Transmitter/Receiver)

Radio	R-105d	R-105e	R-105m	R-107	R-107m	R-107t	R-108d	R-108m	R-109d	R-109m
Use			Infantry, Artillery				Infantry, Artillery	Artillery		Air Defense
Year	1946-1950	1957	1964-84	1965			1948	1964-84	1959-66	1964-84
Frequency (MHz)	36.0-46.1	36.0-46.1	36.0-46.5	20-52 in two Bands	20-52 in two Bands	20-52 in two Bands	28.0-36.5	28-36.5	21.5-28.5	21.5-28.5
TX Power (Watts)	1.2 Watt	not less than 1 Watt	1.2 Watts	1 Watt	1 Watt	1 Watt	1.2 Watt	1.2 Watts	1.2 Watt	1.2 Watts
Sensitivity	1.5 µV for 10 dB Quieting	1.2 µV for 10 dB Quieting	2 µV for 10 dB Quieting	1 µV for 20 dB Quieting	1 µV for 20 dB Quieting	1.5 µV for 20 dB Quieting	1.2 µV for 10 dB Quieting	2 µV for 10 dB Quieting	1.2 µV for 10 dB Quieting	2 µV for 10 dB Quieting
Peak Deviation	±8 kHz	±7 kHz		±76 kHz	±6 kHz	±6 kHz	±6 kHz		±5 kHz	
RX Bandwidth	±15 kHz						±15 kHz		±12 kHz	
Channel Step		50 kHz		25 kHz	25 kHz	25 kHz				
Operate	12 hrs @TX 20%			12 hrs @TX 5%	12 hrs @TX 5%	12 hrs @TX 5%				
Antenna				1. Std Kulikow 2. 2.7m Rod 3. Traveling Wave (Beverage 40m doublet)	1. Std Kulikow 2. 2.7m Rod 3. Traveling Wave (Beverage 40m doublet)	1. Std Kulikow 2. 2.7m Rod 3. Traveling Wave (Beverage 40m doublet)				
Current Consumption	TX: 3-A RX: 1.6-A						TX: 3-A RX: 1.6-A		TX: 3-A RX: 1.6-A	
Size			Radio: 0.31 X 1.7 X 0.325 m Box: 0.62 X 0.35 X 0.42 m	Radio: 0.375 X 1.85 X 0.27 m Box: 0.615 X 0.34 X 0.46 m	Radio: 0.375 X 1.85 X 0.27 m	Radio: 0.375 X 1.85 X 0.27 m		Radio: 0.31 X 1.7 X 0.325 m Box: 0.62 X 0.35 X 0.42 m		Radio: 0.31 X 1.7 X 0.325 m Box: 0.62 X 0.35 X 0.42 m
Weight	21 kg		Radio: 14 kg (31 lbs) Box: 40 kg (88 lbs)	17 kg (37 lbs)	17 kg (37 lbs)	17 kg (37 lbs)		Radio: 14 kg (31 lbs) Box: 40 kg (88 lbs)		Radio: 14 kg (31 lbs) Box: 40 kg (88 lbs)
Range				3.75 mi with Whip, 4-5 mi Combined Rod, 10-15 mi Traveling Wave	3.75 mi with Whip, 4-5 mi Combined Rod, 10-15 mi Traveling Wave	3.75 mi with Whip, 4-5 mi Combined Rod, 10-15 mi Traveling Wave				

Early Russian radios for vehicles operated in the VHF (Very High Frequency) FM (Frequency Modulation) band, and are very similar to German Torn.Eb units.