

BUILD YOUR OWN CAR PC

BUILD YOUR OWN CAR PC IS AN INCREASINGLY POPULAR PROJECT AMONG AUTOMOTIVE ENTHUSIASTS AND TECH-SAVVY INDIVIDUALS LOOKING TO ENHANCE THEIR DRIVING EXPERIENCE WITH CUSTOM MULTIMEDIA, NAVIGATION, AND DIAGNOSTIC CAPABILITIES. CRAFTING A PERSONALIZED CAR COMPUTER ALLOWS USERS TO TAILOR FEATURES SUCH AS AUDIO PLAYBACK, GPS NAVIGATION, VEHICLE DIAGNOSTICS, AND INTERNET CONNECTIVITY TO THEIR SPECIFIC NEEDS. THIS ARTICLE EXPLORES THE ESSENTIAL COMPONENTS, PLANNING CONSIDERATIONS, INSTALLATION STEPS, AND SOFTWARE OPTIONS INVOLVED IN BUILDING YOUR OWN CAR PC. UNDERSTANDING THE HARDWARE REQUIREMENTS, POWER SUPPLY CHALLENGES, AND INTEGRATION WITH VEHICLE SYSTEMS IS CRUCIAL TO CREATING A RELIABLE AND EFFICIENT AUTOMOTIVE COMPUTER. ADDITIONALLY, WE WILL COVER TROUBLESHOOTING TIPS AND MAINTENANCE ADVICE TO ENSURE LONG-TERM PERFORMANCE. WHETHER UPGRADING AN OLD VEHICLE OR ADDING SMART CAPABILITIES TO A NEW ONE, THIS GUIDE PROVIDES A COMPREHENSIVE OVERVIEW OF HOW TO BUILD YOUR OWN CAR PC SUCCESSFULLY. THE FOLLOWING SECTIONS WILL BREAK DOWN THE PROCESS INTO MANAGEABLE PARTS, MAKING IT EASIER TO FOLLOW AND IMPLEMENT.

- PLANNING AND REQUIREMENTS FOR YOUR CAR PC
- CHOOSING THE RIGHT HARDWARE COMPONENTS
- SOFTWARE AND OPERATING SYSTEMS FOR CAR PCs
- INSTALLATION AND INTEGRATION IN YOUR VEHICLE
- POWER MANAGEMENT AND CONNECTIVITY
- MAINTENANCE, TROUBLESHOOTING, AND UPGRADES

PLANNING AND REQUIREMENTS FOR YOUR CAR PC

BEFORE STARTING TO BUILD YOUR OWN CAR PC, IT IS ESSENTIAL TO OUTLINE CLEAR GOALS AND REQUIREMENTS FOR THE SYSTEM. DEFINING WHAT FUNCTIONS YOU WANT—SUCH AS MEDIA PLAYBACK, NAVIGATION, HANDS-FREE CALLING, OR VEHICLE DIAGNOSTICS—WILL DETERMINE THE HARDWARE AND SOFTWARE NEEDED. ADDITIONALLY, CONSIDER THE ENVIRONMENTAL FACTORS SUCH AS TEMPERATURE VARIATIONS, VIBRATIONS, AND POWER SUPPLY FLUCTUATIONS COMMON IN VEHICLES.

DEFINING YOUR CAR PC'S PURPOSE

DETERMINING THE CORE PURPOSE OF THE CAR PC HELPS IN SELECTING THE RIGHT FEATURES AND COMPONENTS. TYPICAL USES INCLUDE MULTIMEDIA ENTERTAINMENT, GPS NAVIGATION, OBD-II VEHICLE DIAGNOSTICS, INTERNET CONNECTIVITY, AND INTEGRATION WITH SMARTPHONE APPS. PRIORITIZING THESE FUNCTIONALITIES ASSISTS IN DESIGNING A SYSTEM THAT BALANCES PERFORMANCE, COST, AND COMPLEXITY.

ASSESSING COMPATIBILITY AND VEHICLE CONSTRAINTS

EACH VEHICLE PRESENTS UNIQUE CHALLENGES REGARDING SPACE, POWER SUPPLY, AND SYSTEM INTEGRATION. MEASURING AVAILABLE INSTALLATION SPACE, UNDERSTANDING THE VEHICLE'S ELECTRICAL SYSTEM, AND PLANNING FOR USER INTERFACE PLACEMENT ARE CRUCIAL EARLY STEPS. COMPATIBILITY WITH EXISTING CAR AUDIO SYSTEMS OR DASHBOARDS SHOULD BE EVALUATED TO ENSURE SEAMLESS INTEGRATION.

CHOOSING THE RIGHT HARDWARE COMPONENTS

SELECTING APPROPRIATE HARDWARE IS CRITICAL TO BUILDING A STABLE AND EFFICIENT CAR PC. COMPONENTS MUST BE DURABLE, ENERGY-EFFICIENT, AND COMPATIBLE WITH AUTOMOTIVE ENVIRONMENTS. THE MAIN HARDWARE ELEMENTS INCLUDE THE COMPUTER MOTHERBOARD OR SINGLE-BOARD COMPUTER, DISPLAY SCREEN, INPUT DEVICES, POWER SUPPLY UNITS, AND STORAGE.

COMPUTER AND PROCESSING UNIT

THE HEART OF ANY CAR PC IS ITS PROCESSING UNIT. POPULAR CHOICES INCLUDE MINI-ITX MOTHERBOARDS, EMBEDDED PC UNITS, OR SINGLE-BOARD COMPUTERS SUCH AS THE RASPBERRY PI. FACTORS LIKE PROCESSING POWER, SIZE, HEAT DISSIPATION, AND AUTOMOTIVE-GRADE CERTIFICATIONS INFLUENCE THE CHOICE.

DISPLAY AND USER INTERFACE

CHOOSING THE RIGHT DISPLAY INVOLVES BALANCING SCREEN SIZE, RESOLUTION, AND TOUCH CAPABILITIES. CAPACITIVE TOUCHSCREENS ARE PREFERRED FOR THEIR RESPONSIVENESS AND EASE OF USE. PLACEMENT WITHIN THE DASHBOARD SHOULD ENSURE VISIBILITY WITHOUT DISTRACTING THE DRIVER.

INPUT DEVICES AND CONTROLS

INPUT METHODS VARY FROM TOUCHSCREEN INTERFACES TO PHYSICAL BUTTONS, STEERING WHEEL CONTROLS, OR VOICE COMMANDS. SELECTING USER-FRIENDLY AND SAFE INPUT DEVICES ENHANCES DRIVER INTERACTION WITH THE CAR PC WHILE MINIMIZING DISTRACTIONS.

STORAGE SOLUTIONS

SOLID STATE DRIVES (SSDs) OR HIGH-ENDURANCE SD CARDS ARE RECOMMENDED DUE TO THEIR DURABILITY AND RESISTANCE TO SHOCKS AND VIBRATIONS. ADEQUATE STORAGE CAPACITY DEPENDS ON THE INTENDED USE, SUCH AS STORING MAPS, MUSIC FILES, OR SYSTEM SOFTWARE.

POWER SUPPLY AND VOLTAGE REGULATION

AUTOMOTIVE POWER SUPPLIES ARE SUBJECT TO VOLTAGE FLUCTUATIONS AND ELECTRICAL NOISE. A ROBUST DC-DC CONVERTER OR POWER SUPPLY UNIT (PSU) WITH VOLTAGE REGULATION AND SURGE PROTECTION IS NECESSARY TO ENSURE STABLE OPERATION. COMPONENTS SHOULD BE RATED FOR AUTOMOTIVE VOLTAGE RANGES (USUALLY 12V TO 24V SYSTEMS).

SOFTWARE AND OPERATING SYSTEMS FOR CAR PCs

THE CHOICE OF SOFTWARE IS PARAMOUNT FOR USABILITY AND FUNCTIONALITY. OPERATING SYSTEMS OPTIMIZED FOR EMBEDDED OR AUTOMOTIVE ENVIRONMENTS PROVIDE STABILITY AND COMPATIBILITY WITH CAR-SPECIFIC APPLICATIONS. THE SOFTWARE STACK INCLUDES THE OS, MEDIA PLAYERS, NAVIGATION APPS, AND DIAGNOSTIC TOOLS.

OPERATING SYSTEM OPTIONS

LINUX-BASED DISTRIBUTIONS SUCH AS UBUNTU, SPECIALIZED AUTOMOTIVE LINUX VARIANTS, OR LIGHTWEIGHT WINDOWS VERSIONS ARE COMMONLY USED. OPEN-SOURCE PLATFORMS OFFER CUSTOMIZATION FLEXIBILITY, WHILE COMMERCIAL OPTIONS MAY PROVIDE BETTER SUPPORT AND STABILITY.

NAVIGATION AND MULTIMEDIA SOFTWARE

NAVIGATION PROGRAMS LIKE OPENSTREETMAP-BASED APPLICATIONS, GOOGLE MAPS ALTERNATIVES, OR DEDICATED GPS SOFTWARE CAN BE INSTALLED DEPENDING ON THE OS. MULTIMEDIA PLAYERS SUPPORTING VARIOUS AUDIO AND VIDEO FORMATS ENHANCE THE ENTERTAINMENT EXPERIENCE.

DIAGNOSTIC AND VEHICLE INTERFACE SOFTWARE

SOFTWARE CAPABLE OF INTERFACING WITH THE VEHICLE'S OBD-II PORT ALLOWS REAL-TIME MONITORING OF ENGINE PARAMETERS, FAULT CODES, AND FUEL EFFICIENCY. POPULAR AUTOMOTIVE DIAGNOSTIC APPLICATIONS SUPPORT DATA LOGGING AND ALERTS FOR MAINTENANCE NEEDS.

INSTALLATION AND INTEGRATION IN YOUR VEHICLE

PROPER INSTALLATION IS CRITICAL FOR SAFETY, FUNCTIONALITY, AND AESTHETICS. THE CAR PC MUST BE SECURELY MOUNTED, WIRED CORRECTLY, AND INTEGRATED WITH EXISTING VEHICLE SYSTEMS WITHOUT INTERFERING WITH ESSENTIAL CONTROLS OR SAFETY FEATURES.

MOUNTING THE CAR PC COMPONENTS

SECURE MOUNTING REDUCES VIBRATION DAMAGE AND ENSURES SYSTEM STABILITY. COMPONENTS ARE TYPICALLY HOUSED IN ENCLOSURES DESIGNED FOR AUTOMOTIVE USE AND MOUNTED IN GLOVE BOXES, UNDER SEATS, OR WITHIN THE DASHBOARD.

WIRING AND CONNECTIVITY

WIRING SHOULD BE NEAT AND FOLLOW AUTOMOTIVE WIRING STANDARDS TO PREVENT ELECTRICAL INTERFERENCE OR HAZARDS. CONNECTIONS TO THE VEHICLE'S POWER SYSTEM, SPEAKERS, ANTENNAS, AND OBD-II PORT REQUIRE APPROPRIATE CABLES AND CONNECTORS.

INTEGRATING WITH VEHICLE SYSTEMS

INTEGRATION WITH FACTORY AUDIO, STEERING WHEEL CONTROLS, OR CAN BUS SYSTEMS ENHANCES USABILITY. THIS MAY REQUIRE ADDITIONAL INTERFACE MODULES OR ADAPTERS COMPATIBLE WITH THE VEHICLE'S COMMUNICATION PROTOCOLS.

POWER MANAGEMENT AND CONNECTIVITY

RELIABLE POWER MANAGEMENT ENSURES THE CAR PC OPERATES EFFICIENTLY WITHOUT DRAINING THE VEHICLE'S BATTERY OR CAUSING ELECTRICAL ISSUES. CONNECTIVITY OPTIONS EXPAND FUNCTIONALITY THROUGH INTERNET ACCESS AND PERIPHERAL INTEGRATION.

POWER REGULATION AND BATTERY PROTECTION

IMPLEMENTING VOLTAGE REGULATORS, FUSES, AND POWER MANAGEMENT CIRCUITS PROTECTS THE CAR PC FROM VOLTAGE SPIKES AND PREVENTS BATTERY DRAIN DURING ENGINE OFF STATES. AUTOMATIC SHUTDOWN FEATURES CAN SAFEGUARD AGAINST POWER LOSS.

NETWORKING AND INTERNET ACCESS

CONNECTIVITY OPTIONS INCLUDE WI-FI HOTSPOTS, CELLULAR DATA MODEMS, OR BLUETOOTH FOR SMARTPHONE TETHERING. RELIABLE NETWORK ACCESS SUPPORTS NAVIGATION UPDATES, STREAMING SERVICES, AND REAL-TIME TRAFFIC INFORMATION.

PERIPHERAL AND ACCESSORY CONNECTIONS

USB PORTS, AUDIO JACKS, AND BLUETOOTH ENABLE CONNECTION TO EXTERNAL DEVICES SUCH AS SMARTPHONES, EXTERNAL STORAGE, MICROPHONES, AND CAMERAS. EXPANSION CAPABILITIES ALLOW FUTURE UPGRADES AND ENHANCED FUNCTIONALITY.

MAINTENANCE, TROUBLESHOOTING, AND UPGRADES

ONGOING MAINTENANCE ENSURES THE CAR PC REMAINS FUNCTIONAL AND UP-TO-DATE. REGULAR SOFTWARE UPDATES, HARDWARE CHECKS, AND TROUBLESHOOTING ARE NECESSARY TO ADDRESS ISSUES AND IMPROVE PERFORMANCE. PLANNING FOR FUTURE UPGRADES CAN EXTEND THE SYSTEM'S LIFESPAN.

ROUTINE MAINTENANCE TASKS

MAINTENANCE INCLUDES CLEANING DUST FROM COMPONENTS, CHECKING POWER CONNECTIONS, AND UPDATING SOFTWARE TO PATCH VULNERABILITIES OR ADD FEATURES. MONITORING SYSTEM PERFORMANCE HELPS DETECT EARLY SIGNS OF HARDWARE FAILURE.

COMMON TROUBLESHOOTING TECHNIQUES

DIAGNOSING ISSUES SUCH AS BOOT FAILURES, CONNECTIVITY PROBLEMS, OR DISPLAY GLITCHES INVOLVES SYSTEMATIC CHECKS OF HARDWARE CONNECTIONS, POWER SUPPLY, AND SOFTWARE LOGS. RESETTING OR REINSTALLING SOFTWARE MAY RESOLVE PERSISTENT ERRORS.

UPGRADING HARDWARE AND SOFTWARE

UPGRADES MAY INVOLVE INCREASING STORAGE, IMPROVING PROCESSING POWER, ADDING NEW INPUT METHODS, OR INSTALLING ENHANCED SOFTWARE VERSIONS. MODULAR DESIGN AND USE OF STANDARD COMPONENTS FACILITATE EASIER UPGRADES WITHOUT COMPLETE SYSTEM REPLACEMENT.

- PLAN YOUR CAR PC'S PURPOSE AND ASSESS VEHICLE CONSTRAINTS CAREFULLY.
- SELECT DURABLE, AUTOMOTIVE-GRADE HARDWARE OPTIMIZED FOR POWER EFFICIENCY.
- CHOOSE AN OPERATING SYSTEM AND SOFTWARE THAT SUPPORT YOUR SPECIFIC NEEDS.
- INSTALL COMPONENTS SECURELY WITH PROPER WIRING AND SYSTEM INTEGRATION.
- MANAGE POWER SUPPLY CAREFULLY TO AVOID ELECTRICAL ISSUES.
- MAINTAIN AND TROUBLESHOOT REGULARLY TO ENSURE LONG-TERM RELIABILITY.

FREQUENTLY ASKED QUESTIONS

WHAT ARE THE ESSENTIAL COMPONENTS NEEDED TO BUILD YOUR OWN CAR PC?

TO BUILD YOUR OWN CAR PC, YOU'LL NEED A COMPACT COMPUTER OR MINI PC, A POWER SUPPLY COMPATIBLE WITH YOUR CAR'S ELECTRICAL SYSTEM, A TOUCHSCREEN DISPLAY, INPUT DEVICES LIKE A KEYBOARD OR TOUCHSCREEN CONTROLS, AUDIO OUTPUT HARDWARE, AND APPROPRIATE MOUNTING HARDWARE TO SECURELY INSTALL THE SYSTEM IN YOUR CAR.

HOW DO YOU POWER A CAR PC SAFELY FROM A VEHICLE'S ELECTRICAL SYSTEM?

YOU CAN POWER A CAR PC SAFELY BY USING A DC-DC POWER CONVERTER OR AN AUTOMOTIVE POWER SUPPLY DESIGNED TO CONVERT THE CAR'S 12V POWER TO THE REQUIRED VOLTAGE AND CURRENT FOR THE PC. IT'S IMPORTANT TO INCLUDE PROPER FUSES AND VOLTAGE REGULATORS TO PROTECT AGAINST VOLTAGE SPIKES AND ENSURE STABLE POWER DELIVERY.

WHAT OPERATING SYSTEMS ARE BEST SUITED FOR A CAR PC?

POPULAR OPERATING SYSTEMS FOR CAR PCs INCLUDE WINDOWS (FOR COMPATIBILITY WITH MANY APPLICATIONS), LINUX (FOR CUSTOMIZATION AND LIGHTWEIGHT SETUPS), AND ANDROID (FOR TOUCHSCREEN-FRIENDLY INTERFACES AND APP AVAILABILITY). THE CHOICE DEPENDS ON YOUR TECHNICAL SKILLS AND THE INTENDED USE OF THE CAR PC.

HOW CAN YOU INTEGRATE NAVIGATION AND MULTIMEDIA FUNCTIONS IN A CUSTOM CAR PC?

YOU CAN INTEGRATE NAVIGATION BY INSTALLING GPS HARDWARE AND USING SOFTWARE LIKE GOOGLE MAPS, OPENSTREETMAP-BASED APPS, OR SPECIALIZED CAR NAVIGATION SOFTWARE. FOR MULTIMEDIA, INSTALL MEDIA PLAYERS THAT SUPPORT VARIOUS FORMATS, CONNECT TO YOUR CAR'S AUDIO SYSTEM, AND USE INTERFACES OPTIMIZED FOR IN-CAR USE TO CONTROL MUSIC, VIDEO, AND RADIO PLAYBACK.

WHAT ARE COMMON CHALLENGES FACED WHEN BUILDING A CAR PC AND HOW CAN THEY BE ADDRESSED?

COMMON CHALLENGES INCLUDE POWER SUPPLY STABILITY, HEAT MANAGEMENT, VIBRATION RESISTANCE, AND USER INTERFACE USABILITY. THESE CAN BE ADDRESSED BY USING AUTOMOTIVE-GRADE POWER SUPPLIES, INSTALLING COOLING SOLUTIONS, MOUNTING THE PC SECURELY WITH VIBRATION DAMPENERS, AND DESIGNING OR SELECTING TOUCH-FRIENDLY INTERFACES OPTIMIZED FOR DRIVING SAFETY.

IS IT POSSIBLE TO ADD VOICE CONTROL TO A DIY CAR PC?

YES, ADDING VOICE CONTROL IS POSSIBLE BY INTEGRATING A MICROPHONE AND USING VOICE RECOGNITION SOFTWARE OR VIRTUAL ASSISTANTS LIKE GOOGLE ASSISTANT, AMAZON ALEXA, OR OPEN-SOURCE ALTERNATIVES. THIS ENHANCES SAFETY BY ALLOWING HANDS-FREE OPERATION OF NAVIGATION, MUSIC, CALLS, AND OTHER FUNCTIONS.

ADDITIONAL RESOURCES

1. *BUILD YOUR OWN CAR PC: A STEP-BY-STEP GUIDE*

THIS BOOK PROVIDES A COMPREHENSIVE OVERVIEW FOR ENTHUSIASTS LOOKING TO INTEGRATE A CUSTOM PC INTO THEIR VEHICLE. IT COVERS EVERYTHING FROM SELECTING HARDWARE COMPONENTS TO SOFTWARE INSTALLATION AND TROUBLESHOOTING. WITH CLEAR INSTRUCTIONS AND PRACTICAL TIPS, READERS CAN BUILD A RELIABLE AND EFFICIENT CAR COMPUTER TAILORED TO THEIR NEEDS.

2. *THE ULTIMATE CAR PC HANDBOOK*

FOCUSED ON CREATING A VERSATILE IN-CAR COMPUTING SYSTEM, THIS HANDBOOK EXPLORES VARIOUS CONFIGURATIONS AND USE CASES. IT INCLUDES DETAILED ADVICE ON POWER MANAGEMENT, INTERFACING WITH CAR ELECTRONICS, AND MULTIMEDIA

OPTIONS. THE AUTHOR ALSO DISCUSSES COMMON PITFALLS AND HOW TO AVOID THEM DURING THE BUILD PROCESS.

3. DIY CAR PC PROJECTS FOR BEGINNERS

PERFECT FOR NEWCOMERS, THIS BOOK BREAKS DOWN THE PROCESS OF BUILDING A CAR PC INTO MANAGEABLE PROJECTS. IT INTRODUCES BASIC CONCEPTS AND TOOLS, GUIDING READERS THROUGH ASSEMBLING HARDWARE AND INSTALLING USER-FRIENDLY SOFTWARE. THE PROJECTS EMPHASIZE AFFORDABILITY AND FUNCTIONALITY, MAKING CAR PCs ACCESSIBLE TO ALL SKILL LEVELS.

4. ADVANCED CAR PC INTEGRATION TECHNIQUES

AIMED AT EXPERIENCED BUILDERS, THIS TITLE DIVES INTO SOPHISTICATED METHODS FOR INTEGRATING PCs WITH VEHICLE SYSTEMS. TOPICS INCLUDE CAN BUS COMMUNICATION, CUSTOM SENSOR INTERFACING, AND ADVANCED AUDIO/VIDEO SETUPS. READERS WILL FIND IN-DEPTH EXPLANATIONS AND CODE SAMPLES TO ENHANCE THEIR CAR PC'S CAPABILITIES.

5. CAR PC SOFTWARE DEVELOPMENT ESSENTIALS

THIS BOOK IS DEDICATED TO THE PROGRAMMING SIDE OF CAR PCs, COVERING SOFTWARE CUSTOMIZATION AND DEVELOPMENT. IT INTRODUCES FRAMEWORKS AND TOOLS FOR CREATING CUSTOM INTERFACES, NAVIGATION APPS, AND VEHICLE DIAGNOSTICS SOFTWARE. DEVELOPERS WILL BENEFIT FROM PRACTICAL EXAMPLES AND BEST PRACTICES TAILORED TO AUTOMOTIVE ENVIRONMENTS.

6. POWERING YOUR CAR PC: ELECTRICAL SYSTEMS AND SOLUTIONS

UNDERSTANDING THE VEHICLE'S ELECTRICAL SYSTEM IS CRUCIAL FOR A STABLE CAR PC. THIS TITLE FOCUSES ON POWER SUPPLY DESIGN, BATTERY MANAGEMENT, AND SURGE PROTECTION TO ENSURE SAFE AND EFFICIENT OPERATION. IT ALSO REVIEWS COMMON ELECTRICAL CHALLENGES AND HOW TO OVERCOME THEM WHEN INSTALLING A CAR PC.

7. MULTIMEDIA AND ENTERTAINMENT SYSTEMS FOR CAR PCs

EXPLORE HOW TO TRANSFORM YOUR CAR PC INTO A FULL-FLEDGED ENTERTAINMENT CENTER WITH THIS GUIDE. IT COVERS AUDIO AND VIDEO HARDWARE SELECTION, STREAMING SERVICES, AND USER INTERFACE DESIGN. THE AUTHOR PROVIDES TIPS ON OPTIMIZING PERFORMANCE AND COMPATIBILITY WITH VARIOUS MEDIA FORMATS.

8. NETWORKING AND CONNECTIVITY FOR IN-CAR PCs

THIS BOOK ADDRESSES THE IMPORTANCE OF WIRELESS AND WIRED NETWORKING FOR CAR PCs. TOPICS INCLUDE SETTING UP WI-FI, BLUETOOTH, AND MOBILE DATA CONNECTIONS TO ENABLE INTERNET ACCESS AND DEVICE INTEGRATION. READERS WILL LEARN HOW TO CREATE SEAMLESS CONNECTIVITY SOLUTIONS FOR ENHANCED FUNCTIONALITY.

9. CUSTOM ENCLOSURES AND MOUNTING SOLUTIONS FOR CAR PCs

A WELL-DESIGNED ENCLOSURE PROTECTS THE CAR PC AND ENSURES USABILITY. THIS GUIDE PRESENTS MATERIALS, DESIGN PRINCIPLES, AND FABRICATION TECHNIQUES FOR CREATING CUSTOM MOUNTS AND CASES. IT ALSO DISCUSSES THERMAL MANAGEMENT AND VIBRATION RESISTANCE TO MAINTAIN SYSTEM STABILITY ON THE ROAD.

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